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The genomic landscape of somatic viral integration in cancer

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THE GENOMIC LANDSCAPE OF SOMATIC VIRAL INTEGRATION IN CANCER

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https://docs.google.com/document/d/1BJdbKJXKbTLNWyyfcqUNuhhKd-QbXMG7h7L2vDgrxD0/edit?usp=sharing

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A todos los que me habéis acompañado en este camino

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ABSTRACT

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ABSTRACT

Viruses cause 10-15% of human cancers worldwide and, among the seven oncogenic viruses, only HTLV-1 has the integration of its nucleic acid in the human genome as a mandatory stage of its cycle. However, partial or full-length segments of other oncogenic viruses' nucleic acid may become integrated into the human genome. This process can induce tumours, a mechanism called insertional mutagenesis.

One of them is the Hepatitis B virus (HBV) which can cause hepatocellular carcinoma (HCC). Its infection affects more than 240M people and is the second most frequent cause of cancer after tobacco. Here, the landscape of HBV DNA somatic integrations on Illumina paired-end whole-genome sequencing data from 296 HCC tumours from the Pan-Cancer Analysis of Whole Genomes (PCAWG) project was explored. This analysis revealed that a majority of events follow an unexpected, non-canonical pattern. Intriguingly, many non-canonical HBV insertions occur in association with megabase-size deletions that remove telomeric regions of chromosomes, an aberrant mechanism recurrent in these data.

Furthermore, we found that HBV somatic insertions in HCC are typically clonal events acquired early in tumour evolution. Real-time timing was performed on 37 HBV insertions and revealed that some appeared many years before diagnosis. Remarkably, a cryptic HBV-mediated rearrangement in chromosome 10, coupled with a telomeric deletion, occurred at least 21 years before the HCC diagnosis.

HBV-mediated telomeric deletions cause the loss of tumour suppressor genes (TSG), such as *TP53* or *ARID1A*. Indeed, the analysis of the 23 HCC samples with telomeric deletions showed that they result in the loss of 244 TSG, 37 involved in HCC. Overall, these data raise the question about the potential benefit of an earlier antiviral therapy in HBV-infected patients, to prevent the acquisition of early driver mutations caused by the virus in the initial stages of cancer development.

Hence, it reveals crucial to have algorithms for quick and accurate detection of viral integrations. However, available tools are highly computational demanding or restricted to certain viruses, and can not analyse long-read sequencing data. Here, VIRUNS (VIral-Reference UNions Search) was developed to overcome this lack. Its long- and short-read modes were benchmarked using in silico genomes harbouring viral integrations and the latter was compared with three short-read integration detection tools, where VIRUNS displayed the best balance between precision and recall.

VIRUNS was tested with sequencing data from cell lines and human samples. Special effort was done in the characterisation of Human Papillomavirus (HPV) integrations in the PCAWG dataset. This is one of the most common sexually transmitted infections worldwide, with ~291M women carrying it and with similar figures shown in men. Indeed, HPV is present in 90% of cervical cancers, the fourth most commonly diagnosed cancer among females. VIRUNS was able to characterise 34 somatic integrations in cervical and 53 head and neck squamous cell carcinoma samples, where 26 and 38 show a non-canonical pattern. Notably, in these cancer types, 79% and 75% of integrations are associated with local depth changes and some are related to the amplification of genes, such as PD-L1.

Another oncogenic virus, Kaposi's Sarcoma Herpesvirus (KSHV), has never been reported as an integrant and is related, among others, to primary effusion lymphoma (PEL). Two PEL cell lines were analysed by VIRUNS short-reads and 173 KSHV integrations were found, most of them showing the non-canonical pattern, likely related to rearrangements. For instance, an amplification demarcated by KSHV and spanning *SELPLG* and *CORO1C* genes was found.

Overall, this thesis aims to illuminate the role of viral integrations in human cancers, focusing on HBV, HPV and KSHV. It also presents a tool to facilitate further studies on discovering and analysing viral integrations using cutting-edge high-throughput sequencing technologies.

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INTRODUCTION

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INTRODUCTION

The human genome sequencing journey

The genome involves all genetic information of an organism. It is composed of nucleic acids that can have different shapes. Viruses, for instance, give us a wonderful variety of different genomes. As it will be detailed later on, some viruses can have an RNA genome, while others have DNA as their nucleic acid. Likewise, their genomes can be linear or circular. Focusing on the human genome, it is composed of nearly three billion bases of linear double strained DNA, organized in 22 autosomes and two sex chromosomes. Its length and its sequence diversity, make the discovery of its complete sequence a challenge for the scientific community. Nonetheless, the efforts since the last century have enabled incredible progress in this topic (Introductory Fig. 1).

Since the discovery of the DNA double helix structure in 1953 [1], the interest in revealing its nucleotide sequence increased. However, the first successes of sequencing were performed in proteins and RNA. Intriguingly, the first amino acids and nucleotide sequences were achieved based on a methodology that is still used at the moment, called de novo assembly. Basically, the results of sequencing experiments are sequence fragments (reads) that overlap each other. This overlap allows us to infer the order of some of these fragments and the reconstruction of the wanted sequence, in a similar way that a puzzle is made. Using this approach, the first completely sequenced genome was the one of the MS2 phage, conformed by RNA. A year later and more than two decades after the double helix milestone, another phage's genome was completely deciphered. This was possible because, as part of his wide research in the sequencing field, Sanger was able to sequence the whole DNA genome of the phage φX174 in 1977 [2]. However, this was not done with the well-known 'Sanger sequencing' [3], a technique developed by this scientist in the same year. It basically consists in adding radiolabelled dideoxynucleotides (ddNTPs) that lack the 3' hydroxyl group to the DNA amplification reaction, avoiding the joint of the following nucleotide. As ddNTPs are randomly added to the DNA chain, fragments of different lengths are formed. They can be sorted by length on a polyacrylamide gel to then infer the sequence by autoradiography. Even though this technology was widely used several decades later and improved, for instance, radioactive labels were replaced by fluorescent ones [4], it was still quite slow, expensive and tedious.

During the 80s, two main discoveries added speed and improved the performance of sequencing methods. First, 'shotgun sequencing' showed up [5], increasing the length of the reads. A few years later, in 1986, the Polymerase Chain Reaction (PCR) [6,7] changed the panorama of DNA sequencing among other molecular biology techniques [8], since it allows in vitro amplification of DNA fragments, appearing as a promising alternative to in vivo cloning methodologies and their moths or even years of preparation. "Sequences, sequences, and sequences" [9] appeared as a result of many brand-new sequencing projects motivated by these new and advantageous approaches. Simultaneously, several databases were added to the few existing ones in order to catalogue and make all collected sequences available to the scientific community [10]. One of the most important databases of our days was started by the European Molecular Biology Laboratory (EMBL), managing all nucleic acid sequences that have been generated [10]. A few years later, GenBank [11] and DDBJ (DNA Data Bank of Japan) [12] joined [13], establishing an international network for sharing sequencing data, still alive and widely used by scientists worldwide.

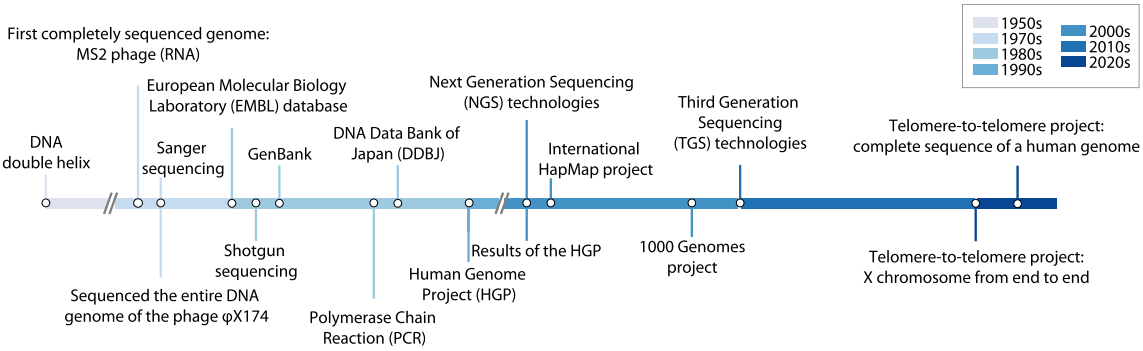
All these events set the perfect background for the development of one of the most important projects in the genomics field, the Human Genome Project (HGP). This public initiative started in 1990, was carried out simultaneously with a private company called Celera, and launched a draft and the complete sequence of the human genome in 2001 and 2003, respectively. It is important to take into account that the 99% of the euchromatic sequence containing gaps was revealed, remaining several parts of the genome unravelled, specially centromeres and telomeres [14]. Still, this achievement was a boost to the genomics field, since the efforts were translated not only into the achievement of the human genome sequence but also into more efficient, accessible and improved techniques and methodologies.

Of course, this was not the end. Actually, it was the beginning. The success and the multiple applications derived from the sequencing projects so far just increased the interest in this field giving birth to the so-called "Next Generation Sequencing" (NGS) technologies. Several methodologies appeared almost at once, each of them from a different company: emulsion PCR (emPCR) by Roche-454 Life Sciences, sequencing by oligonucleotide ligation and detection (SOLiD) and ion torrent (IonT) chip by Thermo Fisher Scientific-Life Technologies, and reversible-terminator (RT) by Illumina [15]. These approaches allow performing not only whole-genome sequencing (WGS) but also more narrow strategies such as whole-exome sequencing (WES) or targeted sequencing. Finally, Illumina dominated the market and their sequencing became applied worldwide. Even though the company developed different strategies, Illumina paired-end sequencing is the most used, consisting of pairs of reads of 100-150 base pairs (bp) in length belonging to both ends of a 500-600 bp DNA fragment [16].

This is again a key point from where many projects aiming to sequence genomes from all species expanded, leading to the increase in the amount of new – human and no human – genomes sequenced. This, combined with the fact that the human genome obtained by the HGP was a mix of genomes derived from different individuals, highlighted the variability among them. Thus, several projects arose to record, report and find out more about this variability. One of the most relevant is the International HapMap project, which provided a genome-wide database of single nucleotide polymorphisms (SNPs), trying to reflect the variety of the human population [17]. It was followed by the 1000 Genomes project in which a larger number of individuals was analysed. As WGS was used in the latter, it is not constricted to SNPs, including small insertions and deletions (indels) and structural variants (SVs) as part of the study [18]. Along with the start of the 2010's decade, the last revolution in genome sequencing so far took place: Third Generation Sequencing (TGS) technologies. Again, different approaches were proposed by different companies, such as true single-molecule sequencing (tSMS) by Helicos BioSciences or combinatorial probe-anchor ligation (cPAL) by BGI Group-Complete Genomics. However, two companies are now sharing the long-read sequencing market: Pacific Biosciences (PacBio) with their single-molecule real-time (SMRT) and Oxford Nanopore Technologies (ONT) with the nanopore sequencing [15].

Regarding DNA sequencing, the major advantages of TGS are the huge increase in read length – between 5-30 kilobases (kb) [19]–, the lack of the amplification step and the real-time sequencing process of single molecules [20]. Despite these technologies being rather recent, they are already being used in international projects, giving interesting results. For example, the telomere-to-telomere project, in which they were able to sequence the X

chromosome from end to end [21] and, very recently, the complete sequence of a human genome [22].



Introductory Figure 1. Timeline of genome sequencing milestones, with special focus on the human genome. Starting from the discovery of the DNA double helix structure, major achievements are shown. If there is no further specification, points represent the start of each event. The colour of the timeline indicates the different decades.

The human genome: three billion bases full of trash?

Thanks to the HGP and other studies, our knowledge of the human genome sequence increased significantly. Strikingly, only a very small part (1.5%) [23] of it corresponds to coding sequences, the ones that are translated into proteins. Thus, there is a huge part of the genome that was considered "junk DNA", due to the belief that it has no function. A big proportion of this miscalled junk DNA are repetitive sequences, that comprise 55% of the genome [24,25]. The Encyclopedia of DNA Elements (ENCODE) project [26] helped to elucidate the function of part of the non-coding genome, stating that the ~80% of the human genome has a role in a biochemical RNA and/or chromatin event and refusing the idea that a major proportion of the genome is just trash. Overall, the results of the ENCODE project paved the way for a wide change in the functional perspective of the different genomic components, making the term "junk DNA" old-fashioned.

Apart from the ENCODE project, one of the most important approaches that helped to refuse the idea that most DNA is rubbish was looking beyond its sequence. Research lines centred on different aspects directly related to the DNA but not implying its nucleotide sequence, such as epigenomics, are giving light to unknown aspects and functions of the different DNA components [27].

Bioinformatics

As it can be deduced from previous sections, the development of new sequencing technologies was hand-by-hand with the increased use of informatics [28]. The joint of these two disciplines, known as bioinformatics, was necessary not only for handling the tones of information that have been generated but also for analysing them.

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Since the consecution of the human genome sequence, it has been used as a "reference genome". As such, all newly sequenced genomes are compared with it, arising the differences each genome has. The difficulties of de novo assembly are the main reason why this strategy is the most commonly used. As previously mentioned, an important proportion of the human genome is composed of repetitive DNA, which makes the

"puzzle" of the de novo assembly strategy very difficult to make. This reference genome has been updated since its birth, adding all newly available information through the different versions, not only about its sequence but also about other features such as genes and repeats annotation.

Burrows-Wheeler Aligner (BWA) [29] is the most widely used tool for aligning short-read sequenced genomes against the reference. Once aligned, different tools are needed to pick the differences that the test genome has in comparison with the reference. There is a wide variety of these callers, from those that find differences involving few nucleotides, such as SAMtools [30], Genome Analysis Toolkit (GATK) [31] or Platypus [32], to others that look for structural variants, like Delly [33], CNVnator [34] or Lumpy [35], for instance. Together with the emergency of Third Generation technologies, new long-read aligners and structural variants callers are appearing, such as minimap2 [36], NGMLR [37], LAST [38] and GraphMap [39] for genomic aligning; and Sniffles [37], Picky [40] and NanoSV [41] for calling SVs.

Mapping against the reference using short reads derived from NGS approaches is very useful but also has a bunch of limitations. First, the reference genome is not complete and it does not handle much variability. Therefore, some regions of the test genome do not have their "equivalent" region to align and they remain unmapped. In addition, those reads corresponding to repetitive sequences are impossible to map correctly, since there are identical sequences all along the genome and there is no way to decipher to which of them a read belongs. Another important limitation is related to rearrangements. As it is going to be discussed later on, the human genome can suffer different changes in its sequence. Some of them involve from hundred to thousand kilobases and are not always resolved using short reads.

Third generation technologies can bypass some of the former technical issues. For instance, if the size of a long read is big enough to span a repeat and include the unique genomic sequences on both sides, it is straightforward to know from what part of the genome it comes from. Nonetheless, TGS platforms have some drawbacks. Among them, the higher sequencing error rate in comparison with NGS ones is the most relevant. However, several tools for correcting these errors are already available, such as NanoReviser [42] or LoRMA [43], minimizing this disadvantage.

As one can imagine, the use of these two technologies is not mutually excluded, actually, their joint use acts as a synergy and the error rate give us the perfect example. Given the lower error rate of short reads in comparison with long ones, the former can be used to correct the latter, using tools such as CoLoRMap [44], increasing the overall sequencing quality.

As pointed out before, despite the important improvements in successive versions, the use of a reference genome still has some caveats, being the most important one the lack of variability. Trying to skip these problems, a generation of a human pan-genome is a recurrent idea among the scientific community [45–47]. Another line of research aims for abandoning the reference mapping since long reads can allow de novo assembly of each genome sequenced.

Genomic alterations

The human genome contains the necessary information for a cell to function. However, it is not completely stable and it is subjected to suffer different changes. These changes, or mutations, are classified according to how they affect the DNA sequence or structure.

Point mutations

Point mutations (Introductory Fig. 2a) are the most simple form of mutation since they involve only one base pair. Even though they can occur in any part of the genome, their outcomes are very well defined when they are located within protein-coding genes, since they can alter the resulting protein in three different ways. Synonymous mutations are also known as silent mutations since they are substitutions in which the resulting codon corresponds to the same amino acid, so no protein change is observed. On the contrary, there are non-synonymous mutations, where missense mutations are those in which the resulting amino acid is different from the original one. Similarly, nonsense mutations also change the original codon fate, changing it to a stop codon. Thus, even though these are small events they can have huge consequences.

Small insertions and deletions (indels)

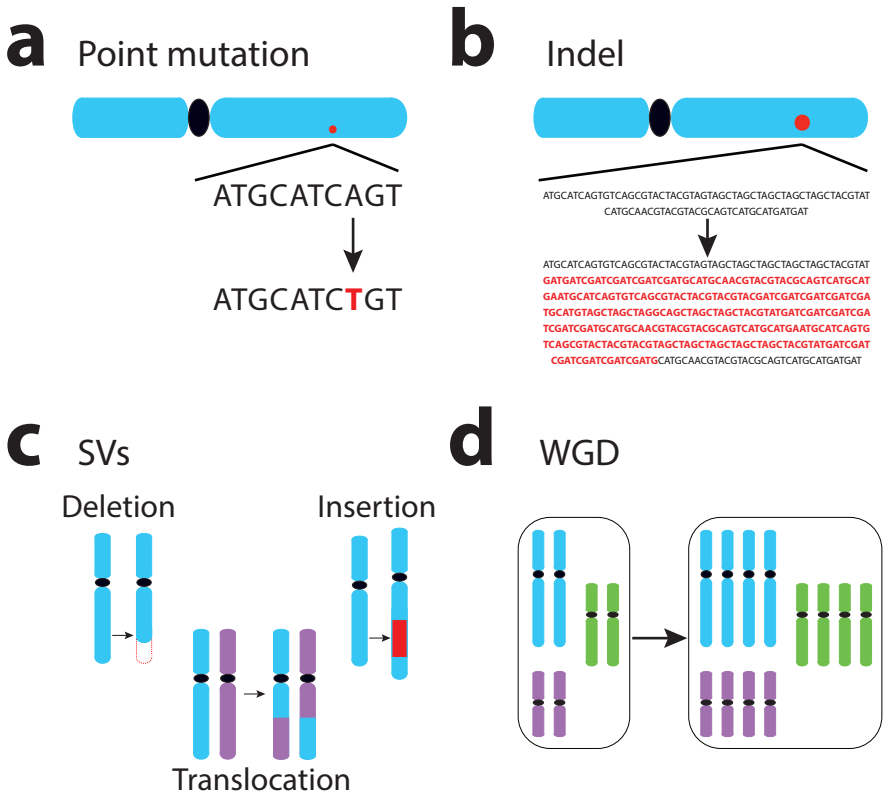
Insertions and deletions spanning a small number of base pairs (Introductory Fig. 2b) are also frequently present in the human genome [48]. Similar to point mutations, indels can also have phenotypic consequences. Called in-frame when they are located in coding regions and are multiple of three, they can maintain the reading frame; whereas frameshift indels can lead to deletions, additions or changes in the amino acids yielding no or deleterious proteins [49]. In the same way, indels occurring in regulatory regions can also affect gene function.

Structural variants (SVs)

Large genomic alterations are altogether named structural variants (SVs) (Introductory Fig. 2c). This general definition encompasses different modifications of non-well defined size (some studies set the minimum length in 50 bp and others up to 1000 bp [48,50–52]). Some of them affect the total amount of DNA content in the involved area and are called copy-number variants (CNVs). Among them, there are insertions and duplications that imply gains of DNA in the affected area, whereas deletions correspond to the loss of genomic material. CNVs also include larger-scale events, that can span regions larger than 50 kb. Among SVs that do not affect the amount of DNA, we have inversions, in which the affected sequence has reversed orientation in comparison to surrounding DNA. Translocations are another type of SV characterised by an abnormal location of the affected segment, inside or outside its original chromosome [51]. Nonetheless, this classification is quite general and flexible since, for instance, translocations can be balanced or unbalanced, leading the latter to the loss of DNA. In the same way, there are many other kinds of modifications of the human genome that can be gathered here, such as heteromorphisms, fragile sites or isochromosomes [51]. Chromothripsis [53] or chromoplexy [54] are also part of this broad classification. These complex rearrangements have their origin in a single catastrophic event, resulting in copy number changes in one or few chromosomes in the case of chromothripsis. Regarding chromoplexy, it is characterised by the presence of related translocations among several chromosomes [55]. Finally, higher scale SVs are also possible such as whole chromosome aneuploidies.

Polyploidy

The majority of the cells in the human body are diploid, carrying two copies of each of the 22 autosomes. Thus, the presence of additional complete sets of chromosomes is known as polyploidy (Introductory Fig. 2d). Even though they are used to be associated with diseases, there are cells in our body that usually carry more than two sets of homologous chromosomes. This is the case of cardiomyocytes or hepatocytes, among others [56].



Introductory Figure 2. Schematic representation of different examples of genomic alterations. For simplicity, except for SVs, only one type of each category is depicted. (a) Point mutation, the nucleotide change is highlighted in red. (b) Indel, a small insertion is represented and highlighted in red. (c) Structural variants (SVs), in this case only three types of SVs are depicted. A telomeric deletion is represented, being the deleted region the one inside the red dashed line. An example of insertion is also shown, with the insert highlighted in red. Finally, a translocation is also represented. In this example, a balanced translocation is shown, since there is no loss of DNA. (d) Whole-genome duplication (WGD), leading to polyploidy. Please note that, as it is a simplified representation, only three pairs of chromosomes are represented here (instead of the 23 pairs of the human genome). The key message is that the total number of chromosomes is doubled.

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Cancer

Epidemiology

Unfortunately, it seems quite unnecessary to look at statistics in order to know that cancer is a very common disease. Despite the development of new techniques helping cancer diagnoses and treatments, its incidence, as well as deaths caused by it, are continuously increasing all over the world. Even though there are differences between countries, mostly related to the prevalence of infections and lifestyle, all of them accumulate high prevalence. Thus, it is being estimated that, in the present century, cancer will be the leading cause of death and the limitation to increase the life expectancy worldwide [57].

Even though this prevalence rising can be explained by the ageing and growth of the human population, cancer is also responsible for many premature deaths. Actually, according to the latest Global Cancer Statistics (GLOBOCAN) publication [57] the cumulative risks of developing and dying from cancer before age 75 are 21.4% and 17.7%, respectively. This translates to one in five men and one in six women will be diagnosed with cancer while one in eight men and one in ten women will die from it.

Regarding cancer types, lung cancer is the most frequently diagnosed malignancy taking men and women together. Female breast, colorectal and prostate cancers follow it in incidence worldwide. Lung cancer is also the major cause of cancer deaths, followed by colorectal, stomach and liver cancer. Even splitting by sex, lung cancer is still at the highest part of the rank of incidence and mortality in men, in companion with prostate and colorectal cancer when it comes to incidence and with liver and stomach when talking about mortality. Among females, there is also only one cancer type leading both, incidence and mortality. It is breast cancer, relegating lung cancer as the second cause of female cancer death and colorectal as the third. These two cancer types switch places when talking about incidence, and in both scenarios are followed by cervical cancer [57].

Geographically, in 91 out of 172 countries cancer was estimated to be the first or second cause of death before the age of 70 by the World Health Organization (WHO). Third and fourth positions are also estimated in other 22 countries. While some cancer types, such as liver cancer, show a more heterogeneous distribution, others are clustered in high-risk regions. One example of the latter is Kaposi's sarcoma which, despite it is not present in the worldwide ranks, is endemic in some African regions. Indeed, it is estimated to be the cancer type with the highest incidence and mortality rates in 2018 in Malawi, Mozambique, Uganda and Zambia [57].

Overall, cancer causes morbidity and mortality all over the globe, with high rates of incidence that are increasing.

Genomic overview of cancer development

Genomic mutations are the raw material from which cancer may arise. Thus, it is important to distinguish between two types of mutations according to their origin. On the one hand, there are germline mutations, which are inherited from the progenitors and can be transmitted to offspring. On the other hand, there are somatic mutations, those acquired during the lifespan from the fertilized egg to death.

All cells of the human body accumulate somatic mutations during our lifespan. Some of these mutations give the cell an advantage and positive selection acts on them, following a Darwinian evolution process, which is the one accepted for explaining tumour evolution. These are named driver mutations, opposite to passenger ones, which do not contribute to tumours [58]. These drivers are known to be so because they are recurrently mutated in different cancers, and this frequency allowed to create databases of driver genes that are still growing, such as CGC [59] and Intogen [60].

Genes that play an important role in malignant development are broadly classified into two categories. Some act to make the cell grow and survive while others act as barriers to these functions, trying to stop them. Thus, these are known as oncogenes and tumour suppressor genes (TSG), respectively. This way, mutations that overexpress oncogenes and inactivate tumour suppressor genes are the ones contributing to tumour development. Even though it seems pretty straightforward, these categories are not hermetic and one gene can act as both depending on different variables [61].

As a Darwinian evolution process, most cells acquiring deleterious mutations are wiped by natural selection or grow just as little [58]. However, in some cases a cell accumulates enough driver mutations that give it the advantage to grow and proliferate, leading to clonal expansion and the formation of primary tumours, which are surrounded by several different elements, altogether known as tumour microenvironment (TME). It is formed by all cells in the vicinity of the tumour, including cancer cells, their secreted products, metabolites and the components of the extracellular matrix. Tumour-TME interactions have a key role in tumour progression and its metastatic ability [62]. Briefly, metastasis consists of the incessant growth and spread of cancer cells to different organs [63]. This is such an important process, not only due to the biological complexity that implies cells travelling through the body but also because it is responsible for 90% of deaths from solid tumours [64].

Even though the Darwinian model of cancer evolution is widely accepted, there are still many questions unanswered, many of them related to how, when and what a cell requires to go from normal to malignant [65]. The logical way for knowing how cells evolve until this uncontrolled status is to study them before they become malignant. This way allows one to know the "initial" situation and follow their path until they become tumoural cells. However, little is known about physiologically normal tissues, mainly because of technical limitations: (1) mutations are not shared between cells, due to the polyclonality of the normal tissue, so they are more difficult to find, and (2) it is difficult to have access to tissue samples from healthy donors.

Some studies give some light to these remaining questions taking the advantage of current sequencing technologies. Deep sequencing coverage allows several studies on mutations carried by non-tumoral tissues, overcoming the issues of polyclonality to a small extent. Some of these studies were carried out on blood cells, concluding that the amount of mutations in normal cells is related to age [66–68]. Actually, clonal haematopoiesis is a process almost paired together with ageing and the absolute risk of progression to haematological cancer is quite low. Regarding the number of mutations in normal cells, their results match those obtained in another study carried in eyelid skin [65], that even though it is a very exposed epithelium, especially to the UV (ultraviolet) light, its cells were catalogued as physiologically normal. Strikingly, all of them conclude that normal cells carry many more mutations than were assumed till now. In this way, cancer and

normal tissues seem to be very similar, and the number of driver mutations per cell seems to be the difference between normal and tumoural scenarios, even though the amount of driver mutation needed to initiate a pre-tumoural state is still unknown.

Sequencing, bioinformatics and cancer

The research in almost all existing diseases was beneficiated by the emergency of high-throughput sequencing technologies, being cancer the most affected. Indeed, shortly after NGS's appearance, the first of many analyses of tumour and normal genomes was performed in AML (acute myeloid leukemia) cells [69,70].

Until that moment, research was mainly based on the study of cancer genes, which are still an important target of study. However, the spread of NGS made it feasible to perform WGS in many samples. This has a direct implication in two ways. First, the number of sequenced patients is higher, allowing the discovery of common driver events. In addition, the higher the number of patients sequenced the higher the possibility to find rare mutations that happen in few people but are crucial for carcinogenesis in them. As cancer is a group of diseases, sequencing as many individuals and cancer types as possible, is key to giving light to its characteristics. The second implication comes with the fact that studying the cancer genome of each patient implies the sequencing of at least two samples, one from the tumour and another one from normal tissue, to detect somatic mutations. Of course, maybe even more samples from only one patient are needed to be sequenced, in order to follow the development of the malignancy, something almost impossible before the NGS development. These technologies also allow for increasing the sequencing depth, another key point for studying cancer, taking into account the heterogeneity of both, genome and tissue [71].

Together with the availability of high-throughput sequencing technologies, specific bioinformatic tools are essential. The steps of a usual genomic analysis are followed until the genome is mapped. However, when analysing a cancer genome, generic variant callers are not enough. They are useful for knowing the difference against the reference, which could allow the finding of some events in the cancer genome. Still, it is needed to compare those with the genome derived from the normal sample in order to assess if they are somatic or not. Even though this analysis could be done in many sequential steps, several tools were developed to perform this analysis in a streamlined and simultaneous way.

Basically, most callers look for mutational events and compare their variant allele frequency (VAF) in the tumoural and normal tissues, distinguishing if there are present in both or only in one of them [16]. However, when looking at the VAF it is necessary to be aware of the copy number, purity and ploidy of the cancer genome. Again, there are already tools for inferring them, such as ASCAT [72] and Battenberg [73], making the results of the somatic variant callers more accurate.

Apart from the above "generic" callers, there are others that look for more specific sources of mutation; including pipelines for detecting mutational signatures, new driver genes, the jumps of interspersed elements or those looking for pathogens' DNA.

Bioinformatic tools for detecting somatic events are in constant development, sometimes at the same time that they are being applied to samples derived from international

projects. Among them, the International Cancer Genome Consortium (ICGC) and The Cancer Genome Atlas (TCGA) are the two having the highest number of collected genomes, analysing mutations in coding regions of more than 20,000 samples [16]. Within the framework of these two international initiatives, the first results of the Pan-Cancer Analysis of Whole Genomes (PCAWG) were launched in 2020, studying the entire cancer genome.

PCAWG is an international project handling 2,658 tumour genomes together with their matched normal, for 38 different tumour types. Each of them has been sequenced by Illumina whole-genome sequencing with a mean read coverage of 39X in the case of normal blood samples. Regarding tumours, coverage distribution follows a bimodal fashion with modes at 38X and 60X. There is still no international project of such dimensions using TGS. This is just because they are brand-new technologies and the rise of new studies using them seems to be a matter of time. Indeed, there are already tools for analysing long-read cancer data, such as CAMPHOR [74], while many others are in development, such as nanomonsv [75].

The above examples show that high-throughput sequencing is a boost for cancer research. However, it is also implying important clinical advances, since translational research warrants that the results of research projects have an impact on the clinics, applying them to diagnose and treat people. Furthermore, sequencing techniques such as targeted genetic tests, are already being used to characterise or follow patients' progression [70]. Thus, the incessant efforts for making genome sequencing more reachable are contributing to the advance of precision oncology.

Genomic mutations and their presence in cancer

As cancer stands for different diseases and it involves complex mutational processes, it is not surprising that it can harbour several genomic modifications. Although it is out of the scope of this study, it is important to bear in mind that other processes affecting the DNA are also important in cancer progression. Epigenomics requires a special mention here, since DNA methylation and chromatin organization, among others, are part of the epigenome and play a crucial role in tumorigenesis [76].

Point mutations

Due to their important outcome and also the easiness to find them, somatic point mutations are quite well studied in cancer. In 2010, the first catalogue of somatic mutations from a human cancer genome was published, reporting 292 somatic base substitutions in protein-coding sequences of the melanoma cancer cell line COLO-829 [77]. This study proved the usefulness of NGS technologies for the discovery of novel point mutations that, at the same time, allow the discovery of new driver mutations. This is the aim of many studies since then, most of them focused on a concrete cancer type [78,79]. The PCAWG followed the same strategy but somatic substitutions from a wide variety of tissues were called, stating that driver point mutations are not equally frequent in all tumour types, being more present in colorectal adenocarcinomas and B cell lymphomas.

Small insertions and deletions (indels)

Even though indels are not as well studied as point mutations, some interesting findings highlight their presence in cancer genomes. For example, Priestley and colleagues (2019)

have found an excess of in-frame indels in already described mutational hotspots within oncogenes [80].

Structural variants (SVs)

In 2007, the way by which structural variants can be called using high-throughput paired-end mapping was established [81]. Two years later, the feasibility of parallel sequencing technologies to explore SVs in cancer genomes was demonstrated, detecting several germline and somatic rearrangements in two lung cancer cell lines and deciphering them at base-pair level [82].

These major discoveries led to several studies of somatic SVs in a variety of tumour types [83–85]. This tumour variety is also reflected in the PCAWG study, in which the distribution of SVs types varies not only among tumour types but also among different patients belonging to the same histology group. Regarding simple SVs, deletions, tandem duplications and unbalanced translocations are the most common [86]. Broadly, large CNVs affect solid tumours dramatically, since they span an average of 25% of the cell genome, with a median of three and five large gains and losses per tumour, respectively [87].

However, despite all these efforts, the nature of SVs makes them still difficult to call in cancer genomes, especially the complex ones. Hence, they were one of the main focuses of PCAWG. In this project, chromoplexy was frequently observed in prostate cancer samples and lymphoid malignancies as shown before [54,88,89] and also in thyroid adenocarcinoma. The presence of chromothripsis was highlighted in other non-solid tumours such as multiple myeloma [90], and it was found in the 22.3% of the samples from the PCAWG cohort. Remarkably, this catastrophic event is abundant in lung squamous cell carcinoma samples, also characterised by a high frequency of regions with localized hypermutation of base substitutions [91], known as kataegis [92].

Polyploidy

Whole-genome duplication (WGD, or tetraploidy) is a common feature of cancer cells. Actually, Bielski and colleagues (2018) score it as the second most prevalent cancer hallmark, only after mutations of the protein p53, being present in 28.2% of 9,692 advanced cancer samples. In addition, it is significantly associated with a poor prognosis. This study has also described that WGDs are prevalent in prostate cancer metastases. Nonetheless, WGD does not seem to be a late event, indeed, it seems to be the opposite, making primary tumours more aggressive and more able to metastasize [93]. This could be intriguing since, usually, normal cells can not handle this chromosomal dosage. So, taking that into account, WGD should prevent tumorigenesis instead of promoting it.

However, these additional chromosomes help cells to handle other mutations occurring in cancer development such as deletions from gene to chromosome level. Also, it can drive chromosome missegregation. These are proper circumstances in which a cell can accumulate but at the same time tolerate mutations along with its progression to malignancy. Of course, other features of the tumour progression such as the cell type or the TME are crucial in order to assess if WGD is beneficial or harmful for tumorigenesis [87,94].

Risk factors and causes: Sources of mutation

Genomic variation is the substrate of tumour progression. Thus, a key question is from where it arises.

Endogenous sources

Not all cancer-related mutations are somatic. Some of them are in the germline and, thus, heritable. Briefly, familial cancers are characterised by the inheritance of one copy of a deleterious mutation. Given that cancer development is a Darwinian process driven by the accumulation of mutations, this establishes a scenario in which the occurrence of fewer events is needed to promote tumorigenesis since at least one is already present in the genome. Therefore, malignancy progression is more frequent among people carrying these mutations than within the general population, but it still depends on the accumulation of somatic damage [95], caused by different sources.

The random mutation rate is one of these sources, it is endogenous and intrinsic to all of us, happening mainly due to DNA polymerases' errors and spontaneous deamination of cytosines [96]. Failure of other mechanisms during cell division can be more dramatic, although they are non-intrinsic, way less frequent to happen by chance and can be triggered by other factors. Alterations on cytoplasm partitions at the end of cell division are an example. The malfunction of this process, called cytokinesis, occurs in about 2% of all cell divisions in non-tumoural diploid cultured keratinocytes, even though it is not sure if it is a proper model for calculating in vivo rates [97].

Other endogenous sources of mutation are also found within the genomic sequence, such as repeats. Already in 2001, when the human genome was sequenced for the first time, it was estimated that at least 50% of it was composed of repeats [98]. Low-copy repeats, covering 4-5% of the genome [99], make the unique genomic region they flank prone to rearrangements mainly by nonallelic homologous recombination (NAHR) [52]. This process also occurs due to retrotransposons, which are the most common class of high-copy repeats and span about 44% of the genome. In addition, their ability to be copied and inserted in different regions of the genome is another way by which they add variation to it. Interestingly, the consequences of these "copy and paste" events can go further, not only depending on the region of the genome they get inserted but also due to their association with SVs [100–102]. Although they are already in the germline, their somatic activation has been demonstrated to trigger different genomic rearrangements. What activates these "jumping elements" is unknown but, as in cytokinesis failure, likely both, other endogenous plus exogenous factors, are involved.

Apart from retrotransposition, other endogenous factors interact with cells and contribute in many different ways to cancer initiation. These are factors such as hormone levels, TME, inflammation, etc. Of course, this is a complex map of interactions in which odd levels of some of these agents can decompensate others and vice versa.

Finally, other kinds of important agents are those that are completely external. These exogenous factors (mutagens) can be of different nature: physical (such as electromagnetic fields or UV radiation), chemical (e.g., alcohol, tobacco, aflatoxins) or biological (e.g., microorganisms).

Environment and lifestyle

External factors form part of our environment, consciously or unconsciously. For instance, tobacco smoking could be an active or passive activity, while living in an area with high radon concentration is usually a not on purpose action. Apart from the presence of these agents in someone's life, other day-to-day activities have something to do when it comes to cancer triggering, considered in some cases as biological factors, such as diet or physical activity. However, their correlation with cancer is still controversial.

One of the reasons was already pointed out above. Since all of these factors, whether exogenous or endogenous, are acting simultaneously and interact which each other, it is very tricky to distinguish their effect. It is all about complex interactions, for instance, obesity is related to lifestyle (diet, sport, etc.) but at the same time is influenced by genetics, so unravelling the effect of each of them on cancer is not straightforward. The same happens with age, considered the most important risk factor, but it is due to the accumulation of DNA damage produced by different sources.

However, there are other kinds of biological factors for which their correlation with cancer development is widely accepted, and these are viruses. Some of them can trigger cancer in different ways, including the integration of their DNA in the human genome, in a similar way as retrotransposons. This event will be discussed in detail throughout this thesis, as it is the main focus of it.

Even though some virus-cancer relations are well known, there seem to be many more. In addition, these associations are more blurred for other microorganisms such as bacteria (e.g., *Helicobacter pylori*). Hence, further studies are needed to elucidate these relationships, since it has been estimated that at least 16% of tumours are related to microorganisms [103].

Mechanisms of repair

The number of lesions that each cell of the human body handles in a day is estimated at around 70,000. Hence, if all the above-pointed mechanisms of mutations were not repaired by any means, the human genome would be dramatically variable. Fortunately, most are efficiently repaired [96], as there are many tools by which cells can fix some of the above-described damage [104,105].

Our cells have several repair mechanisms, some of them specific to a concrete type of damage. For instance, damaged bases that do not imply large defects in the DNA configuration are replaced by the base excision repair (BER) process. Other errors, such as complementary bases that do not follow canonical base pairing and small mispairs between complementary strands due to small indels, are corrected by the mismatch repair (MMR) mechanism. Among the variety of DNA repair pathways, there are other less damage-specific, like nucleotide excision repair (NER), which targets voluminous lesions and can deal with different kinds of DNA damage, such as those induced by UV radiation. However, the existence of diverse repair mechanisms in the cells does not prevent them from accumulating damage. Indeed, it has been estimated that the rate of non-repaired errors is $\sim 5 \times 10^{-10}$ per nucleotide site per cell division [106].

Beyond the nucleotide level, DNA breaks can also be repaired, even happening in one or both DNA strands. The latter, called double-strand breaks (DSB), are prone to initiate

chromosomal rearrangements and are repaired by two different pathways: non-homologous end-joining (NHEJ) and homologous recombination (HR). The main difference among them is that HR acts by using a homologous DNA molecule as a template for repairing the DSB, while NHEJ can join any DNA ends, with little or no homology and without the need for a template [107].

Genomic instability

Given that previously described factors are just able to add minor mutations on their own, plus the fact that the cells keep repairing DNA damage, most of the deleterious mutations do not remain in the genome. In addition, when the damage to a cell is critical, programmed cell death (or apoptosis) takes place, in order to prevent the spread of defective cells [108,109].

Eventually, defences against DNA damage are not enough and a mechanism similar to the one described in the mutator hypothesis [110,111] seems to happen. Minor and first driver mutations lead to more and more prominent mutations and, thus, to genomic instability. This state involves several abnormalities, such as increased mutation rates [112], CIN (chromosomal instability) or MIN (microsatellite instability) [113], which can trigger further anomalies. For instance, CIN can lead to cytokinesis failure, resulting in WGD. Conversely, it has also been discussed that this process can happen in both directions, meaning that WGD can occur before CIN. Genome doubling can be triggered by different causes, such as continuous activation of DNA damage signals, and the presence of both times the number of chromosomes than in a normal cell can easily lead to aneuploidy and CIN [94,97,114].

Thus, genomic instability is a major process in cancer, paving the way for the acquisition of the so-called cancer hallmarks [115].

Back to the origin of mutations found in a cancer genome

The sequence of a cancer genome is a snapshot of a precise moment, in which mutations that have been accumulated during the process of tumorigenesis can be observed. However, all information about them is relevant, not only their presence but also how and when they appeared. Even though these questions are still widely unknown, some approaches give light to them.

Mutational signatures

The DNA damage promoted by some of these endogenous and exogenous risk factors and the repair and maintenance mechanisms leave footprints in the human genome [116], making us able to detect their presence along its lifespan. Briefly, they are combinations of mutation types that arose in the genome due to different mutational processes [117].

Mutational signatures are based on the analysis of mutations and their context. For instance, single base substitution (SBS) signatures are classified not only by looking at the mutated nucleotide but also at the ones that are right upstream and downstream. This way, the same substitutions can be distinguished thanks to their context. In addition to the right next bases, other context features are examined, such as transcriptional strands.

Apart from single base substitutions, other events are analysed to extract mutational signatures, for example, those in which two adjacent nucleotides are mutated, conforming double base substitution (DBS) signatures, which represent 1% of SBS frequency within the PCAWG cohort [118]. Other than substitutions, indels are also examined for mutational signatures, distinguishing them by their size and context and representing the 10% of base substitutions frequency [118]. Even though there are fewer studies and the knowledge is limited, other classes of mutations have been analysed such as rearrangements [86].

The most valuable point of mutational signatures is that they give us information about the processes that a genome went through. For example, SBS4 is a signature that is associated with tobacco smoking and SBS7 with UV exposure. Thanks to the huge number of samples of the PCAWG project, among others, new signatures were identified, some of them with inferable sources. For instance, SBS38 is driven by additional effects of UV exposure. This is not the only case where one mutational process can lead to several features and this can also happen with different mutational signature types. For instance, SBS2 is related to APOBEC cytidine deaminases over-activity [117], and DBS11 is associated with this SBS and therefore likely generated by APOBEC activity. A similar case is found with DBS2 and tobacco smoking [118].

Interestingly, SBS1 is likely related to spontaneous deamination of cytosines and it is strongly correlated with age in cancer [117] and normal tissues [119]. This gives more strength to the idea that this is an intrinsic process with a relatively constant rate, happening in normal cells during someone's lifespan. The PCAWG project revealed also this correlation for signature SBS5, even though it was weakly related to tobacco smoke in previous studies [117]. The lack of this correlation for the other signatures, likely reflects different circumstances of the different tumours, for instance in terms of exposure to mutational agents. Apart from SBS, DBS2 and 4 and indel signatures 1,2,5, and 8 also correlate with age in the PCAWG project, indicating that likely multiple mutational processes operate in normal cells from the fertilized egg.

PCAWG data show high variation in the number and nature of signatures between cancer types and samples, with samples exhibiting a mode of 3. This is consistent with previous studies in which between 2-6 signatures were observed per cancer type [117]. Also, the number of SBS and DBS is usually proportional. Regarding indels, some cancers have more deletions and others more insertions, however, taking all of them together the number of both events is similar [118].

Finally, it is important to highlight that signatures extraction has several limitations and is based on assumptions that make the analysis possible. Furthermore, some of them are supposed to be artefacts and are always treated like that. Nevertheless, many are found consistently by different methods, making them a useful additional tool for trying to understand cancer evolution.

Timing

Given that the current tumour evolution perspectives lay on the accumulation of random mutations during the time that are under natural selection pressure following a Darwinian model, the moment when each mutation arises is an important aspect. However, even though it is a widely asked question, little is known about this topic, due to the complexity of time measurement.

The most straightforward and faithful way to measure when different mutations happen is multisampling, spatially and temporally. However, sequencing multiple samples of the same patient is not used to be feasible for technical, ethical and economical reasons. Thus, having a way that can time mutations from only one sample would be very useful. Variant allele frequency (VAF) is a key concept at this point, that measures how frequent a somatic mutation is based on the number of sequencing reads supporting it. Those mutations with high VAFs are present in most of the cells in a sample, were already present during tumour clonal expansion and are supposed to precede those with lower VAFs or subclonal [120].

Similarly, segmental gains allow us to distinguish those point mutations that happened before and after the rearrangement, looking at their VAF and taking into account the copy number and the purity of the tumour. Thus, point mutations that are present in both, the original and the gained segment, are supposed to have occurred earlier than those only present in the new segment. In addition, the number of mutations before and after the gain helps to infer when the gain happened on a molecular time scale, in which the time of occurrence of each mutation is relative to the total number of clonal mutations [121]. These mutations can be classified as early clonal (ploidy > 1), late clonal (ploidy = 1) or subclonal (ploidy < 1) [73].

This classification was applied to the 47 million point mutations comprehended in 2,583 samples involved in the PCAWG project. As a result, 22% of them were classified as clonal, 7% as late clonal, 53% as unspecified clonal and 17% as subclonal. Focusing on a set of 453 driver genes, 5,913 point mutations were classified as follows: 29% were early clonal, 5% late clonal, 56% unspecified clonal and 8% subclonal. The variety of mutated driver genes among all cancer types also changes across time. While at early tumour stages some common driver genes show up in almost all cancer types, as the tumour progresses many different driver genes arise in the different cancer types [121].

Taking a step further, mutational signatures of each sample were also examined. There are some signatures particularly present at the beginning of clonal tumorigenesis. They are mainly those associated with exogenous mutagens, such as the early presence of tobacco smoking signatures in lung adenocarcinoma or those related to UV light in melanoma. Other signatures are not that predominantly present at the initial stages of tumour progression, but their presence increases during this process. This is the case of APOBEC associated signatures or those related to mismatch repair mechanisms [121].

Regarding chromosomal gains, they occur in different molecular times across tumour types. Conversely, for each tumour type similar distributions are observed for different chromosomes and at the sample level gains usually occur at the same molecular time [121].

In a previous study performed in clear cell renal cell carcinoma [122], the base substitution burden of each subclone was correlated with the patients' age. Differences were observed across patients, while subclones of the same sample show similar correlations, indicating similar mutational rates. Thus, this correlation is considered a proper approach to make real-time estimates. As could be expected, the majority of these mutations are triggered by two mutational processes, those that are associated with SBS1 and SBS5, both of them related to patients' age. Actually, SBS1 has been proposed as a molecular clock, even though its mutation rate experiences a moderate increase in cancer cells in comparison with normal [121].

WGD represents the best scenario when it comes to timing, since the whole genome is doubled and, thus, above estimations extendable. Applying the above approaches to PCAWG samples that carry WGD, yielded that this massive event happened many years before diagnosis in several samples. Ovarian adenocarcinoma stands out, with WGD events happening, on average, ten years before diagnosis, even when the mutation rate is increased in computational models. Overall, the PCAWG brought to light approximate timelines showing the evolutionary history trends of tumour types, whether in molecular or real-time scales.

Viruses and cancer

Nowadays, as pointed out above, more than 15% of the global cancer burden is linked to infectious agents, including viruses, bacteria, and other parasites [103], and advances in research will likely increase this percentage in the future. Viruses are a great part of them, they present a huge variety and their classification is in constant review and change. Even though there are described about 5,560 species, classified in 143 families [123], only seven oncogenic viruses are known and it is estimated that they are the cause of 10-15% of human cancers worldwide [124].

In 1964, the relation of Epstein-Barr virus (EBV) with human tumours was described, being the first discovered among this group of seven so-called human cancer viruses. EBV belongs to the *Herpesviridae* family, indeed, it is also known as Human Herpesvirus 4 (HHV4) and was first observed in Burkitt's lymphoma cell lines [124]. As a herpesvirus, it has a 172 kb long double-stranded DNA genome and apart from Burkitt's, it is related to other lymphomas and nasopharyngeal carcinomas. Intriguingly, this is a widespread virus throughout the population, being present in more than 90% of the population and only causing cancer on rare occasions [125].

In the 80's decade, a boom in cancer virus discovery happened, starting with Human T lymphotropic virus-I (HTLV-I). Belonging to the *Retroviridae* family, it presents 9 kb double-strand RNA as its nucleic acid. Similarly to EBV, this virus is estimated to infect between 5 to 10 million people all around the world, being endemic in the Caribbean, South America, Africa and Japan. Again, even though its prevalence in the population is high, only a small percentage of infected people (2-5%) will develop adult T-cell leukaemia (ATL), the cancer type promoted by this virus [126]. Hence, it seems that its infection is not enough to trigger tumorigenesis and the mechanisms involved in this process remain unestablished. Nonetheless, several studies point out that the role of the viral protein Tax is the key to the initiation of the transforming process. Among other molecular interactions, Tax has been proposed to help to induce CIN, a hallmark of ATL [127].

After that, the Hepatitis B virus (HBV) was described as an oncogenic virus even though it had already been detected in the serum of Hepatitis B patients ten years earlier. Today, this member of the *Hepadnaviridae* family is known to be one of the main causes of hepatocellular carcinoma (HCC). Several features of this virus will be thoughtfully described later on, since it is one of the main topics of this thesis.

This study also pays attention to the Human Papillomavirus (HPV), which was related to cancer a couple of years later. High-risk types of this virus, such as HPV16 and HPV18,

promote most cervical cancers, and some anogenital and head and neck cancers. Again, a detailed description of these *Papillomaviridae* viruses will be held in further sections of the present thesis.

By the end of the decade, the Hepatitis C virus (HCV) was discovered. Similarly to HBV, it is known to be related to cirrhosis and hepatocellular carcinoma. However, HCV belongs to the *Flaviviridae* family, having a double-strand RNA genome of 9.6 kb in length and being related to non-A and non-B hepatitis and some lymphomas [128]. Regarding the mechanisms that lead to cancer progression, they are not well known, but HCV was described to promote genomic instability [129]. One of the most important proteins in cancer progression seems to be Core, which leads to HCC in transgenic mice [130].

At the begging of the 90s, the idea that the epidemiology of Kaposi's sarcoma (KS) was consistent with a viral causal agent was widespread. Actually, in 1994 Kaposi's Sarcoma Herpesvirus (KSHV) was found in Kaposi's sarcoma samples and a year later it was isolated from primary effusion lymphoma (PEL) cells. Nowadays, it is also related to Castleman's disease. It belongs to the same family as EBV, *Herpesviridae*, and is also termed Human Herpesvirus 8 (HHV8). This recently discovered cancer-related virus is described in detail below, as it is also one of the main focuses of this work.

Only one human cancer virus was described in the 21st century. It is the Merkel cell polyomavirus [131] (MCV) that is found in association with Merkel cell carcinoma, an aggressive skin cancer. Its genome is composed of 5.4 kb of circular double-strand DNA. The epidemiological patterns of its infection across the human population are similar to the observed for the herpesvirus mentioned above, since it is almost ubiquitous in the human population. Due to its recent discovery, little is known about its genes' function. However, some similarities have been found between them and other polyomaviruses that promote tumorigenesis in animals [132].

There are two main reasons why it is difficult to identify infectious agents as pathogenic factors for human cancers [133]: firstly, the ubiquity of most viral infections, since most of the infectious agents linked to human cancers are common in human populations; secondly, the long time periods required for malignant transformation since primary infection, usually in the range of 15-40 years. Despite these difficulties, many viruses leave hallmarks of their activity during infection, that could be used for detecting their presence and quantifying their relative activity along the evolution of a particular tumour. One of such hallmarks is the integration of genetic material of the virus into the genome of the cells of the tumour [134,135].

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Viral integrations

Among human cancer viruses, only one (HTLV-1) belongs to retroviruses, a family that has the integration of their nucleic acid in the human genome as a mandatory stage of their cycle. Human immunodeficiency virus (HIV) is the most widely known member of this family, due to the HIV-1/AIDS pandemic, and even though it is not directly related to malignant transformation, it is usually present as a co-infective agent. Thus, in principle, the vast majority of human oncogenic viruses are not expected to get integrated into the host genome, since it is not needed for continuing with their cycle. However, partial or full-length segments of their nucleic acid may become integrated into the nuclear human genome, being even a usual step for some of them.

Viruses can induce tumours by this integration process, a mechanism called insertional mutagenesis, that may disrupt tumour suppressor sequences or activate cellular oncogenes [134,136]. Studies of viral infection in animal models have demonstrated that recurrent integration of the viral genome into, or in the vicinity, of a cellular gene controlling cell growth, can result in oncogenic transformation [137]. In humans, a similar mechanism has been proposed in hepatocellular carcinoma via HBV disruption of cancer-related genes [138,139]. Similarly, HPV16 and HPV18 DNA has been found integrated into the genome of cervical and penile cancer cells, disrupting key genes [136].

Bioinformatic tools for viral integration detection

In situ hybridization was the method used for detecting viral integrations in a world without high-throughput sequencing technologies. Probes of known viral sequences were used to pick viral fragments. Then, these fragments were amplified by PCR and sequenced by 'Sanger sequencing'. However, this method was not accurate enough to study viral integrations, similarly to the case of other genomic features [140]. As previously described, NGS changed everything. Their emergency, together with the continuous development of bioinformatics tools, made possible the discovery of the Merkel cell polyomavirus by sequencing Merkel cell carcinoma samples [131].

NGS approaches allow the detection of viral sequences integrated into the human genome by adding no additional steps to the usual sequencing routine. As the viral nucleic acid is part of the human genome, it is sequenced with it and the only necessary step is to find the virus across the three billion base pairs.

This "single" step is not trivial and some efforts have been done in the bioinformatics field since 2010 for identifying viral integration. Essentially, it is necessary to look for non-human reads and their joint with human ones. However, analysing non-human reads implies the risk of considering contamination as real calls. Indeed, contamination is a common problem when looking for viral sequences within human genomes that have led to misleading results in the past [141].

Even though pipelines for detecting viral sequences in WGS or RNA-Seq data are quite common, the variety becomes lower when looking at viral integration tools. This is even more dramatic when it comes to TGS since there are no tools to find viral integrations in such a rich type of data. The lack and the characteristics of viral integration detection tools are going to be discussed further in this manuscript.

Hepatitis B virus

Epidemiology, transmission and aetiology

Globally, among all HBV infections, only 10% are diagnosed and half of them are treated. Thus, it has been estimated that the prevalence of HBV chronic infection is ~3.9%, which translates to around 292 million people infected all around the world. Even though there has been an effective vaccine since the 1980s decade [57], its impact is unnoticeable in the global HBV burden. Indeed, it was estimated that HBV was responsible for 884,000 deaths in 2015 [142].

Nine different HBV genotypes are described, plus one not confirmed yet. They are named from A to J. Each of these genotypes has its geographical distribution and a major way of transmission [143]. Vertical transmission is predominant worldwide, but infections due to horizontal transmission still happen, mainly by sexual transmission or needle sharing [144].

Differences among genotypes are also reflected in the progression of the disease. Hepatitis B is a complex disease, in which the probability of acquiring a chronic infection decreases as the age of contact with this highly infective virus increases. Different phases can be distinguished in chronic HBV infection, based on several serological markers. Among them, there are viral antigens, such as Hepatitis B e antigen (HBeAg), a protein of the nucleocapsid core of HBV that indicates the presence of the virus and high levels of infectivity. Together with viral antigens, antibodies indicate the presence and stages of the viral infection, while alanine aminotransferase (ALT) helps to infer liver inflammation levels. In an attempt to simplify the different clinical phases of Hepatitis B, the following explanation is focused on HBV DNA presence, ALT levels and hepatic inflammation [143].

The immune tolerant phase is characterised by high HBV DNA levels and normal ALT. Thus, during this chronic infection phase, there is almost no liver damage. In contrast, during HBeAg+ chronic hepatitis, viral DNA levels decrease while ALT levels increase due to the host immune response. Hence, liver inflammation and damage are high during this phase. After it, HBV DNA levels remain very low together with stabilized ALT levels in most patients. This is known as HBeAg- chronic infection, in which liver inflammation is also very low. This inflammation is higher during HBeAg- chronic hepatitis, when levels of HBV DNA and ALT are destabilized again, similar to the other inflammatory phase previously described. Finally, there is a recovery phase characterised by not detectable HBV DNA and normal levels of ALT [145].

It is crucial to take into account that the above phases are not sequential and that the disease can progress in very different ways, from switching between the different phases to remaining in one of the non-inflammatory ones forever. Of course, liver damage is accumulating during the different phases and its fibrosis stages depend on them. Indeed, HBV chronic infection can lead to hepatocellular carcinoma (HCC), being one of the major risk factors for liver cancer, the fourth deadliest cancer type [57]. It has been described that about 50% of HCC cases are associated with HBV infections [143].

Genome and cycle

HBV usually presents a circular genome consisting of ~3.2 kb of partially double-stranded DNA. It contains four overlapping ORFs (open reading frames) (Introductory

Fig. 3a). One of them encodes the e Antigen (HBeAg), the pre-core protein and the Core protein (HBcAg), which is a viral nucleocapsid protein. The surface antigen or S protein is encoded by ORF preS1/Pre-S2/S; the viral polymerase (P) is encoded by another ORF and a different one has the Hepatitis B X protein (HBxAg) sequence [145,146]. The transcription of HBV promoters, such as basal core promoter (BCP), is regulated by the enhancers EnhI and EnhII [147].

HBV enters the hepatocytes by binding to the sodium–taurocholate cotransporting (NTCP) receptor, which is located in the hepatocytes' plasma membrane. Then, the nucleocapsid delivers the circular relaxed (or linear on rare occasions) double-stranded DNA into the nucleus. There, this DNA is packaged into chromatin by the repair proteins of the cell, resulting in a covalently closed circular DNA (cccDNA) and forming an episome. This form of the HBV genome was described to be symmetrically distributed among daughter cells during hepatocytes replication, acting as a viral genomic reservoir. This DNA is also transcribed by the cell RNA polymerase II, yielding the 3.5 kb of pre-genomic RNA (pgRNA), among other four RNA molecules. The pgRNA can be encapsidated and retrotranscribed to the initial form of the HBV genome (relaxed circular or linear double-stranded DNA), thanks to the HBV polymerase. Then, nucleocapsids can follow two paths: they may go back to the nucleus to be added to the cccDNA reservoir or they may be assembled with the envelope, yielding infectious virions that are exported. Remarkably, amongst these several genomic forms, double-strand linear DNA (dslDNA) is likely the molecule participating in the integration into the host genome, but maybe not the only one [143].

HBV and cancer

Liver fibrosis, cirrhosis and HCC are outcomes of HBV infection. Due to its replication mechanism, HBV has higher mutation rates in comparison to other DNA viruses. This is because the HBV polymerase uses RNA as a template through an error-prone retrotranscription process. This yields in the appearance of different quasispecies that are subject to selective pressure, helping the virus to adapt and evolve [147,148]. In addition, HBV interacts with many cellular factors, contributing to liver disease in several different ways.

Even cryptic and mainly studied through in vitro or rodent models, it is known that HBx plays a crucial role in HBV replication and carcinogenesis. There is a huge number of pathways this protein interacts with, such as the transcription machinery, epigenetic factors, DNA repair proteins and chromatin modifiers [149]. It also alters mitotic checkpoints, leading to aberrant chromosome segregation and centrosome duplication [150]. This large interaction map seems to be the reason why HBx has been described to promote both, cellular apoptosis and cellular proliferation. The latter is necessary for tumour progression and HBx contributes to it in many different ways. Inactivating tumour suppressors, like p53 and pRB (retinoblastoma protein); increasing telomerase activity; blocking tumour necrosis factor and promoting angiogenesis are some of them. HBx also increases the expression of *MYC* (a cellular oncogene), β-catenin and epithelial cell adhesion molecule (EpCAM), helping tumour progression and expansion.

Other important pathways deregulated by HBV are MAPKs, PI3K/AKT and cytokines, for example. Apart from HBx, other viral components contribute to HCC development. For instance, cccDNA is relevant in HCC recurrence [151]; core protein and HBeAg increase cytokine production [152]; and HBsAg increases telomerase activity and produces oxidative

stress causing DNA damage [150]. Indeed, oxidative stress and inflammation caused by viral chronic infection are other key factors for carcinogenesis. In addition, HBV not only interacts with cellular proteins but it promotes important modifications in host DNA methylation state and miRNA expression, leading to cell proliferation [150,152].

All these mechanisms lead to genomic instability, which can also be caused by insertional mutagenesis, a process that is also known to be related to HCC development and that will be discussed later.

Human Papillomavirus (HPV)

Epidemiology, transmission and aetiology

Human Papillomavirus (HPV) is a sexually transmissible infection (STI), being the one most commonly transmitted around the globe, with similar transmission rates for both genders. In 2017, the estimation of women carrying HPV infection was 291 million. Prevalence data are similar for men, and variable across different countries, being higher in low- and middle-income regions. Even though vaccination against HPV infection already exists, from 2007 to 2010 its prevalence increased by ~1% among women. A similar increase rate has been estimated for men, who are being suggested to be reservoirs and transmission vectors of HPV [153].

HPV is classified into two main categories according to its symptomatology: low-risk HPV (LR-HPV), causing anogenital and cutaneous warts and high-risk HPV (HR-HPV), the cause of different types of oropharyngeal and anogenital cancers. There are more than 200 different HPV genotypes [154–156], being HPVs 16 and 18 the most prevalent high-risk genotypes, followed by 59, 45, 31, 33, 52, 58, 35, 39, 51, 56 and 53. In contrast, the high ranks of prevalence worldwide of LR-HPVs are shared only by two genotypes, HPV 6 and 11.

Uncommon LR-HPV genotypes (4,65,2,27,57,1) cause cutaneous warts. The LR-HPV genotypes with the highest prevalence (HPV 6 and 11), are still quite rare, with less than 1% of prevalence in both genders. Their transient infection leads to the most common symptom of HPV infection, anogenital warts. Even though warts rarely develop into cancer, they are one of the major risk factors for anal and oropharyngeal cancers. Thus, HPV infections, especially high-risk genotypes, promote the development of not very common cancer types such as anal, vulvar, vaginal, penile, tonsil, and different oral and throat areas. Prostate and breast are other cancer types related to HPV infection, but in these malignancies, the virus seems to contribute to the disease instead of being responsible for it. However, further studies are needed in order to give light to the exact role of HPV in them [153].

Despite the above malignancies are rare or their relation with HPV infection is not well established, it is consistently known that HPV also promotes the development of cervical cancer. As previously shown, it has a very high prevalence with approximately 569,847 new cases and about 311,365 deaths per year, more than 98% of them associated with HR-HPVs. Indeed, HPV is present in 90% of cervical cancers [153], being HR-HPV 16,18,31,33 and 45 the ones with the highest risk of malignant development [155].

Above HR-HPV genotypes, among others (HPV 26, 30, 35, 39, 51, 52, 53, 56, 58, 59, 66, 67, 68 and 69), have been identified in head and neck squamous cell carcinoma (Head-

SCC) [156]. Although the four most common (16, 18, 31 and 33) are targets of currently available vaccines, more and more head and neck cases are being diagnosed, with more than 830,000 new cases and about 430,000 deaths each year [156]. Indeed, head and neck HPV+ cases have surpassed cervix related ones during the last years [157]. This is especially relevant if we take into account that: (1) cervical cancer is the fourth most commonly diagnosed cancer among women worldwide and nearly all cases are HPV+; and (2) while there is a systematic screening for HPV+ cervical cancer, it does not exist for head and neck. In addition, even though HPV+ head and neck malignancies have a better prognosis than HPV- ones, the former affects younger patients [157]. Thus, these two HPV+ cancer types, head and neck and cervical cancer, require a lot of attention and research.

Genome and cycle

The HPV genome is composed of ~8 highly conserved kilobases of circular double-stranded DNA. Three different domains can be distinguished in all HPV genomes, independently of their genotype (Introductory Fig. 3b). An early transcription region, containing ORFs translated into regulatory proteins involved in viral replication and gene expression regulation [155]. These are E1, E2, E4, E6 and E7, while E5 and E8 are only present in some genotypes. A late transcription region, with L1 and L2 encoding two capsid proteins. The L1 sequence is the one used to differentiate HPV genotypes, defining a new one when this sequence differs at least 10% from others [156]. Between both regions, there is another one called the non-coding region (NCR), upstream regulatory region (URR) or long control region, which contains transcription cis-regulatory elements and the origin of replication (Ori) [158].

The infection begins when the viral capsid attaches to basal epithelial cells and the virus enters the cell via endocytosis thanks to L1 and L2 proteins, the latter also helps the virus enter the nucleus and associate with chromosomes [153,154,158]. Then, transcription of the viral genome is dependent on the host cell differentiation [156]. In self-renewing basal cells, E1 and E2 proteins interact with the phase S of the cell cycle, so that cell DNA polymerases replicate the viral DNA, acting as an infection reservoir [154]. This constant division of the HPV genome together with the host cell DNA is possible thanks to the interaction of E5, E6 and E7 proteins with the cellular machinery [158]. The HPV genome remains tethered to host cell DNA, segregating with each cell division. To keep cells alive, and so viral proliferation, these proteins also regulate apoptosis and delay differentiation. When it occurs, the rate of DNA amplification increases and L1 and L2 are expressed in mature squamous cells, yielding the capsid proteins for producing new virions that shed as a result of epithelial desquamation and repeat the cycle [154,158].

HPV and cancer

HPV elimination is very frequent, around 75-90% in both genders, suffering a transient infection that causes warts and can lead to intraepithelial neoplasia grade 1. The average duration of this kind of infection is 2.5 years, which is the estimated average time the viral clearance process takes. However, in other cases, the virus persists latent and its reactivation leads to a high-grade squamous intraepithelial lesion (grades 2/3) or, potentially while rarely, to invasive carcinoma [153].

E6 and E7 are the main HPV oncogenic proteins since they interact with many host cell proteins [159,160]. Some interactions are with well-known tumour suppressors, as they promote the degradation of p53 and pRB, respectively. Telomerase and histone activity

is also affected by them [155,158]. In addition, E5 is known to lead to the overexpression of the epidermal growth factor receptor (*EGFR*).

Apart from proteins, E6 and E7 are also able to change the host miRNA expression [155]. This is supposed to be done by methylation of their promoters. Indeed, epigenetic modifications of both, the viral and host genomes, is another described mechanism of HPV+ tumour progression, even though it is not well established [155]. One proposed reason for the overexpression of E6 and E7 proteins is the integration of HPV into the host genome, an event discussed further in this manuscript.

Overall, even though some pathways and mechanisms have been unravelled, HPV tumorigenesis is quite complex and further studies are needed to have a complete understanding of the disease [160].

Kaposi's Sarcoma Herpesvirus (KSHV or HHV8)

Epidemiology, transmission and aetiology

KSHV was discovered years after the two previous ones and its prevalence is lower compared with theirs. Therefore, the knowledge of this virus is much more limited. Despite that, five different genotypes can be distinguished denominated from A to E.

The distribution of this virus around the globe is heterogeneous and even though it is suspected that other kinds of transmission are possible, it is mainly transmitted via saliva. KSHV is endemic in the northwestern of China and Amerindian populations in South America. It is also highly endemic in sub-Saharan Africa and the Mediterranean region, showing the latter prevalence values of 20%-30% [161]. The prevalence in Europe, North America and Asia is less than 10% and genotypes A and C predominate in these areas. This prevalence increases in sub-Saharan Africa, being higher than 40%, even above 90% in some populations [161]. Here, genotypes A and B are responsible for most infections. The remaining genotypes D and E, are found in the Pacific region and Amerindian populations, respectively [162,163]. The reason for this asymmetric geographical prevalence is not well understood, but it is clear that co-infections with other pathogens, such as malaria or HIV [161], are an important factor.

Broadly, three different diseases have been related to KSHV, even though it is still unclear if the virus is the only necessary causal agent. Kaposi's sarcoma (KS) is the first known malignancy associated with this virus and it is the most frequent cancer type in Malawi, Mozambique, Zambia and Uganda, having also a high prevalence in other African countries such as Namibia or Botswana [57]. KS is a vascular tumour that affects different anatomical regions. According to its origins and geographical distribution, this complex disease presents different clinical subtypes. There is a classic subtype, which is usually non-aggressive and is characterised by localized lesions, rarely mucosal or visceral. A similar subtype occurs in immunosuppressed patients, with cutaneous and infrequent mucosal and visceral lesions. KS can also be AIDS-related, presenting cutaneous, mucosal and visceral lesions, which are usually aggressive. Finally, even though the endemic subtype is similar to the classic one in adults, it is very aggressive in children, with visceral affectation [161].

KSHV is also associated with primary effusion lymphoma (PEL), sometimes also called body cavity-based lymphoma (BCBL) [164]. As the latter denomination points out, this is a

rare lymphoma developed in body cavities such as pleural, abdominal and pericardial. Moreover, this herpesvirus is found in Multicentric Castleman disease (MCD) samples, characterised by multiple enlarged lymph nodes. Both diseases predominantly develop in immunosuppressed patients, usually HIV+ [164]. Finally, two new categories of disease (KSHV-associated diffuse large B cell lymphoma, not otherwise specified and KSHV Inflammatory Cytokine Syndrome) have been recently added to the list of KSHV related diseases. In addition, this virus has been related to several other diseases, such as multiple myeloma or squamous carcinoma, but these associations are not well established. Overall, the aetiology of KSHV remains poorly defined and understood [165].

Genome and cycle

Linear double-stranded DNA is the nucleic acid of the KSHV genome, which contains approximately 90 ORFs, all of them encoded in a ~140 kb coding region (Introductory Fig. 3c). It is flanked by terminal repeats containing from 35 to 45 copies of an 803 bp sequence with high CG content (85%) [164].

As it has been described in other viruses of the same genus, KSHV has several regulatory genes that resemble cellular genes, which are supposed to be acquired as part of virus-host co-evolution, such as proteins involved in interferon signalling. Conversely, genes named from K1 to K15, are KSHV specific. The former encodes a type I transmembrane protein and it presents two regions with higher sequence variability than the rest of the genome. These regions, VR1 and VR2, define the five different genotypes [163]. Finally, the KSHV genome also encodes for several non-coding and micro RNAs [164].

KSHV has a broad tropism of infection since it can infect epithelial and dendritic cells, keratinocytes, fibroblasts and monocytes. Endothelial cells are also targets of this virus and are the ones from which KS tumours are supposed to develop. In addition, B cells are also susceptible to infection, leading to PEL or MCD, for instance. Viral glycoproteins interact with cellular receptors for the entry of the virion capsid into the cytoplasm. After that, the KSHV DNA is delivered into the nucleus, where it circularizes and tethers to host chromosomes. Once here, the virus has two different pathways to follow: latency and lytic phase.

Two proteins, LANA and RTA, are the main controllers of the balance between these two phases. LANA promotes viral latency, which is the default and persistent mode. Conversely, RTA promotes sporadic periods of lytic activity. The viral genome remains as an episome during latency and its replication is coupled with host replication, being present in all daughter cells. Thus, the expression of viral genes is limited to those proteins that ensure the survival and proliferation of the host cell and help to evade the immune response.

It is not known what stimuli make the virus activate the lytic cycle, but it could happen several times during the viral latency. This phase is when virions are formed so the viral expression and replication are higher. Three groups of viral genes are expressed sequentially. First, immediate early ones pave the ground for viral replication. Then, early genes (a.k.a. delayed-early genes), encode proteins that control the rolling circle replication of viral DNA. This process yields linear molecules that are then assembled with the structural proteins resulting from the expression of late genes, yielding infectious virions that destroy the cell membrane [161,164].

KSHV and cancer

Even though most pieces of evidence are from rodent models, it is clear that KSHV contributes to tumorigenesis in several different ways.

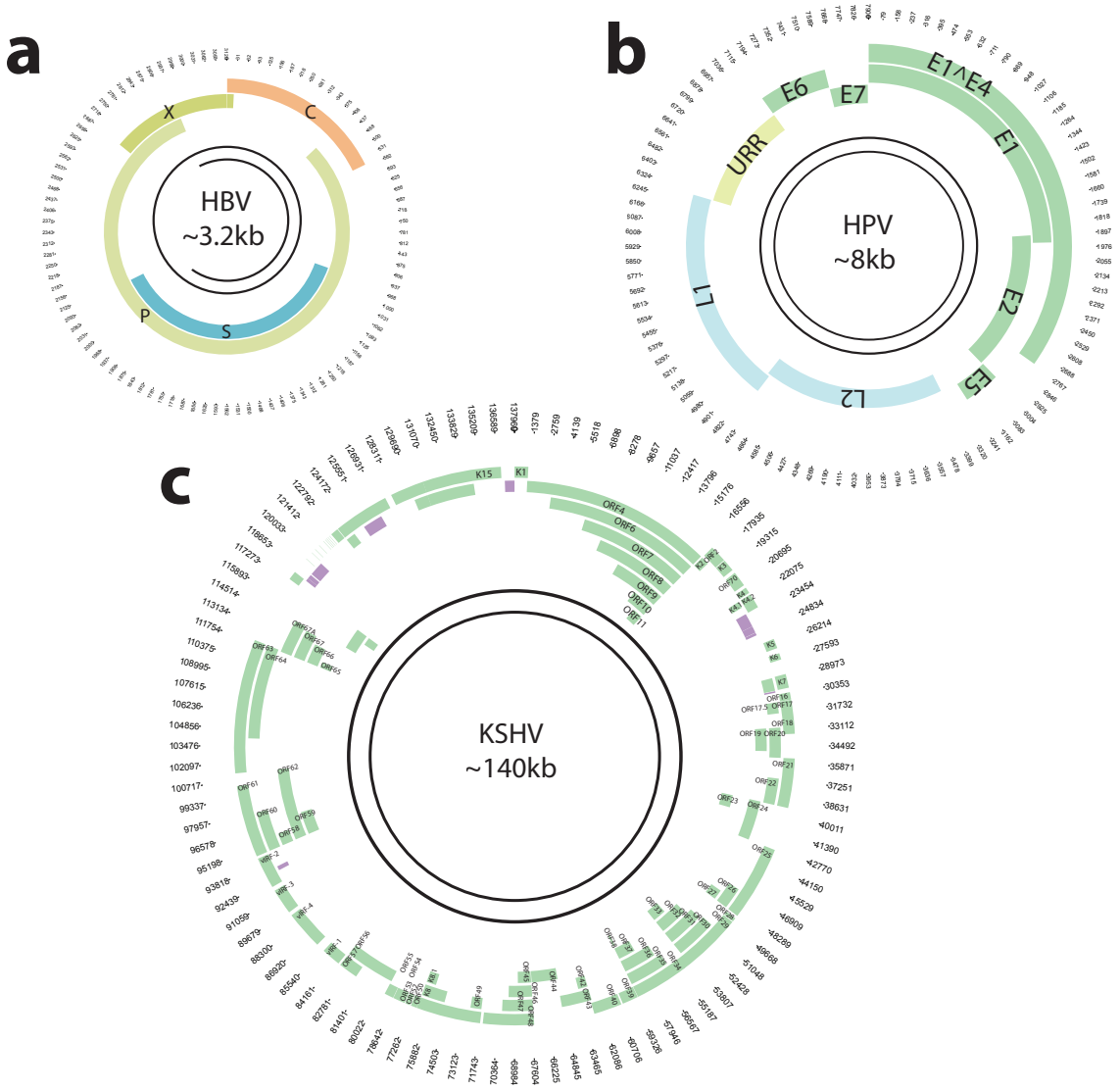
There are some well known cellular oncogenes, frequently mutated in different cancer types; such as melanoma, KS or lung cancer; which are activated by KSHV. Ras, c-Myc, c-Kit, c-Src and Bcl-2 are some examples of these oncogenes. As such, they are involved in the regulation of cell proliferation, growth, angiogenesis, migration, invasion and apoptosis [166]. In addition, KSHV has been described to inactivate tumour suppressors, such as pRB or p53 [164].

Apart from interacting with cellular oncogenes, the KSHV genome encodes its own oncogenes. One of the most relevant ones is LANA, which is constitutively expressed but more predominant during latency. Among its functions, it degrades p53. Interestingly, it maintains the long terminal repeats of KSHV episomes in a similar way that telomerase does with human telomeres. Other oncogenes, even though they are always being expressed, are mostly active during the lytic phase, with low levels of expression during latency, such as K1, that can induce tumorigenesis even without the viral machinery.

KSHV genome also contains some viral oncogenes that are homologues to cellular ones, such as vCyclin homologue of cellular cyclin D2, vIL-6 of human interleukin 6 or vGPCR of G protein-coupled receptor. Similarly, there are four viral interferon regulatory factors (vIRF1-4), with vIRF1 and vIRF3 acting as oncogenes during lytic and latent phases, respectively. Other viral homologues, such as vBcl-2 or vFLIP are encoded by most gammaherpesviruses. As viral oncogenes, they have a similar function to cellular ones, leading to malignancy progression [166].

Finally, KSHV miRNAs are still very cryptic, but they are known to play an important role in malignancy progression. They can bind to cell mRNA, modulating host expression and promoting endothelial cell reprogramming, migration and invasion [161], through apoptosis inhibition, for instance. Interestingly, these miRNAs are found inside exosomes that could migrate and have effects in distal regions [165].

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Introductory Figure 3. Schematic representation of HBV, HPV and KSHV genomes. (a) The partial double-stranded DNA of HBV is represented in black and the four ORFs are represented in different colours: the ORF in orange is the one encoding the e Antigen (HBeAg), the pre-core protein and the Core protein (HBcAg); the one in blue encodes the surface antigen or S protein; the viral polymerase is encoded by the ORF coloured in light green and the one in dark green contains the sequence of the Hepatitis B X protein (HBxAg). (b) The black circles represent the HPV double-stranded DNA in which we can distinguish three different domains: an early and a late transcription regions, in green and blue, respectively; and the upstream regulatory region (URR) in yellow. (c) Although the KSHV nucleic acid is linear double-stranded DNA, it circularizes when it is delivered into the nucleus and this circularized form is the one depicted here. The different ORFs are in green and the repetitive sequences are represented in purple. The coordinates of the genomes are indicated on the outermost layer of each representation.

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OBJECTIVES

Viral infections' contribution to tumorigenesis remains poorly characterised, although they may cause 15% of all human tumours worldwide. Global statistics also point out that liver malignancies are the fourth deadliest cancer type in the world and cervical cancer is the fourth most prevalent and also the fourth deadliest among women. Intriguingly, both have as major causal agents two viruses, HBV and HPV, which roles in tumour development are still poorly understood, especially when it comes to viral integrations. Most recently discovered viruses, such as KSHV, are also known to be related to different cancer types. However, in the particular case of KSHV, it has never been found integrated into the host genome so far. One of the reasons could be, among others, the limited availability of computational methods for viral integration detection. Indeed, there are still no specific tools for searching for these kinds of events in TGS data.

Hence, the purpose of this doctoral thesis is to use PCAWG samples and data to explore and characterise the landscape of somatic insertions attributable to HBV in human cancer. In addition, it aims to provide useful tools to facilitate further analyses and apply them to the characterisation of human-HPV DNA junctions and the detection of these events in not-so-well described viruses, namely KSHV. This objective can be divided as follows:

- Detection and characterisation of somatic HBV integrations in HCC samples.
- Development of a tool for the detection of viral integrations in both, NGS and TGS data.
- Application of the new tool for the analysis of human cancer samples (HBV and HPV positive) and cell lines (KSHV positive).

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RESULTS AND DISCUSSION:
HBV integrations

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RESULTS AND DISCUSSION: HBV integrations

HBV integrations

Hepatitis B virus (HBV) infection is the second most frequent cause of cancer after tobacco and a major cause of HCC. Previous studies indicate that the disease has a complex genomic landscape, with frequent copy number changes and interchromosomal rearrangements [167,168]. In the same way, HBV infection has been associated with chromosomal instability in cancerous and non-cancerous liver genomes, and HBV DNA integration is known to be the cause of chromosomal rearrangements in HCC [169–176]. However, we still ignore the full extent to which HBV DNA integrations impact the structure (i.e., patterns and mechanisms of mutation) and function (i.e., driver events) of HCC genomes [177], which may have important consequences for the diagnosis, prognosis and treatment of the disease.

Analysis of HBV integration sites identifies non-canonical HBV insertions

Here, to further illuminate the insights of this complex disease, bioinformatic algorithms were run to explore the landscape of HBV DNA integrations acquired somatically. This was performed on Illumina paired-end whole-genome sequencing data from 296 HCC tumours from the Pan-Cancer Analysis of Whole Genomes (PCAWG) project, comparing them with their matched normal samples derived from blood.

An insertion of a sequence that is not present in the reference genome, even if it is of endogenous or exogenous DNA, usually has two breakpoint junctions. These are the joint points between the genomic DNA already present in the region and the inserted sequence, one in its 5' and the other one in its 3' edges. NGS, specifically, paired-end sequencing, allows the detection of these junctions in two different ways. Those pairs of reads that are mapped within different lengths than the insert side, called discordant, point out that something is different in comparison to the reference genome. In the case of insertions, one of these reads belongs to the genomic part while its mate corresponds to the inserted fragment. However, the point where the joint happens is not shown, since it is within the nucleotides located in the sequence that is in between the read pair, which is not sequenced by this method. Conversely, split reads do show this junction. These reads span the exact joint point of these two sequences, containing the genomic coordinates of where the breakpoint is.

Intriguingly, when analysing viral integrations, two different read pair patterns arise. One of them is characterised by two reciprocal – face-to-face oriented – read clusters delimiting the integration site, and whose mates support the presence of viral DNA (Fig. 1a). This is the usual way in which integrations are found and it is pointing to a sequence that has been inserted into the human genome in between the two different clusters. This pattern represents canonical integrations, where the virus is present as an insert without other major modifications in the human genome. Nonetheless, these clusters can be separated by a few or several nucleotides (from a couple to hundreds), indicating that the breakpoints are closer or far away from each other. Sometimes, changes in the sequencing coverage are observed in the base pairs between the breakpoints, showing an amplification or a deletion of the target site. These reads shape is the one shown for small insertions of endogenous DNA. Thus, this pattern is well characterised and it is used by

many tools for detecting these kinds of events, even whether looking for indels in general [178] or more specific kinds of insertions, such as retrotransposition [135].

Remarkably, in addition to these canonical insertions, this analysis revealed a non-canonical pattern. Here, paired-end mapping data show single clusters of reads whose mates identify one extreme of the somatic viral integration only, while the reciprocal cluster supporting the other extreme of the insertion appears to be missing (Fig. 1b). Again, this pattern resembles the one shown for other genomic modifications. In particular, it is similar to those patterns of SVs, in which breakpoints are far from each other. Similarly to the ones described above, the patterns of SVs, especially the ones that are classified as simple by Yilong and colleagues [86], are well established and have been used by SV callers since some years ago [33]. However, the presence of the virus makes them blurry and more difficult to unravel, as shown later on.

Looking at the landscape of HBV integrations in the HCC samples, 42 of these events represent canonical viral DNA insertions. Of note, the total number of found insertions is 148 in 51 tumour samples (Supplementary Data 1; Fig. 1c), meaning that the majority (72%, 106/148) of events follow the non-canonical pattern. The predominance of the non-canonical pattern in this genomic landscape is worth to be studied more in detail. Broadly, all of these insertions show a similar pattern to the SA501453 tumour, in which paired-end reads show a single cluster supporting one extreme of an HBV insertion event on chromosome 19, with no reciprocal cluster in the proximity of the integration site (Fig. 1b). Applied algorithms successfully reconstructed the ends of these 106 non-canonical insertion events, confirming that they match HBV sequences (Supplementary Data 2).

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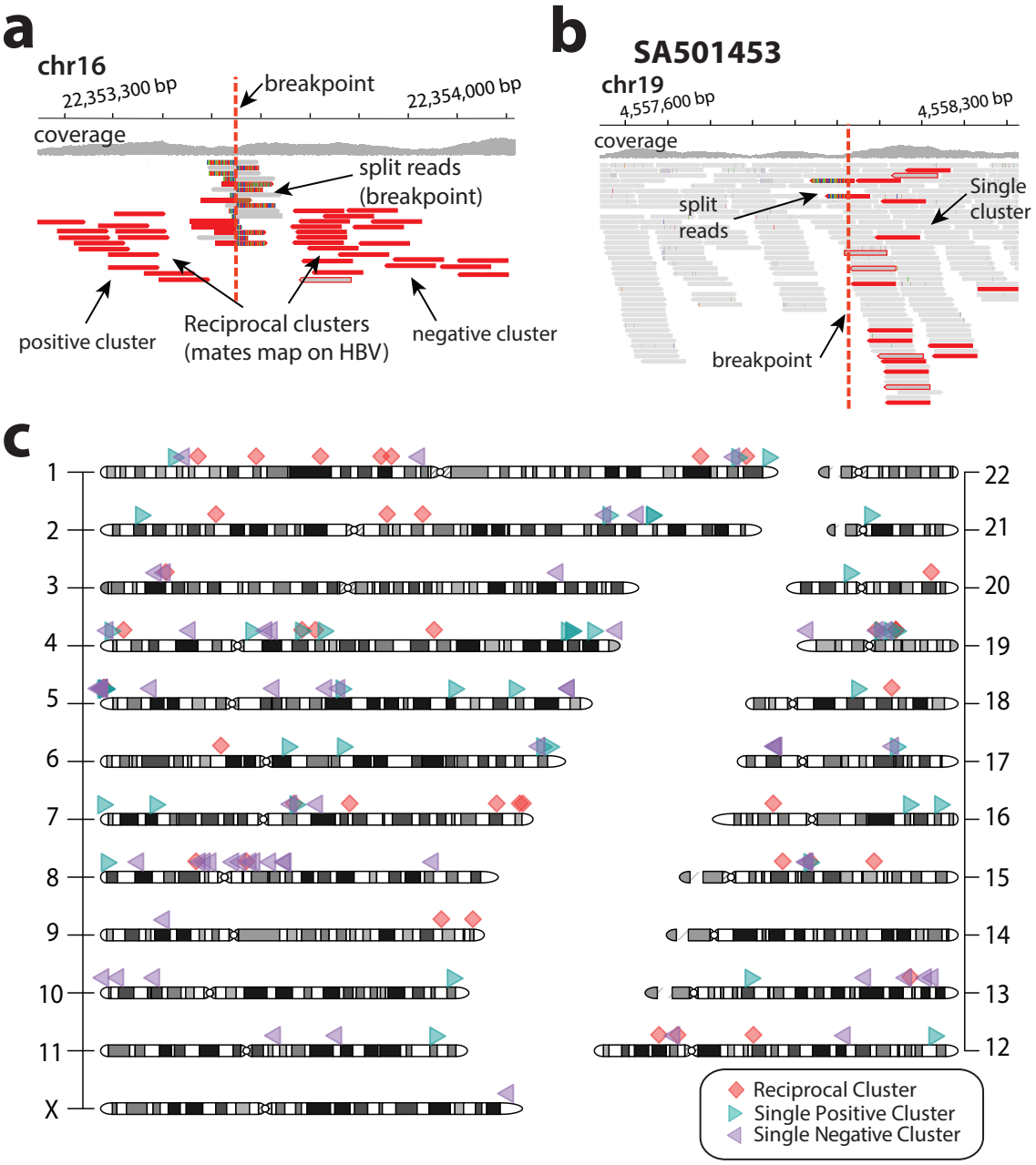


Figure 1. The landscape of HBV insertions in 296 HCCs from the PCAWG dataset. (a) The classical pattern of canonical HBV insertions identified with Illumina paired-end mapping data is characterised by two reciprocal clusters of discordant reads, and split reads, in face-to-face orientation, demarcating the boundaries of the genomic integration. The mates of these reads map onto HBV consensus sequences. Split reads span the insertion site allowing base-pair resolution of the insertion breakpoints. (b) Most HBV insertion events in HCC tumours show a non-canonical pattern in which a single cluster of paired-end reads (short reads in red) demarcates one of the two boundaries of the insertion only, while the second cluster is missing. (c) Canonical (reciprocal) insertions are represented as red diamonds, and non-canonical insertions (single clusters) as purple and green triangles for positive and negative clusters, respectively. In total, 148 integration events are shown of which 72% represent non-canonical events.

Similar paired-end mapping patterns were identified in a previous study from our lab [102]. Here, single clusters of reads pointing to long interspersed nuclear elements (LINE-1) somatic insertions were found in cancer genomes with high retrotransposition rates[15].

Interestingly, this type of events represents hidden genomic rearrangements mediated by aberrant DNA integrations.

This suggested that the present findings could represent cryptic somatic rearrangements mediated by HBV DNA insertion. Hence, to illuminate the genuine configuration of the relevant rearrangement involved in the patterns described above, long-read whole-genome sequencing was performed. This technology has the advantage that, as it produces long reads (of several kilobases) they could span the whole inserted sequence, including both breakpoints, allowing us to reconstruct them and see what parts of the genome are joined with both ends of the viral insert.

Thus, the same tumour sample, SA501453, was sequenced using Oxford Nanopore Technologies (ONT) to a final coverage of 13.5X (median read size = 12 kb). The long reads revealed a cryptic translocation linking chromosomes 19 and 11, which is bridged by a 640 bp HBV DNA insert (Fig. 2). Although the executed algorithms had initially identified the missing reciprocal cluster on chromosome 11 in the paired-end data, the interchromosomal rearrangement remained undetectable due to the size constraints of the Illumina sequencing library, which is too short to span the HBV insertion.

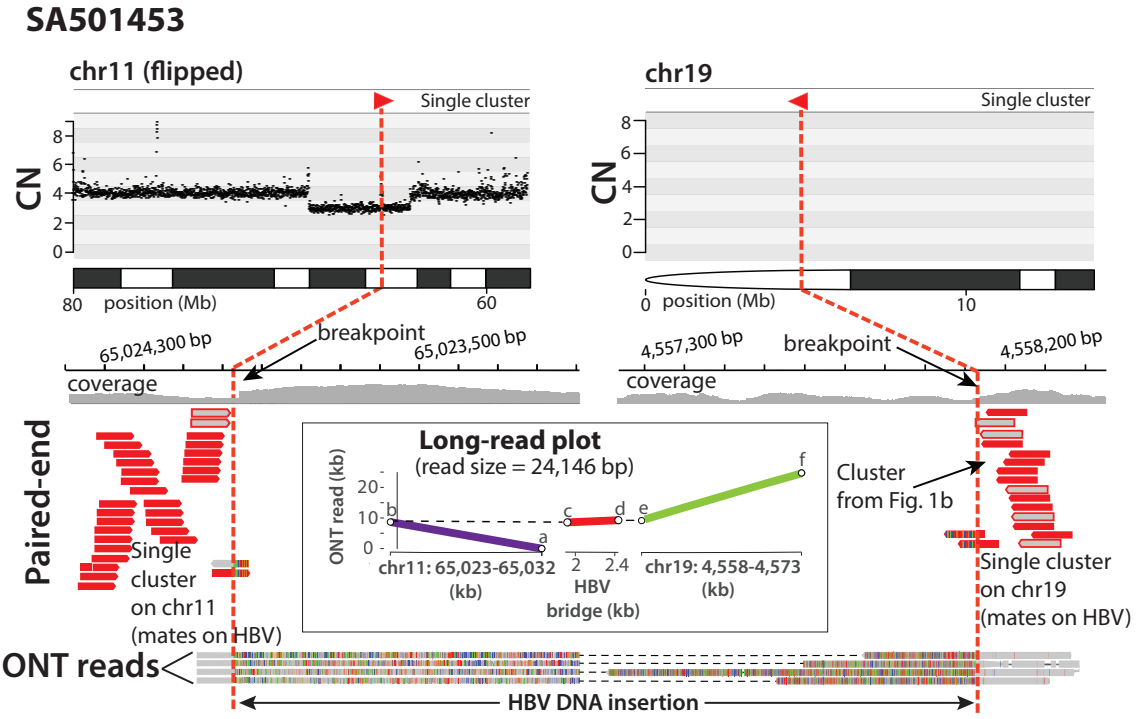


Figure 2. Long-read sequencing reveals cryptic HBV-mediated translocations in human HCC. In HCC SA501453, a hidden interchromosomal rearrangement between chromosomes 11 and 19 is identified using Oxford Nanopore Technologies (ONT). The copy number plot (CN) at the top shows the copy number profiles of the chromosomes involved in the rearrangement (note that the CN plot on chromosome 11 is flipped for illustrative purposes). The Illumina paired-end sequencing data (short reads in red) show two single clusters of discordant read pairs, one on 11q and a second on 19p, pointing to HBV insertion events that cannot be bridged due to Illumina library size constraints. The bottom shows four long reads obtained with ONT that reveal the real configuration of the hidden rearrangement, consisting of a 640 bp HBV DNA insertion bridging a translocation between 11q and 19p. ONT reads were cut (discontinued) for illustrative purposes. The long-read plot represents the alignment of one ONT read – 24 kb long – to chromosomes 11

and 19 of the human reference genome and to an HBV consensus sequence. The long reads used to construct the long-read plots are annotated in Supplementary Data for Figures.

It is important to highlight how viral integrations can lead short-read SVs callers to retrieve wrong results. On the one hand, sometimes viral reads align incorrectly with some regions of the genome. Due to this misalignment, the callers identify these kinds of events as a translocation, when it is just a canonical viral integration. On the other way around, when translocations are coupled with a viral integration, if its length is longer than the Illumina insert size, the translocation is not detected as read pairs of both integration sides are not connected. Actually, this is the case of the previously described translocation, in which the genomic breakpoints remained unnoticed by a set of four different structural variant calling pipelines, which were employed in the identification of genomic rearrangements in the PCAWG dataset. Despite this fact, somatic rearrangements linked to HBV insertion sites have been recently identified using long-read sequencing technologies in human HCC cell lines [170] and primary tumours [175].

Telomeric deletions mediated by HBV DNA insertions in HCC

Many non-canonical HBV insertions occur in association with megabase-size deletions that remove telomeric regions of chromosomes. For instance, in HCC tumour SA529726, the paired-end sequencing data revealed one single cluster of an HBV insertion on the short arm of chromosome 3. Here, the insertion boundary is associated with a large copy number loss (Fig. 3a), suggesting that the insertion event occurred in conjunction with a telomeric deletion that removed 21 Mb of chromosome arm 3p. Long-read sequencing was performed on this sample, which revealed that the telomeric deletion occurred due to an unbalanced translocation between chromosomes 3 and X bridged by a 3.3 kb HBV insertion that shows a classical fragmented and rearranged form [5,17] (Fig. 3a; Supplementary Fig. 1a). In the same sample, the ONT data showed a second, unrelated HBV insertion (3.5 kb long) that bridges a translocation between chromosomes 4 and 7, associated with a 20 Mb telomeric deletion on 4q (Fig. 3a; Supplementary Fig. 1b). Similarly, in another remarkable HCC tumour, SA501511, up to three different HBV insertions were found associated with large deletions – 20.5, 33.6, and 76.7 Mb long – removing the telomeres on chromosome arms 10p, 4p and 13q, respectively (first circos plot in Fig. 3b). This time, the long-read sequencing data revealed three cryptic HBV-mediated translocations between the long arm of chromosome 8 and the relevant deletion breakpoints on chromosomes 4, 10 and 13 (Fig. 3b; Supplementary Fig. 2a-c).

A screening of the PCAWG HCC dataset looking for other HBV insertions demarcating huge telomeric copy number loss events, which could involve the same mutational mechanism, yielded 26 additional events in 19 different HCC tumours (Supplementary Fig. 3). Hence, ~8% (23/296) of all HCC samples in the PCAWG dataset bear the hallmarks of this mutational process (Supplementary Data 1). These 23 samples carry in total 40 telomeric deletions apparently caused by HBV integration. Three of these samples (SA501424, SA501481 and SA529830) were analysed by whole-genome long-read sequencing with ONT, which confirmed cryptic interchromosomal rearrangements linked to telomeric deletion breakpoints in all of them (Fig. 3b), demonstrating that this aberrant mutational mechanism mediated by HBV insertions is recurrent in human HCC.

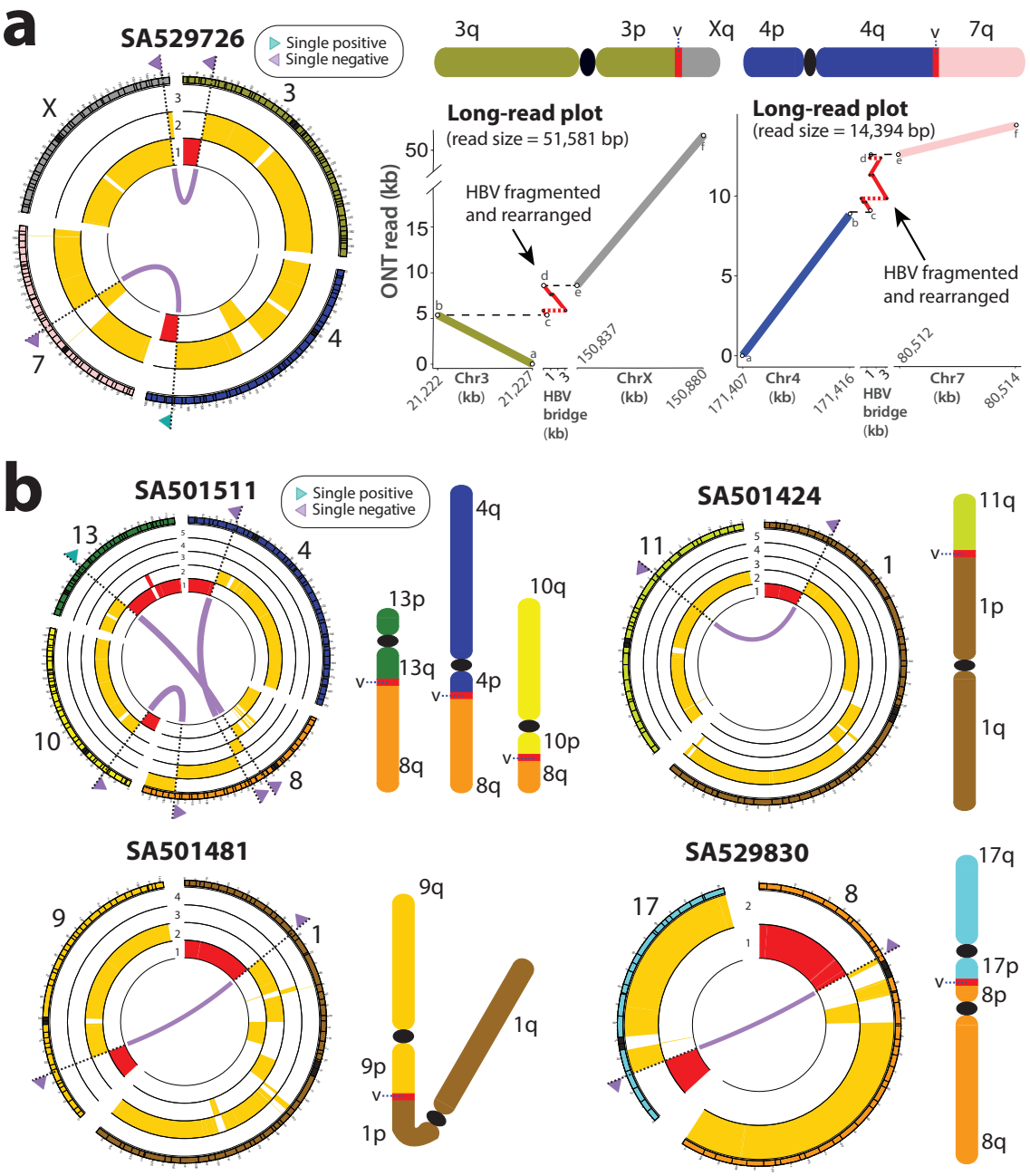


Figure 3. HBV DNA integration mediates interchromosomal genomic rearrangements that lead to megabase-size telomeric deletions in HCC. (a) In tumour SA529726, two unrelated HBV-mediated interchromosomal rearrangements between chromosomes 3 and X, and between chromosomes 4 and 7, promote 21.2 Mb and 19.8 Mb telomeric deletions on the 3p and the 4q, respectively. The circos plot (left) represents the translocations (purple lines) revealed by ONT data. Single clusters identified with paired-end mapping data are denoted as triangles (green for positive orientation, purple for negative) on the chromosome ideograms. The copy number profiles are shown in yellow below the chromosome ideograms, with relevant telomeric deletions highlighted in red. The long-read plots (right) represent the alignment of one ONT long read to chromosomes 3 and X, and chromosomes 4 and 7, of the human reference genome and an HBV consensus sequence, which validates the interchromosomal rearrangements mediated by the virus shown in the circos plot. Here, the analysis of the long reads supporting the HBV events showed an HBV DNA insertion in a classical fragmented and rearranged form [170,179]. The expected configuration of the rearranged chromosome is shown above each long-read plot (the ideograms

are for illustrative purpose only); 'v' denotes the HBV insertion. The long reads used to construct the long-read plots are annotated in Supplementary Data for Figures. (b) Circos plots and chromosome diagrams of similar HBV-mediated non-homologous translocations promoting megabase-size telomeric deletions in four additional HCC tumours. Again, the expected configuration of the rearranged chromosome is shown next to each circos (the ideograms are for illustrative purposes only). In SA501511, three unrelated HBV-mediated translocations involving different loci on chromosome 8 promote huge deletions involving telomeric regions on chromosomes 13q, 4p and 10p. In SA501424, one HBV insertion bridges a genomic translocation between chromosomes 1 and 11 that generates a terminal deletion at 1p. In SA501481 and SA529830, HBV-mediated translocations generate dicentric chromosomes and promote megabase-size terminal deletions.

Notably, in two of the samples sequenced with ONT (SA501481 and SA529830) the configuration of the rearrangement found supports a derived chromosomal fusion that generates a dicentric chromosome (i.e., a chromosome with two centromeres; Fig. 3b). These chromosomes are known to represent a potential source for breakage-fusion-bridge (BFB) repair [102,180]. This phenomenon, first proposed by Barbara McClintock [181,182], consists of the generation of a sister chromatid from a DNA fragment released after a double-strand break. The ends of both chromatids are joined to avoid cell death and successive double-strand breaks happen during the following mitosis, due to chromatid separation. Thus, this repetitive process is known as BFB cycle, creating rearrangements such as inverted duplications [183]. Nonetheless, dicentric chromosomes can become stabilized due to reduced intercentromeric distance or by means of inactivation of one of the two centromeres 19, avoiding BFB cycles. Here, the absence of copy number profiles and chromosomal rearrangements typically associated with BFB cycles supports the last scenario.

In this work, the whole genomes from nine of the HCC samples in the PCAWG dataset were obtained using ONT long-read sequencing, seven of them bearing HBV-mediated telomeric deletions. The reconstruction of the nucleotide sequences from the inserted HBV DNA showed that, in general, insertions mediating telomeric deletions tend to have a more complex structure than canonical ones, including deletions, duplications and inversions of the reference HBV genome (Supplementary Fig. 4).

HBV insertions are clonal events acquired early in HCC evolution

The present results illuminate a scenario where rearrangements mediated by viral DNA integration are important remodelers of human HCC genomes. The analysis of copy number profiles revealed that many HBV-mediated rearrangements occurred in chromosomes with copy number gains, providing opportunities for timing analyses [120,121]. To pinpoint these rearrangements on a timeline from the fertilized egg to tumour diagnosis, current timing algorithms were modified to operate with single read-clusters only (see Materials and Methods). The method revealed that somatic insertions of HBV DNA in HCC are typically clonal events that have been acquired early in tumour evolution (i.e., prior to the copy number gain). For example, in one notable HCC, SA269680, which underwent whole-genome duplication (WGD), eleven viral insertion events were identified. All but one were catalogued as early events (Fig. 4a; Supplementary Data 3), and five of these early events correspond to single clusters associated with megabase-size copy number losses (Supplementary Fig. 3), supporting the notion that these large-scale rearrangements may be important in the initial stages of liver oncogenesis.

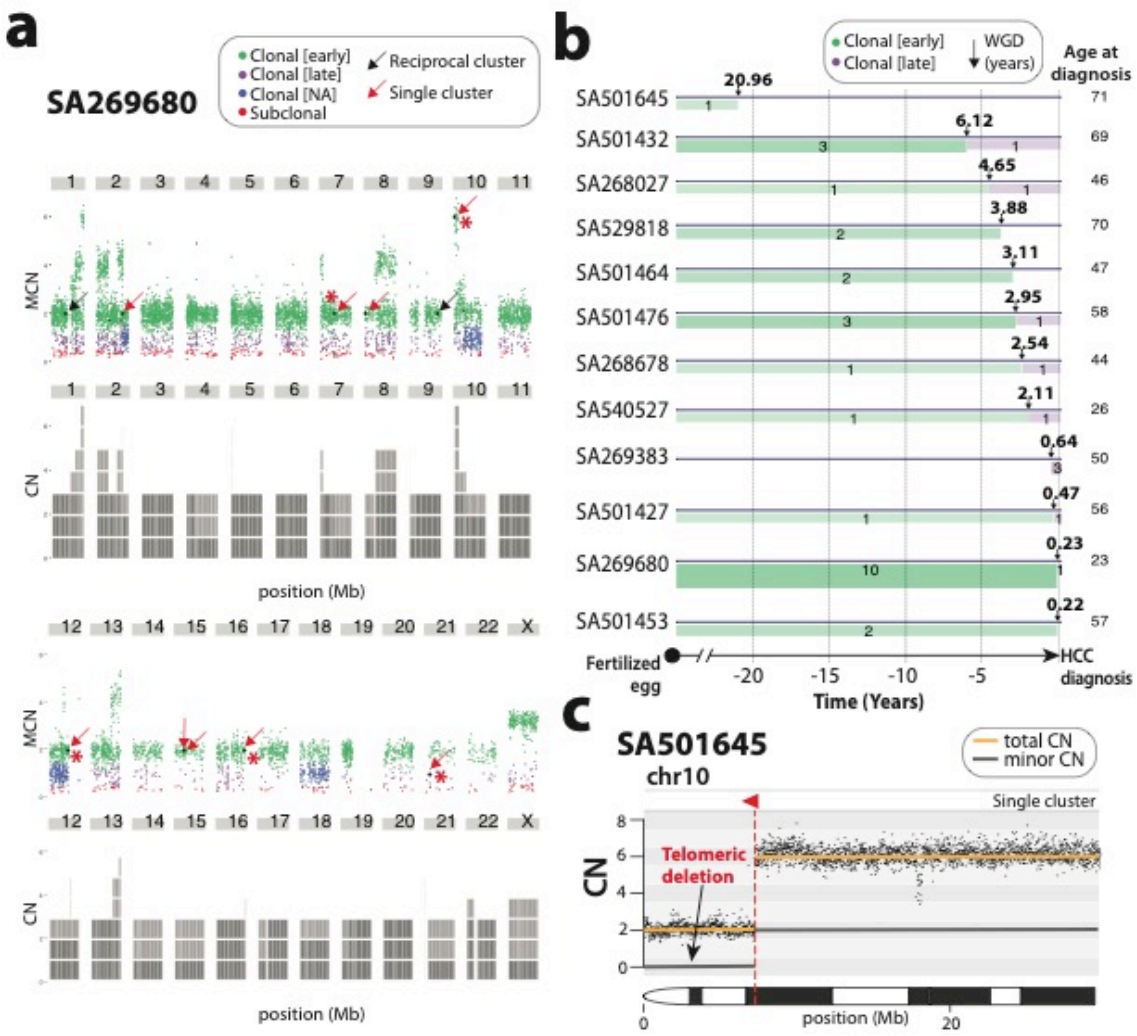


Figure 4. HBV-mediated rearrangements are early clonal events in HCC evolution. (a) In SA269680, an HCC with a whole-genome duplication, HBV insertions are shown in the context of point mutation burden for that sample. Coloured dots above chromosome ideograms represent point mutations with different timing: early clonal (before the whole-genome duplication; green), late clonal (after the whole-genome duplication; purple), clonal (blue) and subclonal (red). Nine HBV single clusters were identified (black dots with red arrows), all but one catalogued as early clonal events. Five of these early HBV insertions (marked with red asterisks) are associated with megabase-size telomeric deletions (see copy number plots in Supplementary Fig. 3). The same sample bears two additional early clonal HBV canonical insertions (black dots with black arrows). Grey blocks below chromosome ideograms represent the copy number profile. MCN stands for Minor Copy Number. (b) Real-time timing estimation of HBV insertions along patients' lifetime in samples with whole-genome duplication events. The X-axis shows the time interval when – before (green) and after (purple) – the somatic HBV insertions took place relative to the WGD event; the thickness and strength of the green and purple bars correlate with the number of events. Black arrows represent when a WGD event took place, and the numbers above arrows show the time – in years – before HCC diagnosis when the WGD event has occurred. Numbers within the green and purple timelines represent the number of insertion events. Numbers at the end of the timeline represent the age of the patient at diagnosis. (c) Copy number plot showing a single cluster that supports an HBV insertion event (red triangle) associated with a 7 Mb telomeric deletion on chromosome 10 in SA501645 that, according to Fig. 4b, occurred at least 20.96 years before HCC diagnosis. The gold line represents total chromosome CN, and the grey line is the minor chromosome CN.

Several studies support the idea that HBV integrations are early events during tumour development [184–186], found even in infected non-malignant tissue [187]. Given these results, it would be of real interest to know how early these integrations are with respect to tumour diagnosis. Thus, to further investigate the clinical relevance of HBV integration in HCC, real-time estimation data of WGD events from PCAWG [121] were employed to perform a more precise timing estimation of HBV events along patients' lifetime. The method is based on the analysis of mutational clock signatures that correlate with patient age at diagnosis [188], which can be used for the timing of WGDs and their associated variants [121]. This approach allowed real-time timing of 37 HBV insertions (8 canonical and 29 non-canonical) embedded in WGD tumours (Fig. 4b; Supplementary Data 4) and revealed some of these rearrangements appear many years before diagnosis. For instance, in HCC SA501645, a cryptic HBV-mediated rearrangement in chromosome 10, coupled with a 7.3 Mb telomeric deletion on 10p, occurred at least 21 years before the patient was diagnosed with HCC (Fig. 4b-c).

This is particularly relevant for chronic hepatitis B patients in the "immune-tolerant" phase, a stage of the disease characterised by no-fibrosis or minimal fibrosis for which antiviral therapy is not recommended by current patient management guidelines [145,189,190]. However, levels of HBV replication in this stage are very high [145,189], generating the template of double-strand linear DNA (dslDNA) [191] required for the somatic acquisition of the HBV DNA insertions and HBV-mediated rearrangements that, eventually, drive the oncogenic process.

In addition to possible changes in chronic hepatitis treatment, this time estimation opens new insights into the rapid diagnosis of severe liver damage. The prognosis of HCC, and virtually all cancers, depends on how early they are diagnosed. As HCC derived from HBV infection presents non-specific symptoms in early phases, most cases are diagnosed at middle or advanced stages. However, most effective treatments are only applicable for those tumours in early stages, deriving in high mortality rates [192]. Indeed, the survival rate within five years is less than 20% [193]. This is even more important when talking about non-cirrhotic HCC. Even though most HCCs arise from a liver cirrhotic state, 20% of them do not go through this grade of liver disease. Remarkably, HBV, together with non-alcoholic fatty liver disease, is one of the major causes of this HCC development pathway. Thus, due to the lack of an acute liver disease episode and surveillance, these cancers are commonly detected late, leading to poor outcomes [194].

HBV integration is found in 70% [192,195]-90% [193] of all HCC, even after the clearance of HBV infection (measured by HgsAg seroconversion). As here evidence that integrations happen very early is provided, their detection can be a reason for a closer HBV+ patient follow up. In this line, detection of chimeric human-viral sequences in serum was proposed as a novel cell-free tumour-specific DNA biomarker for diagnoses. As HBV integrations are early events in tumour development, their monitorization and detection will allow rapid HCC detection and higher survival rates [193]. In addition to early diagnosis, circulating chimeric DNA was also recently proposed to be a biomarker of HCC recurrence [192]. Overall, the fact that integrations happen early in tumour development, may have important consequences in the prevention, early diagnosis and treatment of the disease.

HBV insertion rate varies across the HCC genome

To understand the properties of the insertion points of HBV DNA, the genome-wide distribution of 148 somatic events was analysed (including 42 canonical and 106 non-canonical). Considerable variation in the rate of HBV integration was found (Fig. 5a). One region at chromosome 5p, with 13 HBV insertions, stands out over the others, with a hotspot in the *TERT* gene (11 HBV insertions in *TERT*, nine of them located upstream of the gene close to the promoter region; Fig. 5a and Supplementary Data 5). This cancer gene has been previously identified as a main target for HBV insertions [139,175,176,196], which are the cause of *TERT* focal amplification and *TERT* promoter activation [175]. Notably, 72% (8/11) of the events in *TERT* represent non-canonical insertions of HBV, which confirms previous data showing that this relevant gene can be targeted by genomic rearrangements bridged by the virus [175].

TERT gene is widely known as it encodes the catalytic subunit of the telomerase enzyme. The action of this complex is also largely studied, as its function is the maintenance of the telomeres, repetitive DNA sequences located at chromosomes' ends. Telomeres prevent chromosomes from abnormal sticking and degradation, and they are elongated at each cell division by the telomerase. To ensure normal cell division, *TERT* expression is very low and cells with too short telomeres die through apoptosis. That's why overexpression of this enzyme is extremely relevant in cancer progression, especially shown in melanoma and acute myeloid leukaemia. Remarkably, deregulation of *TERT* by HBV integration has also been suggested to promote uncontrolled cell growth and proliferation in HCC [143].

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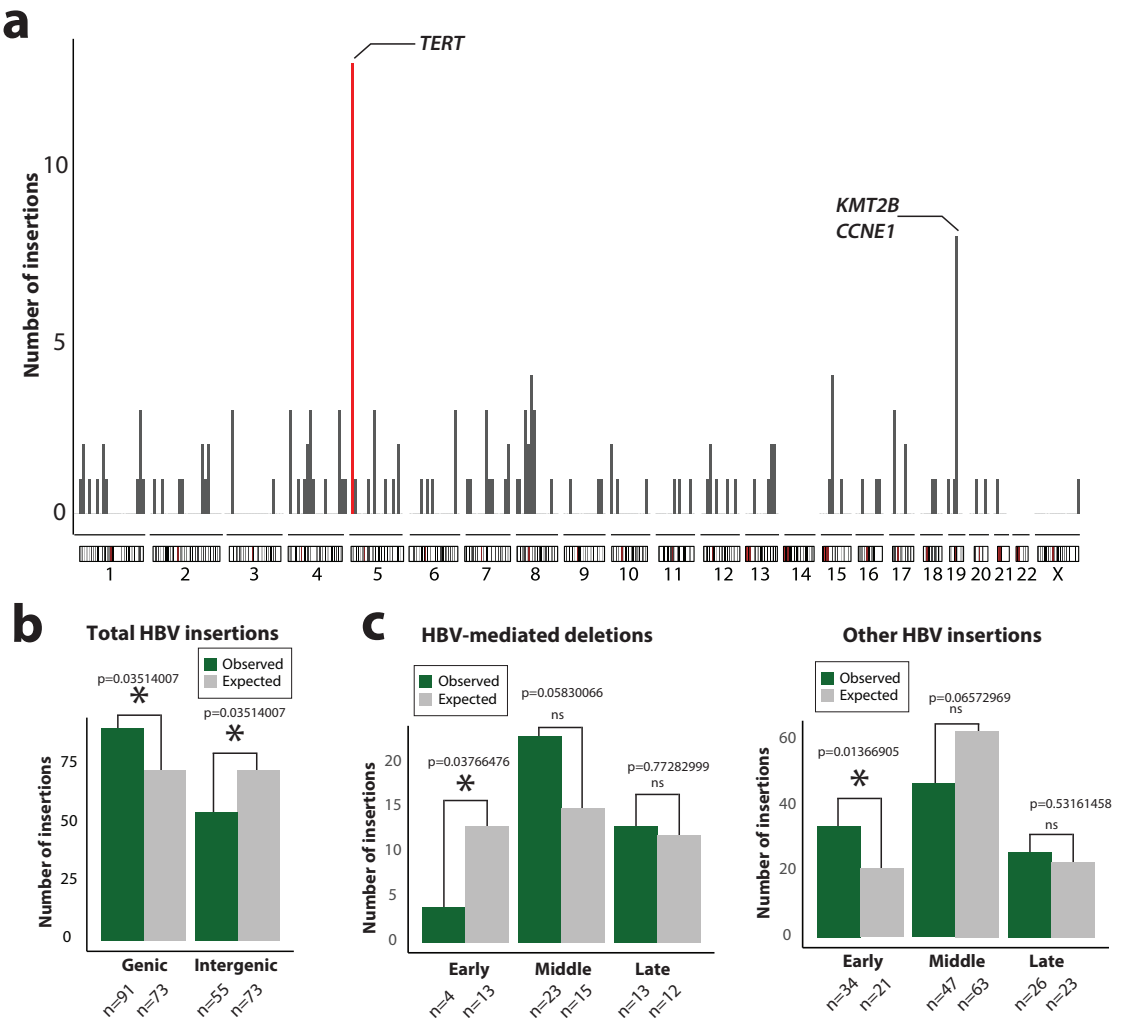


Figure 5. Distribution of HBV insertions across the HCC genome and association with genomic organization features. (a) Bars show the number of HBV insertions per 10-Mb window of the genome. The red bar represents the *TERT* hotspot at chromosome 5p. Other genes (*KMT2B* and *CCNE1*) with a high rate of HBV insertion are shown at chromosome 19q. (b) HBV insertions are more frequent in genes than expected by chance (chi-squared test, p-value=0.0035, n=91) and depleted in intergenic regions of the genome (chi-squared test, p-value=0.035, n=55). False Discovery Rate (FDR) correction was applied (see Materials and Methods). (c) HBV events at telomeric deletion breakpoints are depleted in regions of the genome exhibiting early replication timing (chi-squared test, p-value=0.037, n=4), while the remaining HBV insertions show the opposite pattern (chi-squared test, p-value=0.013, n=34). "ns" stands for not significant. FDR correction was applied.

Even though, according to other studies [185,197,198], HBV integrations are randomly distributed across the human genome in the PCAWG dataset (Fig1a), integrations within genes, in addition to *TERT*, have been recurrently reported, involving *CCNA2*, *CDKN2A* or *MAPK1*, among others [139,199]. Actually, the analysis of the PCAWG HCC cohort showed significant enrichment of HBV integration events in genes (p-value=0.035, Fig. 5b) and a depletion in intergenic regions (p-value=0.035; Fig. 5b). Notably, 61% (91/148) of all HBV events fall within gene boundaries. Apart from *TERT*, other cancer-related genes with recurrent insertions within gene boundaries are *KMT2B* (n=4, three in coding exons) and *CCNE1* (n=2, all intronic), both at chromosome 19q (Fig. 5a). *CCNE1*

participates with *TERT*, and with many other proteins, in the control of the cell cycle and it is also in the list of recurrent HBV integration targets. It encodes the cyclin E protein that triggers the S phase start and progression. Therefore, mutations in this protein can lead to deregulation of the cell cycle driving oncogenesis. *KMT2B* can also contribute to this malignant process since it is involved in histone modification. It has been reported to be mutated in different cancer types, including in HCC by viral integrations, and it can act as both, an oncogene or tumour suppressor [143].

To further characterise the patterns of HBV integration in human HCC, the association of HBV events and genomic features was studied, including chromatin state, replication timing and gene expression (Fig. 5c and Supplementary Fig. 5). When the HBV events were split into those linked to megabase-size telomeric deletions (n=40) and the remaining HBV insertions (n=108), it was observed that while the category of HBV insertions with no telomeric deletions exhibits the expected pattern for canonical HBV insertions, characterised by an enrichment in regions of early replication timing [196], HBV insertions causing telomeric deletions are depleted in those regions (p-value=0.013 and p-value=0.037, respectively; Fig. 5c). This could be due to different DNA repair mechanisms driving the integration of HBV DNA at different stages of the S phase of the cell cycle [200].

HBV-mediated telomeric deletions cause loss of tumour suppressor genes

A total of 40 HBV-mediated rearrangements with telomeric deletions were found, involving 23 HCC samples. Intriguingly, there are instances in which essential tumour suppressor genes are lost by this mutational mechanism, which may provide the driver rearrangements that a cancer clone requires to survive and grow. In one remarkable HCC tumour, SA529830, one paired-end single cluster supporting an HBV insertion on the short arm of chromosome 17 was identified. The insertion occurred in conjunction with a 14.9 Mb clonal telomeric deletion at the integration site, which removed one copy of tumour suppressor gene *TP53* (Fig. 6). Notably, the second copy of *TP53* in this tumour is inactivated by the missense point mutation C242S [201,202] (Supplementary Fig. 6). The paired-end data showed a similar pattern on the short arm of chromosome 8, where a single cluster supporting an HBV insertion occurs together with a loss of the first 41 Mb of the chromosome. The patterns suggest that an HBV DNA molecule could be bridging an unbalanced translocation between chromosomes 17 and 8 that would generate a dicentric chromosome (see circos plot in Fig. 3b). Whole-genome long-read sequencing was carried out, which confirmed the expected configuration of this relevant rearrangement (long-read plot in Fig. 6). In addition, in situ hybridization was performed to identify the loss of *TP53* and the chromosomal fusion between chromosomes 17 and 8, which further validated these concomitant events (Supplementary Fig. 7).

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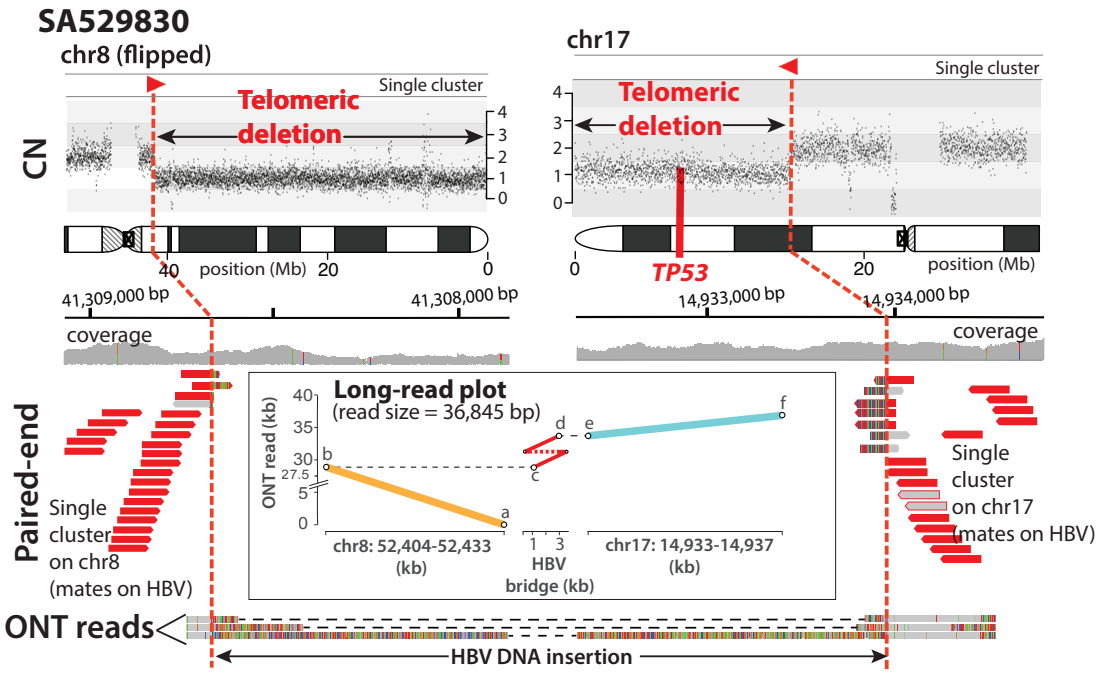


Figure 6. HBV-mediated translocations may lead to the loss of tumour suppressor gene *TP53*. In HCC SA529830, a cryptic interchromosomal rearrangement between chromosomes 17 and 8 is bridged by a 4,829 bp HBV insertion associated with a 14.9 Mb telomeric deletion on chromosome 17 that removes one copy of the tumour suppressor gene *TP53*, and a second 43 Mb telomeric deletion on chromosome 8. Note that the CN plot on chromosome 8 is flipped for illustrative purposes. Single paired-end clusters (short reads in red) on chromosomes 17 and 8 demarcate the boundaries of both deletions and support the insertion of HBV DNA. One ONT read of 36,845 bp evidences the extent of the rearrangement, whose alignment onto the reference genome – chromosomes 8 and 17 – and to a consensus HBV sequence is shown in the long-read plot. ONT reads were cut (discontinued) for illustrative purposes. The configuration of the rearrangement predicts the formation of a dicentric chromosome (Fig. 3b). The long reads used to construct the long-read plots are annotated in Supplementary Data for Figures.

TP53 is the first-ever defined tumour suppressor gene and presumably the most studied cancer-related gene. Maybe because of this reason, multiple functions have been attributed to its encoded protein, p53, which is known to have a dynamic behaviour. Nonetheless, its main functions are related to the arrest of the cell cycle, as well as the promotion of senescence and apoptosis. Thus, it is an essential tumour suppressor gene and the loss of its function has been reported in many cancer types, among other diseases [203]. In particular, the inactivation of p53 has been reported in HBV-related HCCs, mainly by the action of HBx oncoprotein [204]. Here, another viral-related mechanism is shown, by which this tumour suppressor gene is depleted, contributing to malignancy.

Similarly, it was identified in one additional HCC tumour, SA501481, an HBV insertion into the chromosome 1, associated with the deletion of one copy of the tumour suppressor gene *ARID1A* (Fig. 7a). Here, paired-end data show a single cluster of reads, whose mates support the HBV insertion, demarcating a copy number loss of the first 57.2 Mb of 1p including *ARID1A*. Again, in this case, the DNA region on the other side of the rearrangement mediated by the virus was initially undetectable, due to Illumina library insert size constraints. The paired-end data showed an analogous pattern in chromosome

9, with an independent cluster supporting an HBV insertion that occurred together with a telomeric deletion of the first 41 Mb of 9p at the integration site. This scenario suggested a cryptic unbalanced translocation between 1p and 9p, generating a dicentric chromosome (see circos in Fig. 3b), which was confirmed by long-read sequencing with ONT (long-read plot in Fig. 7a).

ARID1A encodes a subunit of the SWI/SNF chromatin remodelling complex and is a relevant cancer gene harbouring monoallelic loss-of-function mutations in 10-15% of human HCC samples [205]. In normal cells, it contributes to stop cell proliferation and participates in DNA repair and cell apoptosis. Thus, the loss of this tumour suppressor gene was described to contribute to liver cancer development and it is associated with poor disease outcomes [206–208].

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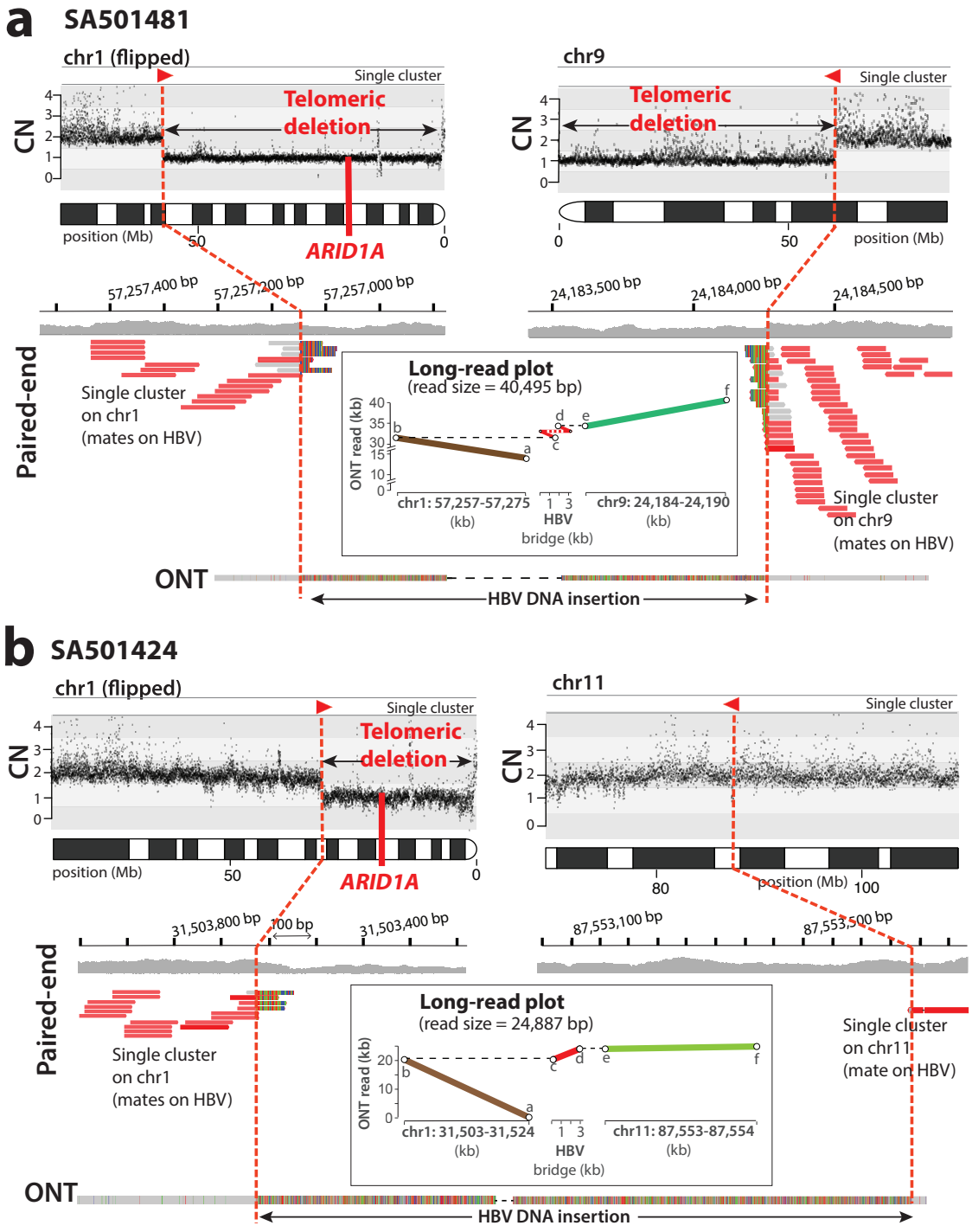


Figure 7. HBV-mediated translocations lead to recurrent loss of tumour suppressor gene *ARID1A*. (a) In HCC tumour SA501481, the Illumina paired-end data (short reads in red) show two clusters, one on chromosome 1 and another on chromosome 9, which point to both extremes of an HBV insertion. The copy number (CN) plot at the top shows the total (gold line) and minor (grey line) chromosomes' copy number profiles. The CN plot reveals two telomeric deletions associated with HBV events, one that removes 57.2 Mb on 1p, including one copy of the *ARID1A* tumour suppressor gene, and a second deletion that removes 21.2 Mb on 9p. Note the CN plot from chromosome 1 is flipped for illustrative purposes. The long-read plot shows a 2,688 bp HBV insertion that bridges an interchromosomal rearrangement between chromosomes 1p and 9p. The configuration of the rearrangement predicts the formation of a dicentric chromosome (Fig. 3b).

(b) A similar scenario, in tumour SA501424, where an HBV DNA insertion induces an interchromosomal translocation between chromosomes 1 and 11. The Illumina paired-end data (short reads in red) show two single clusters, one on chromosome 1 and another on chromosome 11, which point to both extremes of an HBV insertion. The CN plot at the top reveals a 31.5 Mb telomeric deletion on 1p associated with the HBV insertion event (note that the CN plot from chromosome 1 is flipped for illustrative purposes). Here, the associated telomeric deletion on chromosome 1 removes one copy of the tumour suppressor gene *ARID1A*. The long-read alignment plot demonstrates an interchromosomal rearrangement between chromosomes 1 and 11 mediated by an HBV insertion. The long reads used to construct the long-read plots are annotated in Supplementary Data for Figures.

Notably, in a different HCC sample, SA501424, a similar scenario to the one described above was found. This time, an HBV insertion demarcates a deletion of the first 31.5 Mb of chromosome 1p, which again involves the loss of one copy of *ARID1A* (Fig. 7b). Hence, long-read sequencing with ONT was performed, which revealed a cryptic interchromosomal rearrangement between chromosomes 1p and 11q bridged by HBV (see circos in Fig. 3b). The deletion and the chromosomal fusion were also validated by in situ hybridization (Supplementary Fig. 7).

Overall, the analysis of the copy number data from the 23 HCC samples with telomeric deletions showed that these alterations result in the loss of 244 genes classified as tumour suppressor or loss-of-function genes, according to Cancer Gene Census (CGC) and Intogen, respectively (Supplementary Data 6). Thirty-seven of these genes are found to be involved in human HCC in the mentioned databases.

FAT1 is the most frequently affected gene, being lost in six different samples. It encodes a protocadherin, participating in cell adhesion, proliferation and migration. Actually, it takes part in key processes and pathways. For instance, it is involved in the correct function of the cytoskeleton through the Ena/VASP pathway. Regarding the Wnt/β-catenin pathway, it participates in the β-catenin transportation to the nucleus and regulates the expression of important genes of this pathway, such as *MYC* or *CCND1*. Even though its relation with the Hippo signalling pathway is not very well established, it is known that FAT1 is an upstream factor of it, preventing uncontrolled growth. Cell proliferation is also regulated by FAT1 through the MAPK/ERK pathway, even its role is not well defined. However, the participation in this pathway as well as in other cellular processes gives FAT1 an important role in the epithelial-mesenchymal transition (EMT) [209].

Hence, it is not rare that its mutation has been linked with different cancer types such as head and neck, oesophageal and HCC, among others [209]. Despite its role in previously described pathways, together with the fact that it is described as a tumour suppressor gene in both CGC and Intogen databases, the role of *FAT1* in HCC is controversial. Indeed, some studies describe its function as a tumour promoter [210,211]. However, it has been reported to be deleted in several samples of HCC, according to the results of the present work [212,213]. Thus, more studies are needed to unravel the overall role of this gene in HCC.

FAT1 is not the only member of the FAT atypical cadherins family that is affected by the HBV integrations in these samples. Interestingly, *FAT1*, together with the second most studied member of this family, *FAT4*, are simultaneously deleted in two samples. Even though the overall knowledge of the latter is more limited than the knowledge of *FAT1*, the majority of the studies point out its function as a tumour suppressor gene, with few exceptions [214]. This also applies to HCC, as there are several studies reporting its potential

role as a tumour suppressor in this cancer type [215,216]. As members of the same family, it shares some pathways with *FAT1*, such as the Hippo pathway, contributing to the inhibition of cell proliferation [217].

Notably, at least three of these depletions of tumour suppressor genes are reported in the Compendium of driver copy number alterations of the PCAWG Consortium [91]. These three events are described above and include the deletion of *TP53* in sample SA529830 (Fig. 6), the deletion of *ARID1A* in sample SA501424 (Fig. 7), and the loss of one copy of the *RB1* gene in a 13q telomeric deletion from sample SA501511 (Fig. 3b and Supplementary Fig. 2c). Regarding HCC, patients with *RB1* inactivating mutations were described to have a poor prognosis [218].

In addition, although not included in the PCAWG Compendium, three additional clonal telomeric deletions removing one copy of two relevant cancer genes in human HCC were found. First, in sample SA529726, a telomeric deletion at chromosome X removes one copy of the loss-of-function gene *RPS6KA3*, which encodes a member of the Ras/MAPK signalling pathway and can control cell differentiation [219–221] (this rearrangement is described in Fig. 3a). Second, two unrelated deletions were found, in patients SA268027 and SA269383, that remove one copy of the *IRF2* gene (Supplementary Fig. 3). *IRF2*, which encodes the interferon regulatory factor 2, plays an important role in cell growth control and immune response. Although it is not catalogued in CGC nor Intogen, functional studies have identified it as a cancer suppressor gene in HBV-related HCC, as its loss of function leads to p53 inactivation [221]. These results provide evidence that this is a mutational mechanism that likely contributes to the development of human HCC.

HBV integration mechanism

Although the mechanism of integration of this virus is largely unknown, several models have been proposed based on different observations of the integrated sequence and its flanking DNA [143]. However, it is important to notice that these sequences can suffer changes after the integration, modifying the initial features of the event and leading to misinterpretations.

The 80s were the ‘golden decade’ of HBV integration mechanisms since almost all models were proposed during those years. One of them describes two types of junctions, one is dependent on two sequences (direct repeats, DR1 and DR2) near the ends of viral strands, while the other is independent of them. Given that, a model where DR sequences are necessary for the joint with cellular DNA and then recombination produces the other kind of junctions was proposed. In addition, the reorganization of the HBV genome before integration was hypothesised as a similar mechanism. Here, inverted DRs are unstable and can lead to integration followed by HBV DNA rearrangements that can even cause the deletion of DR sequences [222]. This integration mechanism did not explain the patterns observed in a succeeding study [223]. Thus, they proposed an HBV site-specific roll-in replication based on small sequence homologies and the existence of relaxed circular HBV DNA in the nucleus. Other authors found flanking repetitive regions at both sides of HBV integrations [224]. To explain them, they hypothesize that DNA from reverse transcription is integrated within unspecific cellular genomic breaks and the cell repair mechanisms create direct repeats of human flanking DNA.

Another hypothesis is based on DNA polymerase switches. During the 'single-stranded gap' integration, the cellular DNA polymerase switches from the cellular DNA to the single-stranded HBV DNA, likely close to the 5' end. Then, after the recombination of viral and human strands, single-strand gaps are filled and the ligation of DNA tips leads to the completion of the integration [225]. Koch et al. (1984) proposed a similar model, also based on the switch of the DNA polymerase from cellular to viral DNA. In addition, they reported the existence of human viral homologies at integration sites that would participate in the positioning of viral DNA close to cellular DNA prior to recombination. Thus, HBV integration could have some preferential human genomic sites instead of being completely random [226]. Polymerase switches are also described in another proposed mechanism, in which cellular enzymes are responsible for cutting and ligating viral and human DNA. This non-homologous recombination leads to the creation of a small deletion in the target site [227]. A more recent study not only reaffirms this NHEJ model but also adds the role of microhomology-mediated end joining (MMEJ), since identical nucleotide sequences between the human and viral genome (i.e., microhomologies) are sometimes found at integration breakpoints [228].

Despite the several efforts that have been done trying to unravel it, the HBV integration mechanism is still quite opaque. Of note, the majority of models proposed, which are not mutually excluded, derive from studies applying old-school techniques, mainly restriction enzymes. Thus, new studies that investigate this topic are needed.

In a nutshell, the patterns of a recurrent, quite remarkable mutational mechanism are described here. It occurs in the early stages of human HCC development whereby HBV DNA integration mediates interchromosomal rearrangements contributing to megabase-size telomeric deletions, which may lead to the loss of tumour suppressor genes. The results of this doctoral thesis demonstrate that the consequences of this mutational mechanism are dramatic for the architecture of HCC genomes and, on occasion, the resulting structural configuration can drive the oncogenic process. This mutational mechanism is active early during tumour evolution since some HBV-mediated rearrangements can occur as early as 21 years before cancer diagnosis. Overall, these data underscore the importance of characterising liver cancer genomes for patterns of HBV integration, and raise the question about the potential benefit of an earlier antiviral therapy against HBV, in HBV-infected patients, to prevent the acquisition of early driver mutations caused by the virus in the initial stages of liver cancer development.

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RESULTS AND DISCUSSION: VIRUNS

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RESULTS AND DISCUSSION: VIRUNS

VIRUNS (VIral-Reference UNions Search)

Taking into account the huge impact that viral integrations can have, it reveals crucial to have pipelines for its quick and accurate detection. The development of massive parallel short-read sequencing has enabled the access to host and viral sequences in large collections of thousands of cancer genomes as the PCAWG dataset [91]. The systematic analysis of these publicly available cancer genome cohorts has the potential to illuminate the aetiology of viral-associated cancers and uncover novel cancer-associated viruses. In addition, detecting whether the viral nucleic acid is inserted as part of the host genome or not is crucial to better understand the relationship between viruses and cells. This would lead to better knowledge about the aetiology of viral-related diseases and open new approaches to treat them.

The number of computational methods for viral integration detection from short-read WGS data is limited. They typically rely on the identification of discordant read pairs and split read signatures, although the algorithmic approaches are variated. Tools such as Vy-PER [229], align reads into the reference genome first to subsequently realign unmapped reads into the viral genome. In contrast, Virus-Clip [230] and BATVI [231] among others, do the viral genome mapping first and map split reads to the human genome afterwards. Reads are aligned to chimeric viral-human genomes by tools like ViFi [232] or VirusSeq [233], which is the first publicly available tool for the detection of viral integrations in human tumour samples [234]. Other tools like VirusFinder2 [234] use a combined procedure, aligning raw reads first against the human genome and then against viral-human chimeric genomes [235]. However, currently available tools are highly computational demanding, in time, memory and disk space, preventing their application for the analysis of large scale datasets composed of thousands of cancer genomes. In addition, they are difficult to install by the user, since most of them have many dependencies requirements, sometimes hard to fulfil due to version incompatibilities. Besides, these methods are not accurate enough or are restricted to the search of certain viral families, hampering the identification of novel cancer-associated viruses [235]. Finally, emerging long-read sequencing approaches are promising for SV research, including viruses, while no viral insertion detection tool exists for analysing whole genomes derived from such type of data. VIRUNS (VIral-Reference UNions Search) was developed to try to overcome this lack, as its algorithm was generated based on the experience acquired when analysing HBV integrations.

The VIRUNS algorithm

VIRUNS takes as input a Binary Alignment Map [30] (BAM) file containing pre-aligned reads on the human reference from short- or long-read sequencing platforms. Then, VIRUNS exploits read information to seek for either canonical viral integration events or complex patterns where the viral integration bridges two distal breakpoints, typically being associated with a secondary SV, such as a duplication, deletion or translocation. Occasionally, sequence information is not able to completely resolve the integration structure, resulting in the identification of breakends (BND), where only one of the integration breakpoints can be characterised. Viral insertion calls are provided as output in the standard Variant Call Format [236] (VCF).

Given the notable differences in the analysis of short- and long-read data, VIRUNS is composed of two independent modules, one per technology. The underlying algorithm for each module is described below and represented in Fig. 8.

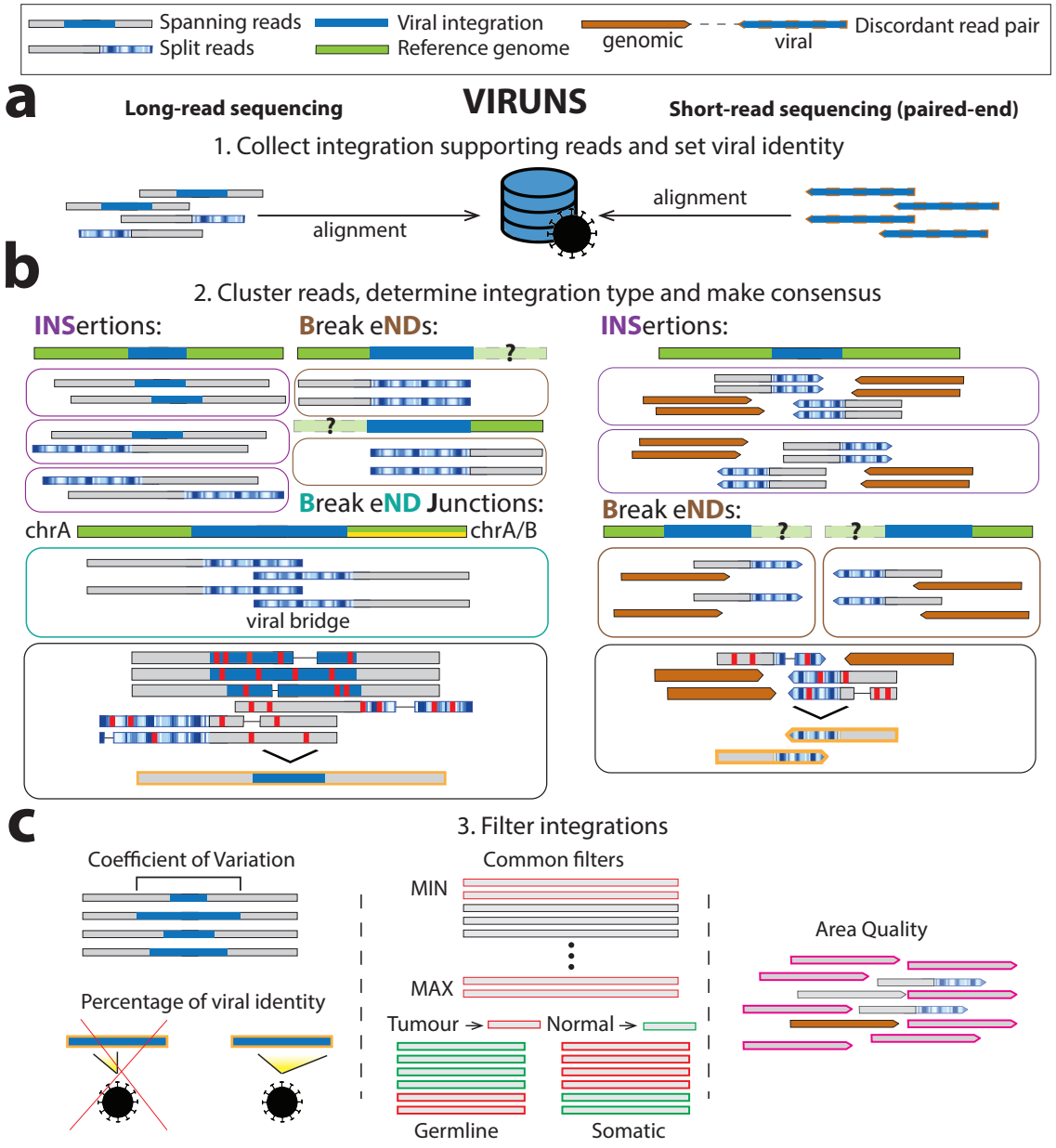


Figure 8. VIRUNS (VIral-Reference UNions Search) workflow. Schematic representation of the VIRUNS algorithm. Long- and short-read modes are depicted on the left and right sides, respectively. (a) Selection of those reads that are informative. These are spanning reads, split reads and discordant read pairs, that are aligned against the viral database. (b) Those reads that are within the same genomic position are clustered together, allowing the identification of the SV that they are supporting: insertions, break ends or break ends junctions (due to read length, junctions are only possible to find with long reads). A consensus sequence for each SV cluster is obtained when possible, polishing sequencing errors. (c) Several customizable filters are applied. In long-read mode, thresholds for the coefficient of variation of integration's length and the percentage of the integration that corresponds to a viral sequence are set. Regarding short reads, the quality and mapping pattern of the cluster's genomic region are evaluated. In both modes, a minimum and a maximum number of reads are established. If there are two input samples, integrations are classified based on their presence/absence in both of them.

Short-read module (VIRUNS_SR)

VIRUNS_SR searches for viral insertion events based on two read signatures: (a) discordant read pairs, with one mate aligning on the reference adjacent to the insertion breakpoint while the other mapping into a viral sequence; and (b) split reads, which consist of reads spanning the insertion breakpoint and therefore partially aligning on both, the reference and viral genomes. Discordant and split reads analysis is done in a four-step process in which default values can be modulated by the user:

1. Collect discordant read pairs. The input genome is divided into bins from which read pairs containing potential viral reads are collected. These are read pairs with one mate aligning on the reference genome with high confidence (anchor) while the other is either unmapped, mapped with low mapping quality (MAPQ < 20) or mapped in the reference Epstein-Barr sequence. Non-anchor mates are filtered by the Local Composition Complexity [237] (LCC >=1.5) and the base composition of their sequence (each nucleotide can not represent more than 85% of it). Selected reads are aligned to the viral database using BWA-MEM [29]. The resulting alignments are filtered under different criteria: (1) minimum number of 40 matching bases, (2) partial matches must have a minimum length of 15 bp and (3) the matching segment of the sequence must present less than 85% for each base and its LCC must be higher or equal to 1.5. Discordant read pairs with non-anchor aligning to a viral sequence and passing these filters are selected for clustering.

2. Discordant read pair clustering. Selected discordant read pairs are grouped according to viral sequence identity. Non-anchor reads with the same viral identity are used to cluster discordant read pairs. Anchor reads having the same orientation must be up to 200 bp apart to be clustered together, while a distance until 600 bp is allowed between oppositely oriented reads. Only those clusters supported by at least two discordant read pairs are selected as candidate integration events. Clusters composed of two sets of anchor reads with opposite orientations are classified as canonical insertion events. Clusters formed by anchors in the same orientation are classified as BND, with only one of the insertion breakpoints identified and potentially supporting a virus-associated genomic rearrangement.

3. Insertion breakpoint refinement via split read analysis. In order to determine the exact insertion breakpoint position, VIRUNS seeks split reads that are close to the discordant cluster interval. Split reads composing the discordant cluster are prioritized, clustered together by breakpoint position and used as guides to search for additional reads supporting each breakpoint in an interval of +-5 bases. If no split reads are found at the discordant cluster, all split reads located closer than 150 bp are aligned to the viral database using BLAT [238] to identify chimeric reads supporting the insertion junction. As before, these reads are used as guides to search for more reads supporting the breakpoint. If both previous approaches fail, split reads within the cluster area are selected. Of note, the strategy followed to collect split reads is indicated in the output for each insertion. Afterwards, breakpoint reconstruction is done by making the consensus sequence of all split reads composing the cluster, using muscle [239] and cons [240]. This consensus step can be skipped by the user, being the read with the longest viral sequence chosen as representative of the cluster. These sequences are then aligned against the viral database using minimap2 [36] to assess viral genomic breakpoints.

4. Filtering. Candidate insertions and BNDs are filtered in case any of these criteria are not fulfilled: (1) minimum number of supporting reads of three, (2) maximum number of supporting reads of 500 and (3) candidate insertion must not be located at a noisy genomic region. Percentages of reads with low mapping quality (MAPQ < 10) and reads with both ends clipped are calculated within a region that spans +-50 bp from both breakpoints of canonical insertion events and +-100 bp from BND's breakpoint, considering a region noisy when their values are higher than 30% and 15%, respectively.

Long-read module (VIRUNS_LR)

Two read signatures are considered for long-read data: (a) spanning reads, which are reads completely encompassing an insertion event; and (b) split reads supporting one of the insertion breakpoints. Spanning and split reads' analysis is done in a four-step process that also allows threshold modification by the user:

1. Collect viral insertion supporting reads. Spanning and split reads are collected from each genomic bin created by splitting the input genome. Occasionally, inserted sequences produce spurious alignments on the reference genome, leading to the fragmentation of the insert. Therefore, adjacent insertion signals within the same spanning read are merged into a single insertion event. Inserted and split sequences are aligned to the viral database with BWA-MEM and are filtered by the following criteria: (1) minimum number of matching bases of 84, (2) base percentage and (3) LCC of the matching sequence must be higher than 60% and 1.7, respectively. Split reads' matches against the viral database which are far (>250 bp for right clipping and >660 bp for left clipping) from the integration breakpoint are not considered. Those reads that are not aligned by BWA-MEM or do not pass the filters are then aligned using minimap2 [36] and filtered with the same criteria but a minimum number of matching bases of 125. Finally, reads not passing both previous alignments, are interrogated by BLAST [241]. For simplicity, only the BWA-MEM step is mandatory, while minimap2 and BLAST can be disabled by the user. Only those reads matching a viral sequence by one of the previous methods are selected for clustering.

2. Read clustering. Insertion and breakpoint events supporting the same viral identity are grouped by proximity into meta-clusters. Similarly to the short-read module, split reads with the same orientation must be no more than 200 bp apart, while for oppositely oriented reads this distance goes up to 600 bp. Meta-clusters are polished by removing spanning reads supporting insertion lengths that deviate significantly from the average.

3. Insertion structure determination. Meta-clusters are classified as canonical insertions if they are composed of: (a) spanning reads, (b) split reads with two clipping orientations and therefore supporting both insertion breakpoints or (c) spanning and split supporting reads. Meta-clusters only composed of split reads with the same orientation are classified as BND. In addition, VIRUNS searches for viral bridges connecting distal breakpoints. For each meta-cluster supporting a BND, supplementary alignments are clustered together and compared with the genomic position of every BND. Pairs of BNDs connected via supplementary mappings are classified as BND junctions. Then, viral bridges are identified as extra pieces of viral DNA inserted between both junction breakpoints. The bridge can be intrachromosomal, typically associated with a loss or gain of DNA, or can connect two different chromosomes leading to a translocation. Consensus sequences of canonical insertions, BNDs and viral bridges are obtained using minimap2 [36] and racon [242].

4. Filtering. Candidate insertions and BNDs are filtered in case any of these criteria are not fulfilled: (1) number of supporting reads between three and 500, both included, and (2) the coefficient of variation for insertion length estimate across all individual spanning reads must be lower than 43%.

Single or Paired analyses

Both modules, short- and long-read, offer the possibility to analyse one or two samples at once. If two samples are given as input, it must be specified which one is the tested sample and which is the control. During execution, integrations will be classified as germline, if they are present in both samples; somatic-tumour, if they are present only in the test sample or somatic-germline, if they are exclusively present in the control sample.

Annotation and reporting results

If the user chooses the annotation repeats option, the overlapping of each integration with an annotated repeat in the reference genome is assessed, using as reference a database of repeats given as input to VIRUNS. There is also a gene annotation option, in which genes within integration breakpoints are annotated using ANNOVAR [243].

Finally, viral integrations are reported in VCF format. Clusters that do not pass the filters are also reported by default. Regarding short-read results, all integrations are reported in one VCF file, in which canonical integrations have "ORIENT=RECIPROCAL", while BNDs have the tags "PLUS" or "MINUS", meaning the viral sequence is located downstream or upstream of the breakpoint, respectively. Long-read results are reported in several VCF files: "INS_Spanned_VIRUNSLR.vcf", for canonical insertions that are supported by spanning, spanning and split reads or by split reads that overlap each other; "INS_noOverlap_VIRUNSLR.vcf", containing canonical insertions supported by two face-to-face clusters of split reads that do not overlap each other; and "soloBND_VIRUNSLR.vcf" with insertions composed by one cluster of split reads (i.e., BNDs). Furthermore, a tab-separated values (TSV) file is used to report BND junctions ("BNDjunctions_VIRUNSLR.tsv"). A detailed description of all features shown in the INFO field of VCF outputs is provided in the Materials and Methods section.

Detection of viral integrations in synthetic genomes

In order to benchmark VIRUNS with published viral insertion detection tools, an in-house simulator able to generate in silico genomes harbouring randomly distributed viral integrations was leveraged.

It was used to simulate short- and long-read genomes with an average read depth of 30X. For each sequencing technology, five genomes were generated harbouring 300 canonical viral integrations at VAFs from 10% to 50%, respectively. Thus, each simulated genome harbours 100 HBV, 100 HPV and 100 HHV4 integrations, generated from the NCBI Reference Sequences: NC_003977.2, NC_027779.1 and NC_007605.1, respectively. All simulated genomes were processed with VIRUNS_SR and VIRUNS_LR and their precision and recall were estimated across the VAF spectrum (see Materials and Methods). Both methods reported no false positive calls for any of the simulated datasets. In terms of recall, VIRUNS_SR displays a progressive decline from 0.98 to 0.95 (50%-20% VAF range) (Fig. 9a; Supplementary Data 7) and then drops to 0.78 (10% VAF) with 73 HBV, 81 HPV and 81 HHV integrations identified. VIRUNS_LR can detect all

simulated insertions at VAFs above 30%. Three HBV and three HHV insertions were not detected at 30% VAF. VIRUNS_LR recall decreases to 0.94 and 0.63 at 20% and 10% VAF, respectively. Of note, true positive calls only supported by two reads were discarded in these analyses, otherwise these evaluation metrics would improve substantially, especially for VIRUNS_LR. The VAF impacted the level of resolution for viral insertion calls, with the percentage of insertions incorrectly detected as BNDs increasing as VAF decreases (Fig. 9a). VIRUNS_LR reported a lower proportion of BNDs for all VAFs, indicating the superiority of long reads to disentangle insertions' structure. Indeed, VIRUNS_LR reports 8 events as BND at VAF 10%, whereas VIRUNS_SR reports 42.

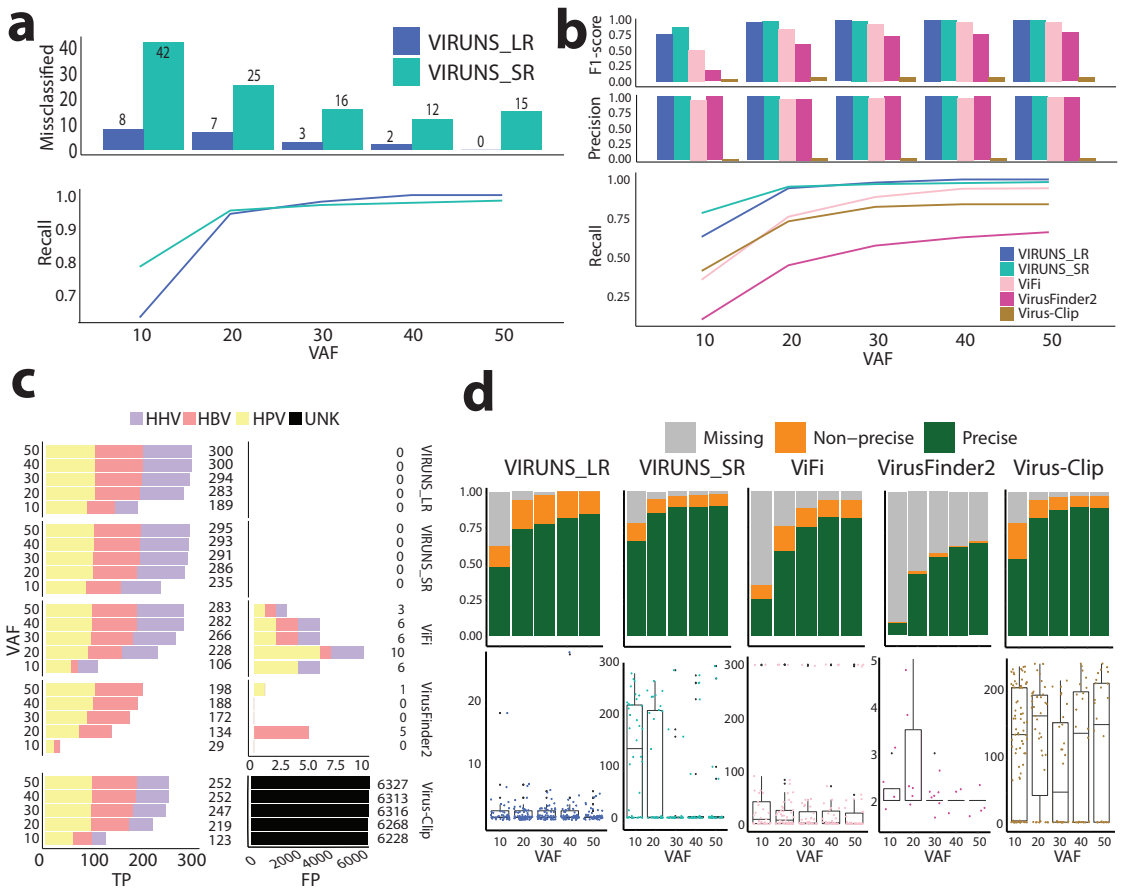


Figure 9. Evaluation on simulated data. (a) Recall and misclassified integrations through increasing VAF for both VIRUNS modules. The recall is above 0.90 from VAFs 20% to 50%, only dropping at the lowest VAF. Regarding misclassified integrations, they increase as the VAF decreases, since the number of reads supporting the breakpoints is lower. VIRUNS_LR is more accurate than VIRUNS_SR, due to the advantages of single-molecule sequencing technologies, that in many cases can span both breakpoints within the same read, avoiding the loss of one of them. (b) F1-score, precision and recall per VAF for VIRUNS_LR and the four short-read methods. Both VIRUNS methods have consistently high values for the three metrics, while recall and precision are low for VirusFinder2 and Virus-Clip, respectively. (c) Number of true and false positive (TP and FP) calls for each tool at different VAFs. Each colour represents one viral family, whereas black is designated for those tools that do not specify the identity of viral hits. (d) Bar plot representing the percentage of missing, precise and non-precise breakpoint coordinates found by each tool for each VAF. Those calls that are two or more bases apart from the breakpoint coordinate are considered non-precise and the distribution of distances from the real breakpoint

is shown. Although VirusFinder2 is the most precise, the number of found breakpoints is lower than those reported by the other tools.

VIRUNS_SR performance was compared with VirusFinder2, Virus-Clip and ViFi, three short-read based viral detection tools. VirusFinder2 and Virus-Clip were selected as representative tools in a previous study [235], while ViFi was not included due to timeline constraints.

VirusFinder2 includes the VERSE algorithm, which works with customized reference genomes. First, sequencing reads are mapped to the human reference genome, collecting those that are viral candidates. Then it uses these reads to customize the viral reference genome. Next, candidate reads are aligned against a chimeric genome composed of the host genome and the previously viral customized one. Here, it calls rearrangements that span both host and the viral genome. Host regions involved in these events are collected and customized as previously done with viral references. All customized references are joined, sequencing reads are mapped against this new customized chimeric reference and SVs are called, assuming that they are pointing to a viral integration event. Doing so, VirusFinder2 reports high and low confidence integration breakpoints. Virus-Clip aligns sequence reads to viral genomes. Then, it chooses split reads and maps them to the human genome, performing gene annotation of the human integration site.

ViFi is the most recent of the benchmarked tools and also the most different since it uses a phylogenetic approach. Briefly, it uses ensemble of Hidden Markov Model (eHMMs) to construct a reference genome of one concrete viral family. Then, reads are mapped against a chimeric human-viral genome and those mapping in both, human and virus, are considered candidates. Besides, unmapped reads can be scored against the eHMMs, to recover discarded viral reads. In this work, this approach is done using the pre-built eHMMs for HBV and HPV. Finally, it filters poorly mapped candidates and identifies three different integration points, from wider to narrower delimitation of the real breakpoint. Although initially included in the evaluation, BATVI was excluded given its excessive run-time, making it impractical for large scale datasets.

VirusFinder2 displayed similar precision values as VIRUNS_SR, calling only five and one false positive viral insertions at 20% and 50% VAFs, respectively. However, VirusFinder2 recall steadily decreased from 0.66 (50% VAF) to 0.45 (20% VAF) with only 29 insertions found at 10% VAF (Fig. 9b,c; Supplementary Data 7,8), pinpointing its limitations to call subclonal events. Looking at the virus family, 64.18% (500/779) of false negative calls correspond to HHV with no HHV identified at any VAF (Fig. 9c; Supplementary Data 8). A similar situation is encountered when looking at ViFi measures, where precision is above 0.94 for all VAFs. However, its recall is dramatically affected by the VAF decrease, dropping to 0.35 for the lowest (10%). All viral families are affected by this lack of detection, especially HBV, with only 17/100 integrations reported at VAF 10%. Virus-Clip showed a recall from 0.84 to 0.41 across the complete VAF spectrum (Fig. 9b; Supplementary Data 7). However, Virus-Clip precision is low, reporting up to 6,327 false positive insertions in a single genome (50% VAF) (Fig. 9c; Supplementary Data 8).

Overall, VIRUNS_SR displayed the best balance between precision and recall, measured as F1-score, among the four evaluated short-read callers (Fig. 9b). Breakpoint insertion accuracy is affected by the VAF, with the percentage of correctly identified breakpoints

decreasing at lower VAFs for all methods. Breakpoint predictions can deviate more than 200 bp for VIRUNS_SR, Virus-Clip and ViFi, while VirusFinder2 is less sensitive but reports highly accurate breakpoints (Fig. 9d; Supplementary Data 9). Remarkably, 93.98% (250/266) of VIRUNS_LR non-precise breakpoints deviate less than 5 bp even at VAF 10%, suggesting a greater breakpoint accuracy for long reads even at relatively low coverage (Supplementary Data 10).

Computational performance in simulated data

VIRUNS execution time and memory usage were first assessed via a simulated genome containing 300 viral inserts at 50% VAF and an average read depth of 30X. VIRUNS_SR and VIRUNS_LR were executed in three replicates for 13 levels of parallelization, ranging from a single to 24 processes (Fig. 10a; Supplementary Data 11). Using a single process, VIRUNS_SR can analyse a genome in 50' on average. An increased number of processes leads to a progressive reduction in run-times till 15' for 8 processes, reaching a plateau. VIRUNS_LR exhibits longer run times, being able to analyse a genome in 690' using a single process and decreasing to 60' for 24 processes. The peak of Random Access Memory (RAM) usage oscillated between 5 and 10 Gb for both tools at all parallelization levels.

VIRUNS_SR was compared with short-read callers using five simulated genomes with average read depths from 10X to 50X. All tools were run using 10 processes and default parameters (see Materials and Methods). As expected, every algorithm displayed a positive correlation between execution time and coverage (Fig. 10b; Supplementary Data 12). This increment is particularly pronounced for ViFi, which demanded the highest values of time for all coverages, ranging from 1.63 days when analysing a 10X genome, to 8.15 for a genomic coverage of 50X. Virus-Clip and VirusFinder2, require 0.36 and 0.69 days to process a 10X, increasing up to 1.22 and 2.9 days for a 50X, respectively. In contrast, VIRUNS_SR scales up from 8' and 15' for average read depths of 10X and 50X, being tens to hundreds of orders of magnitude faster (Fig. 10c). In terms of memory usage, ViFi exhibited the highest peaks of RAM consumption (~18 Gb for all coverages), followed by VirusFinder2 (8-14 Gb), VIRUNS_SR (6-7 Gb) and Virus-Clip (1-2 Gb) (Fig. 10b; Supplementary Data 12).

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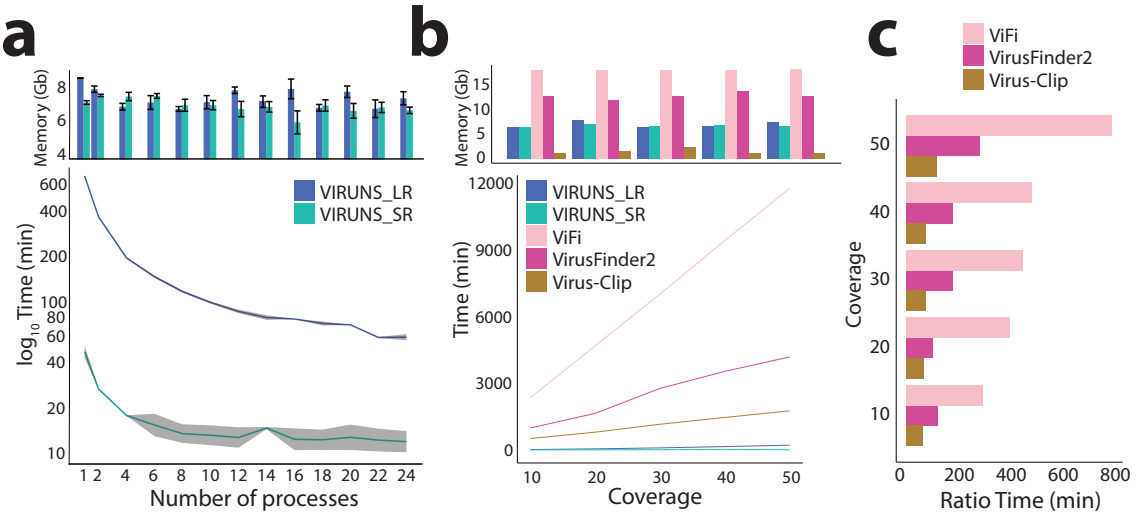


Figure 10. Computational resources consumption by VIRUNS. (a) Mean and standard error of time (presented as log10, in minutes) and maximum memory (Maximum Resident Set Size in Gb) used by VIRUNS (LR and SR) through an increasing number of processes. Mean values of a total of three runs per condition are shown. (b) Time and maximum memory used by each tool through increasing sequencing coverage. Time consumption is much higher for ViFi, VirusFinder2 and Virus-Clip compared with VIRUNS. Regarding maximum memory, VIRUNS uses ~7 Gb for all conditions, consuming more than Virus-Clip but less than VirusFinder2. (c) Time ratio for short-read tools, VirusFinder2 and Virus-Clip, compared with VIRUNS short-reads.

Detection of viral integrations in cancer cell lines

Two cancer cell lines containing experimentally validated viral integration events were selected to further evaluate VIRUNS. CaSki is an epidermoid cervical carcinoma cell line with 44 HPV insertions that have been empirically verified [244]. PLC/PRF/5 is an HCC cell line containing 11 HBV integrations. Both cell lines were sequenced at 30X coverage with Illumina paired-end and at 17X and 10X, respectively, with ONT.

Cell line sequencing data were processed with VIRUNS_LR, VIRUNS_SR, ViFi, VirusFinder2 and Virus-Clip. Then, a gold-standard (GS) set of high confidence viral integrations was created for each cell line by integrating all candidate insertion events identified. Only those insertion calls that were either previously validated or detected by both sequencing technologies (Illumina and ONT) were incorporated in the GS. In summary, the cervical carcinoma GS contains 65% (29) of all validated events plus ten novel HPV inserts, while all HBV previously verified were included in the hepatocellular carcinoma GS (Fig. 11a).

VIRUNS_SR and published algorithms were benchmarked using the GS as ground truth, therefore considering as false positives those calls not included. Consistently with simulated data, VIRUNS_SR, Virus-Clip and ViFi displayed recall values over 90% in both cell lines, while for VirusFinder2 these values drop to 54% and 36% for HPV and HBV insertions, respectively (Fig. 11b; Supplementary Data 13). All tools except Virus-Clip and ViFi with CaSki cell line had precision higher than 99%. Overall, VIRUNS_SR exhibited the best balance between both metrics among short-read callers, followed by ViFi, VirusFinder2 and Virus-Clip (Fig. 11b,c and Supplementary Data 13).

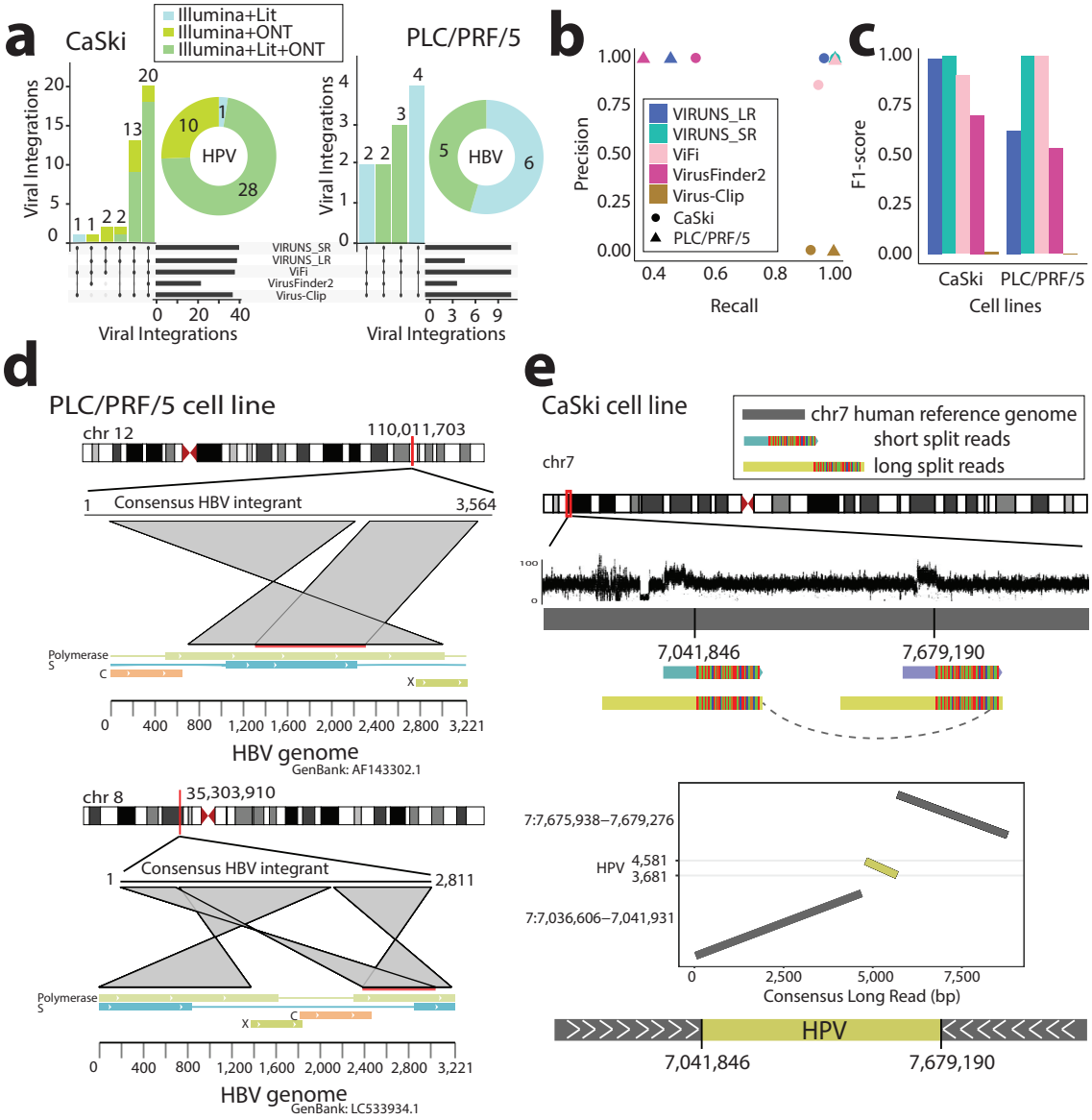


Figure 11. Evaluation of viral integrations search in cell lines data. (a) Donut plots show the number of integrations described for each cell line (CaSki and PLC/PRF/5) being: Illumina+Lit the ones that have been found by at least one short-read tool and are also described in the literature; Illumina+ONT those that have been found by at least one short-read tool and are supported by the long reads; and Illumina+Lit+ONT integrations that were found in short- and long-read data and are also described in the literature. Upset plots show integrations of previous categories shared by the five different tools (VIRUNS_LR, VIRUNS_SR, ViFi, VirusFinder2, Virus-Clip). (b) Precision and recall of the five tools for CaSki (circle) and PLC/PRF/5 (triangle). (c) F1-score of the five tools for CaSki and PLC/PRF/5. (d) Schematic representation of the alignment of two HBV integrants' consensus sequences against the HBV genome (HBV ORFs are represented in different colours). Both consensus sequences were reported by VIRUNS_LR and were extracted from canonical integrations events in chromosomes 12 and 8 of the PLC/PRF/5 HCC cell line. (e) Rearrangement in chromosome 7 of the CaSki cell line coupled with an HPV integration. Sequencing coverage is shown at the top. Split reads are represented at the breakpoints and the consensus long reads spanning the whole event are represented in the dot plot (human genome in grey, HPV genome in yellow) and in a simplified scheme at the bottom.

Third generation sequencing opens new insights into the characterisation of viral integration. Even though HBV genomic rearrangements were detected decades ago through molecular biology techniques [245,246], they have several limitations. Thus, thanks to read sizes resulting from single-molecule techniques, the sequence of integrated viruses can be completely spanned, something that was not possible to achieve even with NGS. This is especially relevant with viruses such as HBV, as its size can be completely over-passed by the sequencing reads, as shown in the previous HBV section, revealing not only host genomic SVs but also the whole integrants' sequence. Indeed, in PCAWG samples, both, simple and rearranged forms of HBV were integrated, even showing complex patterns that are known to happen in HBV integrants [247,248].

VIRUNS_LR provides a consensus sequence of each integration event, allowing the analysis of each viral integrant. For instance, regarding the PLC/PRF/5 HCC cell line, a canonical integration of HBV was sequenced side-to-side in chromosome 12 (Fig. 11d). Only part of the virus is integrated, harbouring an inverted duplication involving the S ORF and the central region of the polymerase. Likewise, another integration was sequenced from breakpoint to breakpoint, in this case, located at chromosome 8. Intriguingly, it also harbours an amplification, in this case spanning part of preS and polymerase ORFs. In both integration events, the Core gene is not present. This scenario reminds the one described by Fujiwara and colleagues (2005) [249]. In their study, core deletions and preS insertions are described, in relation to upregulated HBV mRNA transcription and progression of liver fibrosis.

Besides integrant sequences, long-read analysis performed by VIRUNS_LR allows the detection of host structural rearrangements, similar to those described in the HBV chapter. Indeed, VIRUNS_LR succeeded in the detection of the previously described rearrangements in HCC PCAWG samples. In addition, it also found cellular genomic rearrangements that involve HPV. An example, together with a good opportunity to observe the advances of long reads in comparison to short-read sequencing, can be found in an integration event located at chromosome 7 of the CaSki cell line (Fig. 11e). Here, ~1000 bp of the HPV genome are integrated, having chromosome 7 sequences at both breakpoints. However, the coordinates of these flanking sequences are not consecutive, showing that HPV is bridging two regions that are ~637 kb apart in the reference genome. Intriguingly, one of the bridged regions of chromosome 7 is inverted and a local increase in coverage is shown at both breakpoints, pointing to a more complex cryptic rearrangement. This event would not be detected by the sole analysis of short reads. Even though both breakpoints are present in this kind of data, the viral bridge impedes the connection of the two chromosome 7 regions, in a similar way that was shown for cryptic HBV translocations.

Detection of viral integrations in human samples

VIRUNS was also tested with sequencing data from human tissue samples. For doing so, different already analysed and published datasets were interrogated for both, HBV and HPV integrations.

HBV+ samples

In a former study performed by Sung and colleagues (2012) [139], HBV integrations were computationally searched in HCC samples and their adjacent normal tissues, sequenced by Illumina paired-end technology with a sequencing depth of ~30X. In addition, they

validated a subset of the found events by PCR. The richness and the accessibility of the data provided by this study, make it a perfect dataset for testing purposes.

Thus, nine of these samples and their matched normal were downloaded and processed by VIRUNS. Importantly, the selection of the samples did not follow any exclusion criteria, simply the first samples on the list were the ones chosen. Remarkably, all the integrations reported by Sung et al. (2012) but one were detected by VIRUNS in this subset of samples (Supplementary Data 14), highlighting the sensitivity of this pipeline. When looking at the missing integration (chr8:12,270,963 in sample 117T), it is located in a spurious region which makes it unclear. Regarding the rest of the integrations, even though their coordinates do not match exactly due to the different procedures used for their identification, all breakpoints reported by both analyses present a good mapping, pointing at the same events. This comparison reinforces the results discussed in previous sections since VIRUNS can detect HBV-human junctions in tumours and normal tissue.

HPV+ samples

VIRUNS was also tested for the characterisation of integrations in human samples lacking the context of the whole genome, to ensure its usability in non-whole genome data. For doing so, the v-TraFiC algorithm (see Materials and Methods) was used to extract windows of ~25 kb, containing potential viral integrations. They were obtained from 18 cervical and 44 head and neck squamous cell carcinoma (from now, Cervix-SCC and Head-SCC) biopsies and their matched normal from the PCAWG cohort and provided as input to VIRUNS.

As previously described, HR-HPVs infection has been related to cervical and head and neck carcinoma for years [250,251]. In a normal viral life cycle, HPV genomes are kept in an episomal state, (i.e., circular, non-integrated) from which the expression of E6 and E7 viral oncogenes can be highly regulated. However, in cancer, deregulation of viral oncogenes is mediated by the genomic integration of viral DNA [250,251]. Despite these integrations into the host genome are known to be associated with tumour development, these events are still poorly understood.

HPV integrations landscape in cervical and head and neck squamous cell carcinoma

A total of 42 and 68 viral-human genomic junctions were characterised in 15 Cervix-SCC and 10 Head-SCC samples, respectively. Notably, all found junctions are somatic, being absent in matched normal blood samples for each patient.

Two different patterns of viral integrations were detected in both tumour types, as it has already been shown for HBV. Altogether, there is a total of 87 HPV integrations, 34 of them found in Cervix-SCC and the remaining 53 in Head-SCC (Supplementary Data 15). The majority (64/87) of found HPV integrations showed the single cluster pattern, only having one breakpoint. Looking at different tissue types, 26/34 integrations showed only one cluster in Cervix-SCC samples and 38/53 in Head-SCC ones. Indeed, even at the sample level, the number of single cluster integrations is the highest in all samples but one (SA534431) (Fig. 12a,b). A detailed description of all breakpoints can be found in Supplementary Data 16, as nucleotide level reconstruction of these patterns was performed for virus-human genomic junctions of all reported HPV integrations. This table also contains the identification of the characterised integrations in two previous studies [252,253]. Nonetheless, to double-check the existence of these integrations, all of them were manually curated visualising the BAM files using IGV [254] and performing BLAST

searches of read's sequences, with special emphasis on those only reported in the present work.

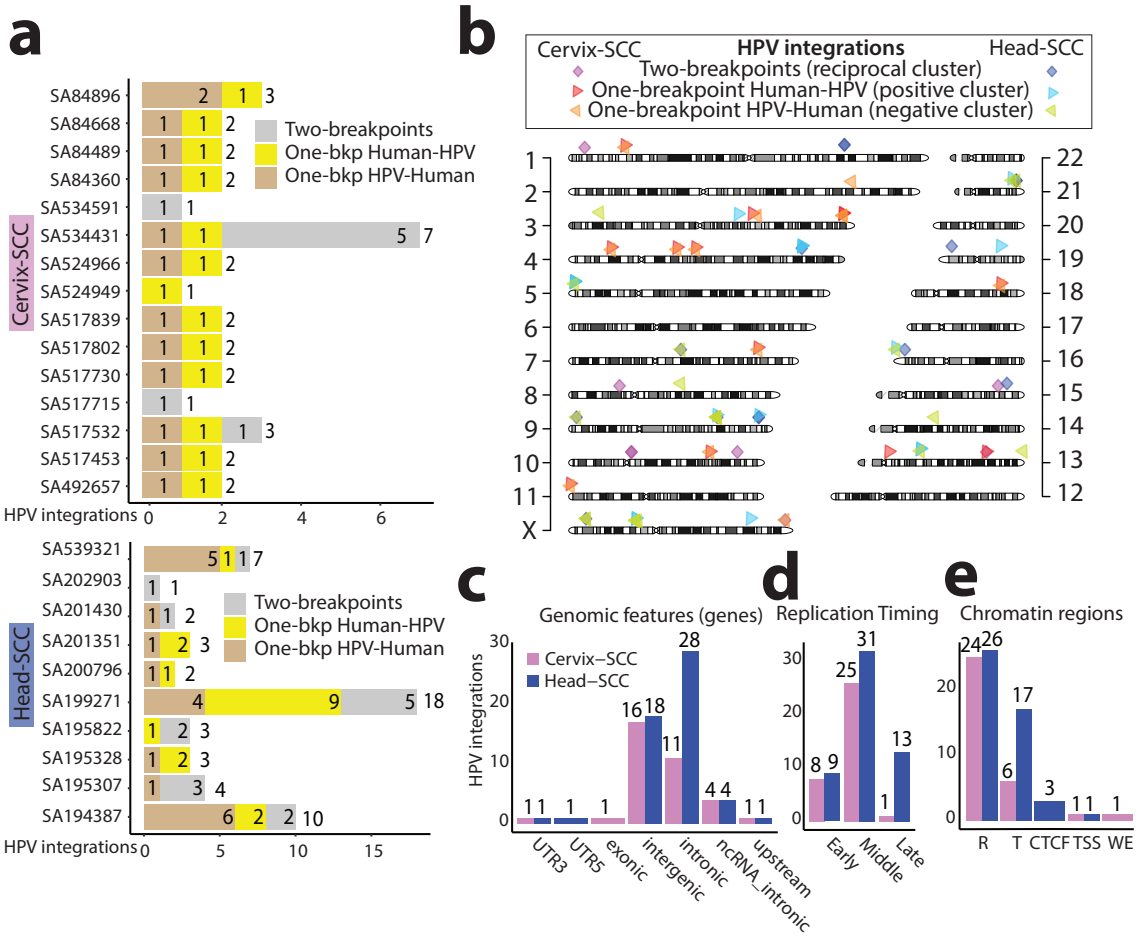


Figure 12. HPV integrations and their distribution across the human genome. (a) Number of HPV integrations per Cervix-SCC and Head-SCC samples. Grey is used for the two-breakpoints pattern. Brown and yellow stand for the one-breakpoint pattern, indicating the viral sequence location, upstream or downstream, respectively. (b) Genomic distribution of HPV integrations in Cervix-SCC and Head-SCC samples. Diamonds represent the two-breakpoints pattern. Triangles represent the one-breakpoint pattern, pointing to the side where the viral sequence is found. Warm colours depict HPV integrations in Cervix-SCC samples, while cool colours are used for Head-SCC ones. (c) HPV integrants distribution along coding and non-coding regions of both Cervix-SCC (magenta) and Head-SCC (blue). (d) Presence of HPV integrations in early, middle or late replication timing regions. (e) Presence of HPV integrations in different genomic regions according to chromatin states.

HPV insertion rate varies across the genome

Similarly to HBV and as it has been shown in several studies [255,256], HPV integrations' distribution across chromosomes revealed no clear trend, showing that HPV can get integrated into any part of the genome in both tumour types. However, there are some genomic regions in which integrations have been recurrently observed. Some of these hotspots have been described in different cytogenetic bands such as 2q22.3, 3p14.2, 3q28, 4q13.3, 8q24.22, 9q22, 13q22.1, 14q24.1, 17p11.1, 17q21.2 and 17q23.1–17q23.2 [255,257]. Regarding genes, integrations nearby *MYC, TMEM49, FANCC, POU5F1B, FHIT, KLF12, KLF5, HMGA2, LRP1B, LEPREL1, DLG2, SEMA3D, AGTR2, DMD, CDH7,*

DCC, HS3ST4, CPNE8, C9orf85, MSX2, CADM2 [258], *ERBB2, NR4A2, RAD51B* and *TP63* [259] were found in several occasions.

The local genomic context of the 87 HPV integrations is assorted. Less than half are in intergenic regions, eight of them quite close to genes (<10 kb) and others really far away (12 are >100 kb far from any gene) (Supplementary Data 16). Introns of protein-coding genes are the most common location for those integrations found in genic regions, followed by non-coding RNA introns, while a few of them are integrated within exons or regulatory regions. Splitting by tumour type, in Cervix-SCC 16 HPV insertions are found in intergenic regions whereas 11 of the remaining 18 are placed in introns. There are also four in non-coding RNA introns, two in regulatory regions and, finally, one exonic. Similarly, among the 35 integrations found in genic regions of Head-SCC samples, 32 fall in introns and three in regulatory regions (Fig. 12c; Supplementary Data 16).

The fact that HPV integrations are more common within or nearby genes is in concordance with the results described by Parfenov et al. in 2014 [260]. They reported that ~73% of the found HPV integrations in Head-SCC samples were located within genes or within their adjacent area of 20 kb.

Among the integrations described within the PCAWG dataset, there are some of them located in cancer-related genes: *CASZ1, TP63, PTPN13, PD-L1* and *SSX1*. (Supplementary Data 17). Exogenous DNA integrations can disrupt or change the function of these genes by different mechanisms like alternative splicing or exonization. HPV integration within some of these genes has been reported in previous studies, including Zapatka et al. (2018) [252]. Even earlier studies show results according to the ones presented here, since the loss of *CASZ1*, a tumour suppressor gene involved in DNA repair [261], was described in HPV cervical cancers [262], emphasizing its role in this tumour type.

Despite being part of the p53 transcription factors' family, *TP63* is not recurrently found mutated in cancer. In addition, its function remains ambiguous and it appears to be dependent on its isoform. Nonetheless, several studies have shown its capacity of mediating apoptosis and its disruption leads to a decrease in cell adhesion, together with an increase in cell migration, supporting its role as a tumour suppressor gene [263,264]. Another tumour suppressor, *PTPN13*, is involved in many different pathways inhibiting cell proliferation and invasiveness. Noteworthy, it is known to be inhibited in HPV+ tumours, mainly through the action of the viral protein E6, leading to cell growth and EMT [265].

Apart from genes, the majority of HPV integrations are found close to annotated repeats (<100 bp away). Most of them are nearby Alu elements and long interspersed nuclear elements L1 and L2, with 21 and 29 integrations close to each repeat type and nine near to both types simultaneously. Also, mammalian-wide interspersed repeats (MIR) are in close proximity to the target region of 13 integrations (Supplementary Fig. 8). This co-occurrence could be related to some proposed mechanisms by which HPV gets integrated into the host genome.

One of these hypotheses was proposed by Hu et al. in 2015 [266], based on a microhomology-mediated integration mechanism. They identified enrichment of identical nucleotide sequences between the human and viral genome near or at integration

breakpoints. Interestingly, sources of genomic instability, such as short tandem repeats, long terminal repeat-endogenous retroviral sequence 1 (LTR-ERV1), satellite and short interspersed nuclear element (SINE)-Alu repeats, were also found significantly enriched at integration sites. This finding led them to propose two main integration mechanisms, involving microhomology-mediated DNA repair pathways, which are triggered by genomic instability. The behaviour of genomic elements, such as the above-mentioned repeats, is deregulated by, likely, the HPV infection among other unknown causes. They lead to DNA breaks or replication forks disruption, promoting the activation of FoSTeS (fork stalling and template switching) or MMBIR (microhomology-mediated break-induced replication) [266]. The former is characterised by a template exchange during a halt of the replication fork, where HPV replaces the human genome by its own. Similarly, during MMBIR the HPV integrates its genome during cell replication induced by a DNA break [258]. Of note, even though some models have been proposed, the exact mechanism of HPV integration is unknown.

Regarding chromatin features, most integrations (56) are within regions with middle replication timing according to the HeLa cell line ENCODE dataset (https://www.encodeproject.org, GEO: GSM958739), while 17 and 14 are in early and late regions, respectively (Fig. 12d). Also, most of them (50) are found in repressed chromatin segments being 23 in transcriptionally active regions (Fig. 12e). Position and detailed features of each event can be found in Supplementary Data 16 and 18. These results differ from those reported by Bodelon et al. (2016) [267], in which they conclude that HPV integrations are frequently integrated into transcriptionally active regions. The discrepancies in the observations may be due to the different methods used to detect the integrations in both studies or the different tumour stages of the analysed samples.

HPV integrations and copy number alterations

Parfenov et al. (2014) described copy number alterations together with HPV integrations in a cohort of head and neck primary tumours [260]. This association was also reported in cervical carcinomas [268]. However, despite these previous studies, the exact relationship between HPV integrations and copy number alterations is still cryptic. Thus, to contribute to previously described observations, a deeper analysis was done in order to find host genomic copy number alterations within integrations' breakpoints. As local changes of coverage can be missed by copy number variant (CNV) callers, a more specific analysis was performed, assessing the differences between sequencing depth upstream and downstream of the viral-human junctions (see Materials and Methods). As a result, 79% of HPV integrations in Cervix-SCC and 75% in Head-SCC are in association with local depth changes. Stratifying by insertion type, 63% of canonical and 84% of single cluster integrations show coverage variation in Cervix-SCC; being 93% and 68% in Head-SCC. However, these figures drop to 3/34 and 27/53 when determining how many viral integrations are located close (<1,000 bp) to CNV calls, probably because previously described coverage changes are lost at the chromosome scale. Some of these CNVs denote different structural variant types: 7 deletions, 7 duplications, 2 translocations and 11 inversions (Supplementary Data 19 and Fig. 13a).

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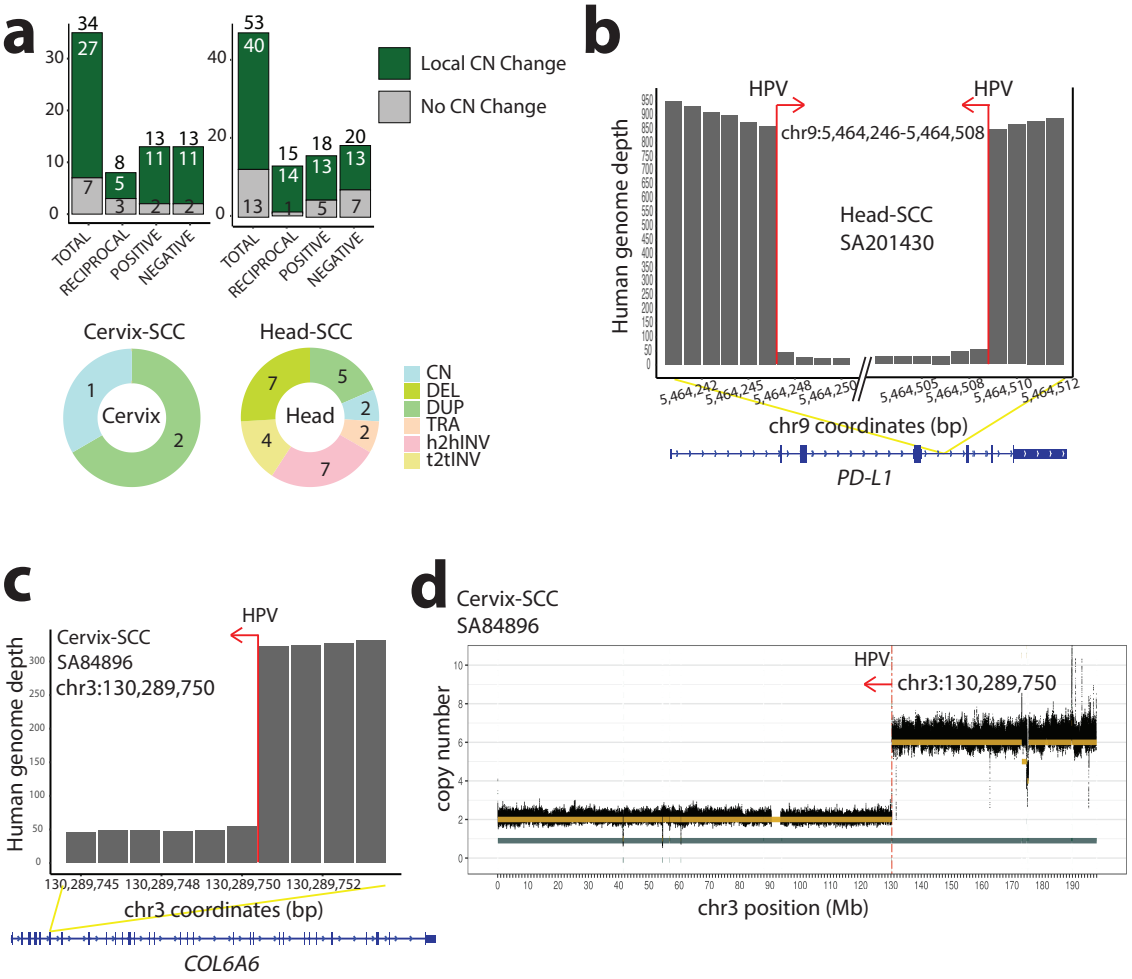


Figure 13. HPV integrations in association with genomic rearrangements. (a) Bar plot showing counts of viral integrations coupled or not with changes in sequencing coverage in green and grey, respectively. The total number of integrations and counts grouped according to integration patterns are shown for both, Cervix-SCC and Head-SCC. Donut plots indicate the number of HPV integrations concurring with copy number variants (CN) or structural variants (DEL: deletion, DUP: duplication, TRA: translocation, h2hINV: head-to-head inversion and t2tINV: tail-to-tail inversion). (b) Two-breakpoints integration found in the Head-SCC sample SA201430 and located in chr9:5,464,246-5,464,508. Grey bars indicate the sequencing depth of the human reference genome and red ones indicate the integration breakpoints. Also, the position of this event within the *PD-L1* gene is shown, where boxes and lines represent exons and introns, respectively. (c) One-breakpoint integration in chr3:130,289,750 found in the Cervix-SCC sample SA84896. As in the previous panel, grey bars represent the sequencing depth of the reference human genome and the red one indicates the integration breakpoint. Also, the location of this event in the structure of the *COL6A6* gene is shown, following the schematic representation described before. (d) Copy number (CN) profile of the entire chromosome 3 of the sample carrying the HPV integration shown in panel c, which is represented here as a red dotted line. Total and minor CN are indicated by the gold and grey lines, respectively.

Regarding integrations showing two breakpoints, the host genomic region affected by the change of coverage can be located in between both breakpoints or just before the upstream breakpoint and right after the downstream one. The latter corresponds to the pattern shown in chr9:5,464,246-5,464,508 of the SA201430 Head-SCC sample (Fig. 13b). In this particular case, the host genome located surrounding the two HPV breakpoints is amplified. Remarkably, both, the integration and the concomitant amplification are

between exons 3 and 4 of the gene *PD-L1* (*CD274*). This gene encodes a ligand of the programmed death1 (PD-1) receptor, which regulates immune cell response. Basically, PD-L1 prevents the attack of immune cells, specifically, T cells. Thus, this is a mechanism that can be deregulated in tumours to evade the immune response.

Several studies have reported overexpression of *PD-L1* in cervical cancers and cervical intraepithelial neoplasia lesions compared with normal cervical samples [269–271]. Besides helping HPV+ cervical malignant cells to grow and proliferate, it hinders the clearance of infected cells in premalignant lesions. Even though this high expression was described to be promoted by the HR-HPV oncoproteins E6/E7 [272]; from the present results it can be inferred that increases in copy number could also contribute to this rise. Head and neck malignancies are even more intriguing, since despite they are located close to the lymphoid organs and the high inflammatory response that viral antigens originate, these tumours usually have the ability to escape the immune system [273]. Thus, studies demonstrating the elevated patterns of *PD-L1* expression in head and neck cancers [274,275] can give some light to this evasion strategy. Remarkably, it has been proved that the presence of an HPV integrant within one intron of *PD-L1* does not lead to the loss of its function [276].

Overall, PD-1/PD-L1 provides an "immune-privileged" niche for HPV infection and its progression to malignancy. Thus, PD-L1 can be recognized as a biomarker of head and neck and cervical carcinomas. Also, it can be used as a target of cancer immunotherapy, using PD-L1 inhibitors (or anti-PD-L1 therapy) to trigger tumour regression, being a promising therapy for both head and neck and cervical malignancies [277].

Single cluster integrations can also be related to large genomic rearrangements. For instance, in the SA84896 Cervix-SCC sample, an HPV integration can be found located in the sixth exon of the *COL6A6* gene. Interestingly, the coverage of the region downstream of the viral breakpoint is higher compared with the host genomic region upstream of the breakpoint (Fig. 13c). Actually, this increase in coverage implies a 4-fold copy number gain, spanning more than half of the q arm of chromosome 3 (Fig. 13d).

Gains of the large arm of chromosome 3 are a recurrent feature of HPV positive carcinomas. The high frequency of this rearrangement and its relation to cervical carcinoma progression have been described more than two decades ago [278,279]. In this particular case, it is leading to the amplification of 14 oncogenes (Supplementary Data 20). Interestingly, the amplification of some of these genes has been previously related to Head-SCC and Cervix-SCC development. For instance, the copy number of *TP63* was found to be increased in the progression of cervical intraepithelial neoplasia to cervical carcinoma. Although, as previously described, this transcription factor can act as a tumour suppressor gene, its short isoform inhibits *TP53*, acting as an oncogene. Indeed, it has been related to cancer progression in squamous cell carcinomas and it is usually amplified in oesophagus, lung and cervical malignancies [280]. Likewise, mucins – as *MUC4*, also amplified in this sample – are often overexpressed in epithelial cancer's development, promoting the EMT [281].

Even not present in CGC nor Intogen databases, another remarkable gene is found within the above amplification. *TERC* gene is essential for the telomerase activity, which role in the maintenance of cancer growth and progression is widely accepted in many tumour types. Specifically, *TERC* overexpression has been described to correlate with cervical

cancer progression [282]. As it happens with *PD-L1*, the high levels of expression of *TERC* were associated with the activity of E6 viral oncogene [283]. However, genomic amplifications such as the one shown here can also be the source of this upregulation.

These observations can be closely related to another proposed mechanism by which HPV gets integrated into the host genome. This is the "looping" model, proposed by Akagi et al. in 2014 [244]. Similar to the results presented here, they observed focal genomic CNVs at some HPV integration breakpoints, mainly in cell lines. These CNVs could be created through HPV bridges joining distant human genomic points. Thus, replication of these circularized HPV-human segments could lead to the amplification of the joined sequences, yielding several copies of the same identical breakpoint. The repair of these organized viral-human concatemers, created as a result of rolling circle replication, could be the cause of chromosomal rearrangements. On occasion, the shape of these SVs can remind those resulting from other already described mutational processes. Chromotripsis could be one of them and, even though it is also a mechanism dependent on replication, it is characterised by random breakpoints instead of organized concatemers. The same reasoning differences this "looping" model from an NHEJ repair. Given that no palindromic sequences were found at integration breakpoints, BFB cycles are also discarded. Some years later, AT-rich sequences were reported near integration sites [284]. These are prone to form secondary structures interfering with DNA polymerase and promoting chromosomal instability.

Most recently, it was proposed that these amplifications could be mediated via the formation and replication of extrachromosomal DNA (ecDNA) [253,285]. Indeed, they analysed a subset of the samples characterised here and described signatures that suggest that some of the integrations found in them resulted in hybrid amplicons containing viral and human sequences. More in detail, these signatures were found in nine Cervix-SCC samples (Supplementary Data 16) and five Head-SCC samples (SA195307, SA202903, SA195822, SA201430 and SA201809). Interestingly, the Cervix-SCC sample with the amplification in chromosome 3 is amongst these nine samples. As another remarkable example, they report that the *PD-L1* amplification presented above is due to the existence of a chimeric ecDNA amplicon containing that gene. These recent findings show the plasticity and sensitivity of the VIRUNS pipeline, being able to detect integrations even in these complex configurations.

However, as previously pointed out and despite the existence of several models, the mechanism of HPV remains widely unknown, and can perhaps be a combination of some of them.

In a nutshell, VIRUNS succeeded in the characterisation of HPV human junctions. These events are present in almost all (83%, 15/18) of Cervix-SCC samples, highlighting the importance of HPV associated events in these tumours. Even though HPV integration prevalence is not that high in Head-SCC, the average number of integrations per sample is higher (Fig. 12a), indicating that this process is more active in this tumour type. Remarkably, the majority of the integrations are linked to copy number alterations and even structural variants in both tumour types.

HBV and HPV integration in cancer: Final remarks

As previously described, HBV and HPV have oncogenic mechanisms independent of integration. Nonetheless, the latter acts as a persistent template for viral expression,

helping viral pathways to act in favour of tumour progression [145,255]. Indeed, integrants' sequence disruption can upregulate viral oncogenes expression [155,158] or lead to truncated protein products, that are known to produce DNA damage contributing to oncogenesis [286].

In light of the results of the present study together with previous observations, there is no doubt that HBV and HPV integration plays a role in tumorigenesis. The insertion of these viruses can affect gene expression in many different ways. Integration within a gene can lead to its disruption, particularly significant for carcinogenesis when it happens within a tumour suppressor gene. Conversely, overexpression of oncogenes is usually observed in HBV and HPV positive tumours. This can be led by the inserted viral regulatory sequences that enhance the expression of close genes [151,255,286]. Furthermore, gene expression deregulation can also be promoted by integrations-related rearrangements, which modify the behaviour of genes present in the affected regions. Finally, other regulatory mechanisms were proposed to be altered by HPV integration, such as epigenetic marks [287] or 3D chromatin interactions [259], which are also likely modified by HBV integrants.

Overall, the impact of viral genomic integration in the tumour genome can result in a selective growth advantage of the affected cells, triggering their proliferation and tumour progression [149,255].

VIRUNS: Why is it needed?

VIRUNS gives a very competitive alternative to look for viral integrations along the genome. It has the best F1-score compared with the other three tools tested here (ViFi, VirusFinder2 and Virus-Clip) (Fig. 9b) and its accuracy goes together with its low consuming computational performance (Supplementary Data 11; Fig. 10).

One of the most important advantages of this tool is its plasticity. It can be run with NGS data (including WGS, WES and targeted sequencing), a widespread technology nowadays, making it suitable for analysing already available datasets and ongoing projects. However, its long-read mode, for the analysis of TGS data, makes this tool suitable for recently started and future projects. This mode also gives the opportunity to find integration-related host genomic rearrangements, such as translocations. According to a literature search, it is the first available tool for the detection of viral integration in whole-genome single-molecule sequencing data.

Its plasticity is also noticeable in the way viruses are searched, since there is no need of knowing which viruses are present in the sample. This applies also to co-infection, in contrast to ViFi and VirusFinder2, as there is no limit on the number of different viruses that can be detected within the same sample in one execution. Similarly, viral genomic size is not a limitation, since VIRUNS was tested with HBV, HPV and HHV4 with approximate genomic sizes of 3 kb, 8 kb and 170 kb, respectively.

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Furthermore, it allows to find and compare integrations from two different samples in just one run. One of the main applications of this feature is the analysis of tumour-normal pairs, as it can report which integrations are only present in the tumour, a situation that commonly occurs with those oncoviruses that are prone to get integrated.

KSHV integrations

VIRUNS was used to perform an analysis of KSHV integrations in two primary effusion lymphoma (PEL) cell lines (BC-1 and BC-3). KSHV DNA was found integrated in both samples, with a total of 173 KSHV integrations, 117 in BC-1 and 56 in BC-3 (Fig. 14a, Supplementary Data 21).

The distribution of KSHV integrations seems to be random, although there is a hotspot at the end of chromosome 8 (Fig. 14a) and it tends to integrate into early replication time regions more than expected by chance (Fig. 14d). In addition, there are integrations located within cancer genes (Fig. 14b). Among them, *ARID1B* is especially relevant. It is another member of the SWI/SNF complex. This complex is frequently mutated in lymphomas and other types of cancer [288], and even though modifications are more frequently found in *ARID1A*, its partner *ARID1B* has been proposed as a candidate tumour suppressor for diffuse large B-cell lymphoma (DLBCL), a type of non-Hodgkin lymphoma, as it can remodel chromatin to activate or repress transcription [289].

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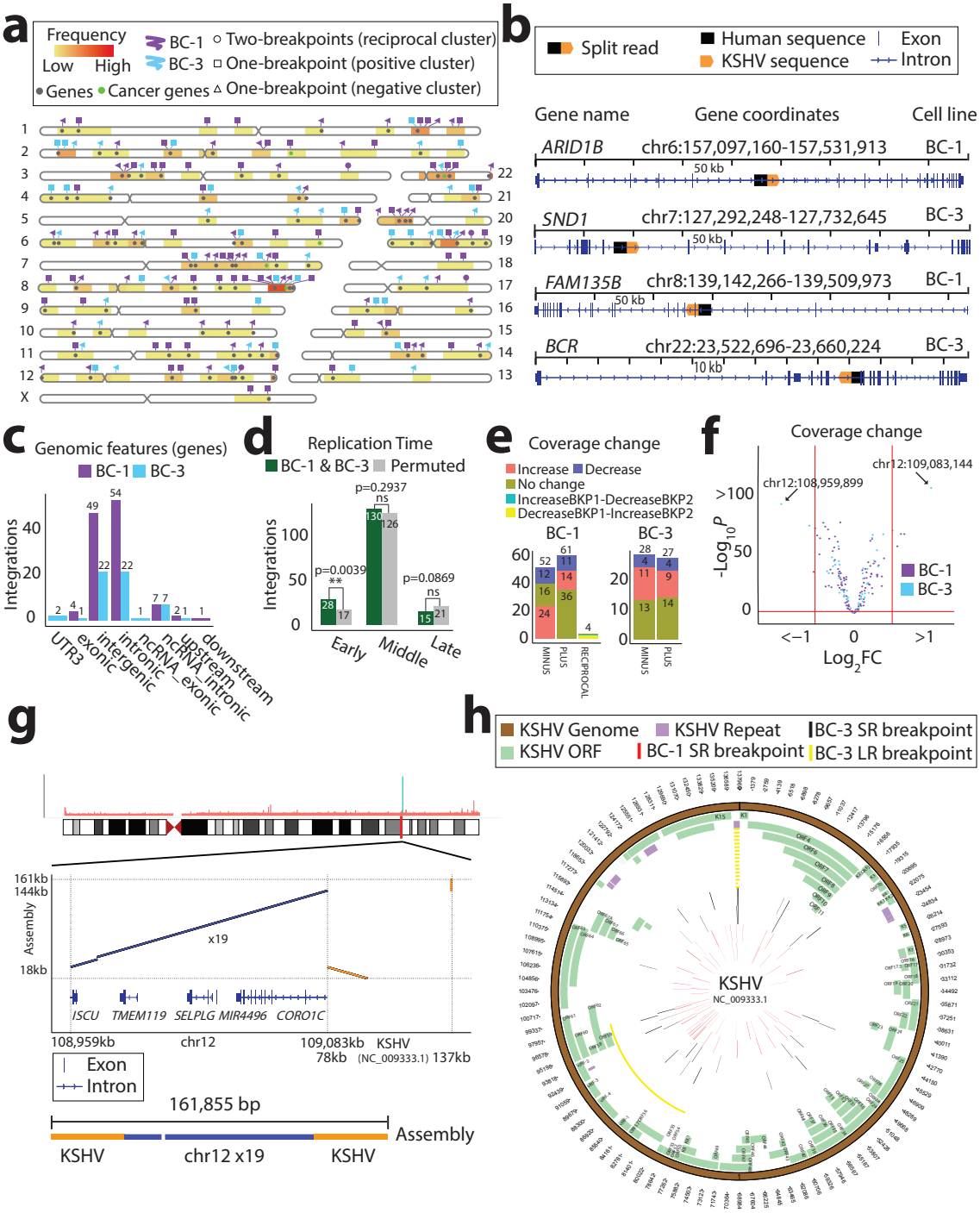


Figure 14. Detailed analysis of KSHV-human junctions in BC-1 and BC-3 cell lines. (a) Ideogram containing KSHV integrations within BC-1 and BC-3 genomes (purple and blue, respectively). The chromosome's colour represents the frequency of the integrations per 10M bp bins, black dots indicate that the integration is within a gene, being green dots cancer genes. The kind of integration is shown by shapes: circles stand for two-breakpoints integrations, squares and triangles represent integrations with one breakpoint in which the viral sequence is downstream and upstream, respectively. (b) Gene models of the cancer genes carrying integrations in both cell lines, where boxes and lines represent exons and introns, respectively. Split reads are represented at integration breakpoints. (c) Genic regions where integrations of both cell lines (BC-1 purple and BC-3 blue) are found. (d) Counts of KSHV integrations classified by regions' replication time (see Materials and Methods). Integrations are more frequent in early replication regions than expected by chance (permutation test, p-value=0.0039). (e) Changes in sequencing coverage at

integrations breakpoints for both cell lines (BC-1 and BC-3). For events with only one breakpoint, no coverage change is coloured in brown, increase in coverage is represented in red and decrease in blue (always from upstream to downstream direction). For two-breakpoints clusters, green represents those in which coverage increases in the first breakpoint and decreases in the second and yellow represents the opposite situation. (f) Volcano plot representing log2FC and p-value of previous changes of coverage, log2FC thresholds are -0.6 and 0.6. Two KSHV integrations in BC-3's chromosome 12 (highlighted with arrows) show a high change in coverage at the breakpoint, demarcating an amplification. (g) Assembled long reads resolving the latter amplification were aligned against human chromosome 12 (blue) and KSHV genome (yellow, NCBI Reference Sequence: NC_009333.1) and represented in a dot plot. The 19-fold amplification demarcated by KSHV integrations spans from chr12:108959kb to chr12:109083kb, involving genes represented in blue boxes. At the top, a schematic representation of the sequencing coverage of chromosome 12 is shown in pink, with the amplification highlighted in green. At the bottom, there is a schematic representation of the dot plot, with chromosome 12 in blue and KSHV in yellow. (h) KSHV genome (NCBI Reference Sequence: NC_009333.1), ORFs are in green and repetitive regions in purple. KSHV sequences at breakpoints in the BC-1 cell line are represented in red and those in BC-3 in black. In addition, long reads are shown in yellow for the BC-3 cell line.

Regarding gene features, most integrations are within introns of protein-coding genes, being five exonic (Fig. 14c). The role of these genes related to cancer is not largely investigated. However, some studies carried out by different teams shed some light on their cancer-related functions. ROBO3 (Roundabout-3), is a transmembrane receptor involved in axon guidance together with SLIT ligands. SLIT/ROBO pathway inactivation has been described to promote cervical cancer progression [290]. Accordingly, another study showed antitumorigenic effects of Slit-2 mediated by Robo-3 receptor in oral squamous cell carcinoma [291]. Inactivation of this signalling pathway has also been described in melanoma and inactivating mutations of ROBO3, among others, in pancreatic carcinoma [292]. Conversely, a concomitant study showed ROBO3 upregulated in pancreatic cancer [293]. Indeed, the role of this gene in tumorigenesis is still controversial [294], with recent studies detecting lower levels of ROBO3 in breast invasive ductal carcinoma in comparison with normal and non-tumoural proliferative lesions [295].

A similar situation arises with *CREBRF*, which main role is promoting cell apoptosis. It was described to act as a tumour suppressor in glioblastoma since it inhibits autophagy [296]. However, its elevated expression in cervical carcinoma was shown [297]. Thus, even though the latest results point out its tumour progression prevention in acute myeloid leukaemia [298], more studies are needed to elucidate its role in cancer development. Even less is known about the remaining three genes harbouring KSHV exonic integrations. Nonetheless, *STRN4* has been related to tumour progression [299–301] and *TTLL8* may play a role in controlling tumour proliferation [302].

An integration in the *ARHGEF3* gene was found in the BC-3 cell line (chr3:57,028,604). This Rho guanine nucleotide exchange factor is involved in the activation of RhoA, a member of the Rho-associated Kinase (ROCK) pathway which participates in cytoskeletal reorganization. Due to *ARHGEF3* participation in the control of this pathway, it was described to modulate acute myeloid leukaemia cell differentiation [303]. Differentiation inducers usually stop cancer progression and, indeed, *ARHGEF3* has been suggested as a putative tumour suppressor gene [304]. Interestingly, a potential integration within this gene was also found in the BC-1 cell line (chr3:57,040,274). However, it is supported only by two reads and therefore excluded from the results presented here.

Apart from their distribution along the genome, due to the novelty of these integrations, further studies are needed in order to know how these virus-human junctions behave. For instance, it would be of interest to investigate if the viral DNA remains attached to the chromosomes or if these junctions could be exscinded and packed with the viral DNA, among many other open questions. In the present work, it is important to highlight that almost all integrations found in both cell lines have only one breakpoint, i.e., a single cluster of reads. Even though this lack of a second breakpoint could be just the cause of insufficient coverage in some events, in other cases it is related to genomic rearrangements, especially if the present breakpoint is associated with changes in coverage. Actually, this relation has been shown above for HBV and HPV, as well as in previous studies from our group [102].

Genomic imbalances are frequent in PEL genomes [305] and it has been shown that cell lines and primary cases are very similar in terms of genomic imbalances [306]. Hence, as KSHV is usually associated with chromosomal instability, changes in coverage at integration breakpoints were tested (see Materials and Methods and Fig. 14e). Also, these changes in coverage are represented in a volcano plot, showing two highly significant integrations, both corresponding to the BC-3 cell line (Fig. 14f).

These KSHV sequences demarcate an amplification on chromosome 12 that was already reported [306]. However, the presence of the KSHV nucleic acid in the rearrangement breakpoints was not detected previously. Strikingly, in the present study, the KSHV genome was found demarcating this 19-fold amplification of a region of chromosome 12. This event spans *SELPLG* and *CORO1C* genes (Fig. 14g), that show high and moderate protein expression, respectively, in the qPCR essays done by Luan et al. in 2010 [306].

CORO1C product is known as Coronin-3 or Coronin-1C and it is a conserved F-actin binding protein. Transcriptional regulation, signal transduction, vesicular trafficking and the control of the cytoskeleton are some of the main processes in which this protein is involved [307].

Even though *CORO1C* is not recorded in cancer-related gene databases, such as CGC or Intogen, several studies point out its relation with this malignancy. By 2008, Coronin-1C was observed to be upregulated in an aggressive tumour type of endometrial carcinoma, in comparison with a more benign tumour type of the same tissue. Likewise, its upregulation was also detected together with hallmarks of aggressive prostate cancer. In addition, it was identified as a hypoxia expression signature in Head-SCC. This lack of oxygen is associated with bad outcomes, highlighting the idea that *CORO1C* is also related to this prognosis. Immunohistochemical analyses were also carried out in melanoma, a cancer type widely known because of its aggressiveness and resistance to treatments. The presence of Coronin-1C was higher in pre-malignant and metastatic stages of melanoma in comparison with normal skin [308]. Indeed, in 2008, a study involving different brain tumour types found a positive correlation between the *CORO1C* expression levels and the malignancy grade of diffuse gliomas. Moreover, to learn more about these protein functions, they observed a decrease in cell proliferation rate in Coronin-1C knockdowns, together with a decrease in their ability to migrate, degrade and invade the extracellular matrix [307]. More recently, similar silencing experiments were performed in lung-squamous cell carcinoma cells, showing similar results, since cell proliferation, migration and invasion were inhibited [309]. In 2017, two studies highlighted the role of the actin filaments re-modeller *CORO1C* in metastases in both breast and

ovarian cancer cells, changing their morphology and accelerating actin dynamics [310,311]. Regarding gastric cancer, the expression of *CORO1C* is higher in tumoural tissue compared with normal, and it also correlates with lymph node spread. In addition, it is also higher in advanced stages of gastric cancer and poor survival cases. Gastric cancer cells were also studied in knockdown experiments, where the lack of expression of *CORO1C* promotes apoptosis and inhibits the cell cycle. These experiments also showed that relevant proteins were upregulated by *CORO1C*. One of them is Cyclin D1, involved in cell cycle progression; and the other is vimentin, present in migration, cellular attachment and signalling pathways, and responsible for cytoplasm integrity and cells' shape. The suppression of these proteins results in the inhibition of cellular proliferation and spread in gastric cancer cells, whereas high levels of expression are related to poor gastric cancer prognosis [312]. Correlation of high levels of *CORO1C* with tumour-infiltrating neutrophils was described in bladder cancer, facilitating the spread of tumoural cells. Intriguingly, copy number amplification was one of the main mutational changes detected in this gene when studying TCGA bladder cancer data [313]. A concomitant study found *CORO1C* upregulated in renal cell carcinoma [314]. In the light of previous experiments, studies exploring the role of *CORO1C* in cancer are still running nowadays. For instance, it has been described to trigger migration, invasion and adhesion in colorectal cancer cells [315].

Altogether, the above evidences support the notion that *CORO1C* plays an oncogenic role in different cancer types, as it promotes cellular growth, proliferation, migration and adhesion, among others. All these processes are related to a malignant, even aggressive, phenotype, as in the case of PEL.

Little is known about the other amplified gene (*SELPLG* or *PSGL-1*) and its relation with carcinogenesis. It encodes a P-selectin ligand involved in lymphocyte trafficking and migration, among other putative functions. Interestingly, high selectin levels have been shown in breast and haematological cancers, showing their potential implication in tumour development [316]. *SELPLG* is also needed for lymphomas dissemination and it was found highly expressed in diffuse large B-cell lymphoma subtype of methotrexate-associated lymphoproliferative disorder ($DLBCL^{MTX\text{-}LPD}$) [317]. Recently, immunotherapy based on anti-PSGL-1 antibodies was proposed, since PSGL-1 presents elevated expression in lymphoproliferative disorders and multiple myeloma [318].

Finally, it is also remarkable that the upstream breakpoint of the amplification is within an intron of *ISCU*, a mitochondrial iron sulfur scaffold protein. Interestingly, previous studies have shown that the inhibition of this gene in a KSHV-positive cell line could promote cell survival and iron uptake needed for cell growth [319].

The presence of the virus in the amplification boundaries was also checked in two other ways. Low coverage long-read sequencing of the whole genome of the BC-3 cell line was performed. Also, PCRs of viral-genome junctions were carried out, resulting amplicons were sequenced using ONT technology and viral sequences at integrations' breakpoints derived from the amplicons were aligned against the KSHV genome (Fig. 14g). These long reads are also represented in Fig.14h, in addition to the viral sequences at the breakpoints of the rest of the integrations reported by VIRUNS, which were also aligned against the KSHV genome. They cover the majority of the viral genome, showing that any region of it can be found at breakpoints. Long reads of BC-3 chromosome 12 give more information about the viral sequence at the breakpoints. The downstream

amplification breakpoint is joined to the terminal repeat of the KSHV genome, and the upstream one is demarcated by a KSHV sequence starting at coordinate 78kb of the viral genome, and spanning until 97kb at least. This region contains the four viral interferon regulatory factors (vIRF). These factors interfere with cellular interferon (IFN) response, the first and quick response that cells trigger against viral infections. vIRF-1 is known to downregulate IFN signalling, as well as it can promote malignant transformation in nude mice cells. Indeed, it is known to suppress p53 [320]. Several studies performed on vIRF-2 showed that it inhibits the activation of some members of IFN [320,321]. Similar to vIRF-1, vIRF-3 (also known as LANA-2), inhibits p53 activity and it has also been suggested to decrease IFN genes transcription [320]. Whereas vIRF-1 is mainly expressed during the lytic phase, vIRF-2 and vIRF-3 do so during latency. Finally, vIRF-4 is the least known, but it can assist in the degradation of p53 via proteasome [322]. Overall, the four vIRF allow the virus to evade the immune response and establish a persistent infection.

Overall, VIRUNS enables the efficient analysis of currently available cancer genome cohorts, as it can process high-coverage short-read data in 30' with a RAM usage under 10 Gb. Based on extensive benchmarks using both, simulated and real data, VIRUNS displays the best balance between precision and recall among all assessed tools (F1-score>= 0.99 for clonal events). In addition, VIRUNS can accurately (F1-score > 0.75) detect subclonal viral integrations at VAFs as low as 10% and it is also suitable for analysing data derived from human tissues. This tool exploits long-read information to disentangle the conformation of viral integrations, revealing the ubiquitous existence of complex integration patterns, including the loss and gain of DNA sequences at the integration breakpoints. VIRUNS viral insertion search is not restricted to certain virus families, as the only requirement is that these are included in a database of sequences provided as input. This feature enables the identification of novel viral integrations. Indeed, one of the most outstanding results of VIRUNS so far is the finding of KSHV genomic integrations. According to a literature search, no integrations of KSHV DNA in the host genome have been described [323]. However, VIRUNS detects several KSHV-human DNA junctions in two PEL cell lines. This discovery shows that KSHV can potentially have a profound impact on cancer genome architecture as illustrated by a KSHV-associated focal amplification spanning 123 kb of chromosome 12. These observations expand our knowledge regarding KSHV, a virus which cancer-driving mechanisms remain highly unexplored.

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CONCLUSIONS

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CONCLUSIONS

HBV integrations

HBV causes a remarkable mutational mechanism in HCC, by which DNA molecules from the virus are inserted into the tumour genome causing dramatic changes in its configuration, including non-homologous chromosomal fusions, dicentric chromosomes and megabase-size telomeric deletions. This aberrant mutational mechanism, present in at least 8% of all HCC tumours from the PCAWG dataset, can provide the driver rearrangements that a cancer clone requires to survive and grow, including the loss of relevant tumour suppressor genes. Most of these events are clonal and occur early during liver cancer evolution. Real-time timing estimation reveals that HBV-mediated rearrangements can occur as early as two decades before cancer diagnosis. Overall, these data underscore the importance of characterising patterns of HBV integration in liver cancer genomes.

VIRUNS (VIral-Reference UNions Search)

VIRUNS is a new tool developed for the detection of somatic and germline viral-human junctions in short- and long-read sequencing data. It can detect any viral sequence present in its input database, including co-infections of different viruses, and it is not dramatically affected by the VAF drop of viral integrations. Indeed, it shows the best balance between precision and recall when compared with other three short-read based callers and its accuracy goes together with its low consuming computational performance. Notably, VIRUNS is the first tool for the identification of viral integrations in TGS data, which allows it to find integration-associated SVs and build a consensus sequence of viral integrants.

This tool successfully performed the characterisation of HPV integrations. Somatic genomic integration of HPV DNA in the host genome is a common phenomenon in Cervix-SCC, occurring in 83% of the samples from the PCAWG. Being less frequent in Head-SCC, found in 23% of these samples, it is revealed as an active mechanism in this tumour type, since the burden of events per sample is higher. Finally, HPV integrations are randomly distributed along the genome and are usually coupled with local sequencing depth changes and, on occasion, with large rearrangements. These findings highlight the important role of HPV in tumorigenesis within different tumour types.

KSHV-human DNA junctions, not described until the moment, were detected by VIRUNS in two PEL cell lines. Randomly distributed integrations were detected in these cell lines that tend to be located within early replication time regions. The discovery of two KSHV sequences flanking a 19-fold amplification, paves the way to further studies on the potential impact of these events on the host genomic architecture.

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MATERIALS AND METHODS

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MATERIALS AND METHODS

HBV and HPV integrations

Sequencing dataset and DNA sources

We analysed Illumina whole-genome paired-end sequencing reads, 100-150 bp long, from 286 hepatocellular carcinoma (HCC), 44 head and neck squamous cell carcinoma (SCC) and 18 cervix SCC tumours and their matched normal samples from the Pan-Cancer Analysis of Whole Genomes (PCAWG) project dataset [91]. The tumour specimens consisted of a fresh frozen sample, while the normal specimens consisted of a blood sample. The average coverage was 44 reads per bp for HCC tumour samples and 33 reads per bp for matched normal samples. Regarding the SCC dataset, the average coverage was 60.61X and 37.58X, for tumoural and normal samples, respectively. BWA-MEM algorithm v0.78.8-r455 [29] was used to align sequencing reads to human reference genome build GRCh37/hg19, version hs37d5.

Tumour's DNA for additional long-read sequencing and FISH were transferred from the HCC tumours collection at RIKEN (Japan) within the framework of the International Cancer Genome Consortium (ICGC). The ethics oversight for the PCAWG protocol was undertaken by the TCGA Program Office and the Ethics and Governance Committee of the ICGC. Each individual ICGC and TCGA project that contributed to the PCAWG dataset had its own local arrangements for ethics oversight and regulatory alignment. We performed additional whole-genome sequencing with Oxford Nanopore Technologies (ONT) on nine HCC tumours from the PCAWG project (all are ICGC tumours only). The tumour specimens consisted of a fresh frozen sample. The average ONT sequencing coverage was eight reads per bp (range 3.83-13.97), and the mean read length was 7.9 kb. All tumours sequenced and analysed in this project have written informed consent for the usage of DNA samples for whole-genome sequencing (for either short or long reads) and publication of their genomic data. All patients agreed to participate in the ICGC study and provided informed consent following ICGC guidelines.

Detection of HBV and HPV insertions using v-TraFiC

v-TraFiC represents a modified version of the former algorithm TraFiC [135], for the identification of somatic insertion events of viral DNA using paired-end sequencing data in three main steps: (1) selection of candidate reads; (2) reads clustering; and (3) identification of viral DNA events.

1. Candidate reads selection

v-TraFiC (v0.23) identifies reads from BWA-MEM mapping that are likely to provide information pertaining to viral DNA site inclusion. Two different read pair types are considered for the identification of viral insertions, named SINGLE_END (i.e., one end of the pair – called anchor is mapped onto the reference genome while the other is unmapped), and ABERRANT (i.e., both reads of the pair are improperly mapped to a chromosome, where the read with the highest MAPQ is considered the anchor). In both cases, the anchor's MAPQ must be higher than zero, its mapping pattern must not be 'soft clipping–alignment match–soft clipping' (i.e., CIGAR string must not be #S#M#S, where # represents the number of nucleotides), and must not map onto decoy sequences,

mitochondrial DNA or Y chromosome. In addition, the pair is also excluded if any of the reads is not a primary alignment, fails platform/vendor quality checks, or is PCR or optical duplicate. Non-anchor reads must not contain unsequenced nucleotides ('N') and the MAPQ of non-anchor ABERRANT reads must be < 20. The algorithm dustmasker v2.6.0 [324] is used to identify non-anchor read pairs containing low complexity sequences, which are later discarded.

2. Clustering

Anchor reads are clustered together if (1) they share the same orientation, and (2) the distance relative to the nearest mapped read of the same cluster is ≤ 200 bp. Two main cluster categories are defined, namely POSITIVE and NEGATIVE (i.e., anchor reads are mapped onto the positive and negative strand, respectively). A preliminary range of genome coordinates is associated with each single cluster – final breakpoint coordinates are refined in a later step –. Ranges are defined by a lower (left) coordinate (P_L_POS and N_L_POS, respectively for positive and negative clusters) and an upper (right) coordinate (P_R_POS and N_R_POS, for positive and negative). Only clusters consisting of ≥4 supporting reads are considered for further analysis. To avoid miscalls due to alignments in complex regions, the full set of reads mapping within cluster coordinates [P_L_POS, N_R_POS] are further analysed, and clusters are removed if: (1) the proportion of reads with MAPQ ≤ 10 relative to the total reads mapped within cluster boundaries represents >0.3 (30%), and/or (2) the proportion of reads with CIGAR string #S#M#S relative to the total reads mapped within cluster boundaries represents <0.15 (15%). Clusters in the tumour are removed if a syntenic cluster in the matched normal sample is detected with the same orientation and mapping the same locus less than 500 bp away. Finally, one positive and one negative clusters are reciprocal if P_R_POS ≥ N_L_POS and abs(N_L_POS – N_R_POS) ≤ 350 bp, otherwise clusters are catalogued as single (or independent).

3. Identification of viral DNA events

Non-anchored reads from each cluster were de novo assembled using Velvet v1.2.10 [325], and contigs were used as queries of BLAST v2.6.0 searches against the RVDB Reference viral database [326] v12.2 containing 2,467,269 viral DNA sequences, of which 91,455 correspond to human HBV and 20,246 to the Papillomaviridae family. Only contigs matching human HBV or HPV DNA are considered, and reciprocal clusters pointing to HBV or HPV DNA are catalogued as canonical insertion events, while single, independent clusters are catalogued as candidates for aberrant integration events.

Finally, we used MEIBA v.0.8.8 [102], to identify and reconstruct HBV DNA insertion breakpoints to base-pair resolution, with the following non-default parameters: 'Maximum number of split read clusters in the insertion region' = 20 (default = 10), and 'Window size to search for split read clusters from discordant read pair clusters ends' = 100 bp (default = 50 bp). The VIRUNS algorithm (described in detail in this thesis and completely independent of v-TraFiC) was used to deep analyse HPV integrations. This tool allows the accurate identification of breakpoint positions and the nucleotide level reconstruction of host genomic and viral sequences surrounding them. In addition, it reports annotated genes and repeats that are nearby detected integrations, along with their distance to the breakpoint.

Copy-number and structural variants datasets

We analysed copy number profiles obtained by the PCAWG Working Group 11 (PCAWG-11) using a consensus approach combining six different state-of-the-art copy

number calling methods [327]. GC content corrected LogR values were extracted from intermediate Battenberg algorithm results [73], smoothed using a running median, and transformed into copy number space according to $n = [2^{\log R}(2(1-\rho)+\psi\rho)-2(1-\rho)]/\rho$, where ρ and ψ are the PCAWG-11 consensus tumour purity and ploidy, respectively.

Structural variants (SVs) were retrieved from the PCAWG Technical Working Group. Concisely, somatic SVs were called using four different callers: SvABA (Broad pipeline), DELLY (DKFZ pipeline), BRASS (Sanger pipeline) and dRanger (Broad pipeline) [91]. Only the events called by at least two of the mentioned tools were considered for further analysis.

Identification of telomeric deletions associated with HBV insertion events

Single read clusters, identified with v-TraFiC, supporting an HBV insertion event (i.e., clusters of discordant read pairs – Illumina – with apparently no reciprocal cluster within the proximal 500 bp, and whose mates support a somatic HBV event), were interrogated for the presence of associated telomeric deletions. Briefly, we looked for copy number loss calls from PCAWG (see "Copy number dataset" above) where: (1) the copy number loss extends from the HBV insertion breakpoint up to the end of the chromosomal arm, involving the telomere, and (2) one independent cluster, which supports the integration of the HBV event, unequivocally demarcates the copy number loss boundary. We used MEIBA to reconstruct the relevant insertion breakpoint.

Analysis of sequencing depth of HPV integrations

Changes in sequencing depth at both sides of the HPV breakpoints are reported in VIRUNS output. Briefly, it separately computes the average sequencing coverage of 5 bp upstream and 5 bp downstream the breakpoint position, providing the difference between them. The intersection between viral integrations and copy number and structural variation (from the Copy-number and structural variants datasets described above) was studied, considering them as concomitant events whenever their genomic coordinates fall within a maximum distance of 1000 bp.

Rate across genomic features

We analysed the frequency of HBV events across genomic features. Chi-squared was employed to test significance (α=0.05). For each test, in silico HBV insertions were randomly generated in the genome, as many as observed in the real dataset, with the regioneR package v1.22.0 [328]. In cases where chi-squared test assumptions were not met due to the low number of observations (i.e., cells with less than five observations), the chi-squared test was not performed. False Discovery Rate (FDR) correction was applied. Chromatin segments: We used the ENCODE segmentation of the HepG2 cell line genome into a set of major genome states [329], considering the following two predicted categories: repressed and transcriptionally active; Replication timing: Replication timing was defined using HepG2 Repli-seq data (GEO: GSM923446). Regions with gene expression signals higher than 70 were defined as early, below 20 were defined as late, and between 20-70 as middle, in the same way described by [196]; Expression: Transcripts Per Kilobase Million (TPM) from 208 liver tissues [330] were used to evaluate HBV insertion rate within genes classified according to different gene expression categories in the liver [0-0.5), [0.5-10), [10-10000].

HPV integrations were tested to be present in regions classified as ‘early,’ ‘middle,’ or ‘late’ with regards to HeLa replication timing defined in the ENCODE Project (https://www.encodeproject.org, GEO: GSM923449), ranking the regions in the same way as it was done for the HepG2 cell line. In addition, to evaluate the presence of HPV integrations across chromatin states, we used the ENCODE segmentation of the HeLa cell line genome into a set of major genome states [329], considering the following five possible categories: R = "Repressed", T = "Transcriptionally active", WE = "Weak Enhancer regions", TSS = "Promoters and flanking regions" and CTCF = "CTCF-enriched element”.

Timing of viral insertions

We have used two (related) ways of estimating the timing of HBV insertions and their mediated telomeric deletions. The first is a relative timing approach, which classifies insertion events as clonal early/late/NA or subclonal, depending on their allele frequency and the local copy number state. This approach does not look at the whole-genome doubling state of the tumour and only provides timing information relative to a chromosomal gain (if any). The second approach takes this one step further. When a whole-genome duplication has generated the gain of the HBV-derivative chromosome, we can time the gain itself much more precisely by aggregating info from the allele frequencies of small variants across the genome. By focusing on the clock-like mutations, this relative timing can be anchored and turned into real-time timing.

We employed the SVclone algorithm v0.2.2 [121] to obtain the number of reads supporting and non-supporting HBV DNA insertions. To deal with HBV insertions supported by single-read clusters only, a modification of the method was implemented to accept structural variants with only one break-end side as follows: (1) relevant filters were switched off in order to allow insertion events with one breakpoint only to be considered by SVclone; (2) only two types of reads were extracted from the BAM file: split reads (soft-clipped reads that cross each break-end) and normal reads (reads that cross or span the break-ends but match the reference), being spanning reads removed (read pairs that align either side of the break-ends but match the reference). Read counts from SVclone, together with tumour purity and copy number states, were used as input of MutationTime.R v0.1 [121] for the classification of HBV insertions into four different timing categories, namely clonal [early], clonal [late], clonal [NA] or subclonal. Then, real-time estimates for whole-genome duplication (WGD) events, based on CpG>TpG mutations analysis [121], were used to place particular HBV insertion within a chronological time frame (in years) during a patient’s lifespan, depending on whether mutations occurred before or after a WGD event.

Identification of HBV-mediated translocations and validation of v-TraFiC calls using single-molecule sequencing with Oxford Nanopore Technologies

We performed long-read whole-genome sequencing with Oxford Nanopore Technologies (ONT) on nine native HCC tumours with relevant HBV DNA insertion events (i.e., SA501491, SA529726, SA529759, SA529830, SA501424, SA501453, SA501481, SA501511, SA501534). Libraries were constructed using the Oxford Nanopore Sequencing 1D ligation library preparation kit (SQK-LSK109, Oxford Nanopore Technologies Ltd) according to the manufacturer's protocol, including an initial DNA

repair step with NEBNext FFPE DNA Repair Mix (New England BioLabs) and NEBNext Ultra II Ligation Module (New England BioLabs). Two low DNA yield samples (SA529726 and SA501481) were whole-genome amplified using ϕ29 DNA polymerase (REPLI-g midi kit, Qiagen) prior to library construction. Amplified DNA was then digested with t7 endonuclease I (New England BioLabs) for linearization of branched amplicons and deproteinized with Proteinase K (New England BioLabs). Next, unbranched DNA underwent size selection of fragments longer than 20 kb through a Short Read Eliminator buffer (Circulomics) precipitation step and was further purified with Ampure XP Beads (Beckman Coulter Inc). Then, libraries were obtained according to the manufacturer's protocol as described above.

Sequencing was performed onto MinION R9.4 flowcells (FLO-MIN106 rev-D, Oxford Nanopore Technologies Ltd), controlled by the Oxford Nanopore MinKNOW software v18.12.09 to v19.12.5. Base-calling and post-processing of the ONT raw fast5 files were conducted with ONT software Albacore v2.3.4 or Guppy v2.3.1 to obtain FASTQ files. Files with quality scores below the recommended values were dropped at this point from further analysis. Reads for each library were then independently mapped to the hs37d5 human reference genome with minimap2 v2.14-r883 [36] and the resulting SAM files were converted to BAM files, sorted and indexed using SAMtools v1.7 [30]. All partial BAM files were merged, sorted and indexed to the final BAM files.

We performed validation of 47 putative somatic HBV insertion events (36 single clusters and 11 reciprocal insertions) identified with v-TraFiC in the nine HCC tumours that were sequenced using Illumina paired-end and ONT long-reads. For each one of the HBV events, we interrogated the long-read tumour BAM file to seek long reads validating the event. Two types of supporting reads were employed, namely (1) 'spanning reads', composed of ONT reads completely spanning the HBV insertion, hence they can be identified as a standard insertion on the reference genome, and (2) 'split reads', composed of ONT reads spanning only one of the HBV insertion ends, hence they get clipped the alignment onto the reference genome. HBV events supported by at least one ONT read were considered true positive events, while those not supported by such reads were considered false positive calls. Overall, we found ~10% (5/47) of false positive events (note that this rate could be overestimated due to low coverage in the ONT data). Spanning reads were used to identify 11 cryptic translocations.

Probe synthesis and fluorescence in situ hybridization of HBV-mediated translocations

Two sets of bacterial artificial chromosome (BAC) clones (RP5-1125N11 and RP11-891N16 for t(1;11); and RP11-125F4 and RP11-652N13 for t(8;17)) were obtained from the BACPAC Resources Center (https://bacpacresources.org/) to develop two-colour single-fusion FISH probes to detect chromosome translocations. *ARID1A* deletion probe was developed with RP5-696E2 and RP11-372B18 BAC clones, and Metasystems #D-5103-100-OG probe was used to study *TP53* gene deletion. RP5-1125N11, RP11-125F4, and RP5-696E2 BACs were labelled with Spectrum-Orange, and RP11-891N16, RP11-652N13 and RP11-372B18 with Spectrum-Green. FISH analyses were performed using the Histology FISH Accessory Kit (DAKO) following the manufacturer's instructions (PMID: 25798834 DOI: 10.1038/onc.2015.70) on 5mm TMA sections mounted on positively charged slides (Thermo Scientific). Briefly, the slides were first deparaffined in xylene and rehydrated in a series of ethanol. Slides were pre-treated in 2-[N-

morpholino]ethanesulphonic acid (MES), followed by a 30 min protein digestion performed on proteinase-K solution. After dehydration, the samples were denatured in the presence of the specific probe at 73ºC for 5' and left overnight for hybridization at 37ºC. Finally, the slides were washed with 20×SSC (saline-sodium citrate) buffer with detergent Tween-20 at 63ºC and mounted on fluorescence mounting medium (DAPI in antifade solution). Cells were imaged with a Leica DM 5500B fluorescence microscope equipped with a 100x oil-immersion objective, Leica DM DAPI, Green and Orange fluorescence filter cubes and a CCD camera (Photometrics SenSys camera) connected to a PC running the Zytovision image analysis system (Applied Imaging Ltd., UK) with Z stack software v7.4. The z-stack images were manually scored by two independent investigators by counting the number of co-localized signals, representing fused transcripts, or missing signals, representing deletions, all over the tissue.

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VIRUNS and KSHV integrations

DNA sources and sequencing datasets

Four cancer cell lines were analysed in this study: CaSki, an epidermoid cervical carcinoma cell line infected with HPV [331]; PLC/PRF/5, a hepatocellular carcinoma cell line containing HBV [332]; and two PEL cell lines (BC-1 [333] and BC-3 [334]), infected with KSHV.

All samples were sequenced by Illumina paired-end sequencing with an average coverage of 30X. BWA-MEM algorithm v0.78.8-r455 [29] was used to align sequencing reads to human reference genome build GRD37, version hs37d5. Furthermore, CaSki, PLC/PRF/5 and BC-3 were sequenced with MinION from Oxford Nanopore Technologies, with coverages: 17X, 10X and 1.25X, respectively. We followed the same protocol as HBV samples above for library preparation and sequencing.

Simulated data

An in-house simulator was used to create whole genomes containing viral insertions. This simulator is out of the scope of this thesis since it is going to be presented in future publications from our lab. Very briefly, it splits the reference genome in windows and randomly inserts viral sequences along it. Then, it uses ART [335] and PBSIM [336] to simulate short- and long-read genome sequencing, respectively.

In this work, this tool was used to simulate different datasets for evaluation purposes. Five whole genomes were created simulating short-read sequencing with an average read depth of 30X and harbouring 300 canonical integrations each: 100 HBV, 100 HPV and 100 HHV4 integrations; generated from the NCBI Reference Sequences: NC_003977.2, NC_027779.1 and NC_007605.1, respectively. The difference among these five simulated genomes is the VAF of the viral integrations, which values are: 10%, 20%, 30%, 40% and 50%. Following the same approach, another set of five genomes was generated, but simulating long-read sequencing.

Five additional genomes were created simulating short- and long-read sequencing. In this case, the VAF chosen for the 300 integrations is 50% and the difference among the genomes is in the simulated sequencing depth, which values are 10X, 20X, 30X, 40X and 50X.

VIRUNS' viral database

The viral database built for VIRUNS is based on U-RVDBv16 [326]. Query entrez [337] was used for retrieving taxonomy information of each sequence. Only viral sequences were kept, deleting all having "human" as Organism. Then, in order to decrease the size of the database, sequences were clustered by family and consensus sequences of each cluster were obtained using usearch11.0.667_i86linux32 [338], with the lowest identity threshold (0.6). For those family clusters without consensus, viral sequences were grouped by lower levels of taxonomy. When reaching species level without successful consensus sequences, raw viral sequences were added to the database. The resulting database was masked using RepeatMasker [339]. Furthermore, specific masking was done with bedtools

maskfasta [340], masking conflictive regions of some viral sequences. Finally, it was indexed using bwa/0.7.17 [29].

The resulting database is composed of 666,115 viral sequences from 100 different families and 5,673 unclassified or uncultured sequences. Although this database is optimized for running VIRUNS, any other can be used. For simplifying the analysis, a subset of the former database was also created containing 49,523 sequences, lacking the Riboviria family.

Viral integration search: VIRUNS

VIRUNS is a flexible tool that allows the user to control several parameters during its execution (see details in VIRUNS' documentation, linked below). In the present thesis, VIRUNS was run with the following parameters. Although the minimum cluster size was set to two, only calls supported by three or more reads were considered:

- Number of processes: 24
- Target genomic references: 1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,X,MT,Y
- Minimum number of reads: 2
- Minimum cluster size: 2
- Minimum mapping quality: 10
- Maximum cluster size: 10000
- Minimum length of the viral sequence (only for long-read mode): 15

The successful execution of VIRUNS_SR yields two VCF files, one containing those integration calls that passed all the applied filters (INS_VIRUNS_SR_PASS.vcf) and another one with discarded calls (INS_VIRUNS_SR_FAILED.vcf). Both output files contain the same INFO fields, described below:

- NBTOTAL: Total number of insertion supporting reads. [VIRUNS_LR]
- NBTUMOR: Number of insertion supporting reads in the tumour sample, when paired execution is selected. [VIRUNS_LR]
- NBNORMAL: Number of insertion supporting reads in the normal sample, when paired execution is selected. [VIRUNS_LR]
- NBDISC: Number of discordant reads supporting the insertion.
- NBCLIP: Number of split reads supporting the insertion. [VIRUNS_LR]
- IDENT: Identity of the insertion, i.e., what virus is inserted. [VIRUNS_LR]
- ORIENT: This field has three possible values: RECIPROCAL, indicating that the insertion has two breakpoints; PLUS, indicating that the insertion only has one cluster of reads – i.e., one breakpoint (BND) – where the viral sequence is downstream; and MINUS, indicating that the insertion only has one cluster of reads where the viral sequence is upstream.
- BKP2: Reference position of the second breakpoint of the insertion, if present.
- DISCMAPQ: Average MAPQ of discordant reads supporting the insertion.
- CLIPMAPQ: Average MAPQ of split reads supporting the insertion.
- SPECIDENT: Detailed identification of the present viral sequence (e.g., species level), if possible. As different reads can point to a different viral-specific identity,

each detected identity is followed by the number of discordant reads supporting it (SpecificIdentity:#reads). [VIRUNS_LR]

- DISCDUP: Percentage of supporting discordant reads that are labelled as duplicates in the input BAM file.
- CLIPDUP: Percentage of supporting split reads that are labelled as duplicates in the input BAM file.
- DEPTHDIFF: Difference of sequencing depth at both sides of the breakpoint. Positive if depth increases downstream, negative otherwise. [VIRUNS_LR]
- REP: Families of annotated repeats at the insertion region.
- REPSUB: Subfamilies of annotated repeats at the insertion region.
- DIST: Distance between the insertion breakpoint and annotated repeats.
- REGION: Genomic region where insertion occurs.
- GENE: HUGO gene symbol.
- INTBKP: Coordinates of the inserted sequence at the breakpoint.
- INTBKP2: Coordinates of the inserted sequence at the second breakpoint, if present.
- CLIPTYPE: Approach by which split reads were collected at the breakpoint. DISC: Based on discordant split reads. BLAT: Based on BLAT search. REG: Based on cluster position.
- REFSeq: Reference sequence at the insertion point, spanning 10 bp upstream and 10 bp downstream the insertion breakpoint.
- BKPCSEQ: Consensus sequence at the breakpoint.
- BKP2CSEQ: Consensus sequence at the second breakpoint, if present.
- BKPRSEQ: Sequence of the read with the longest viral fragment at the breakpoint.
- BKP2RSEQ: Sequence of the read with the longest viral fragment at the second breakpoint, if present.
- CLIPTYPE2: Approach by which split reads were collected at the second breakpoint, if present. DISC: Based on discordant split reads. BLAT: Based on BLAT search. REG: Based on cluster position.
- DISC: Names of discordant reads supporting the insertion.
- CLIP: Names of split reads supporting the insertion. [VIRUNS_LR]

Those fields tagged in the above list as "[VIRUNS_LR]", are also reported in the VCF files given as output by the long-read mode, which returns four different files:

- INS_Spanned_VIRUNSLR.vcf: This VCF file contains found canonical insertions (i.e., insertions with two clusters/breakpoints), that are supported by spanning, spanning and split reads or by split reads that overlap each other.
- INS_noOverlap_VIRUNSLR.vcf: This VCF file contains found canonical insertions supported by two face-to-face clusters of split reads that do not overlap each other.
- soloBND_VIRUNSLR.vcf: This VCF file contains insertions composed of one cluster of split reads (i.e., BNDs).
- BNDjunctions_VIRUNSLR.tsv: This TSV file contains those pairs of BNDs connected via supplementary mappings. These are BND junctions joined by a viral bridge.

Similar to VIRUNS_SR, files with discarded calls for each category are also provided. In addition to the fields described above, VIRUNS long-read mode shows the following information within the VCF INFO field:

- NBSPAN: Number of spanning reads supporting the insertion.
- LEN: Insertion length.
- MAPQ: Average of the mapping quality of the reads supporting the insertion.
- INSEQ: Inserted sequence.
- CV: Coefficient of variation for insertion length across spanning reads.
- INS: Read name of spanning reads supporting the insertion.
- SUPPOBKP: For those insertions that are supported only by split reads, this field indicates if both breakpoints are supported by them (PLUS, MINUS); or just the breakpoint where the viral sequence is downstream (PLUS) or upstream (MINUS) is supported.

Regarding the TSV file, BNDjunctions_VIRUNSLR.tsv, it consists of 16 columns:

- REF_A: Reference (chromosome in the majority of the cases) of the first breakpoint.
- BKP_A: Coordinates of the first breakpoint.
- REF_B: Reference of the second breakpoint.
- BKP_B: Coordinates of the second breakpoint.
- junctionType: Intrachromosomal if both breakpoints are within the same reference; interchromosomal otherwise.
- NBTOTAL: Total number of insertion supporting reads.
- NBTUMOR: Number of insertion supporting reads in the tumour, when paired execution is selected.
- NBNORMAL: Number of insertion supporting reads in the normal, when paired execution is selected.
- bridgeType: It can take three different values: “viralSolo”, when a viral sequence is inserted without any modifications with respect to the viral reference; “viralFamilyNested”, when the inserted viral sequence presents rearrangements in comparison to the viral reference one; and “viralNested”, when viruses from different families are present in a single insertion event.
- IDENTITY: Identity of the bridge, i.e., what virus is inserted.
- SPECIDENT: Detailed identification of the present viral sequence (e.g., species level), if possible.
- bridgeLEN: Length of the inserted viral sequence acting as a bridge.
- NBBridge: Number of reads supporting the viral bridge.
- bridgeSeq: Sequence of the viral bridge.
- junctionConsSeq: Consensus sequence of the complete BND junction event.
- bkpsConsSupport: Boolean, True if the previous consensus was possible to obtain, False otherwise.

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To achieve a successful performance, VIRUNS is written in Python 3 [341] and makes use of different Python modules and the following third-party tools:

- VIRUNS_SR:
  - miniconda2/4.7.10 [342]
  - gcc/6.4.0 [343]
  - samtools/1.9 [30]
  - minimap2/2.14 [36]
  - bwa/0.7.17 [29]
  - racon/1.3.1 [242]
  - ncbi-blast/2.2.29+ [241]
  - bedtools/2.28.0 [340]
  - ANNOVAR, version: 2018-04-16 [243]

- VIRUNS_LR:
  - binutils/2.31.1 [344]
  - gcc/6.4.0 [343]
  - ncurses/6.1 [345]
  - zlib/1.2.11 [346]
  - bzip2/1.0.6 [347]
  - xz/5.2.4 [348]
  - samtools/1.9 [30]
  - minimap2/2.14 [36]
  - bwa/0.7.17 [29]
  - racon/1.3.1 [242]
  - ncbi-blast/2.2.29+ [241]
  - bedtools/2.28.0 [241]
  - ANNOVAR, version: 2018-04-16 [243]

At the moment of this thesis submission, VIRUNS is in the alpha testing phase. Hence, its code and documentation are available upon request at <https://gitlab.com/mainVIRUNS>.

Viral integration search: external available tools

VirusFinder2 and Virus-Clip were run using default parameters. However, some modifications and/or further steps were needed. VirusFinder2 failed to run with any database that has more than one viral sequence. Thus, each simulated sample had to be run three times, one per virus. Regarding Virus-Clip, computing time was more than two weeks if run with a database containing all viral families, so it was run using a database containing only sequences belonging to the families of the viruses used for the simulated genomes (*Hepadnaviridae*, *Papillomaviridae* and *Herpesviridae*). HHV sequences from the same database were used to run ViFi, which already provides HPV and HBV databases. It was also run with default parameters and split by virus, as VirusFinder2. Notably, eHMMs are provided by the developers for HBV and HPV so they were also used when analysing those viruses but not for HHV.

Both, VirusFinder2 and Virus-Clip, were run using FASTQ files since they crashed with BAM file inputs. Also, VirusFinder2's main script did not work and it had to be launched

in three different steps. In addition, some changes had to be done inside internal scripts to avoid modules' version incompatibility issues.

Viral integration tools benchmarking

Results from all pipelines (VIRUNS_LR, VIRUNS_SR, VirusFinder2, Virus-Clip and ViFi) were compared with the real coordinates of the simulated dataset and with the gold-standard (GS) for the cell lines. Those calls that were more than 300 bp (250 bp for cell lines) away from the real integration breakpoint were considered as false positives (FP), being the rest considered true positives (TP) if present in the output, and false negatives (FN) otherwise. Among all calls from the same pipeline, if two or more were less than 250 bp apart from each other, they were merged and considered as only one FP event. Then, evaluation metrics were obtained as follows:

- Precision = TP/(TP+FP)
- Recall = TP/(TP+FN)
- F1-score = 2*(Precision*Recall)/(Precision+Recall)

Analysis of KSHV integrations' genomic distribution

The distribution of KSHV integrations across the human genome was analysed for BC-1 and BC-3 cell lines. All integrations were classified in 10Mb windows. For looking for hotspots, the total number of integrations (173) was randomized across the human genome 100 times and the median number of integrations in each 10Mb genomic window was calculated to obtain the ratio of real integrations/random integrations for each bin.

Replication timing

Replication timing was defined using Repli-seq data (GEO:GSM923450, GSM923439, GSM923440, GSM923443, GSM923451) of five B-lymphocyte cell lines (GM12813, GM12812, GM12801, GM06990, GM12878, respectively). Regions with gene expression signals higher than 70 were defined as early, below 20 were defined as late, and between 20-70 as middle, in the same way described by [196]. A permutation test was performed to test for significance as follows: the total number of integrations was randomized across the genome 100 times and their location in the different classified regions was compared against real integrations.

Detection of changes in coverage associated with KSHV-human junctions

For calculating the change in coverage, sequencing coverage per base pair was collected using SAMtools depth in a range of 100 bp upstream and 100 bp downstream of the integration breakpoint. Then, the sequencing coverage average was calculated for both areas and the difference between them was obtained, considering a change when this difference is equal to or higher than five. For those meeting this criterion, increase and decrease categories are established, depending if the coverage increases upstream to downstream or vice versa. Averages of both areas were also used to calculate the log2FC and p-values.

EXTENDED SUMMARY

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EXTENDED SUMMARY

Every single organism has a genome, which size, shape and nucleic acid vary between species and clades. However, it always encodes the necessary information to function. Hence, the 23 pairs of chromosomes composing the human genome have been a target of research for ages. One of the most relevant discoveries was its double helix structure, triggering the raise of experiments to unravel its nucleotide sequence. Even though the first successful attempts were only able to sequence small genomic fragments and their execution was slow, expensive and tedious, they paved the way to the consecution of one of the most important projects in the genomics field, the Human Genome Project (HGP). It covered the 99% of the euchromatic sequence from a pool of different individuals and revealed that the majority of the genome does not encode proteins. This brought the idea that the sequence of our genome is full of trash or "junk DNA", a statement that is already refused thanks to projects like ENCODE, that study the functional role of different genomic components.

The techniques used in the HGP initiative led to the development of "Next Generation Sequencing" technologies, allowing to sequence whole genomes in an effective and quite affordable way. As a consequence, the number of genomic, human and not human, sequences heavily increased together with the studies to gather and describe their variability, within and between species. Among others, one of the main drawbacks of these technologies is the limited length of the sequencing reads, leaving non-sequenced gaps all along the genome. The efforts to elongate this length led to the more advanced technologies that are in place at the moment, called "Third Generation Sequencing". Their long reads are already giving us a better understanding of the human genome, such as the sequence of the chromosome X from end to end or the complete sequence of a human genome.

These advantages could not have been possible without the power of bioinformatics. An uncountable number of tools have been developed not only for dealing with the sequencing reads and assembling or mapping them in a meaningful way but also to extract a wide variety of information from them. Thus, some of these tools are dedicated to find genomic alterations. These changes, or mutations, are classified according to how they affect the DNA sequence or structure, being point mutations the ones affecting only one base pair. Indels refer to the event when a few base pairs are affected by the change, being inserted or deleted. Larger changes, or structural variants, can affect the sequence in many different ways, changing the shape of the genome. Also, the number of the complete set of chromosomes can be increased, a phenomenon called polyploidy.

These mutations are common in cancer, a term that stands for different genetic diseases involving complex mutational processes. It has been estimated that cancer will be the leading cause of death and the limitation to increase the life expectancy worldwide. Genomic mutations are the raw material from which cancer may arise. All cells of the human body somatically accumulate mutations, following a Darwinian evolution process in which the majority of them are passenger, while the driver ones give the cell an advantage and positive selection acts on them towards tumour progression. Genes' roles are also important in tumorigenesis: while oncogenes make the cell grow and survive; tumour suppressors act as barriers to these functions.

Mutations can arise from many different sources. Some of them are inherited and present in the germline and others are the cause of endogenous mutational processes, some of them intrinsic to all of us. Exogenous agents, usually linked with our environment and lifestyle, can also induce mutations. Fortunately, cells can actively protect themselves, having several mechanisms of repair. However, on occasion, defences against damage are not enough and first driver mutations lead to more and more prominent mutations and, thus, to genomic instability. Even though most cells acquiring deleterious mutations are wiped by natural selection, when a cell accumulates enough driver mutations to grow and proliferate, it promotes the formation of primary tumours, that can spread and metastasize.

Cancer prevalence and complexity make it cryptic and several projects, such as Pan-Cancer Analysis of Whole Genomes (PCAWG), use high-throughput sequencing technologies and specific bioinformatics tools to analyse it. Among many different topics, they study the origin of mutations found in a cancer genome. Mutational signatures left in the genome by some mutagens and timing analysis based on molecular clocks, raised during the last years as useful approaches to unravel mutations' provenance.

It is known that the origin of some mutations is related to microorganisms. Actually, it has been estimated that at least 16% of tumours are associated with microorganisms. Viruses are a great part of them, being the cause of 10-15% of human cancers worldwide. Only seven oncogenic viruses are known to date: Hepatitis B virus (HBV) and Hepatitis C virus (HCV) are the cause of some hepatocellular carcinomas (the latter also causes some lymphomas); Human Papillomaviruses (HPV), such as HPV16 and HPV18, promote most cervical cancers, and some anogenital and head and neck cancers; Epstein-Barr virus (EBV) causes many lymphomas and nasopharyngeal carcinomas; Kaposi's Sarcoma Herpesvirus (KSHV) promotes Kaposi's sarcoma and some lymphomas; Merkel cell polyomavirus (MCV) causes most Merkel cell carcinomas; and Human T-lymphotropic virus-I (HTLV-I) promotes adult T cell leukaemia. Among them, only HTLV-1 belongs to retroviruses, a family that has the integration of their nucleic acid in the human genome as a mandatory stage of their cycle. However, partial or full-length segments of other oncogenic viruses' nucleic acid may become integrated into the nuclear human genome, even being a usual step for some of them. These viruses can induce tumours by this integration process, a mechanism called insertional mutagenesis.

The prevalence of worldwide chronic hepatitis B infection is ~3.9%, being a complex disease that can be caused by nine different genotypes of a virus with a ~3.2 kb circular partially double-stranded DNA genome. Liver fibrosis, cirrhosis and hepatocellular carcinoma (HCC) are outcomes of HBV infection, a condition affecting more than 240 million people worldwide and the second most frequent cause of cancer after tobacco. HCC has a complex genomic landscape, with frequent copy number changes and interchromosomal rearrangements, where HBV promotes genomic instability through viral proteins and insertional mutagenesis. However, we still ignore the full extent to which HBV DNA integrations impact the structure (i.e., patterns and mechanisms of mutation) and function (i.e., driver events) of HCC genomes.

Here, to further illuminate the insights of this complex disease, bioinformatic algorithms were run to explore the landscape of HBV DNA integrations acquired somatically on Illumina paired-end whole-genome sequencing data from 296 HCC tumours from the Pan-Cancer Analysis of Whole Genomes (PCAWG) project. Their matched normal

samples derived from blood were also sequenced. This analysis retrieved a total of 148 somatic HBV integration events in 51 tumour samples. Forty-two of these events represent canonical viral DNA insertions, where sequencing reads show two virus-human junctions at both sides of the integrated viral sequence. However, this analysis revealed that a majority (72%, 106/148) of events follow an unexpected, non-canonical pattern. It is characterised by the presence of only one breakpoint of the somatic viral integration, while the one supporting the other extreme of the insertion appeared to be missing. This pattern could represent cryptic somatic rearrangements mediated by HBV DNA insertion.

This pattern was shown, among other examples, in chromosome 19 of an HCC sample. Hence, to illuminate the genuine configuration of the relevant rearrangement involved in the patterns described above, long-read whole-genome sequencing was performed on the affected tumour, SA501453, using Oxford Nanopore Technologies (ONT). The long reads revealed a cryptic translocation linking chromosomes 19 and 11, which is bridged by an HBV DNA insert.

Intriguingly, many non-canonical HBV insertions occur in association with megabase-size deletions that remove telomeric regions of chromosomes. An example was found in a sample carrying one of these insertions in one chromatid of chromosome 3. The long-read sequencing analysis of this sample revealed that the telomeric deletion occurred due to an unbalanced translocation between chromosomes 3 and X bridged by an HBV insertion. This aberrant mechanism seems to be recurrent since ~8% (23/296) of all HCC samples in the PCAWG dataset bear the hallmarks of this mutational process.

In a genomic context, HBV integrations are enriched in genic regions and canonical ones are enriched in early replication sites. In addition, many HBV-mediated rearrangements occurred in chromosomes with copy number gains, providing opportunities for timing analyses. They revealed that somatic insertions of HBV DNA in HCC are typically clonal events that have been acquired early in tumour evolution, supporting the notion that these large-scale rearrangements may be important in the initial stages of liver oncogenesis. Some samples harbouring whole-genome duplication (WGD) were perfect candidates to perform a more precise timing estimation of HBV events along patients' lifetime. This approach allowed real-time timing of 37 HBV insertions (8 canonical and 29 non-canonical) and revealed that some of these rearrangements appeared many years before diagnosis. For instance, a cryptic HBV-mediated rearrangement in chromosome 10, coupled with a telomeric deletion, occurred at least 21 years before the patient was diagnosed with HCC.

HBV-mediated telomeric deletions cause the loss of tumour suppressor genes. For instance, one remarkable sample was found carrying an HBV integration bridging an unbalanced translocation between chromosomes 17 and 8 that would generate a dicentric chromosome. In addition, the rearrangement removed one copy of the tumour suppressor gene *TP53*. Similar events were identified in two additional samples, with the deletion of another tumour suppressor gene, *ARID1A*, in both cases. Overall, the analysis of the copy number data from the 23 HCC samples with telomeric deletions showed that these alterations result in the loss of 244 genes classified as tumour suppressors, 37 of them involved in human HCC. Notably, at least three of these events are reported in the Compendium of driver copy number alterations of the PCAWG Consortium. These results provide evidence that this is a mutational mechanism that likely contributes to the development of human HCC.

Overall, these data underscore the importance of characterising liver cancer genomes for patterns of HBV integration, and raise the question about the potential benefit of an earlier antiviral therapy against HBV in HBV-infected patients, to prevent the acquisition of early driver mutations caused by the virus in the initial stages of liver cancer development. This is particularly relevant for chronic hepatitis B patients in the "immune-tolerant" phase, a stage of the disease characterised by no-fibrosis or minimal fibrosis for which antiviral therapy is not recommended by current patient management guidelines. However, levels of HBV replication in this stage are very high, generating the template double-strand linear DNA (dslDNA) required for the somatic acquisition of the HBV DNA insertions and HBV-mediated rearrangements that, eventually, drive the oncogenic process.

In the light of the huge impact viral integrations can have, it reveals crucial to have pipelines for its quick and accurate detection. However, currently available tools are highly computational demanding, in time, memory and disk space, preventing their application for the analysis of large scale datasets composed of thousands of cancer genomes. Besides, these methods are not accurate enough or are restricted to the search of certain viral families, hampering the identification of novel cancer-associated viruses. Finally, emerging long-read sequencing approaches, namely Oxford Nanopore Technologies (ONT) or Pacific Biosciences, are promising for structural variation (SV) research, including viruses, while no viral insertion detection tool exists for such type of data. In this project, VIRUNS (VIral-Reference UNions Search) was developed to try to overcome this lack.

Briefly, VIRUNS takes as input a BAM file containing pre-aligned reads on the human reference from short- or long-read sequencing platforms. Then, VIRUNS exploits read information to seek either canonical viral integration events or complex patterns where the viral integration bridges two distal breakpoints, typically being associated with a secondary SV, such as a duplication, deletion or translocation. Occasionally, sequence information is not able to completely resolve the integration structure, resulting in the identification of breakends (BND), where only one of the integration breakpoints can be characterised. Viral insertion calls are provided as output in the standard Variant Call Format (VCF).

Given the notable differences in the analysis of short- and long-read data, VIRUNS is composed of two independent modules, one per technology. VIRUNS short-reads search for viral insertion events based on two read signatures: (a) discordant read pairs, with one mate aligning on the reference adjacent to the insertion breakpoint while the other mapping into a viral sequence; and (b) split reads, which consist on reads spanning the insertion breakpoint and therefore partially aligning on both, the reference and viral genomes. Discordant and split read analysis is done in a four-step process: (1) Collect discordant read pairs, (2) Discordant read pair clustering, (3) Insertion breakpoint refinement via split reads analysis and (4) Filtering candidate integrations. Similarly, two read signatures are considered for long-read data: (a) spanning reads, which are reads completely encompassing an insertion event; and (b) split reads supporting one of the insertion breakpoints. They are also analysed in a four-step process: (1) Collect viral insertion supporting reads, (2) Read clustering, (3) Insertion structure determination and (4) Filtering. Both methods are flexible, with parameters easily modifiable by the user. In addition, they offer the possibility to analyse one or two samples at once, being the latter

a case-control procedure. Finally, they can report annotated repeats and genes within the genomic regions where integrations are located.

VIRUNS was benchmarked using in silico genomes harbouring randomly distributed viral integrations, belonging to HPV, HBV and HHV4. Different variant allele frequencies (VAF) of viral integrations were tested, ranging from 10% to 50%. Both methods reported no false positive calls and with regard to recall, it ranged from 0.78 to 0.98 for VIRUNS_SR and from 0.63 to 1 for VIRUNS_LR.

The performance of VIRUNS_SR was compared with VirusFinder2, Virus-Clip and ViFi, three short-read based viral integration detection tools. Among all of them, VIRUNS_SR displayed the best balance between precision and recall, measured as F1-score, while Virus-Clip showed up as the least accurate method. Computational performance was also measured and, both methods, VIRUNS short- and long-reads, showed the lowest execution times. In terms of memory usage, ViFi exhibited the highest peaks of RAM consumption, followed by VirusFinder2, VIRUNS and Virus-Clip.

Two cancer cell lines, CaSki and PLC/PRF/5, containing experimentally validated HPV and HBV integration events were selected to further evaluate VIRUNS. Consistently with simulated data, VIRUNS, Virus-Clip and ViFi displayed recall values over 90% in both cell lines. All tools except Virus-Clip and ViFi with CaSki cell line had precision higher than 99%. Overall, VIRUNS_SR exhibited the best balance between both metrics among short-read callers, followed by ViFi, VirusFinder2 and Virus-Clip. Notably, VIRUNS_LR provides a consensus sequence of each integration event, allowing the analysis of each viral integrant and the detection of host structural rearrangements.

VIRUNS was also tested with sequencing data from human tissue samples. For doing so, different already analysed and published datasets were interrogated for both, HBV and HPV integrations. The former were interrogated using a publicly available dataset from a previous study and the execution of VIRUNS yielded similar results, confirming its good performance.

Special effort was done in the characterisation of HPV integrations in human tissues by VIRUNS. Among sexually transmitted infections, one of the most common around the world is the one of this oncogenic virus, with about 291 million women carrying it and with similar figures shown in men, being the latter reservoirs and transmission vectors. HPV has more than 200 genotypes and is classified into two main categories according to its symptomatology: low-risk HPV (LR-HPV), causing anogenital and cutaneous warts and high-risk HPV (HR-HPV), the cause of different types of oropharyngeal and anogenital cancers. Indeed, HPV is present in 90% of cervical cancers, being the fourth most commonly diagnosed cancer worldwide among females. Its 8 kb of circular double-stranded DNA encode, among others, two oncogenic proteins (E6 and E7) that trigger tumorigenesis by interacting with many cellular pathways. Once again, protein interactions are not the only mechanism involved in cancer development, as DNA integration also plays an important role in this process.

VIRUNS was able to characterise a total of 42 and 68 viral-human genomic junctions found in 15 cervical and 10 head and neck squamous cell carcinoma (from now, Cervix-SCC and Head-SCC) biopsies from the PCAWG cohort. Notably, all found junctions are somatic, being absent in matched normal blood samples for each patient. Two different

patterns of viral integrations were detected in both tumour types, as it has already been shown for HBV. Altogether, there are a total of 87 HPV integrations, 34 of them found in Cervix-SCC and the remaining 53 in Head-SCC, where 26/34 integrations show only one breakpoint in Cervix-SCC samples and 38/53 in Head-SCC ones.

Similarly to HBV and as it has been shown in several studies, HPV integrations' distribution across chromosomes reveals no clear trend, showing that HPV can get integrated into any part of the genome in both tumour types. Less than half of the 87 integrations are in intergenic regions. Introns of protein-coding genes are the most common location for those integrations found in genic regions, followed by non-coding RNA introns, while a few of them are integrated into exons or regulatory regions. Among the integrations described within the PCAWG dataset, there are 6 located in cancer-related genes. Apart from genes, the majority of HPV integrations are found close to annotated repeats (<100 bp away).

To contribute to previously described observations, an analysis was done in order to find host genomic copy number alterations within integrations' breakpoints, assessing the differences between sequencing depth upstream and downstream of the viral-human junctions. As a result, 79% of HPV integrations in Cervix-SCC and 75% in Head-SCC are in association with local depth changes. Stratifying by insertion type, 63% of canonical and 84% of single breakpoint integrations show coverage variation in Cervix-SCC; being 93% and 68% in Head-SCC. However, these figures drop to 3/34 and 27/53 when determining how many viral integrations are located close (<1,000 bp) to CNV (copy-number variants) calls, probably because previously described coverage changes are lost at the chromosome scale. Some of these CNVs denote different structural variant types: 7 deletions, 7 duplications, 2 translocations and 11 inversions. One of the integrations showing two breakpoints is a remarkable example of the analysis explained above, since the host genome located surrounding both HPV breakpoints is amplified, being both, the integration and the concomitant amplification, between exons 3 and 4 of the gene *PD-L1* (*CD274*, ligand of the programmed death1 (PD-1) receptor). One-breakpoint integrations can also be related to large genomic rearrangements. For instance, in another sample, an HPV integration was found located in the sixth exon of the *COL6A6* gene, coupled with an increase of coverage that implies a 4-fold copy number gain, spanning more than half of the q arm of chromosome 3. Intriguingly, a recent study proposed that these amplifications could be mediated via the formation and replication of extrachromosomal DNA (ecDNA).

Overall, HPV integration is present in almost all Cervix-SCC samples, highlighting the importance of HPV associated events in these tumours. Even though HPV integration prevalence is not that high in Head-SCC, the average number of integrations per sample is higher, indicating that, when occurring, this process is more active in this tumour type. Remarkably, the majority of the integrations are linked to copy number alterations and even structural variants in both tumour types.

VIRUNS was used to perform an analysis of KSHV integrations, a virus that, according to a literature search, has never been reported as a DNA integrant in the host genome. The knowledge about KSHV and its five genotypes is limited, due to its recent discovery and its lower prevalence. However, among other diseases, it has been related mainly to Kaposi's sarcoma, primary effusion lymphoma and Multicentric Castleman disease. KSHV's linear double-stranded DNA of 140 kb in size, encodes the viral oncogenes,

being some of them homologues to cellular ones. This virus also activates cellular oncogenes and interferes with several host pathways, leading to tumour progression.

Two primary effusion lymphoma cell lines (BC-1 and BC-3) were analysed by VIRUNS short-reads. KSHV DNA was found integrated in both samples, with a total of 173 KSHV integrations, 117 in BC-1 and 56 in BC-3, with some located within cancer-related genes. Even though integrations' distribution seems to be random, most of them are within introns of protein-coding genes and show a tendency to integrate into early replication time regions more than expected by chance. Almost all integrations found in both cell lines have only one breakpoint, bringing the possibility of their association with rearrangements. This relation was clearly found in an event where two KSHV sequences are demarcating an amplification on chromosome 12 of the BC-3 cell line, which spans *SELPLG* and *CORO1C* genes.

Overall, VIRUNS enables the efficient analysis of currently available cancer genome cohorts. One of the most outstanding results of VIRUNS so far is the finding of KSHV-human DNA junctions, an event never described until the moment.

In a nutshell, this thesis aims to illuminate the role of viral integrations in human cancers, focusing on HBV, HPV and KSHV. It also presents a new tool, VIRUNS, to facilitate further studies on the discovery and analysis of viral integrations using cutting edge high-throughput sequencing technologies.

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RESUMO AMPLIADO

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RESUMO AMPLIADO

Cada organismo ten un xenoma, cuxo tamaño, forma e ácido nucleico varían entre especies e clados. Non obstante, sempre codifica a información necesaria para funcionar. Por iso, os 23 pares de cromosomas que compoñen o xenoma humano foron obxecto de investigación dende hai séculos. Un dos descubrimentos máis relevantes foi a súa estrutura de dobre hélice, o que provocou o aumento de experimentos para desentrañar a súa secuencia de nucleótidos. Aínda que os primeiros intentos exitosos só foron capaces de secuenciar pequenos fragmentos xenómicos e a súa execución foi lenta, cara e tediosa, abriron o camiño para a consecución dun dos proxectos máis importantes no campo da xenómica, o Proxecto do Xenoma Humano (HGP). Este proxecto cubriu o 99% da secuencia eucromática dun conxunto de individuos diferentes e revelou que a maioría do xenoma non codifica proteínas. Isto levou a idea de que a secuencia do noso xenoma está chea de lixo ou "ADN lixo", unha afirmación que xa se rexeitou grazas a proxectos como ENCODE, que estudan o papel funcional de diferentes compoñentes xenómicos.

As técnicas utilizadas na iniciativa HGP levaron ao desenvolvemento de tecnoloxías de secuenciación coñecidas como "Next Generation Sequencing", que permiten secuenciar xenomas completos dun xeito eficaz e bastante asequible. Como consecuencia, o número de secuencias xenómicas, humanas e non humanas, aumentou moito xunto cos estudos para recoller e describir a súa variabilidade, dentro e entre especies. Entre outros, un dos principais inconvenientes destas tecnoloxías é a limitada lonxitude das lecturas de secuenciación, deixando ocos non secuenciados ao longo do xenoma. Os esforzos por alongar esta lonxitude derivaron nas tecnoloxías máis avanzadas que existen neste momento, chamadas "Third Generation Sequencing". As súas longas lecturas xa nos están a dar unha mellor comprensión do xenoma humano, como a secuencia do cromosoma X de extremo a extremo ou a secuencia completa dun xenoma humano.

Estas vantaxes non poderían ser posibles sen o poder da bioinformática. Un número incontable de ferramentas desenvolvéronse non só para xestionar as lecturas de secuenciación e ensamblalas ou mapealas dun xeito significativo, senón tamén para extraer unha gran variedade de información delas. Así, algunhas destas ferramentas dedícanse a atopar alteracións xenómicas. Estes cambios, ou mutacións, clasifícanse segundo como afectan á secuencia ou estrutura do ADN, sendo as mutacións puntuais as que afectan só a un par de bases. Por outro lado, os indels refírense os eventos nos cales uns poucos pares de bases se ven afectados polo cambio, sendo inseridos ou eliminados. Os cambios máis grandes, ou variantes estruturais, poden afectar á secuencia de moitos xeitos diferentes, cambiando a forma do xenoma. Por último, tamén se pode aumentar o número do *set* completo de cromosomas, fenómeno chamado poliploidía.

Estas mutacións son comúns no cancro, un termo que abarca diferentes enfermidades xenéticas que implican procesos mutacionais complexos. Estímase que o cancro será a principal causa de morte e a limitación para aumentar a esperanza de vida en todo o mundo. As mutacións xenómicas son a materia prima da que pode xurdir o cancro. Todas as células do corpo humano acumulan mutacións somáticamente, seguindo un proceso de evolución darwinista no que a maioría delas son pasaxeiras, mentres que as *drivers* dan vantaxe á célula e a selección positiva actúa sobre elas cara á progresión do tumor . Os papeis dos xenes tamén son importantes na tumoroxénese: mentres que os oncoxenes fan

que a célula medre e sobreviva; os supresores de tumores actúan como barreiras destas funcións.

As mutacións poden xurdir de moitas fontes diferentes. Algunhas delas son herdadas e están presentes na liña xerminal e outras son a causa de procesos mutacionais endóxenos, algúns deles intrínsecos a todos nós. Os axentes esóxenos, normalmente ligados ao noso medio e estilo de vida, tamén poden inducir mutacións. Afortunadamente, as células poden protexerse activamente, tendo varios mecanismos de reparación. Porén, nalgunhas ocasións, as defensas contra os danos non son suficientes e as primeiras mutacións *driver* conducen a mutacións cada vez máis prominentes e, polo tanto, á inestabilidade xenómica. Aínda que a maioría das células que adquiren mutacións deletéreas son eliminadas pola selección natural, cando unha célula acumula suficientes mutacións *driver* para crecer e proliferar, promove a formación de tumores primarios, que poden estenderse e dar lugar á metástase.

A prevalencia e complexidade do cancro fan que sexa críptico e varios proxectos, como Pan-Cancer Analysis of Whole Genomes (PCAWG), utilizan tecnoloxías de secuenciación de alto rendemento e ferramentas bioinformáticas específicas para analizalo. Entre outras cuestións, estudan a orixe das mutacións atopadas no xenoma dun cancro. Neste ámbito, as sinaturas mutacionais deixadas no xenoma por algúns mutáxenos e análise do tempo baseada en reloxos moleculares, foron plantexados durante os últimos anos como enfoques útiles para descubrir a procedencia das mutacións.

Sábese que a orixe dalgunhas mutacións está relacionada cos microorganismos. De feito, estimouse que polo menos o 16% dos tumores están asociados a microorganismos. Os virus son unha gran parte deles, sendo a causa do 10-15% dos cancros humanos en todo o mundo. Ata o momento, só se coñecen sete virus oncoxénicos: o virus da hepatite B (VHB) e o virus da hepatite C (VHC) poden causar carcinoma hepatocelular (ademáis, o último tamén provoca algún linfoma); os virus do papiloma humano (VPH), como o VPH16 e o VPH18, promoven a maioría dos cancros de cérvix, e algúns anoxenitais e de cabeza e pescozo; o virus de Epstein-Barr (VEB) causa linfomas e carcinomas nasofarínxeos; o herpesvirus do sarcoma de Kaposi (KSHV) promove o sarcoma de Kaposi e algúns linfomas; o poliomavirus de células de Merkel (MCV) causa a maioría dos carcinomas de células de Merkel; e o virus linfotrópico T humano-I (HTLV-I) promove a leucemia de células T adultas. Entre eles, só o HTLV-1 pertence aos retrovirus, unha familia que ten como etapa obrigatoria do seu ciclo a integración do seu ácido nucleico no xenoma humano. Non obstante, segmentos parciais ou totais do ácido nucleico doutros virus oncoxénicos poden integrarse no xenoma humano nuclear, sendo mesmo un paso habitual para algúns deles. Estes virus poden inducir tumores mediante este proceso de integración, un mecanismo chamado mutaxénese insercional.

A hepatite B crónica ten unha prevalencia de ~3,9% en todo o mundo, sendo unha enfermidade complexa. Esta pode ser causada por nove xenotipos diferentes dun virus cun xenoma circular de ADN de ~3,2 kb e que presenta unha dobre cadea só nun fragmento da súa secuencia. A fibrose no fígado, a cirrose e o carcinoma hepatocelular (HCC) son consecuencias da infección por VHB, unha afección que afecta a máis de 240 millóns de persoas en todo o mundo e a segunda causa de cancro máis frecuente despois do tabaco. O HCC ten unha paisaxe xenómica complexa, con frecuentes cambios no número de copias e rearranxos intercromosómicos, onde o VHB promove a inestabilidade xenómica mediante proteínas virais e mutaxénese de inserción. Non obstante, aínda

ignoramos ata que punto as integracións de ADN do VHB afectan á estrutura (é dicir, patróns e mecanismos de mutación) e función (é dicir, eventos *driver*) dos xenomas do HCC.

Neste traballo, para iluminar o coñecemento desta enfermidade complexa, executáronse algoritmos bioinformáticos para explorar o panorama das integracións de ADN do VHB adquiridas somáticamente en datos de secuenciación do xenoma completo de Illumina paired-end sequencing a partir de 296 tumores de HCC do proxecto PCAWG. Tamén se secuenciaron as súas mostras normais derivadas do sangue. Esta análise recuperou un total de 148 eventos de integración somático do VHB en 51 mostras tumorais. Corenta e dous destes eventos representan insercións canónicas de ADN viral, onde as lecturas de secuenciación mostran dúas unións virus-humano a ambos os dous lados da secuencia viral integrada. Non obstante, esta análise revelou que a maioría (72%, 106/148) dos eventos seguen un patrón inesperado e non canónico. Este caracterízase pola presenza dun só punto de ruptura da integración viral somática, mentres que o que soportaba o outro extremo da inserción parecía estar ausente. Esto podería representar rearranxos somáticos crípticos mediados pola inserción de ADN do VHB.

Este patrón mostrouse, entre outros exemplos, no cromosoma 19 dunha mostra de HCC. Polo tanto, para iluminar a configuración xenuína da reordenación implicada nos patróns descritos anteriormente, realizouse a secuenciación do xenoma completo de lectura longa do tumor afectado, SA501453, utilizando Oxford Nanopore Technologies (ONT). As lecturas longas revelaron unha translocación críptica que une os cromosomas 19 e 11, que están unido mediante un inserto de ADN del VHB.

Curiosamente, moitas insercións non canónicas do VHB ocorren en asociación con delecións de tamaño de megabase que eliminan rexións teloméricas dun cromosoma. Atopouse un exemplo nunha mostra que presentaba unha destas insercións nun brazo do cromosoma 3. A análise de secuenciación de lectura longa desta mostra revelou que a deleción telomérica produciuse debido a unha translocación desequilibrada entre os cromosomas 3 e X, unida por unha inserción do VHB. Este mecanismo aberrante parece ser recorrente xa que o ~8% (23/296) de todas as mostras de HCC no conxunto de datos do PCAWG teñen as características deste proceso mutacional.

No contexto xenómico, as integracións do VHB están enriquecidas en rexións xénicas e as canónicas en sitios de replicación temprana. Ademais, ocorreron moitos reordenamentos mediados polo VHB en cromosomas con ganancias de número de copias, o que ofrece a oportunidade para analizar cando, durante o desenvolvemento do tumour, tiveron lugar as integracións virais. Estes análises revelaron que as insercións somáticas de ADN do VHB en HCC son normalmente eventos clonais que foron adquiridos no inicio da evolución do tumor, apoiando a idea de que estes reordenamentos a gran escala poden ser importantes nas fases iniciais da oncoxénese hepática. Algunhas mostras que presentaban eventos de duplicación do xenoma completo (WGD), amosáronse como perfectas candidatas para realizar unha estimación temporal máis precisa dos eventos de VHB ao longo da vida dos pacientes. Este enfoque permitiu datar en tempo real 37 insercións de VHB (8 canónicas e 29 non canónicas) e revelou que algúns destes reordenamentos aparecen moitos anos antes do diagnóstico. Por exemplo, un reordenamento críptico mediado polo VHB no cromosoma 10, unido a unha deleción telomérica, ocorreu polo menos 21 anos antes de que o paciente fose diagnosticado de HCC.

As delecións teloméricas mediadas polo VHB provocan a perda de xenes supresores de tumores. Por exemplo, atopouse unha mostra que presenta unha integración do VHB mediando unha translocación desequilibrada entre os cromosomas 17 e 8, que xeraría un cromosoma dicéntrico. Ademais, o reordenamento eliminou unha copia do xene supresor de tumores *TP53*. Identificáronse eventos similares en dúas mostras adicionais, coa deleción doutro xene supresor de tumores, *ARID1A*, en ambos casos. En xeral, a análise dos datos do número de copias das 23 mostras de HCC con delecións teloméricas mostra que estas alteracións dan lugar á perda de 244 xenes clasificados como supresores de tumores, 37 deles implicados no HCC humano. En particular, polo menos tres destes eventos están recollidos no Compendio de alteracións *driver* do número de copias do Consorcio PCAWG. Estes resultados proporcionan evidencias de que este é un mecanismo mutacional que probablemente contribúa ao desenvolvemento do HCC humano.

En xeral, estes datos subliñan a importancia de caracterizar os xenomas do cancro de fígado con respeto os patróns de integración do VHB, e suscitan a pregunta sobre o beneficio potencial dunha terapia antiviral temprana contra o VHB, en pacientes infectados para evitar a adquisición de mutacións precoces causadas polo virus nas fases iniciais do desenvolvemento do cancro de fígado. Isto é especialmente relevante para os pacientes con hepatite B crónica na fase "inmunotolerante", unha etapa da enfermidade caracterizada por ausencia de fibrose ou fibrose mínima para a que non se recomenda a terapia antiviral segundo as directrices actuais de xestión do paciente. Non obstante, os niveis de replicación do VHB nesta etapa son moi altos, xerando o ADN lineal de dobre cadea (dslDNA) necesario para a adquisición somática das inserción de ADN e dos reordenamentos mediados polo VHB que, finalmente, impulsan o proceso oncoxénico.

Á luz do enorme impacto que poden ter as integracións virais, revélase crucial contar con ferramentas bioinformáticas para a súa detección rápida e precisa. Non obstante, as dispoñibles actualmente exixen altos recursos computacionais, de tempo, memoria e espazo en disco, o que impide a súa aplicación á análise de conxuntos de datos a gran escala compostos por miles de xenomas de cancro. Ademais, estes métodos non son o suficientemente precisos ou están restrinxidos á busca de determinadas familias virais, o que dificulta a identificación de novos virus asociados ao cancro. Finalmente, tecnoloxías de secuenciación emerxentes de lectura longa, concretamente Oxford Nanopore Technologies (ONT) ou Pacific Biosciences, son prometedoras para a investigación da variación estrutural (SV), incluídos os virus, aínda que non existe ningunha ferramenta de detección de inserción viral para este tipo de datos. Neste proxecto desenvolveuse VIRUNS (VIral-Reference UNions Search) para tratar de superar estas carencias.

Brevemente, VIRUNS toma como entrada un ficheiro BAM, que contén lecturas de plataformas de secuenciación de lectura curta ou longa, previamente aliñadas sobre o xenoma humano de referencia. Despois, VIRUNS aproveita a información das lecturas para buscar eventos de integración viral canónica ou patróns complexos onde a integración viral conecta dous puntos de ruptura distais, normalmente asociados a unha SV secundaria, como unha duplicación, deleción ou translocación. En ocasións, a información das secuencias non é suficiente para resolver completamente a estrutura de integración, o que resulta na identificación de só un dos puntos de ruptura, eventos coñecidos como BND (*breakends*). As integracións virais atopadas móstranse nun ficheiro VCF (Variant Call Format) estándar.

Dadas as notables diferenzas na análise de datos de lectura curta e lectura longa, VIRUNS está composto por dous módulos independentes, un por tecnoloxía. O modo de lecturas curtas de VIRUNS busca eventos de inserción virais baseándose en dúas sinaturas de ditas lecturas: (a) pares de lectura discordantes, cun par aliñado na referencia adxacente ao punto de inserción mentres que o outro mapea nunha secuencia viral; e (b) lecturas recortadas (ou *split*), que consisten en lecturas que abarcan o punto de ruptura de inserción e, polo tanto, aliñan parcialmente tanto no xenoma de referencia como no xenoma viral. A análise de lecturas discordantes e recortadas realízase nun proceso de catro pasos: (1) Recoller pares de lectura discordantes, (2) Agrupación de pares de lectura discordantes, (3) Refinamento do punto de inserción mediante a análise das lecturas recortadas e (4) Filtrado das integracións candidatas. Do mesmo xeito, considéranse dúas sinaturas de lectura para os datos de lectura longa: (a) lecturas que abarcan (ou *spanning*), que son lecturas que abarcan completamente un evento de inserción; e (b) lecturas recortadas que abarcan só un dos puntos de inserción. Tamén se analizan nun proceso de catro pasos: (1) Recoller lecturas de apoio á inserción viral, (2) Agrupación de lecturas, (3) Determinación da estrutura de inserción e (4) Filtrado. Ambos métodos son flexibles, con parámetros facilmente modificables polo usuario. Ademais, ofrecen a posibilidade de analizar unha ou dúas mostras á vez, sendo este último un procedemento de caso-control. Finalmente, poden reportar as repeticións anotadas e os xenes presentes nas rexións xenómicas onde se detectan as integracións.

VIRUNS foi avaliado utilizando xenomas in silico que albergan integracións virais distribuídas aleatoriamente, pertencentes a VPH, VHB e VHH4. Nun primeiro conxunto de datos, probáronse integracións virais con diferentes frecuencias de alelos variantes (VAF, *variant allele frequencies*), que van do 10% ao 50%. Ambos métodos non reportaron falsos positivos e, no que respecta ó *recall*, oscilou entre 0,78 e 0,98 para VIRUNS_SR e de 0,63 a 1 para VIRUNS_LR.

Comparouse o rendemento de VIRUNS_SR con VirusFinder2, Virus-Clip e ViFi, tres ferramentas de detección de integracións virais baseadas en lecturas curtas. Entre todas elas, VIRUNS_SR mostrou o mellor equilibrio entre precisión e *recall*, medido como puntuación F1 (F1-*score*), mentres que Virus-Clip mostrouse como o método menos preciso. Tamén se mediu o rendemento computacional e, ambos os métodos, VIRUNS para lecturas curtas e longas, mostraron os tempos de execución máis baixos. En canto ao uso de memoria, ViFi presentou os picos máis altos de consumo de RAM, seguido de VirusFinder2, VIRUNS e Virus-Clip.

Dúas liñas celulares de cancro, CaSki e PLC/PRF/5, que conteñen eventos de integración de VPH e VHB validados experimentalmente foron seleccionadas para continuar coa avaliación de VIRUNS. En consonancia cos datos simulados, VIRUNS, Virus-Clip e ViFi mostraron *recalls* de máis do 90% en ambas liñas celulares. Todas as ferramentas excepto Virus-Clip e ViFi coa liña celular CaSki teñen unha precisión superior ao 99%. En xeral, VIRUNS_SR mostrou o mellor equilibrio entre ambas as métricas para as ferramentas de lectura curta, seguida de ViFi, VirusFinder2 e Virus-Clip. Por outra banda, VIRUNS_LR proporciona unha secuencia consenso de cada evento de integración, o que permite a análise de cada integrante viral e a detección de reordenamentos estruturais do hóspede.

VIRUNS tamén se probou con datos de secuenciación de mostras de tecido humano. Para iso, interrogáronse diferentes conxuntos de datos xa analizados e publicados para integracións de VHB e VPH. No caso das integración de VHB, estas foron interrogadas mediante un conxunto de datos dispoñible ao público dun estudo previo. A execución de VIRUNS deu resultados similares, confirmando o seu bo rendemento.

Fíxose especial incapé na caracterización de integracións de VPH en tecidos humanos empregando VIRUNS. Entre as infeccións de transmisión sexual, unha das máis comúns en todo o mundo é a deste virus oncoxénico, con preto de 291 millóns de mulleres portadoras e con cifras similares nos homes, sendo estes reservorios e vectores de transmisión. O VPH ten máis de 200 xenotipos e clasifícase en dúas categorías principais segundo a súa sintomatoloxía: o VPH de baixo risco (LR-VPH), causante de verrugas anoxenitais e cutáneas, e o VPH de alto risco (HR-VPH), causante de diferentes tipos de cancros orofarínxeos e anoxenitais. De feito, o VPH está presente no 90% dos cancros de cérvix, sendo o cuarto cancro máis frecuentemente diagnosticado a nivel mundial entre as mulleres. As súas 8 kb de ADN circular de dobre cadea codifican, entre outras, dúas proteínas oncoxénicas (E6 e E7) que desencadean a tumoroxénese ao interactuar con moitas vías celulares. Unha vez máis, as interaccións proteicas non son o único mecanismo implicado no desenvolvemento do cancro, xa que a integración do ADN tamén xoga un papel importante neste proceso.

VIRUNS foi capaz de caracterizar un total de 42 e 68 unións virus-xenoma humano atopadas en 15 biopsias de carcinoma de células escamosas cervical e 10 de cabeza e pescozo (a partir de agora, Cervix-SCC e Head-SCC) do PCAWG. Cabe destacar que todas as unións atopadas son somáticas, estando ausentes nas mostras normais de sangue para cada paciente. Detectáronse dous patróns diferentes de integracións virais en ambos tipos de tumores, como xa se demostrou para o VHB. En total, hai un total de 87 integracións de VPH, 34 delas atopadas en Cervix-SCC e as 53 restantes en Head-SCC, onde 26/34 integracións mostran só un punto de corte nas mostras de Cervix-SCC e 38/53 nas de Head-SCC.

Do mesmo xeito que o VHB e como se demostrou en varios estudos, a distribución das integracións do VPH entre os cromosomas non revela unha tendencia clara, o que mostra que o VPH pode integrarse en calquera parte do xenoma en ambos tipos de tumores. Menos da metade das 87 integracións atópanse en rexións interxénicas. Os intróns dos xenes codificantes de proteínas son a localización máis común para aquelas integracións que se atopan nas rexións xénicas, seguidos dos intróns de ARN non codificantes, mentres que só algúns deles están integrados en exóns ou rexións reguladoras. Entre as integracións descritas no conxunto de datos PCAWG, hai 6 localizadas en xenes relacionados co cancro. Ademais dos xenes, a maioría das integracións do VPH atópanse preto das repeticións anotadas (<100 pb de distancia).

Para contribuír ás observacións descritas anteriormente, realizouse unha análise co fin de atopar alteracións do número de copias xenómicas nos puntos de ruptura das integracións, avaliando as diferenzas entre a cobertura de secuenciación augas arriba e augas abaixo das unións de ADN virus-humano. Como resultado, o 79% das integracións do VPH en Cervix-SCC e o 75% en Head-SCC están asociadas con cambios locais de cobertura. Estratificando por tipo de inserción, o 63% das integracións canónicas e o 84% das integracións cun so punto de rotura mostran variacións de cobertura en Cervix-SCC; sendo o 93% e o 68% en Head-SCC. Non obstante, estes números baixan a 3/34 e 27/53

cando se determinan cantas integracións virais están situadas preto (<1.000 pb) de *copy-number variants* (CNV), probablemente porque os cambios de cobertura descritos anteriormente pérdense a escala cromosómica. Algúns destes CNV denotan diferentes tipos de variantes estruturais: 7 delecións, 7 duplicacións, 2 translocacións e 11 inversións. Unha integración con dous puntos de ruptura é un exemplo perfecto da análise explicada anteriormente, xa que o xenoma do hóspede situado arredor de ambos os puntos de ruptura do VPH atópase amplificado, estando ambos, a integración e a amplificación concomitante, entre os exóns 3 e 4 do xene *PD-L1* (*CD274*, ligando do receptor da morte programada 1 (PD-1)). As integracións cun só punto de rotura tamén poden estar relacionadas con grandes reordenamentos xenómicos. Por exemplo, noutra mostra atopouse unha integración do VPH localizada no sexto exón do xene *COL6A6*, xunto cun aumento da cobertura que implica unha ganancia x4 do número de copias, que abarca máis da metade do brazo q do cromosoma 3. Curiosamente, un estudo recente propuxo que estas amplificacións poderían estar mediadas pola formación e replicación de ADN extracromosómico (ecDNA).

En xeral, a integración do VPH está presente en case todas as mostras de Cervix-SCC, o que destaca a importancia dos eventos asociados ao VPH nestes tumores. Aínda que a prevalencia de integración do VPH non é tan alta en Head-SCC, o número medio de integracións por mostra é maior, o que indica que, cando ocorre, este proceso é máis activo neste tipo de tumor. Sorprendentemente, a maioría das integracións están vinculadas a alteracións do número de copias e mesmo a variantes estruturais en ambos os tipos de tumores.

VIRUNS utilizouse para realizar unha análise das integracións de KSHV, un virus que, segundo unha procura bibliográfica, nunca foi descrito como integrante de ADN no xenoma do hóspede. O coñecemento sobre KSHV e os seus cinco xenotipos é limitado, debido ao seu descubrimento recente e á súa menor prevalencia. Non obstante, entre outras enfermidades, relacionouse principalmente co sarcoma de Kaposi, o linfoma primario de cavidades e a enfermidade multicéntrica de Castleman. O ADN lineal de dobre cadea do KSHV de 140 kb de tamaño, codifica os oncoxenes virais, sendo algúns deles homólogos dos celulares. Este virus tamén activa os oncoxenes celulares e interfire con varias vías do hóspede, o que leva á progresión do tumor.

Analizáronse dúas liñas celulares de linfoma de efusión primario (BC-1 e BC-3) mediante o modo de lecturas curtas de VIRUNS. Atopouse ADN de KSHV integrado en ambas as mostras, cun total de 173 integracións de KSHV, 117 en BC-1 e 56 en BC-3, algunhas delas localizadas dentro de xenes relacionados co cancro. Aínda que a distribución das integracións parece ser aleatoria, a maioría delas están dentro de intróns de xenes que codifican proteínas e tenden a integrarse nas rexións de tempo de replicación temprano máis do esperado por azar. Case todas as integracións atopadas en ambas liñas celulares teñen só un punto de ruptura, o que posibilita a súa relación con reordenamentos. Esta asociación atopouse claramente en dúas integracións que delimitan unha amplificación no cromosoma 12 da liña celular BC-3, que abarca os xenes *SELPLG* e *CORO1C*.

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En xeral, VIRUNS permite a análise eficiente das cohortes do xenoma do cancro dispoñibles actualmente. Un dos resultados máis destacados de VIRUNS ata o momento é o achado de unións de ADN KSHV-humano, un suceso nunca descrito ata o momento.

En poucas palabras, esta tese pretende iluminar o papel das integracións virais nos cancros humanos, centrándose no VHB, VPH e KSHV. Tamén presenta unha nova ferramenta, VIRUNS, co fin de facilitar estudos posteriores para o descubrimento e análise de integracións virais utilizando tecnoloxías punteiras de secuenciación de alto rendemento.

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SUPPLEMENTARY INFORMATION

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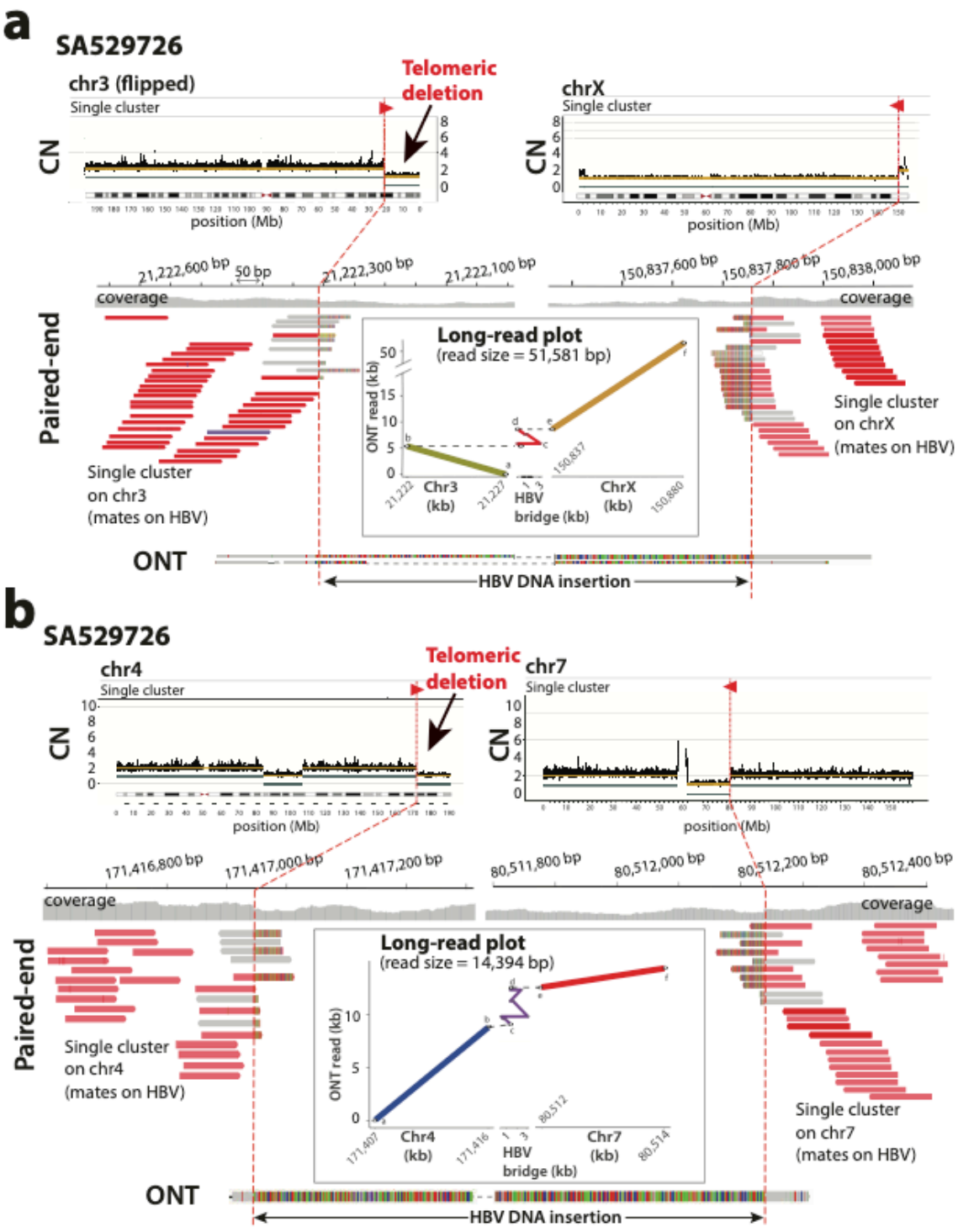
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Supplementary Data for Figures. Genomic annotation of ONT long reads supporting HBV-mediated rearrangements shown in the long-read plots. Column 1 shows sample code; Column 2 (Read) shows the name of the individual ONT read that supports the relevant HBV rearrangement; Column 3 (Length) shows the read size; Columns 4, 5 and 6 provide, for each read, the mapping coordinates onto the human hg19 genome assembly or the HBV genome, being column 4 (Start) the start position, column 5 (End) the end position, and column 6 (Chr) the hg19 chromosome or HBV strain (NCBI Reference Sequence).

Sample	Read	Length	Start	End	Chr
SA529830	c8248f35-5540-4826-9e9c-976f8968ea01	36845	2	28819	8
SA529830	c8248f35-5540-4826-9e9c-976f8968ea01	36845	29160	33691	NC_003977.2
SA529830	c8248f35-5540-4826-9e9c-976f8968ea01	36845	33701	36815	17
SA529726	000cba9b-420c-49d5-bfe0-b28c96ccebe3	51581	30	42982	X
SA529726	000cba9b-420c-49d5-bfe0-b28c96ccebe3	51581	43141	46064	NC_003977.2
SA529726	000cba9b-420c-49d5-bfe0-b28c96ccebe3	51581	46266	51562	3
SA501511	439aa81c-8495-4a3a-aaf0-95992575ca90	8379	21	4993	8
SA501511	439aa81c-8495-4a3a-aaf0-95992575ca90	8379	5115	6623	NC_003977.2
SA501511	439aa81c-8495-4a3a-aaf0-95992575ca90	8379	6681	8344	10
SA501511	ba6f0d12-0e2c-487c-99dc-ade5c4538497	26901	1730	26888	8
SA501511	ba6f0d12-0e2c-487c-99dc-ade5c4538497	26901	1092	1447	NC_003977.2
SA501511	ba6f0d12-0e2c-487c-99dc-ade5c4538497	26901	49	985	13
SA501511	65d86580-c441-4901-a0e4-b649a9358784	17118	60	8627	8
SA501511	65d86580-c441-4901-a0e4-b649a9358784	17118	8691	10845	NC_003977.2
SA501511	65d86580-c441-4901-a0e4-b649a9358784	17118	10861	17062	4
SA501453	dd58521b-0a9b-4550-a4c4-16ff26c30c60	52953	23141	52933	11
SA501453	dd58521b-0a9b-4550-a4c4-16ff26c30c60	52953	22539	23128	NC_003977.2
SA501453	dd58521b-0a9b-4550-a4c4-16ff26c30c60	52953	34	22511	19
SA501424	53874689-28b3-4d8f-9851-03335e6e86ab	24918	527	20311	1
SA501424	53874689-28b3-4d8f-9851-03335e6e86ab	24918	20325	23999	NC_003977.2
SA501424	53874689-28b3-4d8f-9851-03335e6e86ab	24918	24125	24884	11
SA529726	abcd9bf0-d02f-4a3c-8caf-864e9ab06ae3	14398	60	9032	4
SA529726	abcd9bf0-d02f-4a3c-8caf-864e9ab06ae3	14398	9348	12237	NC_003977.2
SA529726	abcd9bf0-d02f-4a3c-8caf-864e9ab06ae3	14398	12422	14376	7
SA501481	5b43bb59-f728-4aea-b299-65228a02385e	54394	36	31655	1
SA501481	5b43bb59-f728-4aea-b299-65228a02385e	54394	31883	34080	NC_003977.2
SA501481	5b43bb59-f728-4aea-b299-65228a02385e	54394	34315	54382	9

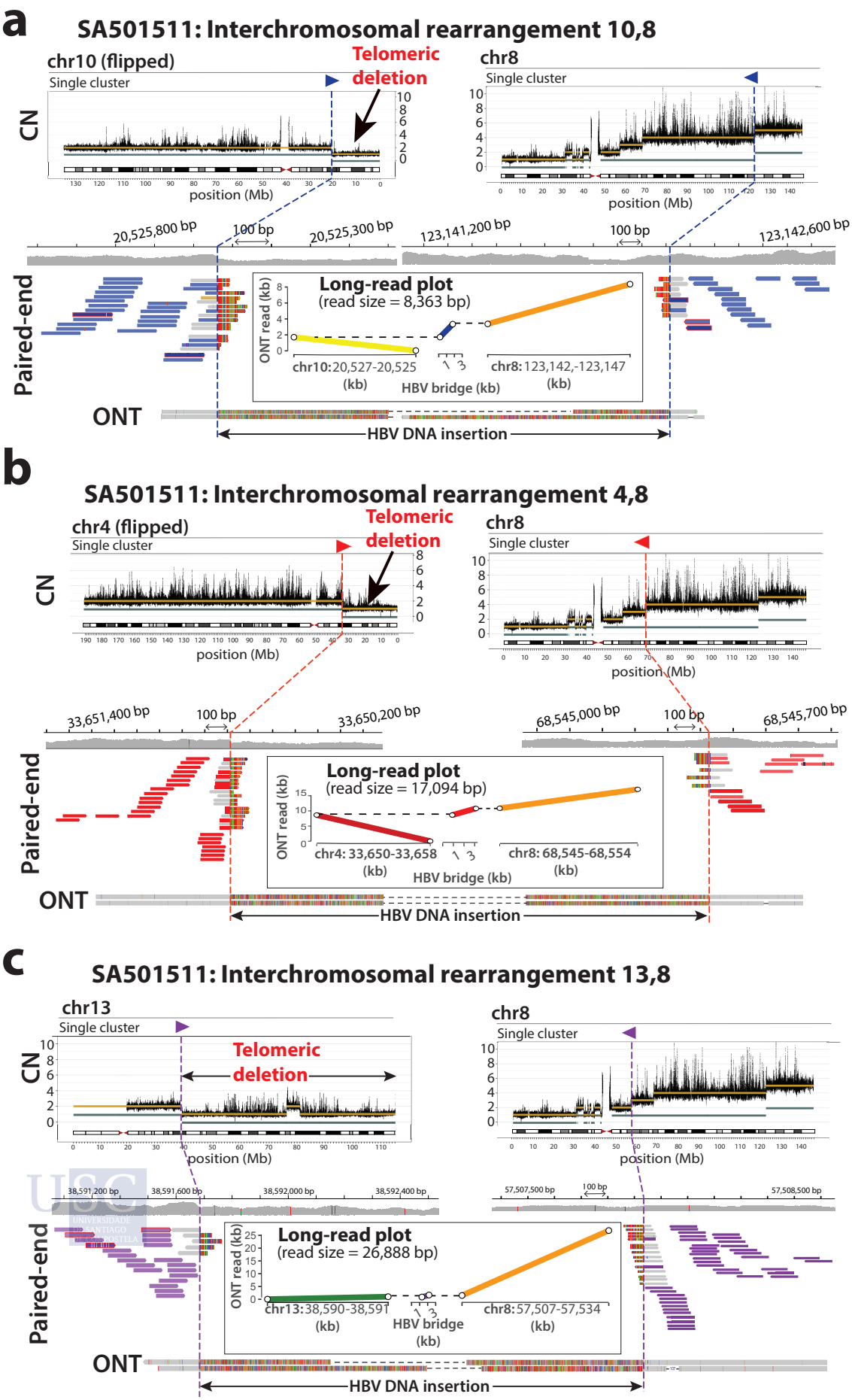
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Supplementary Figure 1. HBV-mediated interchromosomal rearrangements revealed by ONT sequencing in HCC tumour SA529726. (a) The Illumina paired-end sequencing data (short reads in red) show one positive cluster of discordant read pairs pointing to an HBV insertion and demarcating the boundary of a 21.2 Mb telomeric deletion on 3p (note the orientation of the chromosome is inverted for illustrative purposes). The copy number plot (CN) at the top shows the total (gold line) and minor (grey line) chromosomes' copy number profiles. The ONT data at the bottom show two long reads obtained with Oxford Nanopore Technologies that reveal one 3,268 bp long HBV DNA insertion bridging the interchromosomal rearrangement between 3p and Xq.

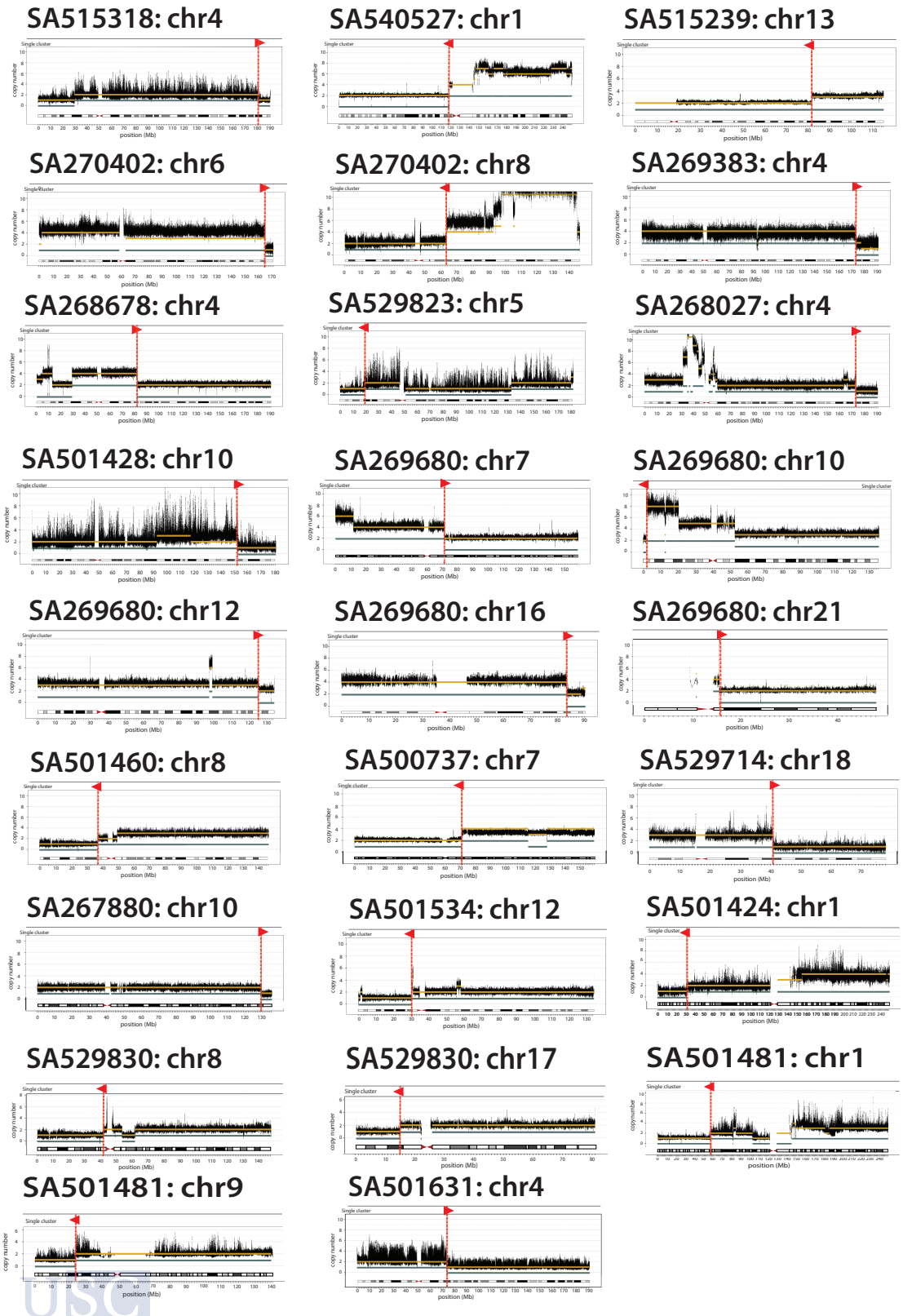
ONT reads were cut (discontinued) for illustrative purposes. A negative cluster of Illumina reads confirms the presence of the other extreme of the HBV insertion on Xq. The long-read plot represents the alignment of one ONT long read to chromosomes 3 and X of the human reference genome and an HBV consensus sequence, which validates the interchromosomal rearrangement mediated by the virus. Note that the HBV insertion shows a typical rearranged pattern. (b) In the same sample, an HBV-mediated interchromosomal rearrangement between chromosomes 4 and 7 removes 19.8 Mb on 4q, including the telomere. Two paired-end clusters (short reads in red) point to an HBV event. One ONT long read reveals a 3,494 bp long HBV DNA insertion that bridges the translocation between 4q and 7q (long-read plot).

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a
SA501511: Interchromosomal rearrangement 10,8
chr10 (flipped)
Single cluster
Telomeric deletion
chr8
Single cluster
CN
position (Mb)
20,525,800 bp
100 bp
20,525,300 bp
123,141,200 bp
100 bp
123,142,600 bp
Paired-end
Long-read plot
(read size = 8,363 bp)
ONT read (kb)
chr10:20,527-20,525 (kb)
HBV bridge (kb)
chr8:123,142,-123,147 (kb)
ONT
HBV DNA insertion
b
SA501511: Interchromosomal rearrangement 4,8
chr4 (flipped)
Single cluster
Telomeric deletion
chr8
Single cluster
CN
position (Mb)
33,651,400 bp
100 bp
33,650,200 bp
68,545,000 bp
100 bp
68,545,700 bp
Paired-end
Long-read plot
(read size = 17,094 bp)
ONT read (kb)
chr4: 33,650-33,658 (kb)
HBV bridge (kb)
chr8: 68,545-68,554 (kb)
ONT
HBV DNA insertion
c
SA501511: Interchromosomal rearrangement 13,8
chr13
Single cluster
Telomeric deletion
chr8
Single cluster
CN
position (Mb)
38,591,200 bp
38,591,600 bp
38,592,000 bp
38,592,400 bp
57,507,500 bp
100 bp
57,508,500 bp
Paired-end
Long-read plot
(read size = 26,888 bp)
ONT read (kb)
chr13:38,590-38,591 (kb)
HBV bridge (kb)
chr8:57,507-57,534 (kb)
ONT
HBV DNA insertion

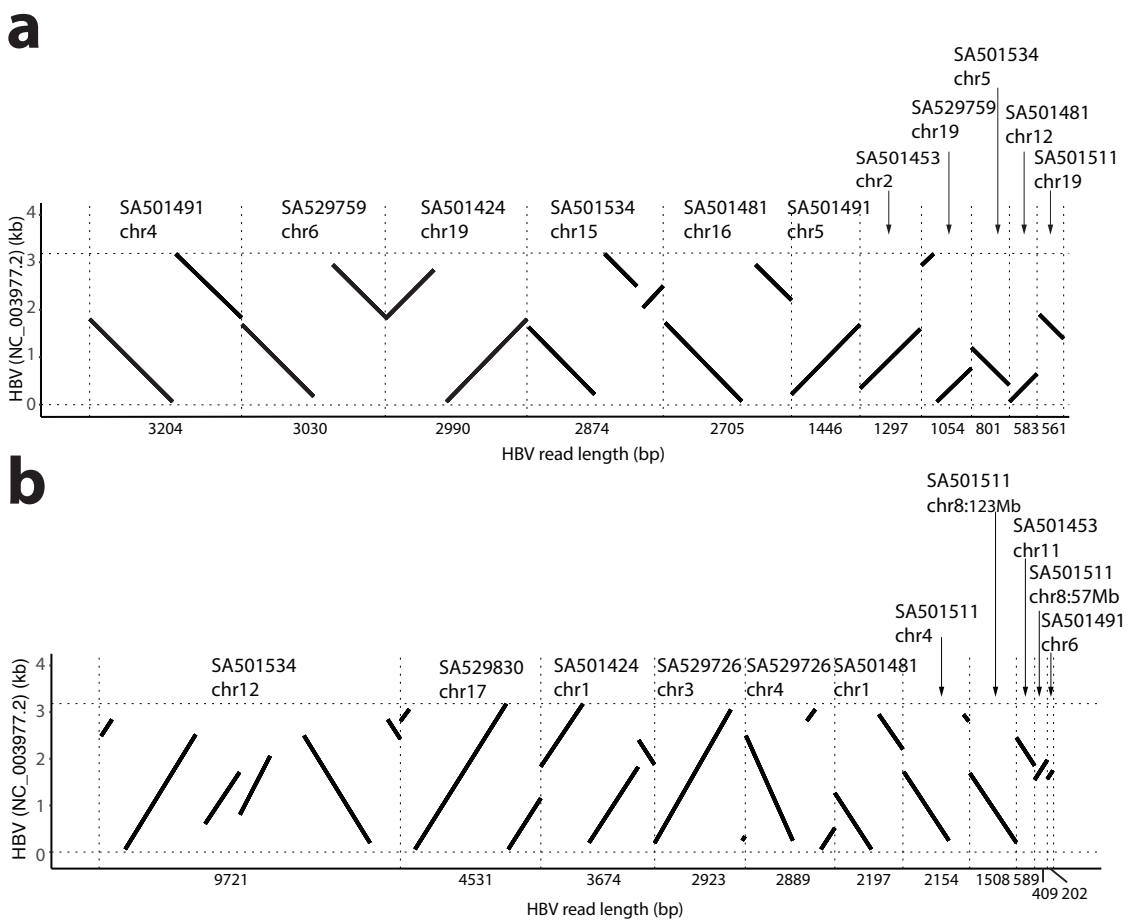
Supplementary Figure 2. HBV-mediated interchromosomal rearrangements revealed by ONT sequencing in HCC tumour SA501511. (a) The Illumina paired-end data (short reads in blue) show two clusters, one on chromosome 10 and another on chromosome 8, which point to both extremes of an HBV insertion. The copy number (CN) plot at the top shows the total (gold line) and minor (grey line) chromosomes' copy number profiles, revealing a 20.5 Mb telomeric deletion on 10p associated with the HBV insertion event (note that the CN plot on chromosome 10 is flipped for illustrative purposes). The ONT data at the bottom show two long reads that reveal the real configuration of the rearrangement. In the long-read plot, a 1,629 bp HBV insertion bridges an interchromosomal rearrangement between 10p and 8q. ONT reads were cut (discontinued) for illustrative purposes. (b) The Illumina paired-end data (short reads in red) show two clusters, one on chromosome 4 and another on chromosome 8, which point to both extremes of an HBV insertion. The CN plot at the top reveals a 33.6 Mb telomeric deletion on 4p associated with the HBV insertion event (note that the CN plot on chromosome 4 is flipped for illustrative purposes). The ONT data at the bottom show two long reads that reveal the real configuration of the rearrangement. In the long-read plot, a 2,227 bp HBV insertion bridges an interchromosomal rearrangement between 4p and 8q. (c) The Illumina paired-end data (short reads in purple) show two clusters, one on chromosome 13 and another on chromosome 8, which point to both extremes of an HBV insertion. The CN plot at the top reveals a 76.7 Mb deletion on 13q involving the telomere, which is associated with the HBV insertion event. The ONT data at the bottom show two long reads that reveal the real configuration of the rearrangement. In the long-read plot, a 531 bp HBV insertion that bridges an interchromosomal rearrangement between 13q and 8q.

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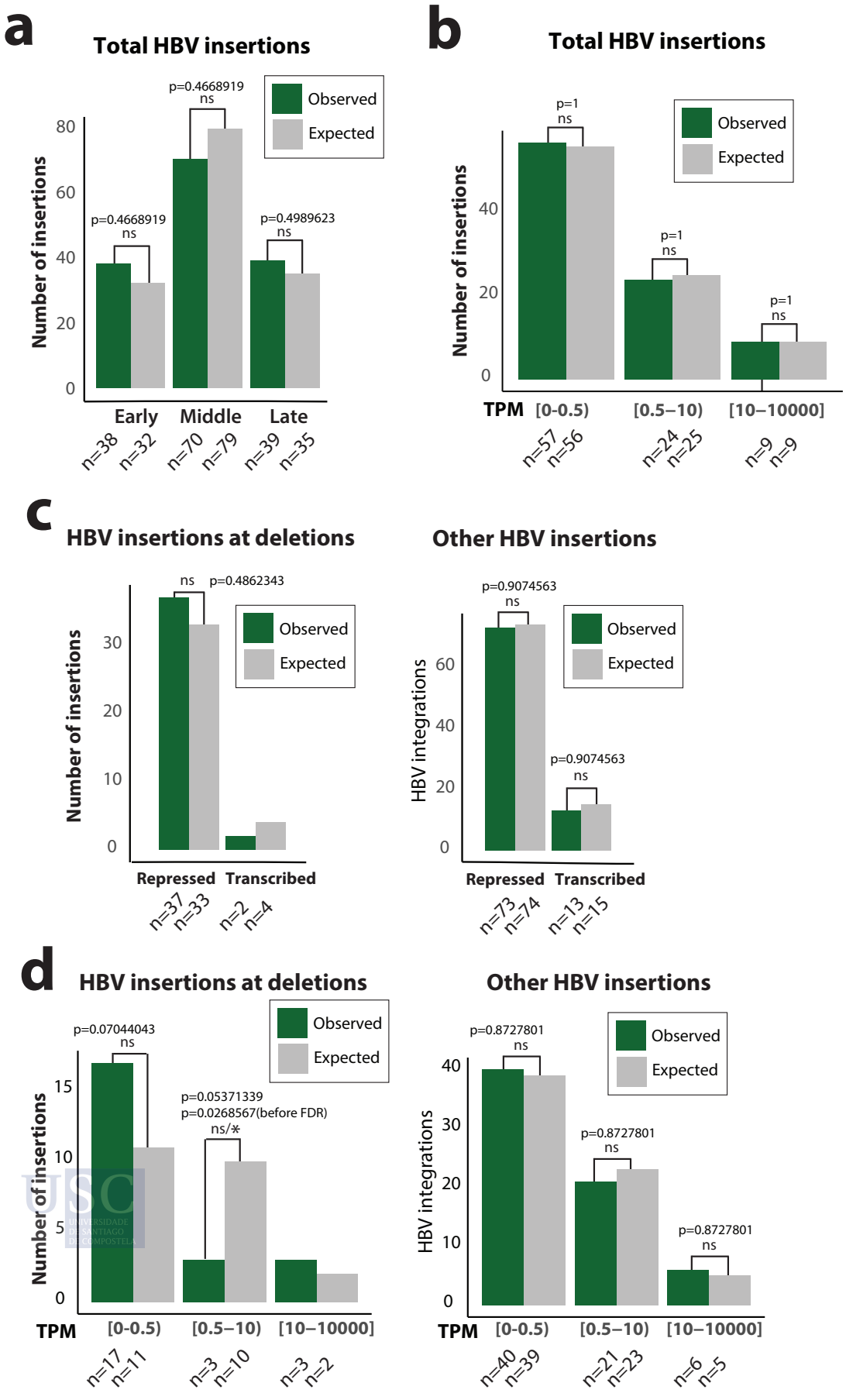
Supplementary Figure 3. Telomeric-like deletions associated with HBV DNA insertions are frequent in human HCC. Copy number (CN) plots from 26 chromosomes with telomeric-like deletions associated with HBV insertion events in HCC tumours from the PCAWG dataset. The CN plots show the total (gold line) and minor (grey line) chromosomes' copy number profiles. Arrows indicate the orientation (positive

or negative) of the paired-end clusters supporting each HBV insertion. Note that a copy of the cancer-related gene *IRF2* is lost in chromosome 4 from samples SA269383 and SA268027.

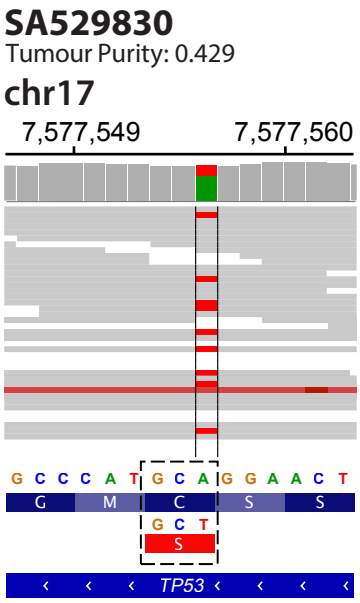


Supplementary Figure 4. Structural analysis of HBV insertions in HCC. Dot plot-like analysis of the HBV DNA sequences inserted in the HCC genome shows that HBV insertions at telomeric deletions tend to have a more complex structure than the HBV canonical insertions. Only those insertions sequenced with ONT and with full structure reconstructed are shown. The reference HBV sequence (NCBI Reference Sequence: NC_003977.2) is represented in the Y-axis. Oxford Nanopore long reads length is displayed in the X-axis. For each HBV insertion, the sample name and the chromosome carrying the insertion are indicated. (a) HBV canonical insertions. (b) HBV non-canonical insertions linked to telomeric deletions.

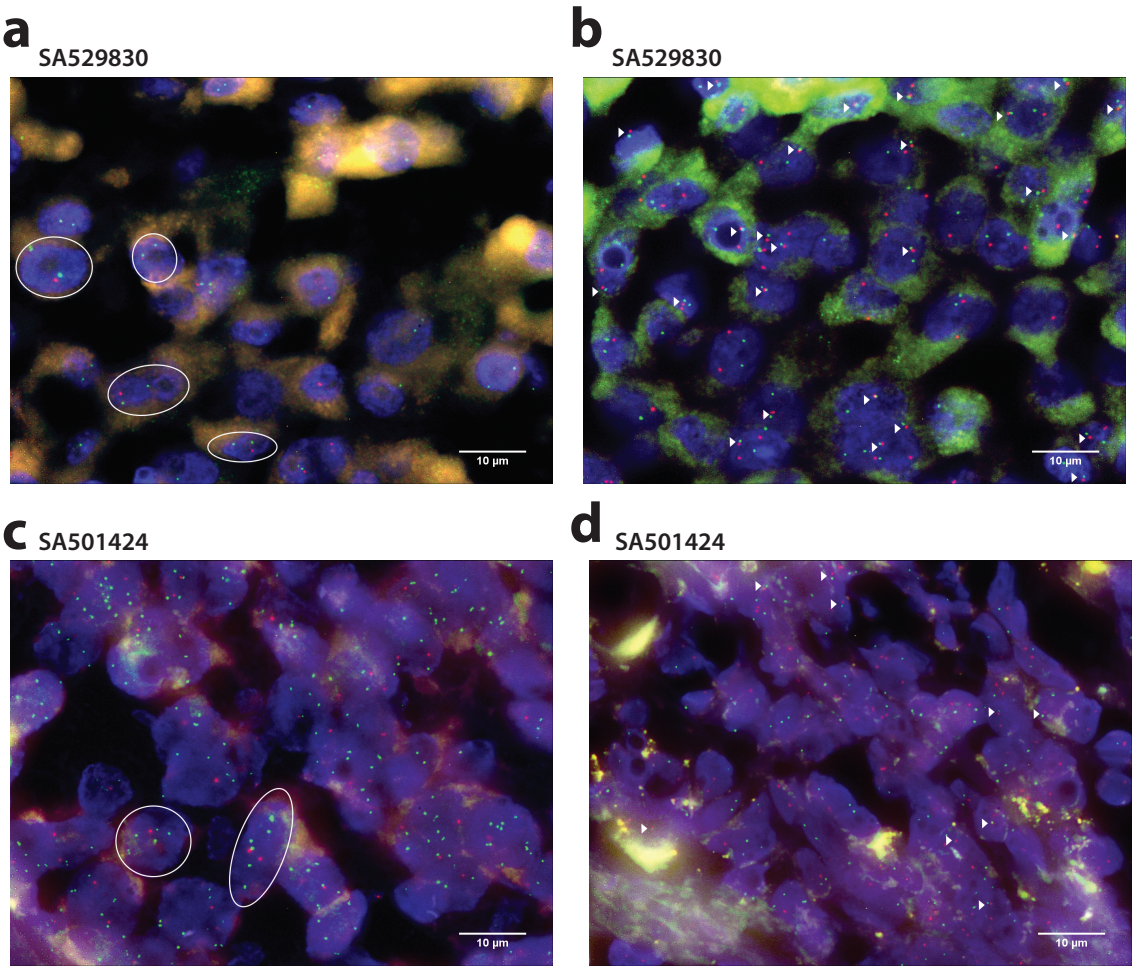
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a
Total HBV insertions
Number of insertions
Observed
Expected
p=0.4668919
ns
p=0.4668919
ns
p=0.4989623
ns
Early
Middle
Late
n=38
n=32
n=70
n=79
n=39
n=35
b
Total HBV insertions
Number of insertions
Observed
Expected
p=1
ns
p=1
ns
p=1
ns
TPM
[0-0.5)
[0.5–10)
[10–10000]
n=57
n=56
n=24
n=25
n=9
n=9
c
HBV insertions at deletions
Number of insertions
Observed
Expected
ns
p=0.4862343
Repressed
Transcribed
n=37
n=33
n=2
n=4
Other HBV insertions
HBV integrations
Observed
Expected
p=0.9074563
ns
p=0.9074563
ns
Repressed
Transcribed
n=73
n=74
n=13
n=15
d
HBV insertions at deletions
Number of insertions
Observed
Expected
p=0.07044043
ns
p=0.05371339
p=0.0268567(before FDR)
ns/*
TPM
[0-0.5)
[0.5–10)
[10–10000]
n=17
n=11
n=3
n=10
n=3
n=2
Other HBV insertions
HBV integrations
Observed
Expected
p=0.8727801
ns
p=0.8727801
ns
p=0.8727801
ns
TPM
[0-0.5)
[0.5–10)
[10–10000]
n=40
n=39
n=21
n=23
n=6
n=5

Supplementary Figure 5. Analysis of HBV insertion rate and genomic features. (a) Analysis of the frequency of total HBV insertions across replication timing categories (early, middle, late) showing no significant (ns) results. Chi-squared test and FDR correction were applied. (b) Same analysis for HBV insertion at genes with different expression levels. TPM denotes Transcripts Per Kilobase Million. No significant results are found after FDR correction. (c) Analysis of the frequency of total HBV insertions across chromatin states (Transcriptionally active and Repressed chromatin), in HBV insertions at deletions (left) and the remaining HBV insertions (right), showing no significant results. Chi-squared test and FDR correction were applied. (d) Same analysis for HBV insertion at genes with different expression levels in TPM. No significant results are found after FDR correction. However, the HBV insertions at deletions were significantly more represented in the category of expression [0.5-10) before correction (p-value=0.02, n=3).

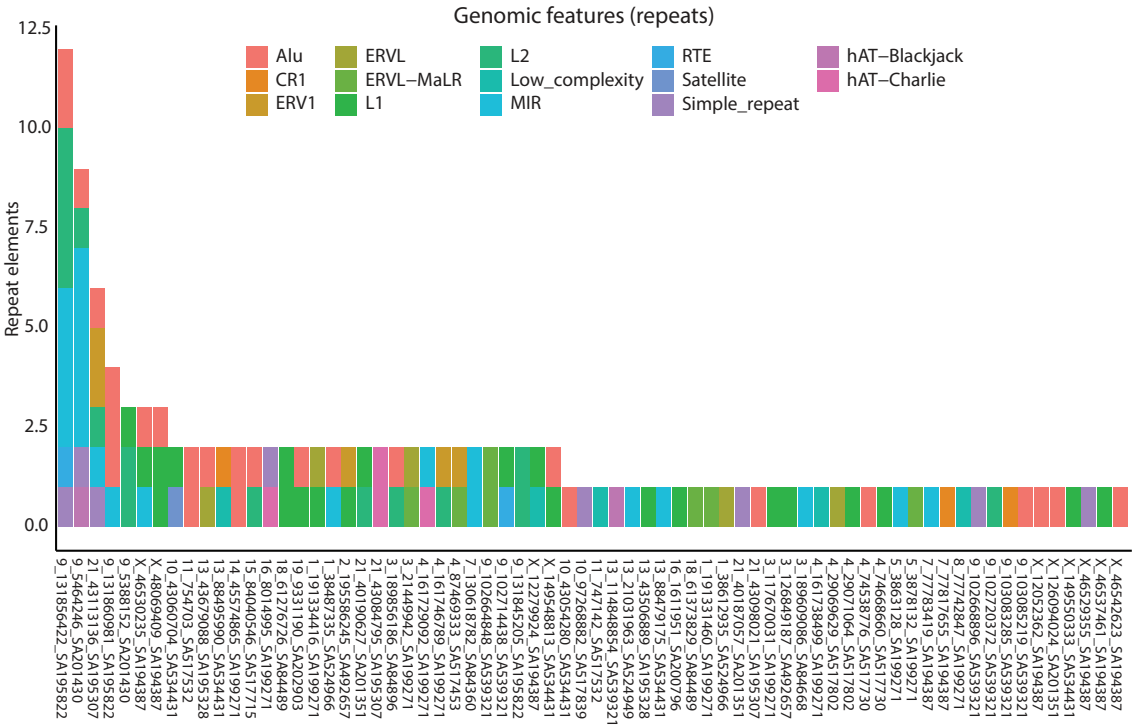


Supplementary Figure 6. Inactivating mutation in *TP53* from tumour SA529830. Inactivating mutation detected in the second allele of *TP53* from sample SA529830. The picture corresponds to an Integrative Genomics Browser (IGV) view of the paired-end mapping data at the relevant locus. An A>T mutation at exon 7 of the gene involves the amino acid change C242S, catalogued as loss-of-function mutation [201]. Note that tumour purity is 0.429, which explains the reference 'A'.



Supplementary Figure 7. Two colour fluorescence in-situ hybridization (FISH) analyses confirm driver reorganizations in HCC tumours. (a) FISH analysis of the *TP53* deletion in HCC SA529830. Representative cells harbouring the deletion are shown inside the circles. Two green signals (control probe) and one red signal (*TP53* probe) are detected in each cell. (b) Single-fusion FISH analysis of the t(8,17) translocation from the same tumour. In cells with the chromosomal fusion, one green and one red signal, each one targeting one of the two chromosomes involved, colocalize together. In case of the standard (i.e., non-rearranged) karyotype, green and red signals split. Arrowheads point to the relevant chromosomal fusions. (c) FISH analysis of the *ARID1A* deletion in HCC SA501424. Representative cells harbouring the deletion are shown inside the circles. Green signals (control probe) and red signals (*ARID1A* probe) are shown. In this case, between six to ten green signals and two red signals are detected in each cell, compatible with *ARID1A* deletion (see Materials and Methods). (d) Single-fusion FISH analysis of the t(1,11) translocation from the tumour SA501424. Arrowheads point to the relevant chromosomal fusions. Same slides from all tissue samples were scored by two independent observers.

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Supplementary Figure 8. Annotated repeats close to HPV-human junctions. HPV integrants close to repeats are shown on the X-axis. Bars display the count of closest repeats, where each type of repeat is indicated in a different colour.

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ABBREVIATIONS

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ABBREVIATIONS

AIDS	Acquired immune deficiency syndrome
ALT	Alanine aminotransferase
BAM	Binary Alignment Map
BFB	Breakage-fusion-bridge
BND	Breakends
bp	Base pairs
BWA	Burrows-Wheeler Aligner
cccDNA	Covalently closed circular DNA
Cervix-SCC	Cervical squamous cell carcinoma
CGC	Cancer Gene Census
CIGAR	Concise Idiosyncratic Gapped Alignment Report
CIN	Chromosomal Instability
CN	Copy number
CNVs	Copy-number variants
DBS	Double base substitution
DDBJ	DNA Data Bank of Japan
DNA	Deoxyribonucleic acid
DR	Direct repeats
DSB	Double strand break
EBV	Epstein–Barr virus
ecDNA	Extrachromosomal DNA
eHMMs	Ensemble of Hidden Markov Model
EMBL	European Molecular Biology Laboratory
EMT	Epithelial-mesenchymal transition
ENCODE	Encode Encyclopedia of DNA Elements
FDR	False discovery rate
FISH	Fluorescence In Situ Hybridization
FN	False negative
FP	False positive
Gb	Gigabyte
GLOBOCAN	Global Cancer Statistics
GS	Gold-Standard
HBV	Hepatitis B virus
HCC	Hepatocellular carcinoma
HCV	Hepatitis C virus
Head-SCC	Head and neck squamous cell carcinoma
HGP	Human Genome Project
HHV	Human Herpesvirus
HIV	Human immunodeficiency virus
HPV	Human Papillomavirus
HR	Homologous recombination
HR-HPV	High-risk HPV
HTLV-I	Human T lymphotropic virus-I

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ICGC	International Cancer Genome Consortium
IFN	Cellular interferon
Indels	Small insertions and deletions
kb	Kilobases
KS	Kaposi's Sarcoma
KSHV	Kaposi's Sarcoma Herpesvirus
LCC	Local Composition Complexity
LINE-1	Long interspersed nuclear elements
LR-HPV	Low-risk HPV
LTR-ERV1	Long terminal repeat–endogenous retroviral sequence 1
MAPQ	Mapping quality
Mb	Megabases
MCD	Multicentric Castleman disease
MCV	Merkel cell polyomavirus
MIR	Mammalian-wide interspersed repeats
miRNA	microRNA
mRNA	Messenger RNA
NCBI	National Center for Biotechnology Information
NGS	Next Generation Sequencing
NHEJ	Non-homologous end-joining
ONT	Oxford Nanopore Technologies
ORF	Open reading frame
PCAWG	Pan-Cancer Analysis of Whole Genomes
PCR	Polymerase Chain Reaction
PEL	Primary effusion lymphoma
RAM	Random-access memory
RNA	Ribonucleic acid
RNA-Seq	RNA sequencing
RVDB	Reference Viral Database
SAM	Sequence Alignment Map
SBS	Single base substitution
SINE	Short interspersed nuclear element
SNP	Single nucleotide polymorphism
SV	Structural variation/variant
TCGA	The Cancer Genome Atlas
TGS	Third Generation Sequencing
TME	Tumour microenvironment
TP	True positive
TPM	Transcripts Per Kilobase Million
TSG	Tumour suppressor gene
TSV	Tab-separated values
UV	Ultraviolet
VAF	Variant allele frequency
VCF	Variant Call Format
vIRF	Viral interferon regulatory factors
VIRUNS	VIral-Reference UNions Search

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VIRUNS-LR	VIRUNS Long-read module
VIRUNS-SR	VIRUNS Short-read module
WES	Whole-exome sequencing
WGD	Whole-genome duplication
WGS	Whole-genome sequencing

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REFERENCES

1. Watson, J. D. & Crick, F. H. C. Molecular structure of nucleic acids: A structure for deoxyribose nucleic acid. *Nature* **171**, 737–738 (1953).
2. Giani, A. M., Gallo, G. R., Gianfranceschi, L. & Formenti, G. Long walk to genomics: History and current approaches to genome sequencing and assembly. *Comput. Struct. Biotechnol. J.* **18**, 9–19 (2020).
3. Sanger, F., Nicklen, S. & Coulson, A. R. DNA sequencing with chain-terminating inhibitors. *Proc. Natl. Acad. Sci. U. S. A.* **74**, 5463–5467 (1977).
4. Heather, J. M. & Chain, B. The sequence of sequencers: The history of sequencing DNA. *Genomics* **107**, 1–8 (2016).
5. Anderson, S. Shotgun DNA sequencing using cloned DNase I-generated fragments. *Nucleic Acids Res.* **9**, 3015–3027 (1981).
6. Saiki, R. K. *et al.* Enzymatic amplification of β-globin genomic sequences and restriction site analysis for diagnosis of sickle cell anemia. *Science* **230**, 1350–1354 (1985).
7. Mullis, K. *et al.* Specific enzymatic amplification of DNA in vitro: The polymerase chain reaction. *Cold Spring Harb. Symp. Quant. Biol.* **51**, 263–273 (1986).
8. Xu, L. Z. & Larzul, D. The polymerase chain reaction: Basic methodology and applications. *Comp. Immunol. Microbiol. Infect. Dis.* **14**, 209–221 (1991).
9. Sanger, F. SEQUENCES, SEQUENCES, AND SEQUENCES. *Annu. Rev. Biochem.* **57**, 1–29 (1988).
10. Mewes, H. W., Doelz, R. & George, D. G. Sequence databases: an indispensible source for biotechnological research. *J. Biotechnol.* **35**, 239–256 (1994).
11. Benson, D. A. *et al.* GenBank. *Nucleic Acids Res.* **41**, (2013).
12. Fukuda, A., Kodama, Y., Mashima, J., Fujisawa, T. & Ogasawara, O. DDBJ update: Streamlining submission and access of human data. *Nucleic Acids Res.* **49**, D71–D75 (2021).
13. Pandey, A. & Lewitter, F. Nucleotide sequence databases: A gold mine for biologists. *Trends in Biochemical Sciences* **24**, 276–280 (1999).
14. Ballouz, S., Dobin, A. & Gillis, J. A. Is it time to change the reference genome? *Genome Biol.* **20**, 1–9 (2019).
15. Dorado, G., Gálvez, S., Rosales, T. E., Vásquez, V. F. & Hernández, P. Analyzing modern biomolecules: The revolution of nucleic-acid sequencing-review. *Biomolecules* **11**, 1–18 (2021).
16. Nakagawa, H. & Fujita, M. Whole genome sequencing analysis for cancer genomics and precision medicine. *Cancer Sci.* **109**, 513–522 (2018).
17. Belmont, J. W. *et al.* A haplotype map of the human genome. *Nature* **437**, 1299–1320 (2005).
18. Auton, A. *et al.* A global reference for human genetic variation. *Nature* **526**, 68–74 (2015).
19. Adewale, B. A. Will long-read sequencing technologies replace short-read sequencing technologies in the next 10 years? *Afr. J. Lab. Med.* **9**, 1–5 (2021).
20. van Dijk, E. L., Jaszczyszyn, Y., Naquin, D. & Thermes, C. The Third Revolution in Sequencing Technology. *Trends Genet.* **34**, 666–681 (2018).
21. Miga, K. H. *et al.* Telomere-to-telomere assembly of a complete human X chromosome. *Nature* **585**, 79–84 (2020).

22. Nurk, S. *et al.* The complete sequence of a human genome. *Science* **376**, 44–53 (2022).
23. Gregory, T. R. Synergy between sequence and size in large-scale genomics. *Nat. Rev. Genet.* **6**, 699–708 (2005).
24. Correction: Initial sequencing and analysis of the human genome. *Nature* **412**, 565–566 (2001).
25. Criscione, S. W., Zhang, Y., Thompson, W., Sedivy, J. M. & Neretti, N. Transcriptional landscape of repetitive elements in normal and cancer human cells. *BMC Genomics* **15**, (2014).
26. Feingold, E. A. *et al.* The ENCODE (ENCyclopedia of DNA Elements) Project. *Science* **306**, 636–640 (2004).
27. McGuire, A. L. *et al.* The road ahead in genetics and genomics. *Nat. Rev. Genet.* **21**, 581–596 (2020).
28. Staden, R. A strategy of DNA sequencing employing computer programs. *Nucleic Acids Res.* **6**, 2601–2610 (1979).
29. Li, H. & Durbin, R. Fast and accurate short read alignment with Burrows-Wheeler transform. *Bioinformatics* **25**, 1754–1760 (2009).
30. Li, H. *et al.* The Sequence Alignment/Map format and SAMtools. *Bioinformatics* **25**, 2078–2079 (2009).
31. McKenna, A. *et al.* The genome analysis toolkit: A MapReduce framework for analyzing next-generation DNA sequencing data. *Genome Res.* **20**, 1297–1303 (2010).
32. Rimmer, A. *et al.* Integrating mapping-, assembly- and haplotype-based approaches for calling variants in clinical sequencing applications. *Nat. Genet.* **46**, 912–918 (2014).
33. Rausch, T. *et al.* DELLY: Structural variant discovery by integrated paired-end and split-read analysis. *Bioinformatics* **28**, (2012).
34. Abyzov, A., Urban, A. E., Snyder, M. & Gerstein, M. CNVnator: An approach to discover, genotype, and characterize typical and atypical CNVs from family and population genome sequencing. *Genome Res.* **21**, 974–984 (2011).
35. Layer, R. M., Chiang, C., Quinlan, A. R. & Hall, I. M. LUMPY: A probabilistic framework for structural variant discovery. *Genome Biol.* **15**, R84 (2014).
36. Li, H. Minimap2: Pairwise alignment for nucleotide sequences. *Bioinformatics* **34**, 3094–3100 (2018).
37. Sedlazeck, F. J. *et al.* Accurate detection of complex structural variations using single-molecule sequencing. *Nat. Methods* **15**, 461–468 (2018).
38. Kiełbasa, S. M., Wan, R., Sato, K., Horton, P. & Frith, M. C. Adaptive seeds tame genomic sequence comparison. *Genome Res.* **21**, 487–493 (2011).
39. Sović, I. *et al.* Fast and sensitive mapping of nanopore sequencing reads with GraphMap. *Nat. Commun.* **7**, 1–11 (2016).
40. Gong, L. *et al.* Picky comprehensively detects high-resolution structural variants in nanopore long reads. *Nat. Methods* **15**, 455–460 (2018).
41. Cretu Stancu, M. *et al.* Mapping and phasing of structural variation in patient genomes using nanopore sequencing. *Nat. Commun.* **8**, 1–13 (2017).
42. Wang, L., Qu, L., Yang, L., Wang, Y. & Zhu, H. NanoReviser: An Error-Correction Tool for Nanopore Sequencing Based on a Deep Learning Algorithm. *Front. Genet.* **11**, 1–12 (2020).
43. Salmela, L., Walve, R., Rivals, E., Ukkonen, E. & Sahinalp, C. Accurate self-correction of errors in long reads using de Bruijn graphs. *Bioinformatics* **33**, 799–806 (2017).

44. Haghshenas, E., Hach, F., Sahinalp, S. C. & Chauve, C. CoLoRMap: Correcting Long Reads by Mapping short reads. *Bioinformatics* **32**, i545–i551 (2016).
45. Sherman, R. M. & Salzberg, S. L. Pan-genomics in the human genome era. *Nat. Rev. Genet.* **21**, 243–254 (2020).
46. Wong, K. H. Y. *et al.* Towards a reference genome that captures global genetic diversity. *Nat. Commun.* **11**, (2020).
47. Yang, X., Lee, W. P., Ye, K. & Lee, C. One reference genome is not enough. *Genome Biol.* **20**, (2019).
48. Jackson, M., Marks, L., May, G. H. W. & Wilson, J. B. The genetic basis of disease. *Essays Biochem.* **62**, 643–723 (2018).
49. Mullaney, J. M., Mills, R. E., Stephen Pittard, W. & Devine, S. E. Small insertions and deletions (INDELs) in human genomes. *Hum. Mol. Genet.* **19**, 131–136 (2010).
50. Mahmoud, M. *et al.* Structural variant calling: The long and the short of it. *Genome Biol.* **20**, 1–14 (2019).
51. Feuk, L., Carson, A. R. & Scherer, S. W. Structural variation in the human genome. *Nat. Rev. Genet.* **7**, 85–97 (2006).
52. Carvalho, C. M. B. & Lupski, J. R. Mechanisms underlying structural variant formation in genomic disorders. *Nat. Rev. Genet.* **17**, 224–238 (2016).
53. Stephens, P. J. *et al.* Massive genomic rearrangement acquired in a single catastrophic event during cancer development. *Cell* **144**, 27–40 (2011).
54. Baca, S. C. *et al.* Punctuated evolution of prostate cancer genomes. *Cell* **153**, 666–677 (2013).
55. Shorokhova, M., Nikolsky, N. & Grinchuk, T. Chromothripsis—explosion in genetic science. *Cells* **10**, (2021).
56. Donne, R., Saroul-Aïnama, M., Cordier, P., Celton-Morizur, S. & Desdouets, C. Polyploidy in liver development, homeostasis and disease. *Nat. Rev. Gastroenterol. Hepatol.* **17**, 391–405 (2020).
57. Bray, F. *et al.* Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA. Cancer J. Clin.* **68**, 394–424 (2018).
58. Stratton, M. R., Campbell, P. J. & Futreal, P. A. The cancer genome. *Nature* **458**, 719–724 (2009).
59. Forbes, S. A. *et al.* COSMIC: Exploring the world's knowledge of somatic mutations in human cancer. *Nucleic Acids Res.* **43**, D805–D811 (2015).
60. Martínez-Jiménez, F. *et al.* A compendium of mutational cancer driver genes. *Nature Reviews Cancer* **20**, 555–572 (2020).
61. Shen, L., Shi, Q. & Wang, W. Double agents: Genes with both oncogenic and tumor-suppressor functions. *Oncogenesis* **7**, (2018).
62. Maman, S. & Witz, I. P. A history of exploring cancer in context. *Nat. Rev. Cancer* **18**, 359–376 (2018).
63. Fidler, I. J. The pathogenesis of cancer metastasis: The 'seed and soil' hypothesis revisited. *Nature Reviews Cancer* **3**, 453–458 (2003).
64. Gupta, G. P. & Massagué, J. Cancer Metastasis: Building a Framework. *Cell* **127**, 679–695 (2006).
65. Martincorena, I. & Campbell, P. J. Somatic mutation in cancer and normal cells. *Science* **349**, 1483–1489 (2015).
66. McKerrell, T. *et al.* Leukemia-Associated Somatic Mutations Drive Distinct Patterns of Age-Related Clonal Hemopoiesis. *Cell Rep.* **10**, 1239–1245 (2015).

67. Welch, J. S. *et al.* The origin and evolution of mutations in acute myeloid leukemia. *Cell* **150**, 264–278 (2012).
68. Genovese, G. *et al.* Clonal Hematopoiesis and Blood-Cancer Risk Inferred from Blood DNA Sequence. *N. Engl. J. Med.* **371**, 2477–2487 (2014).
69. Ley, T. J. *et al.* DNA sequencing of a cytogenetically normal acute myeloid leukaemia genome. *Nature* **456**, 66–72 (2008).
70. Leblanc, V. G. & Marra, M. A. Next-generation sequencing approaches in cancer: Where have they brought us and wherewill they take us? *Cancers (Basel)*. **7**, 1925–1958 (2015).
71. Nakagawa, H., Wardell, C. P., Furuta, M., Taniguchi, H. & Fujimoto, A. Cancer whole-genome sequencing: Present and future. *Oncogene* **34**, 5943–5950 (2015).
72. Van Loo, P. *et al.* Allele-specific copy number analysis of tumors. *Proc. Natl. Acad. Sci. U. S. A.* **107**, 16910–16915 (2010).
73. Nik-Zainal, S. *et al.* The life history of 21 breast cancers. *Cell* **149**, 994–1007 (2012).
74. Fujimoto, A. *et al.* Whole-genome sequencing with long reads reveals complex structure and origin of structural variation in human genetic variations and somatic mutations in cancer. *Genome Med.* **13**, 65 (2021).
75. Shiraishi, Y. *et al.* Precise characterization of somatic structural variations and mobile element insertions from paired long-read sequencing data with nanomonsv. *bioRxiv* 2020.07.22.214262 (2020). doi:10.1101/2020.07.22.214262
76. Gargiulo, G. & Minucci, S. Epigenomic profiling of cancer cells. *International Journal of Biochemistry and Cell Biology* **41**, 127–135 (2009).
77. Friedberg, E. C. A comprehensive catalogue of somatic mutations in cancer genomes. *DNA Repair (Amst)*. **9**, 468–469 (2010).
78. Shi, M. J. *et al.* Identification of new driver and passenger mutations within APOBEC-induced hotspot mutations in bladder cancer. *Genome Med.* **12**, (2020).
79. Wang, K. *et al.* Whole-genome sequencing and comprehensive molecular profiling identify new driver mutations in gastric cancer. *Nat. Genet.* **46**, 573–582 (2014).
80. Priestley, P. *et al.* Pan-cancer whole-genome analyses of metastatic solid tumours. *Nature* **575**, 210–216 (2019).
81. Korbel, J. O. *et al.* Paired-End Mapping Reveals Extensive Structural Variation in the Human Genome. *Science* **318**, 525–528 (2007).
82. Campbell, P. J. *et al.* Identification of somatically acquired rearrangements in cancer using genome-wide massively parallel paired-end sequencing. *Nat. Genet.* **40**, 722–729 (2008).
83. Morrison, C. D. *et al.* Whole-genome sequencing identifies genomic heterogeneity at a nucleotide and chromosomal level in bladder cancer. *Proc. Natl. Acad. Sci. U. S. A.* **111**, E672 (2014).
84. Furgason, J. M. *et al.* Whole genome sequencing of glioblastoma multiforme identifies multiple structural variations involved in EGFR activation. *Mutagenesis* **29**, 341–350 (2014).
85. Macintyre, G., Ylstra, B. & Brenton, J. D. Sequencing Structural Variants in Cancer for Precision Therapeutics. *Trends Genet.* **32**, 530–542 (2016).
86. Li, Y. *et al.* Patterns of somatic structural variation in human cancer genomes. *Nature* **578**, 112–121 (2020).
87. Ben-David, U. & Amon, A. Context is everything: aneuploidy in cancer. *Nat. Rev. Genet.* **21**, 44–62 (2020).

88. Quigley, D. A. *et al.* Genomic Hallmarks and Structural Variation in Metastatic Prostate Cancer. *Cell* **174**, 758-769.e9 (2018).
89. Berger, M. F. *et al.* The genomic complexity of primary human prostate cancer. *Nature* **470**, 214–220 (2011).
90. Rustad, E. H. *et al.* Revealing the Impact of Structural Variants in Multiple Myeloma. *Blood Cancer Discov.* **1**, 258–273 (2020).
91. Campbell, P. J. *et al.* Pan-cancer analysis of whole genomes. *Nature* **578**, 82–93 (2020).
92. Nik-Zainal, S. *et al.* Mutational processes molding the genomes of 21 breast cancers. *Cell* **149**, 979–993 (2012).
93. Bielski, C. M. *et al.* Genome doubling shapes the evolution and prognosis of advanced cancers. *Nat. Genet.* **50**, 1189–1195 (2018).
94. Davoli, T. & De Lange, T. The causes and consequences of polyploidy in normal development and cancer. *Annu. Rev. Cell Dev. Biol.* **27**, 585–610 (2011).
95. Darbary, H., Stoler, D. L. & Anderson, G. R. Family Cancer Syndromes: Inherited Deficiencies in Systems for the Maintenance of Genomic Integrity. *Surg. Oncol. Clin. N. Am.* **18**, 1–17 (2009).
96. Tubbs, A. & Nussenzweig, A. Endogenous DNA Damage as a Source of Genomic Instability in Cancer. *Cell* **168**, 644–656 (2017).
97. Lens, S. M. A. & Medema, R. H. Cytokinesis defects and cancer. *Nat. Rev. Cancer* **19**, 32–45 (2019).
98. Lander, E. S. *et al.* Initial sequencing and analysis of the human genome. *Nature* **409**, 860–921 (2001).
99. Dittwald, P. *et al.* Inverted Low-Copy Repeats and Genome Instability-A Genome-Wide Analysis. *Hum. Mutat.* **34**, 210–220 (2013).
100. Symer, D. E. *et al.* Human L1 retrotransposition is associated with genetic instability in vivo. *Cell* **110**, 327–338 (2002).
101. Gilbert, N., Lutz-Prigge, S. & Moran, J. V. Genomic deletions created upon LINE-1 retrotransposition. *Cell* **110**, 315–325 (2002).
102. Rodriguez-Martin, B. *et al.* Pan-cancer analysis of whole genomes identifies driver rearrangements promoted by LINE-1 retrotransposition. *Nat. Genet.* **52**, 306–319 (2020).
103. Bray, F. & Soerjomataram, I. The Changing Global Burden of Cancer: Transitions in Human Development and Implications for Cancer Prevention and Control. in *Disease Control Priorities, Third Edition (Volume 3): Cancer* 23–44 (The World Bank, 2015). doi:10.1596/978-1-4648-0349-9_ch2
104. Friedberg, E. C. A brief history of the DNA repair field. *Cell Res.* **18**, 3–7 (2008).
105. Lindahl, T. & Barnes, D. E. Repair of endogenous DNA damage. in *Cold Spring Harbor Symposia on Quantitative Biology* **65**, 127–133 (Cold Spring Harbor Laboratory Press, 2000).
106. Wu, S., Zhu, W., Thompson, P. & Hannun, Y. A. Evaluating intrinsic and non-intrinsic cancer risk factors. *Nat. Commun.* **9**, (2018).
107. Van Gent, D. C., Hoeijmakers, J. H. J. & Kanaar, R. Chromosomal stability and the DNA double-stranded break connection. *Nat. Rev. Genet.* **2**, 196–206 (2001).
108. Maslov, A. Y. & Vijg, J. Genome instability, cancer and aging. *Biochimica et Biophysica Acta - General Subjects* **1790**, 963–969 (2009).
109. Zhivotovsky, B. & Kroemer, G. Apoptosis and genomic instability. *Nat. Rev. Mol. Cell Biol.* **5**, 752–762 (2004).

110. Loeb, L. A., Loeb, K. R. & Anderson, J. P. Multiple mutations and cancer. *Proceedings of the National Academy of Sciences of the United States of America* **100**, 776–781 (2003).
111. Loeb, L. A. Human cancers express mutator phenotypes: Origin, consequences and targeting. *Nature Reviews Cancer* **11**, 450–457 (2011).
112. Negrini, S., Gorgoulis, V. G. & Halazonetis, T. D. Genomic instability an evolving hallmark of cancer. *Nat. Rev. Mol. Cell Biol.* **11**, 220–228 (2010).
113. Geigl, J. B., Obenauf, A. C., Schwarzbraun, T. & Speicher, M. R. Defining 'chromosomal instability'. *Trends Genet.* **24**, 64–69 (2008).
114. Storchova, Z. & Pellman, D. From polyploidy to aneuploidy, genome instability and cancer. *Nat. Rev. Mol. Cell Biol.* **5**, 45–54 (2004).
115. Hanahan, D. & Weinberg, R. A. Hallmarks of cancer: The next generation. *Cell* **144**, 646–674 (2011).
116. Volkova, N. V. *et al.* Mutational signatures are jointly shaped by DNA damage and repair. *Nat. Commun.* **11**, (2020).
117. Alexandrov, L. B. & Stratton, M. R. Mutational signatures: The patterns of somatic mutations hidden in cancer genomes. *Curr. Opin. Genet. Dev.* **24**, 52–60 (2014).
118. Alexandrov, L. B. *et al.* The repertoire of mutational signatures in human cancer. *Nature* **578**, 94–101 (2020).
119. Blokzijl, F. *et al.* Tissue-specific mutation accumulation in human adult stem cells during life. *Nature* **538**, 260–264 (2016).
120. Jolly, C. & Van Loo, P. Timing somatic events in the evolution of cancer. *Genome Biology* **19**, (2018).
121. Gerstung, M., Jolly, C., Leshchiner, I. & Dentro, S. C. The evolutionary history of 2 , 658 cancers. *Nature* **578**, (2020).
122. Mitchell, T. J. *et al.* Timing the Landmark Events in the Evolution of Clear Cell Renal Cell Cancer: TRACERx Renal. *Cell* **173**, 611-623.e17 (2018).
123. Kuhn, J. H. Virus Taxonomy. *Encycl. Virol.* (2021). doi:10.1016/b978-0-12-809633-8.21231-4
124. Moore, P. S. & Chang, Y. Why do viruses cause cancer? Highlights of the first century of human tumour virology. *Nature Reviews Cancer* **10**, 878–889 (2010).
125. Syrykh, C. *et al.* Epstein–barr virus-associated t-and nk-cell lymphoproliferative diseases: A review of clinical and pathological features. *Cancers* **13**, (2021).
126. Stufano, A. *et al.* Work-related human t-lymphotropic virus 1 and 2 (Htlv-1/2) infection: A systematic review. *Viruses* **13**, (2021).
127. McLaughlin-Drubin, M. E. & Munger, K. Viruses associated with human cancer. *Biochim. Biophys. Acta - Mol. Basis Dis.* **1782**, 127–150 (2008).
128. Zhang, M. *et al.* Distinct clinical features and prognostic factors of hepatitis C virus-associated non-Hodgkin's lymphoma: a systematic review and meta-analysis. *Cancer Cell International* **21**, (2021).
129. Smirnova, I. S. *et al.* Hepatitis C virus core protein transforms murine fibroblasts by promoting genomic instability. *Cell. Oncol.* **28**, 177–190 (2006).
130. Moriya, K. *et al.* The core protein of hepatitis C virus induces hepatocellular carcinoma in transgenic mice. *Nat. Med.* **4**, 1065–1067 (1998).
131. Feng, H., Shuda, M., Chang, Y. & Moore, P. S. Clonal integration of a polyomavirus in human Merkel cell carcinoma. *Science* **319**, 1096–1100 (2008).
132. Morales-Sánchez, A. & Fuentes-Pananá, E. M. Human viruses and cancer. *Viruses* **6**, 4047–4079 (2014).

133. Hausen, H. Zur. The search for infectious causes of human cancers: Where and why (Nobel Lecture). *Angew. Chemie - Int. Ed.* **48**, 5798–5808 (2009).
134. Butel, J. S. Viral carcinogenesis: Revelation of molecular mechanisms and etiology of human disease. *Carcinogenesis* **21**, 405–426 (2000).
135. Tubio, J. M. C. *et al.* Extensive transduction of nonrepetitive DNA mediated by L1 retrotransposition in cancer genomes. *Science* **345**, (2014).
136. Romanczuk, H. & Howley, P. M. Disruption of either the E1 or the E2 regulatory gene of human papillomavirus type 16 increases viral immortalization capacity. *Proc. Natl. Acad. Sci. U. S. A.* **89**, 3159–3163 (1992).
137. Nusse, R. & Varmus, H. E. Many tumors induced by the mouse mammary tumor virus contain a provirus integrated in the same region of the host genome. *Cell* **31**, 99–109 (1982).
138. Paterlini-Bréchot, P. *et al.* Hepatitis B virus-related insertional mutagenesis occurs frequently in human liver cancers and recurrently targets human telomerase gene. *Oncogene* **22**, 3911–3916 (2003).
139. Sung, W. K. *et al.* Genome-wide survey of recurrent HBV integration in hepatocellular carcinoma. *Nature Genetics* **44**, 765–769 (2012).
140. Flippot, R., Malouf, G. G., Su, X., Khayat, D. & Spano, J. P. Oncogenic viruses: Lessons learned using next-generation sequencing technologies. *Eur. J. Cancer* **61**, 61–68 (2016).
141. Tang, K. W. & Larsson, E. Tumour virology in the era of high-throughput genomics. *Philos. Trans. R. Soc. B Biol. Sci.* **372**, 1–7 (2017).
142. Razavi, H. Global Epidemiology of Viral Hepatitis. *Gastroenterol. Clin. North Am.* **49**, 179–189 (2020).
143. Bousali, M., Papatheodoridis, G., Paraskevis, D. & Karamitros, T. Hepatitis b virus dna integration, chronic infections and hepatocellular carcinoma. *Microorganisms* **9**, 1–30 (2021).
144. Abbas, Z. & Abbas, M. Challenges in Formulation and Implementation of Hepatitis B Elimination Programs. *Cureus* **13**, (2021).
145. Fanning, G. C., Zoulim, F., Hou, J. & Bertoletti, A. Therapeutic strategies for hepatitis B virus infection: towards a cure. *Nat. Rev. Drug Discov.* **18**, 827–844 (2019).
146. Tong, H. Van, Thomas Bock, C. & Velavan, T. P. Genetic insights on host and hepatitis b virus in liver diseases. *Mutat. Res. - Rev. Mutat. Res.* **762**, 65–75 (2014).
147. Pujol, F. H., Navas, M. C., Hainaut, P. & Chemin, I. Worldwide genetic diversity of HBV genotypes and risk of hepatocellular carcinoma. *Cancer Lett.* **286**, 80–88 (2009).
148. Caligiuri, P., Cerruti, R., Icardi, G. & Bruzzone, B. Overview of hepatitis B virus mutations and their implications in the management of infection. *World J. Gastroenterol.* **22**, 145–154 (2016).
149. Levrero, M. & Zucman-Rossi, J. Mechanisms of HBV-induced hepatocellular carcinoma. *J. Hepatol.* **64**, S84–S101 (2016).
150. Chaturvedi, V. K. *et al.* Molecular mechanistic insight of hepatitis B virus mediated hepatocellular carcinoma. *Microb. Pathog.* **128**, 184–194 (2019).
151. Ayub, A., Ashfaq, U. A. & Haque, A. HBV induced HCC: Major risk factors from genetic to molecular level. *Biomed Res. Int.* **2013**, (2013).

152. Kanda, T., Goto, T., Hirotsu, Y., Moriyama, M. & Omata, M. Molecular mechanisms driving progression of liver cirrhosis towards hepatocellular carcinoma in chronic hepatitis B and C infections: A review. *Int. J. Mol. Sci.* **20**, (2019).
153. Kombe Kombe, A. J. *et al.* Epidemiology and Burden of Human Papillomavirus and Related Diseases, Molecular Pathogenesis, and Vaccine Evaluation. *Front. Public Heal.* **8**, 1–19 (2021).
154. Wang, R. *et al.* Human papillomavirus vaccine against cervical cancer: Opportunity and challenge. *Cancer Lett.* **471**, 88–102 (2020).
155. Chan, C. K., Aimagambetova, G., Ukybassova, T., Kongrtay, K. & Azizan, A. Human Papillomavirus Infection and Cervical Cancer: Epidemiology, Screening, and Vaccination - Review of Current Perspectives. *J. Oncol.* **2019**, (2019).
156. Dong, H. *et al.* Current Status of Human Papillomavirus-Related Head and Neck Cancer: From Viral Genome to Patient Care. *Virol. Sin.* **36**, 1284–1302 (2021).
157. Nogues, J. C., Fassas, S., Mulcahy, C. & Zapanta, P. E. Human papillomavirus-associated head and neck cancer. *J. Am. Board Fam. Med.* **34**, 832 (2021).
158. Della Fera, A. N., Warburton, A., Coursey, T. L., Khurana, S. & McBride, A. A. Persistent human papillomavirus infection. *Viruses* **13**, (2021).
159. White, E. A. *et al.* Comprehensive Analysis of Host Cellular Interactions with Human Papillomavirus E6 Proteins Identifies New E6 Binding Partners and Reflects Viral Diversity. *J. Virol.* **86**, 13174–13186 (2012).
160. Medda, A., Duca, D. & Chiocca, S. Human papillomavirus and cellular pathways: Hits and targets. *Pathogens* **10**, 1–23 (2021).
161. Cesarman, E. *et al.* Kaposi sarcoma. *Nat. Rev. Dis. Prim.* **5**, (2019).
162. McMahon, D. E., Maurer, T. & Freeman, E. E. 25 years of Kaposi sarcoma herpesvirus: Discoveries, disparities, and diagnostics. *J. Glob. Oncol.* **6**, 505–507 (2020).
163. Mamimandjiami, A. I. *et al.* Epidemiology and genetic variability of hhv-8/kshv among rural populations and kaposi's sarcoma patients in gabon, central africa. Review of the geographical distribution of hhv-8 k1 genotypes in Africa. *Viruses* **13**, (2021).
164. Li, S., Bai, L., Dong, J., Sun, R. & Lan, K. *Kaposi's sarcoma-associated herpesvirus: Epidemiology and molecular biology*. *Advances in Experimental Medicine and Biology* **1018**, (2017).
165. Katano, H. Pathological features of Kaposi's sarcoma-associated herpesvirus infection. *Adv. Exp. Med. Biol.* **1045**, 357–376 (2018).
166. Hussein, H. A. M., Okafor, I. B., Walker, L. R., Abdel-Raouf, U. M. & Akula, S. M. Cellular and viral oncogenes: the key to unlocking unknowns of Kaposi's sarcoma-associated herpesvirus pathogenesis. *Arch. Virol.* **163**, 2633–2643 (2018).
167. Midorikawa, Y. *et al.* Molecular karyotyping of human hepatocellular carcinoma using single-nucleotide polymorphism arrays. *Oncogene* **25**, 5581–5590 (2006).
168. Wong, N. *et al.* A comprehensive karyotypic study on human hepatocellular carcinoma by spectral karyotyping. *Hepatology* **32**, 1060–1068 (2000).
169. Meyer, M., Wiedorn, K. H., Hofschneider, P. H., Koshy, R. & Caselmann, W. H. A chromosome 17:7 translocation is associated with a hepatitis B virus DNA integration in human hepatocellular carcinoma DNA. *Hepatology* **15**, 665–671 (1992).

170. Meng, G. *et al.* TSD: A computational tool to study the complex structural variants using PacBio targeted sequencing data. *G3 Genes, Genomes, Genet.* **9**, 1371–1376 (2019).
171. Wang, Y. *et al.* Characterization of HBV integrants in 14 hepatocellular carcinomas: Association of truncated X gene and hepatocellular carcinogenesis. *Oncogene* **23**, 142–148 (2004).
172. Rogler, C. E. *et al.* Deletion in chromosome 11p associated with a hepatitis B integration site in hepatocellular carcinoma. *Science* **230**, 319–322 (1985).
173. Pineau, P. *et al.* A t(3;8) chromosomal translocation associated with hepatitis B virus intergration involves the carboxypeptidase N locus. *J. Virol.* **70**, 7280–7284 (1996).
174. Jiang, Z. *et al.* The effects of hepatitis B virus integration into the genomes of hepatocellular carcinoma patients. *Genome Res.* **22**, 593–601 (2012).
175. Péneau, C. *et al.* Hepatitis B virus integrations promote local and distant oncogenic driver alterations in hepatocellular carcinoma. *Gut* 1–11 (2021). doi:10.1136/gutjnl-2020-323153
176. Fujimoto, A. *et al.* Whole-genome mutational landscape and characterization of noncoding and structural mutations in liver cancer. *Nat. Genet.* **48**, 500–509 (2016).
177. Tu, T., Budzinska, M. A., Shackel, N. A. & Urban, S. HBV DNA integration: Molecular mechanisms and clinical implications. *Viruses* **9**, (2017).
178. Ratan, A., Olson, T. L., Loughran, T. P. & Miller, W. Identification of indels in next-generation sequencing data. *BMC Bioinformatics* **16**, 1–8 (2015).
179. Nagaya, T. *et al.* The mode of hepatitis B virus DNA integration in chromosomes of human hepatocellular carcinoma. *Genes Dev.* **1**, 773–782 (1987).
180. Li, Y. *et al.* Constitutional and somatic rearrangement of chromosome 21 in acute lymphoblastic leukaemia. *Nature* **508**, 98–102 (2014).
181. McClintock, B. THE PRODUCTION OF HOMOZYGOUS DEFICIENT TISSUES WITH MUTANT CHARACTERISTICS BY MEANS OF THE ABERRANT MITOTIC BEHAVIOR OF RING-SHAPED CHROMOSOMES. *Genetics* **23**, 315–376 (1938).
182. McClintock, B. THE STABILITY OF BROKEN ENDS OF CHROMOSOMES IN ZEA MAYS. *Genetics* **26**, 234–282 (1941).
183. Hermetz, K. E. *et al.* Large Inverted Duplications in the Human Genome Form via a Fold-Back Mechanism. *PLoS Genet.* **10**, (2014).
184. Bouchard, M. J. & Navas-Martin, S. Hepatitis B and C virus hepatocarcinogenesis: Lessons learned and future challenges. *Cancer Letters* **305**, 123–143 (2011).
185. Yaginuma, K. *et al.* Multiple integration site of hepatitis B virus DNA in hepatocellular carcinoma and chronic active hepatitis tissues from children. *J. Virol.* **61**, 1808–1813 (1987).
186. Guerrero, R. B. & Roberts, L. R. The role of hepatitis B virus integrations in the pathogenesis of human hepatocellular carcinoma. *J. Hepatol.* **42**, 760–777 (2005).
187. Neuveut, C., Wei, Y. & Buendia, M. A. Mechanisms of HBV-related hepatocarcinogenesis. *J. Hepatol.* **52**, 594–604 (2010).
188. Alexandrov, L. B. *et al.* Clock-like mutational processes in human somatic cells. *Nat. Genet.* **47**, 1402–1407 (2015).
189. Lok, A. S., Zoulim, F., Dusheiko, G. & Ghany, M. G. Hepatitis B cure: From discovery to regulatory approval. *Hepatology* **66**, 1296–1313 (2017).

190. Lampertico, P. *et al.* EASL 2017 Clinical Practice Guidelines on the management of hepatitis B virus infection. *J. Hepatol.* **67**, 370–398 (2017).
191. Yang, W. & Summers, J. Integration of Hepadnavirus DNA in Infected Liver: Evidence for a Linear Precursor. *J. Virol.* **73**, 9710–9717 (1999).
192. Liu, Y. *et al.* Viral Biomarkers for Hepatitis B Virus-Related Hepatocellular Carcinoma Occurrence and Recurrence. *Front. Microbiol.* **12**, 1–18 (2021).
193. Wang, S. H., Yeh, S. H. & Chen, P. J. Unique features of hepatitis b virus-related hepatocellular carcinoma in pathogenesis and clinical significance. *Cancers (Basel)*. **13**, 1–19 (2021).
194. Perisetti, A., Goyal, H., Yendala, R., Thandassery, R. B. & Giorgakis, E. Non-cirrhotic hepatocellular carcinoma in chronic viral hepatitis: Current insights and advancements. *World J. Gastroenterol.* **27**, 3466–3482 (2021).
195. Wong, D. K. H. *et al.* Among Patients with Undetectable Hepatitis B Surface Antigen and Hepatocellular Carcinoma, a High Proportion Has Integration of HBV DNA into Hepatocyte DNA and No Cirrhosis. *Clin. Gastroenterol. Hepatol.* **18**, 449–456 (2020).
196. Furuta, M. *et al.* Characterization of HBV integration patterns and timing in liver cancer and HBV-infected livers. *Oncotarget* **9**, 25075–25088 (2018).
197. Tokino, T. & Matsubara, K. Chromosomal sites for hepatitis B virus integration in human hepatocellular carcinoma. *J. Virol.* **65**, 6761–6764 (1991).
198. Budzinska, M. A., Shackel, N. A., Urban, S. & Tu, T. Cellular genomic sites of hepatitis B virus DNA integration. *Genes (Basel)*. **9**, (2018).
199. Kawai-Kitahata, F. *et al.* Comprehensive analyses of mutations and hepatitis B virus integration in hepatocellular carcinoma with clinicopathological features. *J. Gastroenterol.* **51**, 473–486 (2016).
200. Scully, R., Panday, A., Elango, R. & Willis, N. A. DNA double-strand break repair-pathway choice in somatic mammalian cells. *Nature Reviews Molecular Cell Biology* **20**, 698–714 (2019).
201. Jordan, J. J. *et al.* Altered-function p53 missense mutations identified in breast cancers can have subtle effects on transactivation. *Mol. Cancer Res.* **8**, 701–716 (2010).
202. Tate, J. G. *et al.* COSMIC: The Catalogue Of Somatic Mutations In Cancer. *Nucleic Acids Res.* **47**, D941–D947 (2019).
203. Amaral, J. D., Castro, R. E., Steer, C. J. & Rodrigues, C. M. P. P53 and the Regulation of Hepatocyte Apoptosis: Implications for Disease Pathogenesis. *Trends Mol. Med.* **15**, 531–541 (2009).
204. Dewantoro, O., Gani, R. A. & Akbar, N. Hepatocarcinogenesis in viral Hepatitis B infection: the role of HBx and p53. *Acta Med. Indones.* **38**, 154–159 (2006).
205. Sun, X. *et al.* Arid1a Has Context-Dependent Oncogenic and Tumor Suppressor Functions in Liver Cancer. *Cancer Cell* **32**, 574-589.e6 (2017).
206. Xiao, Y. *et al.* Loss of ARID1A Promotes Hepatocellular Carcinoma Progression via Up-regulation of MYC Transcription. *J. Clin. Transl. Hepatol.* **9**, 528–536 (2021).
207. He, F. *et al.* Decreased expression of ARID1A associates with poor prognosis and promotes metastases of hepatocellular carcinoma. *J. Exp. Clin. Cancer Res.* **34**, 1–8 (2015).
208. Yim, S. Y. *et al.* Low ARID1A Expression is Associated with Poor Prognosis in Hepatocellular Carcinoma. *Cells* **9**, 1–14 (2020).
209. Peng, Z., Gong, Y. & Liang, X. Role of FAT1 in health and disease (Review). *Oncol. Lett.* **21**, 1–13 (2021).

210. Zhu, H. Y. *et al.* POU2F1 promotes growth and metastasis of hepatocellular carcinoma through the FAT1 signaling pathway. *Am. J. Cancer Res.* **7**, 1665–1679 (2017).
211. Valletta, D. *et al.* Regulation and function of the atypical cadherin FAT1 in hepatocellular carcinoma. *Carcinogenesis* **35**, 1407–1415 (2014).
212. Nguyen, P. H. D. *et al.* Intratumoural immune heterogeneity as a hallmark of tumour evolution and progression in hepatocellular carcinoma. *Nat. Commun.* **12**, (2021).
213. Piao, Z., Park, C., Park, J. H. & Kim, H. Deletion mapping of chromosome 4q in hepatocellular carcinoma. *Int. J. Cancer* **79**, 356–360 (1998).
214. Sadeqzadeh, E., De Bock, C. E. & Thorne, R. F. Sleeping Giants: Emerging Roles for the Fat Cadherins in Health and Disease. *Med. Res. Rev.* **34**, 190–221 (2014).
215. Huang, F. Y. *et al.* Targeted genomic profiling identifies frequent deleterious mutations in FAT4 and TP53 genes in HBV-associated hepatocellular carcinoma. *BMC Cancer* **19**, (2019).
216. Shi, J. Y. *et al.* Inferring the progression of multifocal liver cancer from spatial and temporal genomic heterogeneity. *Oncotarget* **7**, 2867–2877 (2016).
217. Katoh, M. Function and cancer genomics of FAT family genes (Review). *Int. J. Oncol.* **41**, 1913–1918 (2012).
218. Ahn, S. M. *et al.* Genomic portrait of resectable hepatocellular carcinomas: Implications of RB1 and FGF19 aberrations for patient stratification. *Hepatology* **60**, 1972–1982 (2014).
219. Zhang, Y. *et al.* Integrated analysis of mutation data from various sources identifies key genes and signaling pathways in hepatocellular carcinoma. *PLoS One* **9**, (2014).
220. Guichard, C. *et al.* Integrated analysis of somatic mutations and focal copy-number changes identifies key genes and pathways in hepatocellular carcinoma. *Nat. Genet.* **44**, 694–698 (2012).
221. Amaddeo, G., Guichard, C., Imbeaud, S. & Zucman-Rossi, J. Next-generation sequencing identified new oncogenes and tumor suppressor genes in human hepatic tumors. *Oncoimmunology* **1**, 1612–1613 (2012).
222. Dejean, A., Sonigo, P., Wain-Hobson, S. & Tiollais, P. Specific hepatitis B virus integration in hepatocellular carcinoma DNA through a viral 11-base-pair direct repeat. *Proc. Natl. Acad. Sci. U. S. A.* **81**, 5350–5354 (1984).
223. Shih, C. *et al.* Tight clustering of human hepatitis B virus integration sites in hepatomas near a triple-stranded region. *J. Virol.* **61**, 3491–3498 (1987).
224. Yaginuma, K., Kobayashi, M., Yoshida, E. & Koike, K. Hepatitis B virus integration in hepatocellular carcinoma DNA: Duplication of cellular flanking sequences at the integration site. *Proc. Natl. Acad. Sci. U. S. A.* **82**, 4458–4462 (1985).
225. Koshy, R. *et al.* Integration of hepatitis B virus DNA: Evidence for integration in the single-stranded gap. *Cell* **34**, 215–223 (1983).
226. Koch, S., von Loringhoven, A. F., Kahmann, R., Hofschneider, P. H. & Koshy, R. The genetic organization of integrated hepatitis B virus DNA in the human hepatoma cell line PLC/PRF/5. *Nucleic Acids Res.* **12**, 7962–7964 (1984).
227. Hino, O., Ohtake, K. & Rogler, C. E. Features of two hepatitis B virus (HBV) DNA integrations suggest mechanisms of HBV integration. *J. Virol.* **63**, 2638–2643 (1989).

228. Tu, T., Budzinska, M. A., Vondran, F. W. R., Shackel, N. A. & Urban, S. Hepatitis B Virus DNA Integration Occurs Early in the Viral Life Cycle in an In Vitro Infection Model via Sodium Taurocholate Cotransporting Polypeptide-Dependent Uptake of Enveloped Virus Particles . *J. Virol.* **92**, e02007-17 (2018).
229. Forster, M. *et al.* Vy-PER: Eliminating false positive detection of virus integration events in next generation sequencing data. *Sci. Rep.* **5**, 1–13 (2015).
230. Ho, D. W. H., Sze, K. M. F. & Ng, I. O. L. Virus-Clip: A fast and memory-efficient viral integration site detection tool at single-base resolution with annotation capability. *Oncotarget* **6**, 20959–20963 (2015).
231. Tennakoon, C. & Sung, W. K. BATVI: Fast, sensitive and accurate detection of virus integrations. *BMC Bioinformatics* **18**, (2017).
232. Nguyen, N. P. D., Deshpande, V., Luebeck, J., Mischel, P. S. & Bafna, V. ViFi: Accurate detection of viral integration and mRNA fusion reveals indiscriminate and unregulated transcription in proximal genomic regions in cervical cancer. *Nucleic Acids Res.* **46**, 3309–3325 (2018).
233. Chen, Y. *et al.* VirusSeq: Software to identify viruses and their integration sites using next-generation sequencing of human cancer tissue. *Bioinformatics* **29**, 266–267 (2013).
234. Wang, Q., Jia, P. & Zhao, Z. VERSE: A novel approach to detect virus integration in host genomes through reference genome customization. *Genome Med.* **7**, (2015).
235. Chen, X., Kost, J. & Li, D. Comprehensive comparative analysis of methods and software for identifying viral integrations. *Brief. Bioinform.* **20**, 2088–2097 (2019).
236. Danecek, P. *et al.* The variant call format and VCFtools. *Bioinformatics* **27**, 2156–2158 (2011).
237. Konopka, A. K. Sequence Complexity and Composition. in *eLS* (Wiley, 2005). doi:10.1038/npg.els.0005260
238. Kent, W. J. BLAT —The BLAST -Like Alignment Tool . *Genome Res.* **12**, 656–664 (2002).
239. Edgar, R. C. MUSCLE: A multiple sequence alignment method with reduced time and space complexity. *BMC Bioinformatics* **5**, 113 (2004).
240. Rice, P., Longden, L. & Bleasby, A. EMBOSS: The European Molecular Biology Open Software Suite. *Trends in Genetics* **16**, 276–277 (2000).
241. Altschul, S. F., Gish, W., Miller, W., Myers, E. W. & Lipman, D. J. Basic local alignment search tool. *J. Mol. Biol.* **215**, 403–410 (1990).
242. Vaser, R., Sović, I., Nagarajan, N. & Šikić, M. Fast and accurate de novo genome assembly from long uncorrected reads. *Genome Res.* **27**, 737–746 (2017).
243. Wang, K., Li, M. & Hakonarson, H. ANNOVAR: Functional annotation of genetic variants from high-throughput sequencing data. *Nucleic Acids Res.* **38**, (2010).
244. Akagi, K. *et al.* Genome-wide analysis of HPV integration in human cancers reveals recurrent, focal genomic instability. *Genome Res.* **24**, 185–199 (2014).
245. Takada, S., Gotoh, Y., Hayashi, S., Yoshida, M. & Koike, K. Structural rearrangement of integrated hepatitis B virus DNA as well as cellular flanking DNA is present in chronically infected hepatic tissues. *J. Virol.* **64**, 822–828 (1990).
246. Tran, A. *et al.* Emergence of and takeover by hepatitis B virus (HBV) with rearrangements in the pre-S/S and pre-C/C genes during chronic HBV infection. *J. Virol.* **65**, 3566–3574 (1991).

247. Fujiwara, K., Matsunami, K., Iio, E., Nojiri, S. & Joh, T. Novel non-canonical genetic rearrangements termed “complex structural variations” in HBV genome. *Virus Res.* **238**, 84–93 (2017).
248. Fujiwara, K. Novel genetic rearrangements in hepatitis b virus: Complex structural variations and structural variation polymorphisms. *Viruses* **13**, (2021).
249. Fujiwara, K. *et al.* Novel Type of Hepatitis B Virus Mutation: Replacement Mutation Involving a Hepatocyte Nuclear Factor 1 Binding Site Tandem Repeat in Chronic Hepatitis B Virus Genotype E. *J. Virol.* **79**, 14404–14410 (2005).
250. Gillison, M. L. *et al.* Evidence for a causal association between human papillomavirus and a subset of head and neck cancers. *J. Natl. Cancer Inst.* **92**, 709–720 (2000).
251. Bosch, F. X., Lorincz, A., Muñoz, N., Meijer, C. J. L. M. & Shah, K. V. The causal relation between human papillomavirus and cervical cancer. *Journal of Clinical Pathology* **55**, 244–265 (2002).
252. Zapatka, M. *et al.* The landscape of viral associations in human cancers. *bioRxiv* 465757 (2018). doi:10.1101/465757
253. Deshpande, V. *et al.* Exploring the landscape of focal amplifications in cancer using AmpliconArchitect. *Nat. Commun.* **10**, 1–14 (2019).
254. Robinson, J. T. *et al.* Integrative genomics viewer. *Nature Biotechnology* **29**, 24–26 (2011).
255. Speel, E. J. M. HPV integration in head and neck squamous cell carcinomas: Cause and consequence. *Recent Results Cancer Res.* **206**, 57–72 (2017).
256. Pinatti, L. M., Walline, H. M. & Carey, T. E. Human Papillomavirus Genome Integration and Head and Neck Cancer. *J. Dent. Res.* **97**, 691–700 (2018).
257. Balaji, H. *et al.* Causes and consequences of HPV integration in head and neck squamous cell carcinomas: State of the art. *Cancers (Basel).* **13**, 1–21 (2021).
258. Oyervides-Muñoz, M. A. *et al.* Understanding the HPV integration and its progression to cervical cancer. *Infect. Genet. Evol.* **61**, 134–144 (2018).
259. Groves, I. J. & Coleman, N. Human papillomavirus genome integration in squamous carcinogenesis: what have next-generation sequencing studies taught us? *J. Pathol.* **245**, 9–18 (2018).
260. Parfenov, M. *et al.* Characterization of HPV and host genome interactions in primary head and neck cancers. *Proc. Natl. Acad. Sci. U. S. A.* **111**, 15544–15549 (2014).
261. Gillison, M. L. *et al.* Human papillomavirus and the landscape of secondary genetic alterations in oral cancers. *Genome Res.* **29**, 1–17 (2019).
262. Schmitz, M. *et al.* Loss of gene function as a consequence of human papillomavirus DNA integration. *Int. J. Cancer* **131**, (2012).
263. Nekulova, M., Holcakova, J., Coates, P. & Vojtesek, B. The role of P63 in cancer, stem cells and cancer stem cells. *Cell. Mol. Biol. Lett.* **16**, 296–327 (2011).
264. Trink, B., Osada, M., Ratovitski, E. & Sidransky, D. P63 Transcriptional Regulation of Epithelial Integrity and Cancer. *Cell Cycle* **6**, 240–245 (2007).
265. McHeik, S., Aptecar, L., Coopman, P., D’hondt, V. & Freiss, G. Dual role of the ptpn13 tyrosine phosphatase in cancer. *Biomolecules* **10**, 1–21 (2020).
266. Hu, Z. *et al.* Genome-wide profiling of HPV integration in cervical cancer identifies clustered genomic hot spots and a potential microhomology-mediated integration mechanism. *Nat. Genet.* **47**, 158–163 (2015).

267. Bodelon, C., Untereiner, M. E., Machiela, M. J., Vinokurova, S. & Wentzensen, N. Genomic characterization of viral integration sites in HPV-related cancers. *International Journal of Cancer* **139**, 2001–2011 (2016).
268. Ojesina, A. I. *et al.* Landscape of genomic alterations in cervical carcinomas. *Nature* **506**, 371–375 (2014).
269. Liu, C. *et al.* Increased expression of PD-L1 by the human papillomavirus 16 E7 oncoprotein inhibits anticancer immunity. *Mol. Med. Rep.* **15**, 1063–1070 (2017).
270. Feng, Y. C., Cheng, Z. Z., Huang, Y. C., Ma, X. M. & Wang, L. Association between PD-L1 and HPV status and the prognostic value for HPV treatment in premalignant cervical lesion patients. *Med. (United States)* **96**, (2017).
271. Mezache, L., Paniccia, B., Nyinawabera, A. & Nuovo, G. J. Enhanced expression of PD L1 in cervical intraepithelial neoplasia and cervical cancers. *Mod. Pathol.* **28**, 1594–1602 (2015).
272. Allouch, S. *et al.* High-Risk HPV Oncoproteins and PD-1/PD-L1 Interplay in Human Cervical Cancer: Recent Evidence and Future Directions. *Front. Oncol.* **10**, 1–9 (2020).
273. Lyford-Pike, S. *et al.* Evidence for a role of the PD-1:PD-L1 pathway in immune resistance of HPV-associated head and neck squamous cell carcinoma. *Cancer Res.* **73**, 1733–1741 (2013).
274. Solomon, B. *et al.* Prognostic significance of PD-L1þ and CD8þ immune cells in HPVþ Oropharyngeal squamous cell carcinoma. *Cancer Immunol. Res.* **6**, 295–304 (2018).
275. Kim, H. S. *et al.* Association between PD-L1 and HPV status and the prognostic value of PD-L1 in oropharyngeal squamous cell carcinoma. *Cancer Res. Treat.* **48**, 527–536 (2016).
276. Hassounah, N. B. *et al.* Identification and characterization of an alternative cancer-derived PD-L1 splice variant. *Cancer Immunol. Immunother.* **68**, 407–420 (2019).
277. Golrokh Mofrad, M., Taghizadeh Maleki, D. & Faghihloo, E. The roles of programmed death ligand 1 in virus-associated cancers. *Infect. Genet. Evol.* **84**, 104368 (2020).
278. Heselmeyer, K. *et al.* Gain of chromosome 3q defines the transition from severe dysplasia to invasive carcinoma of the uterine cervix. *Proc. Natl. Acad. Sci. U. S. A.* **93**, 479–484 (1996).
279. Kirchhoff, M. *et al.* Comparative genomic hybridization reveals non-random chromosomal aberrations in early preinvasive cervical lesions. *Cancer Genet. Cytogenet.* **129**, 47–51 (2001).
280. Zhu, D. *et al.* Amplification and overexpression of TP63 and MYC as biomarkers for transition of cervical intraepithelial neoplasia to cervical cancer. *Int. J. Gynecol. Cancer* **24**, 643–648 (2014).
281. Nichols, A. C. *et al.* A Pilot Study Comparing HPV-Positive and HPV-Negative Head and Neck Squamous Cell Carcinomas by Whole Exome Sequencing. *ISRN Oncol.* **2012**, 1–9 (2012).
282. Hopman, A. H. N. *et al.* Genomic integration of oncogenic HPV and gain of the human telomerase gene TERC at 3q26 are strongly associated events in the progression of uterine cervical dysplasia to invasive cancer. *J. Pathol.* **210**, 412–419 (2006).
283. Jarboe, E. A. *et al.* Analysis of telomerase as a diagnostic biomarker of cervical dysplasia and carcinoma. *Oncogene* **21–4**, 664–673 (2002).

284. Gao, G. *et al.* Common Fragile Sites and Extremely Large are Targets for Human Papillomavirus Integrations and Chromosome Rearrangements in Oropharyngeal Squamous Cell Carcinoma. *Genes, Chromosom. Cancer* **56**, 59–74 (2016).
285. Pang, J. *et al.* Extrachromosomal DNA in HPV-Mediated Oropharyngeal Cancer Drives Diverse Oncogene Transcription. *Clin. Cancer Res.* **27**, 6772–6786 (2021).
286. D'souza, S., Lau, K. C. K., Coffin, C. S. & Patel, T. R. Molecular mechanisms of viral hepatitis induced hepatocellular carcinoma. *World J. Gastroenterol.* **26**, 5759–5783 (2020).
287. Hatano, T., Sano, D., Takahashi, H. & Oridate, N. Pathogenic role of immune evasion and integration of human papillomavirus in oropharyngeal cancer. *Microorganisms* **9**, (2021).
288. Liu, Y., Gonzalez, Y. & Amengual, J. E. Chromatin-Remodeled State in Lymphoma. *Current Hematologic Malignancy Reports* **14**, 439–450 (2019).
289. Trifonov, V., Pasqualucci, L., Favera, R. D. & Rabadan, R. MutComFocal: An integrative approach to identifying recurrent and focal genomic alterations in tumor samples. *BMC Syst. Biol.* **7**, (2013).
290. Narayan, G. *et al.* Promoter hypermethylation-mediated inactivation of multiple Slit-Robo pathway genes in cervical cancer progression. *Mol. Cancer* **5**, 1–10 (2006).
291. Bauer, K., Dowejko, A., Bosserhoff, A. K., Reichert, T. E. & Bauer, R. Slit-2 facilitates interaction of P-cadherin with Robo-3 and inhibits cell migration in an oral squamous cell carcinoma cell line. *Carcinogenesis* **32**, 935–943 (2011).
292. Nones, K. *et al.* Genome-wide DNA methylation patterns in pancreatic ductal adenocarcinoma reveal epigenetic deregulation of SLIT-ROBO, ITGA2 and MET signaling. *Int. J. Cancer* **135**, 1110–1118 (2014).
293. Han, S. *et al.* ROBO3 promotes growth and metastasis of pancreatic carcinoma. *Cancer Lett.* **366**, 61–70 (2015).
294. Jiang, Z. *et al.* Targeting the SLIT/ROBO pathway in tumor progression: molecular mechanisms and therapeutic perspectives. *Therapeutic Advances in Medical Oncology* **11**, (2019).
295. Nakamura, R. *et al.* Neural EGFL like 2 expressed in myoepithelial cells and suppressed breast cancer cell migration. *Pathol. Int.* **71**, 326–336 (2021).
296. Xue, H. *et al.* CREBRF is a potent tumor suppressor of glioblastoma by blocking hypoxia-induced autophagy via the CREB3/ATG5 pathway. *Int. J. Oncol.* **49**, 519–528 (2016).
297. Tang, X. *et al.* Hsa_circ_0102171 aggravates the progression of cervical cancer through targeting miR-4465/CREBRF axis. *J. Cell. Physiol.* **236**, 4973–4984 (2021).
298. Feng, S., Liu, N., Chen, X., Liu, Y. & An, J. Long non-coding RNA NEAT1/miR-338-3p axis impedes the progression of acute myeloid leukemia via regulating CREBRF. *Cancer Cell Int.* **20**, 1–11 (2020).
299. Wang, Z. *et al.* MicroRNA profile identifies miR-6165 could suppress gastric cancer migration and invasion by targeting STRN4. *Onco. Targets. Ther.* **13**, 1859–1869 (2020).
300. Zhang, Y., Gu, X., Jiang, F., Sun, P. & Li, X. Altered expression of striatin-4 is associated with poor prognosis in bladder transitional cell carcinoma. *Oncol. Lett.* **21**, (2021).

301. Ito, M. *et al.* Identification of serum anti-striatin 4 antibodies as a common marker for esophageal cancer and other solid cancers. *Mol. Clin. Oncol.* **15**, (2021).
302. Rocha, C. *et al.* Tubulin glycylases are required for primary cilia, control of cell proliferation and tumor development in colon. *EMBO J.* **33**, 2735–2735 (2014).
303. D'Amato, L. *et al.* ARHGEF3 controls HDACi-induced differentiation via RhoA-dependent pathways in acute myeloid leukemias. *Epigenetics* **10**, 6–18 (2015).
304. Park, J. *et al.* Genomic analysis of 220 CTCLs identifies a novel recurrent gain-of-function alteration in RLTPR (p.Q575E). *Blood* **130**, 1430–1440 (2017).
305. Nair, P., Pan, H., Stallings, R. L. & Gao, S. J. Recurrent genomic imbalances in primary effusion lymphomas. *Cancer Genet. Cytogenet.* **171**, 119–121 (2006).
306. Luan, S. L. *et al.* Primary effusion lymphoma: Genomic profiling revealed amplification of SELPLG and CORO1C encoding for proteins important for cell migration. *J. Pathol.* **222**, 166–179 (2010).
307. Thal, D. R. *et al.* Expression of coronin-3 (coronin-1C) in diffuse gliomas is related to malignancy. *J. Pathol.* **214**, 415–424 (2008).
308. Roadcap, D. W., Clemen, C. S. & Bear, J. E. The role of mammalian coronins in development and disease. *Subcell. Biochem.* **48**, 124–135 (2008).
309. Mataki, H. *et al.* Downregulation of the microRNA-1/133a cluster enhances cancer cell migration and invasion in lung-squamous cell carcinoma via regulation of Coronin1C. *J. Hum. Genet.* **60**, 53–61 (2015).
310. Lim, J. P. *et al.* YBX1 gene silencing inhibits migratory and invasive potential via CORO1C in breast cancer in vitro. *BMC Cancer* **17**, 1–15 (2017).
311. Zhang, X. Y. *et al.* Proteomic alterations of fibroblasts induced by ovarian cancer cells reveal potential cancer targets. *Neoplasma* **65**, 104–112 (2018).
312. Cheng, X. *et al.* CORO1C expression is associated with poor survival rates in gastric cancer and promotes metastasis in vitro. *FEBS Open Bio* **9**, 1097–1108 (2019).
313. Wang, C. *et al.* Novel Potential Biomarkers Associated With Epithelial to Mesenchymal Transition and Bladder Cancer Prognosis Identified by Integrated Bioinformatic Analysis. *Front. Oncol.* **10**, 1–13 (2020).
314. Huang, G. *et al.* A Three-microRNA Panel in Serum: Serving as a Potential Diagnostic Biomarker for Renal Cell Carcinoma. *Pathol. Oncol. Res.* **26**, 2425–2434 (2020).
315. Li, J. *et al.* Cytoplasmic RAD23B interacts with CORO1C to synergistically promote colorectal cancer progression and metastasis. *Cancer Lett.* **516**, 13–27 (2021).
316. Cerhan, J. R. *et al.* Genetic variation in 1253 immune and inflammation genes and risk of non-Hodgkin lymphoma. *Blood* **110**, 4455–4463 (2007).
317. Carreras, J. *et al.* Genomic Profile and Pathologic Features of Diffuse Large B-Cell Lymphoma Subtype of Methotrexate-associated Lymphoproliferative Disorder in Rheumatoid Arthritis Patients. *Am. J. Surg. Pathol.* **42**, 936–950 (2018).
318. Belmonte, B. *et al.* Constitutive psgl-1 correlates with cd30 and tcr pathways and represents a potential target for immunotherapy in anaplastic large t-cell lymphoma. *Cancers (Basel).* **13**, 1–16 (2021).
319. Viollet, C. *et al. RNA Sequencing Reveals that Kaposi Sarcoma-Associated Herpesvirus Infection Mimics Hypoxia Gene Expression Signature*. *PLoS Pathogens* **13**, (2017).

320. Fuld, S., Cunningham, C., Klucher, K., Davison, A. J. & Blackbourn, D. J. Inhibition of Interferon Signaling by the Kaposi's Sarcoma-Associated Herpesvirus Full-Length Viral Interferon Regulatory Factor 2 Protein. *J. Virol.* **80**, 3092–3097 (2006).
321. Burýšek, L. & Pitha, P. M. Latently Expressed Human Herpesvirus 8-Encoded Interferon Regulatory Factor 2 Inhibits Double-Stranded RNA-Activated Protein Kinase. *J. Virol.* **75**, 2345–2352 (2001).
322. Tornesello, M. L., Annunziata, C., Tornesello, A. L., Buonaguro, L. & Buonaguro, F. M. Human oncoviruses and p53 tumor suppressor pathway deregulation at the origin of human cancers. *Cancers (Basel)*. **10**, (2018).
323. Cao, S. *et al.* High-Throughput RNA Sequencing-Based Virome Analysis of 50 Lymphoma Cell Lines from the Cancer Cell Line Encyclopedia Project. *J. Virol.* **89**, 713–729 (2015).
324. Morgulis, A., Gertz, E. M., Schäffer, A. A. & Agarwala, R. A fast and symmetric DUST implementation to mask low-complexity DNA sequences. *J. Comput. Biol.* **13**, 1028–1040 (2006).
325. Zerbino, D. R. & Birney, E. Velvet: Algorithms for de novo short read assembly using de Bruijn graphs. *Genome Res.* **18**, 821–829 (2008).
326. Goodacre, N., Aljanahi, A., Nandakumar, S., Mikailov, M. & Khan, A. S. A Reference Viral Database (RVDB) To Enhance Bioinformatics Analysis of High-Throughput Sequencing for Novel Virus Detection. *mSphere* **3**, 1–18 (2018).
327. Dentro, S. C. *et al.* Characterizing genetic intra-tumor heterogeneity across 2,658 human cancer genomes. *Cell* **184**, 2239-2254.e39 (2021).
328. Gel, B. *et al.* RegioneR: An R/Bioconductor package for the association analysis of genomic regions based on permutation tests. *Bioinformatics* **32**, 289–291 (2016).
329. Dunham, I. *et al.* An integrated encyclopedia of DNA elements in the human genome. *Nature* **489**, 57–74 (2012).
330. Aguet, F. *et al.* The GTEx Consortium atlas of genetic regulatory effects across human tissues. *Science* **369**, 1318–1330 (2020).
331. Pattillo, R. A. *et al.* Tumor antigen and human chorionic gonadotropin in CaSki cells: A new epidermoid cervical cancer cell line. *Science* **196**, 1456–1458 (1977).
332. MacNab, G. M., Alexander, J. J., Lecatsas, G., Bey, E. M. & Urbanowicz, J. M. Hepatitis b surface antigen produced by a human hepatoma cell line. *Br. J. Cancer* **34**, 509–515 (1976).
333. Cesarman, E. *et al.* In vitro establishment and characterization of two acquired immunodeficiency syndrome-related lymphoma cell lines (BC-1 and BC-2) containing Kaposi's sarcoma-associated herpesvirus-like (KSHV) DNA sequences. *Blood* **86**, 2708–2714 (1995).
334. Arvanitakis, L. *et al.* Establishment and characterization of a primary effusion (body cavity- based) lymphoma cell line (BC-3) harboring Kaposi's sarcoma-associated herpesvirus (KSHV/HHV-8) in the absence of Epstein-Barr virus. *Blood* **88**, 2648–2654 (1996).
335. Huang, W., Li, L., Myers, J. R. & Marth, G. T. ART: A next-generation sequencing read simulator. *Bioinformatics* **28**, 593–594 (2012).
336. Ono, Y., Asai, K. & Hamada, M. PBSIM: PacBio reads simulator - Toward accurate genome assembly. *Bioinformatics* **29**, 119–121 (2013).

337. Entrez Direct: E-utilities on the Unix Command Line - Entrez Programming Utilities Help - NCBI Bookshelf. Available at: https://www.ncbi.nlm.nih.gov/books/NBK179288/. (Accessed: 20th February 2022)
338. Edgar, R. C. Search and clustering orders of magnitude faster than BLAST. *Bioinformatics* **26**, 2460–2461 (2010).
339. Smit, AFA, Hubley, R & Green, P. RepeatMasker Open-4.0. Available at: http://www.repeatmasker.org.
340. Quinlan, A. R. & Hall, I. M. BEDTools: A flexible suite of utilities for comparing genomic features. *Bioinformatics* **26**, 841–842 (2010).
341. Van Rossum, G. & Drake, F. L. Python 3 Reference Manual. *Scotts Val. CA Creat.* (2009).
342. Anaconda Inc, 'Miniconda Software Distribution' (miniconda2, version 4.7.10) <https://www.anaconda.com>.
343. GCC, 'GNU Compiler Collection' (6.4.0 release) <http://gcc.gnu.org/>.
344. 'GNU Binary Utilities' (version 2.31.1) <http://directory.fsf.org/project/binutils/>.
345. NCURSES <http://www.gnu.org/software/ncurses/>.
346. Gailly, J. & Adler, M. zlib (1.2.11 release) <http://zlib.net/ >.
347. bzip2 (1.0.6 release) <https://www.sourceware.org/bzip2/>.
348. XZ Utils (5.2.4 release) <https://tukaani.org/xz/>.

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RELATED PUBLICATION

The section of the present thesis entitled "RESULTS AND DISCUSSION: HBV integrations" presents the work contained in the publication detailed below.

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Contributions:

E.G.A., P.V.L., P.J.C. and J.M.C.T. conceived the study. **E.G.A.**, J.D., Y.L., J.T., J.Z., C.J., A.B-O., B.R-M., K.H., S.Z., K.R., A.P.B., K.M., I.O., P.V.L. and J.M.C.T. contributed to pipelines and/or data management. **E.G.A.**, J.D., J.Z., Y.L., C.J., M.T., K.H., P.V.L., P.J.C. and J.M.C.T. analysed the sequencing data. J.R-B, **E.G.A.**, P.O., M.M-F. and J.M.C.T. analysed the clinical data. J.T., D.G-S., A.P-V., J.R-C, A.R-C. and A.D-L. performed sequencing. M.T., M.M-F., R.A., P.O., A.O. and A.L.B. performed laboratory experiments. M.T., H.N., X.F., S.P.P, A.O., H.A., K.C., M.U., S.H. and H.Y. provided tumour specimens and/or performed pathological diagnosis. D.G-S., U.G., C.R., M.G.B. and J.M.C.T. build a comprehensive biological model for HBV-mediated rearrangements. R.T. and S.R.P. performed cytogenetics. **E.G.A.**, P.V.L., P.J.C. and J.M.C.T. wrote the manuscript with assistance from all authors. M.T., P.V.L., P.J.C. and J.M.C.T. supervised the project.

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APPENDIX
SUPPLEMENTARY DATA

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APPENDIX: SUPPLEMENTARY DATA

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Supplementary Data 1. Counts of somatic HBV integration events per tumour

The number of total somatic HBV integrations (Total_HBV_Integrations) per tumour sample is shown and stratified as canonical (Canonical_HBV_integrations) or non-canonical events (Non-canonical_HBV_integrations). Counts of those integrations that are coupled with telomeric deletions are also shown (HBV_integrations_coupled_telomeric_deletions). Finally, sequencing technologies used for each sample are indicated (Sequencing_technology: Illumina=Illumina paired-end sequencing; ONT=Oxford Nanopore Technologies).

Legend (Column letter = Column title)
A = Tumor_wgs_icgc_sample_id
B = Histology_abbreviation
C = Total_HBV_Integrations
D = Canonical_HBV_integrations
E = Non-canonical_HBV_integrations
F = HBV_integrations_coupled_telomeric_deletions
G = Sequencing_technology

A	B	C	D	E	F	G
SA515305	Liver-HCC	0	0	0	0	Illumina
SA515377	Liver-HCC	0	0	0	0	Illumina
SA529853	Liver-HCC	0	0	0	0	Illumina
SA270412	Liver-HCC	0	0	0	0	Illumina
SA515276	Liver-HCC	0	0	0	0	Illumina
SA501436	Liver-HCC	1	1	0	0	Illumina
SA501623	Liver-HCC	0	0	0	0	Illumina
SA529849	Liver-HCC	0	0	0	0	Illumina
SA270416	Liver-HCC	1	1	0	0	Illumina
SA500643	Liver-HCC	0	0	0	0	Illumina
SA529881	Liver-HCC	0	0	0	0	Illumina
SA501583	Liver-HCC	0	0	0	0	Illumina
SA269041	Liver-HCC	0	0	0	0	Illumina
SA268591	Liver-HCC	0	0	0	0	Illumina
SA501595	Liver-HCC	0	0	0	0	Illumina
SA515266	Liver-HCC	0	0	0	0	Illumina
SA269251	Liver-HCC	0	0	0	0	Illumina
SA270408	Liver-HCC	0	0	0	0	Illumina
SA268750	Liver-HCC	0	0	0	0	Illumina
SA500918	Liver-HCC	0	0	0	0	Illumina
SA501453	Liver-HCC	7	3	4	2	Illumina&ONT
SA501431	Liver-HCC	0	0	0	0	Illumina
SA500830	Liver-HCC	0	0	0	0	Illumina
SA515261	Liver-HCC	0	0	0	0	Illumina
SA529724	Liver-HCC	0	0	0	0	Illumina
SA515312	Liver-HCC	0	0	0	0	Illumina

SA501619	Liver-HCC	0	0	0	0	Illumina
SA515463	Liver-HCC	0	0	0	0	Illumina
SA269680	Liver-HCC	12	2	10	5	Illumina
SA270422	Liver-HCC	0	0	0	0	Illumina
SA501611	Liver-HCC	0	0	0	0	Illumina
SA267658	Liver-HCC	0	0	0	0	Illumina
SA270460	Liver-HCC	0	0	0	0	Illumina
SA501427	Liver-HCC	2	0	2	0	Illumina
SA267260	Liver-HCC	0	0	0	0	Illumina
SA501446	Liver-HCC	0	0	0	0	Illumina
SA515302	Liver-HCC	0	0	0	0	Illumina
SA529884	Liver-HCC	0	0	0	0	Illumina
SA529732	Liver-HCC	0	0	0	0	Illumina
SA270402	Liver-HCC	2	0	2	2	Illumina
SA515450	Liver-HCC	0	0	0	0	Illumina
SA515339	Liver-HCC	0	0	0	0	Illumina
SA529716	Liver-HCC	0	0	0	0	Illumina
SA540506	Liver-HCC	0	0	0	0	Illumina
SA268117	Liver-HCC	0	0	0	0	Illumina
SA529714	Liver-HCC	2	1	1	1	Illumina
SA515296	Liver-HCC	0	0	0	0	Illumina
SA268432	Liver-HCC	0	0	0	0	Illumina
SA501480	Liver-HCC	1	1	0	0	Illumina
SA501519	Liver-HCC	0	0	0	0	Illumina
SA501506	Liver-HCC	0	0	0	0	Illumina
SA529743	Liver-HCC	0	0	0	0	Illumina
SA501599	Liver-HCC	0	0	0	0	Illumina
SA501537	Liver-HCC	0	0	0	0	Illumina
SA501499	Liver-HCC	0	0	0	0	Illumina
SA501553	Liver-HCC	0	0	0	0	Illumina
SA501456	Liver-HCC	2	1	1	0	Illumina
SA501449	Liver-HCC	1	1	0	0	Illumina
SA501647	Liver-HCC	0	0	0	0	Illumina
SA540960	Liver-HCC	0	0	0	0	Illumina
SA529722	Liver-HCC	0	0	0	0	Illumina
SA501540	Liver-HCC	0	0	0	0	Illumina
SA515270	Liver-HCC	0	0	0	0	Illumina
SA501424	Liver-HCC	5	0	5	2	Illumina&ONT
SA501564	Liver-HCC	0	0	0	0	Illumina
SA529770	Liver-HCC	0	0	0	0	Illumina
SA501442	Liver-HCC	0	0	0	0	Illumina
SA500759	Liver-HCC	0	0	0	0	Illumina
SA501468	Liver-HCC	0	0	0	0	Illumina

SA501531	Liver-HCC	0	0	0	0	Illumina
SA515218	Liver-HCC	0	0	0	0	Illumina
SA529803	Liver-HCC	0	0	0	0	Illumina
SA515316	Liver-HCC	1	1	0	0	Illumina
SA529718	Liver-HCC	0	0	0	0	Illumina
SA501571	Liver-HCC	1	0	1	0	Illumina
SA501484	Liver-HCC	0	0	0	0	Illumina
SA269323	Liver-HCC	0	0	0	0	Illumina
SA529897	Liver-HCC	0	0	0	0	Illumina
SA515309	Liver-HCC	0	0	0	0	Illumina
SA529749	Liver-HCC	0	0	0	0	Illumina
SA515367	Liver-HCC	0	0	0	0	Illumina
SA529759	Liver-HCC	5	1	4	0	Illumina&ONT
SA515292	Liver-HCC	0	0	0	0	Illumina
SA267454	Liver-HCC	0	0	0	0	Illumina
SA515479	Liver-HCC	0	0	0	0	Illumina
SA529901	Liver-HCC	0	0	0	0	Illumina
SA515444	Liver-HCC	0	0	0	0	Illumina
SA501445	Liver-HCC	0	0	0	0	Illumina
SA529800	Liver-HCC	0	0	0	0	Illumina
SA501651	Liver-HCC	0	0	0	0	Illumina
SA270452	Liver-HCC	0	0	0	0	Illumina
SA550978	Liver-HCC	0	0	0	0	Illumina
SA515373	Liver-HCC	0	0	0	0	Illumina
SA515254	Liver-HCC	0	0	0	0	Illumina
SA529845	Liver-HCC	0	0	0	0	Illumina
SA520782	Liver-HCC	0	0	0	0	Illumina
SA270088	Liver-HCC	0	0	0	0	Illumina
SA501439	Liver-HCC	0	0	0	0	Illumina
SA529876	Liver-HCC	0	0	0	0	Illumina
SA501643	Liver-HCC	1	0	1	0	Illumina
SA268834	Liver-HCC	0	0	0	0	Illumina
SA515389	Liver-HCC	0	0	0	0	Illumina
SA270468	Liver-HCC	0	0	0	0	Illumina
SA529863	Liver-HCC	0	0	0	0	Illumina
SA501603	Liver-HCC	0	0	0	0	Illumina
SA515407	Liver-HCC	0	0	0	0	Illumina
SA515438	Liver-HCC	0	0	0	0	Illumina
SA529823	Liver-HCC	3	0	3	1	Illumina
SA270406	Liver-HCC	0	0	0	0	Illumina
SA500148	Liver-HCC	0	0	0	0	Illumina
SA268027	Liver-HCC	2	0	2	1	Illumina
SA501555	Liver-HCC	0	0	0	0	Illumina

SA515298	Liver-HCC	0	0	0	0	Illumina
SA269167	Liver-HCC	0	0	0	0	Illumina
SA270448	Liver-HCC	0	0	0	0	Illumina
SA529811	Liver-HCC	0	0	0	0	Illumina
SA501554	Liver-HCC	0	0	0	0	Illumina
SA501060	Liver-HCC	0	0	0	0	Illumina
SA501510	Liver-HCC	0	0	0	0	Illumina
SA270040	Liver-HCC	0	0	0	0	Illumina
SA501527	Liver-HCC	0	0	0	0	Illumina
SA501575	Liver-HCC	0	0	0	0	Illumina
SA529734	Liver-HCC	0	0	0	0	Illumina
SA501457	Liver-HCC	0	0	0	0	Illumina
SA269383	Liver-HCC	4	0	4	1	Illumina
SA270436	Liver-HCC	0	0	0	0	Illumina
SA270396	Liver-HCC	0	0	0	0	Illumina
SA501522	Liver-HCC	0	0	0	0	Illumina
SA500397	Liver-HCC	0	0	0	0	Illumina
SA529869	Liver-HCC	0	0	0	0	Illumina
SA529858	Liver-HCC	0	0	0	0	Illumina
SA500100	Liver-HCC	0	0	0	0	Illumina
SA501523	Liver-HCC	2	0	2	0	Illumina
SA268678	Liver-HCC	4	1	3	1	Illumina
SA268889	Liver-HCC	0	0	0	0	Illumina
SA529728	Liver-HCC	0	0	0	0	Illumina
SA501485	Liver-HCC	1	1	0	0	Illumina
SA270442	Liver-HCC	0	0	0	0	Illumina
SA520910	Liver-HCC	0	0	0	0	Illumina
SA270428	Liver-HCC	0	0	0	0	Illumina
SA501587	Liver-HCC	0	0	0	0	Illumina
SA501615	Liver-HCC	0	0	0	0	Illumina
SA270382	Liver-HCC	0	0	0	0	Illumina
SA270404	Liver-HCC	0	0	0	0	Illumina
SA501432	Liver-HCC	4	1	3	0	Illumina
SA500797	Liver-HCC	0	0	0	0	Illumina
SA267949	Liver-HCC	0	0	0	0	Illumina
SA268288	Liver-HCC	0	0	0	0	Illumina
SA500499	Liver-HCC	0	0	0	0	Illumina
SA501534	Liver-HCC	6	1	5	1	Illumina&ONT
SA501514	Liver-HCC	1	1	0	0	Illumina
SA270400	Liver-HCC	0	0	0	0	Illumina
SA270380	Liver-HCC	0	0	0	0	Illumina
SA529774	Liver-HCC	0	0	0	0	Illumina
SA270434	Liver-HCC	0	0	0	0	Illumina

SA501653	Liver-HCC	0	0	0	0	Illumina
SA270432	Liver-HCC	0	0	0	0	Illumina
SA515456	Liver-HCC	0	0	0	0	Illumina
SA529835	Liver-HCC	0	0	0	0	Illumina
SA515239	Liver-HCC	3	2	1	1	Illumina
SA515397	Liver-HCC	2	0	2	0	Illumina
SA269629	Liver-HCC	0	0	0	0	Illumina
SA501460	Liver-HCC	4	2	2	1	Illumina
SA270466	Liver-HCC	0	0	0	0	Illumina
SA501559	Liver-HCC	0	0	0	0	Illumina
SA529781	Liver-HCC	0	0	0	0	Illumina
SA529796	Liver-HCC	0	0	0	0	Illumina
SA529783	Liver-HCC	0	0	0	0	Illumina
SA270384	Liver-HCC	0	0	0	0	Illumina
SA529841	Liver-HCC	0	0	0	0	Illumina
SA529741	Liver-HCC	0	0	0	0	Illumina
SA515286	Liver-HCC	0	0	0	0	Illumina
SA501511	Liver-HCC	8	2	6	6	Illumina&ONT
SA501440	Liver-HCC	0	0	0	0	Illumina
SA267880	Liver-HCC	2	0	2	1	Illumina
SA501428	Liver-HCC	3	0	3	1	Illumina
SA501481	Liver-HCC	4	2	2	2	Illumina&ONT
SA501635	Liver-HCC	0	0	0	0	Illumina
SA529739	Liver-HCC	0	0	0	0	Illumina
SA501515	Liver-HCC	0	0	0	0	Illumina
SA515415	Liver-HCC	1	0	1	0	Illumina
SA501435	Liver-HCC	0	0	0	0	Illumina
SA515322	Liver-HCC	0	0	0	0	Illumina
SA515333	Liver-HCC	0	0	0	0	Illumina
SA529787	Liver-HCC	0	0	0	0	Illumina
SA501649	Liver-HCC	2	2	0	0	Illumina
SA501549	Liver-HCC	0	0	0	0	Illumina
SA270418	Liver-HCC	0	0	0	0	Illumina
SA267718	Liver-HCC	4	3	1	0	Illumina
SA515314	Liver-HCC	0	0	0	0	Illumina
SA501544	Liver-HCC	0	0	0	0	Illumina
SA529737	Liver-HCC	0	0	0	0	Illumina
SA500699	Liver-HCC	0	0	0	0	Illumina
SA499813	Liver-HCC	0	0	0	0	Illumina
SA270464	Liver-HCC	0	0	0	0	Illumina
SA515422	Liver-HCC	0	0	0	0	Illumina
SA515353	Liver-HCC	0	0	0	0	Illumina
SA499746	Liver-HCC	0	0	0	0	Illumina

SA529751	Liver-HCC	0	0	0	0	Illumina
SA500054	Liver-HCC	0	0	0	0	Illumina
SA501541	Liver-HCC	4	2	2	0	Illumina
SA501645	Liver-HCC	1	0	1	1	Illumina
SA268957	Liver-HCC	0	0	0	0	Illumina
SA270390	Liver-HCC	0	0	0	0	Illumina
SA501633	Liver-HCC	0	0	0	0	Illumina
SA529905	Liver-HCC	0	0	0	0	Illumina
SA501476	Liver-HCC	4	2	2	0	Illumina
SA529864	Liver-HCC	0	0	0	0	Illumina
SA501473	Liver-HCC	0	0	0	0	Illumina
SA270394	Liver-HCC	0	0	0	0	Illumina
SA270388	Liver-HCC	0	0	0	0	Illumina
SA515277	Liver-HCC	0	0	0	0	Illumina
SA501495	Liver-HCC	0	0	0	0	Illumina
SA499742	Liver-HCC	0	0	0	0	Illumina
SA500737	Liver-HCC	1	0	1	1	Illumina
SA515327	Liver-HCC	0	0	0	0	Illumina
SA500820	Liver-HCC	0	0	0	0	Illumina
SA515300	Liver-HCC	1	0	1	0	Illumina
SA270420	Liver-HCC	0	0	0	0	Illumina
SA270462	Liver-HCC	0	0	0	0	Illumina
SA501545	Liver-HCC	0	0	0	0	Illumina
SA501535	Liver-HCC	0	0	0	0	Illumina
SA270446	Liver-HCC	0	0	0	0	Illumina
SA270456	Liver-HCC	0	0	0	0	Illumina
SA515427	Liver-HCC	0	0	0	0	Illumina
SA501487	Liver-HCC	0	0	0	0	Illumina
SA515972	Liver-HCC	0	0	0	0	Illumina
SA515318	Liver-HCC	5	1	4	1	Illumina
SA529747	Liver-HCC	0	0	0	0	Illumina
SA529830	Liver-HCC	3	0	3	2	Illumina&ONT
SA501631	Liver-HCC	2	0	2	1	Illumina
SA499815	Liver-HCC	0	0	0	0	Illumina
SA501562	Liver-HCC	0	0	0	0	Illumina
SA529777	Liver-HCC	0	0	0	0	Illumina
SA501641	Liver-HCC	0	0	0	0	Illumina
SA515214	Liver-HCC	0	0	0	0	Illumina
SA501639	Liver-HCC	3	0	3	0	Illumina
SA501452	Liver-HCC	0	0	0	0	Illumina
SA501503	Liver-HCC	0	0	0	0	Illumina
SA529720	Liver-HCC	0	0	0	0	Illumina
SA501552	Liver-HCC	0	0	0	0	Illumina

SA529766	Liver-HCC	0	0	0	0	Illumina
SA270444	Liver-HCC	0	0	0	0	Illumina
SA501607	Liver-HCC	0	0	0	0	Illumina
SA270423	Liver-HCC	0	0	0	0	Illumina
SA515104	Liver-HCC	0	0	0	0	Illumina
SA268333	Liver-HCC	0	0	0	0	Illumina
SA515383	Liver-HCC	0	0	0	0	Illumina
SA270430	Liver-HCC	0	0	0	0	Illumina
SA529807	Liver-HCC	0	0	0	0	Illumina
SA501567	Liver-HCC	1	0	1	0	Illumina
SA529792	Liver-HCC	0	0	0	0	Illumina
SA270450	Liver-HCC	0	0	0	0	Illumina
SA501591	Liver-HCC	0	0	0	0	Illumina
SA501469	Liver-HCC	1	0	1	0	Illumina
SA499801	Liver-HCC	0	0	0	0	Illumina
SA270392	Liver-HCC	0	0	0	0	Illumina
SA529827	Liver-HCC	0	0	0	0	Illumina
SA515307	Liver-HCC	0	0	0	0	Illumina
SA270458	Liver-HCC	0	0	0	0	Illumina
SA515472	Liver-HCC	0	0	0	0	Illumina
SA540527	Liver-HCC	2	1	1	1	Illumina
SA270414	Liver-HCC	0	0	0	0	Illumina
SA501465	Liver-HCC	0	0	0	0	Illumina
SA529726	Liver-HCC	6	0	6	4	Illumina&ONT
SA515281	Liver-HCC	0	0	0	0	Illumina
SA500769	Liver-HCC	0	0	0	0	Illumina
SA529753	Liver-HCC	0	0	0	0	Illumina
SA501491	Liver-HCC	3	1	2	0	Illumina&ONT
SA515222	Liver-HCC	0	0	0	0	Illumina
SA529837	Liver-HCC	0	0	0	0	Illumina
SA501498	Liver-HCC	0	0	0	0	Illumina
SA270438	Liver-HCC	0	0	0	0	Illumina
SA499894	Liver-HCC	0	0	0	0	Illumina
SA267307	Liver-HCC	0	0	0	0	Illumina
SA270398	Liver-HCC	1	1	0	0	Illumina
SA500238	Liver-HCC	0	0	0	0	Illumina
SA529735	Liver-HCC	0	0	0	0	Illumina
SA499802	Liver-HCC	0	0	0	0	Illumina
SA268465	Liver-HCC	0	0	0	0	Illumina
SA501579	Liver-HCC	0	0	0	0	Illumina
SA515360	Liver-HCC	0	0	0	0	Illumina
SA270454	Liver-HCC	0	0	0	0	Illumina
SA270440	Liver-HCC	0	0	0	0	Illumina

SA501517	Liver-HCC	0	0	0	0	Illumina
SA501464	Liver-HCC	4	2	2	0	Illumina
SA529730	Liver-HCC	0	0	0	0	Illumina
SA515233	Liver-HCC	0	0	0	0	Illumina
SA529756	Liver-HCC	0	0	0	0	Illumina
SA501477	Liver-HCC	0	0	0	0	Illumina
SA515347	Liver-HCC	0	0	0	0	Illumina
SA529818	Liver-HCC	2	1	1	0	Illumina
SA515248	Liver-HCC	0	0	0	0	Illumina
SA501448	Liver-HCC	0	0	0	0	Illumina
SA501627	Liver-HCC	0	0	0	0	Illumina
SA529857	Liver-HCC	0	0	0	0	Illumina

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Supplementary Data 2. HBV insertions in human HCCs from the PCAWG dataset
Column A is the name of the tumour; Columns B-D are the coordinates of the insertions (NA is indicated in the case of single cluster events) and E-F show the sequence reconstructed at the insertion site (HBV and human genome – hg19 – boundary), where symbols ">" and "<" denote the orientation of the HBV insertion.

Legend (Column letter = Column title)
A = Tumor_wgs_icgc_sample_id
B = CHROM
C = Start
D = End
E = BKP1
F = BKP2

A	B	C	D	E	F
SA515316	5	1298125	1298228	TTTATCCAAGGGCAAATATTTGGTAAGGTTAGGATAGAACCTAGCAGGC ATAATTAATTTTAATCTCCTTTTTTCATTAA<[HBV]CTGTCCTTGGATGTTT CTGTAAACCTTTGTTTTGAAATAATCCTAGATTCACAGTGCATGGGTTTCC TGTTGCTTCTGCAAATCCCCACACACTTCAT	ATGTTTCTGTAAACCTTTGTTTTGAAATAATCCTAGATTCACAGT GCATGGGTTTCCTGTTGCTTCTGCAAATCCCCACACACTTCATGC TA[HBV]>CAGCCTCCTAGTACAAAGACCTTTAACCTAATCTCCTC CC
SA515318	4	181086000	NA	AGTAACAACCTTAGAAATTATCCAGTCTTAGGATGGCAATCTTTGAAAAA TTTAAGTTAAAAAATGCAATGCTGTCTAAAGCTGATTGGAACTTGCTGC[HBV]>AGTTAATCATTACTTCAAAACTAGGCATTATTTACATACTCTGTGG AAGGCTGGCATTCTATATAAAAGAGAA	NA
SA515318	4	190730769	NA	GGTATTGGGGGCGAAGTCTGTACAACATCTTGAGTCCCTTTTTACCTCTA TTACCAATTTTCTTTTGTCTTT<[HBV]GAGGATTCCTATACATTTTTTTCAC ATTAAGCCACTGAAGAAAAAAAAATACCACAGGAAATTAACAATTTTCAAA ACTGTTCTTT	NA
SA515318	5	1295647	1295749	GAATACAAGTGCAGTTTCCGTCCGAAGGTTTTGTACAGCAACAAGAGGG AAACATAGAGGTTCCTTGAGCAGGAAT<[HBV]CGCGGGGCGTCGGGCT CCGGGCACCACGAATGCCGGACGTGAAGGGGAGGACGGAGGCGCGTA GACGCGGCTGGGGAC	GGGGCGTCGGGCTCCGGGCACCACGAATGCCGGACGTGAAGG GGAGGACGGAGGCGCGTAGACGCGGCTGGGGACGAACCCGAG GACGCATTGCTCCC[HBV]>AATGTTATGGAGTTCCACTGCATGG CCTGAGGATGACTGTCTCTTAGAGGTGGAGAGATGGGAGTAGG CTGTCTTCCTG
SA515318	5	1296158	NA	AACCACTGAACAAATGGCACTAGTAAACTGAGCCAGGAGAAACGGACTG AGGCCCACTCCCATAGGAAT<[HBV]CACTGGTCCCCTCCAGACCTGGGG	NA

				CCCCGGCACAACCGCAGGACAGCTGAGGACTTCCCAGGAATCCAGACTC CGGGTTGCTCAAGTTTGGAT	
SA515318	7	729324	NA	AAAGAAAAAGATGGGGAGGATAAGGAGGGGAGGGGGAGGAGAGCCT GCATATAAAAAAAGACCCAAAGAGAAGA[HBV]>ATCATCTCATGTTCAT GTCCTACTGTTCAAGCCTCCAAGCTGTGCCTTGGGTGGCTTTGGGGCATG GACATTGACCCGTA	NA
SA501427	5	88432443	NA	ATGACCACACAGAAAACTCCTTTGTCATGATCATTTTTAAACAATCAGAAT GTTCCTTTGCCTACATTTTTTTCACTTACTATTGTATTTCTTAGGAG[HBV]> GTCCCAGTCTTTAAACAAACAGTCTTTGAAGTATGCCTCAAGGTCGGTTG TTGACATTGCTGAGAGTCCAAGAGTCCTCTTA	NA
SA501427	5	88754908	NA	CATCATCCTGGGCTTTCGCAAGATTCCTATGGGAGTGGGCCTCAGTCCGT TTCTCCTGGCTCAGTTTACTAGTGCC<[HBV]TAATAGGTTTGTGATATTTT CAGTTCTGATTTTTAATATTTATTGCAATATGTTTTGTAAAATTCTAAAAAT AAAGATAGATGAATTACCTACTG	NA
SA267718	1	237656520	237656535	TAAAAGAATTAATGTTCTTGCCCTGTAGCTGATACTATATGGTCTGTTTTT TAAATTAGACCATATAGTATTATTTTCTGTATTTTTGCAGT[HBV]>CTTCT GGACTACCAAGGTATGTTGCCCGTTTGTCCTCTACTTCCAGGAACATCAA CAACCAGCACGGG	CACAAGAACATATTGTACAAAAAATTAAACAATGTTTTCGGAAA CTTCCGATAAATAGACCTCCATATTCGGTGCAGGG<[HBV]TCTC TAACAATCAGATGGGCTAATAATAAATGAACCTAGCAAAATATG GATTTGCCGCAAACACATGTATAAGAGCTTTTATTCACATTCCTA TG
SA267718	2	118543576	118543582	TAGGGCCCCCTGGTGGTGATTTAAAGACCTTGACAGTAAGATCAAAATG TTCATGAATCAAATAAGCTAAGGTAACCAGGTTTTGGAAACTCCTATGT[HBV]>CGGTCGTTGACATTGCTGAGAGTCCAAGAGTCCTCTTATGTAAGA CCTTAGGCAAGACCTGGCGGGCGTTCACGGTGGT	GAACAGTTTCTCTTCCAAAAGTAAGACAGGAAATGTGAAACCAC AAAATTTGTCTAATTTTTAGGCCCATATTAACGTTGAC<[HBV]AT GACTCTTAATGTTTTCAATACTTATAGTTTGTCTGTCTCAACCAAA ATTGATTCAATCTCTTTATATGTAGTCTTCTACAAAAGAAAAAAT GTTA
SA267718	5	1295278	NA	TAAAGGGAGCAGCAAAACCCAAAAGACCCACAATTCTTTGACATACTTTC CAATCGATAGGTCTATTTATCG<[HBV]GGAGGAGGCGGAGCTGGAAGG TGAAGGGGCAGGACGGGTGCCCGGGTCCCCAGTCCCTCCGCCACGTGG GAAGCGCGGTCCTGGGCGTCTGTGCCCGCG	NA
SA267718	9	137029137	137029165	CGCCCTGTGCCTCATGCGGCGACCGAGGCGCCCTCGGGAGACGGGCCCT GTCGGGTGTCGAGACGCGAACACGACCCAATGCCAAGAAGGGGCGGTG AA[HBV]>CTAGAAGGGCATTATTTACATACTCTGTGGAAGGCTGGTATTT TATATAAGAGAGAAACTACTCG	TTAAAGACTGGGAGGAGTTGGGGGAGGAGACCAGGTTAATGA TCTTTGTACTGGGAGGCTGTAGGCATAAATTGGTCTGT<[HBV]G AACGGCGCGCCCGTGCACAAGTGCGACCCGCGCCCGTGTCCCA AGGAAAGAAGATAAAAGATAAAACGAAAAATGCCCCGGGGCTT TGCG
SA540527	1	118079033	NA	AAGAAATCAGAAGGCAAAAAAGAGAGTAATTCCACAGAAGCTCCAAATT CTTTATAAGGGTCAATGTCCTGAG<[HBV]CCCAGCACTTTGGAGGCTGA GTGGGAGGATCACTTGAGCCCAGCAGTTCAAGAACAGCCTGGGCAACAC GACAAAACCCTGTCACTACT	NA

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SA540527	4	8437092	8437091	AACCCCATCTCTACTAAAAATACAAAAACAAAAAATTAGCCAGGCGTGCTGGC[HBV]>ATATTTTATACTGTACATGGAATATCAAAGTTCACACACTATATATTA	TGCAGGATCTTCCAAATTATTCCCCACCCAGGAAGCCAAAGTCATTAACTG<[HBV]GGGCACCTGTAGTCCCAGCTACTCAAGAGGCTGAGGCAGGAGAATTGCAT
SA515397	2	186622915	NA	AATAGCTTGCCTGAGTGCTGTATGGTGAGGTGAACAATGTTCCGGAGACTCTAAGGCCTCCCGATACAGAGCAGAGGC<[HBV]GGATGCACCAGTTTGTTTTTTCATTCTTCAATCAAAAGAAATTTGAAATTTTGGGTTGTTTCCATGTTCGGGTGATTATGTATTGAATGACTAGAAGT	NA
SA515397	2	186641095	NA	AAAATTAGATAAAATGAGAAAAATTAAAAATTATAATAATAATAGCTTTCATGCTCTATATTTTACTATGGATGTACAACTCAACACTGTACATTTT[HBV]>CCAATCAATAGGTCTATTTACAGGCAGTTTCCGAAAACATTGCTTGAGTTTTAATACAATATGTTCCTGTGGTAAAGTACC	NA
SA515415	5	1295144	NA	CGCAGCAGGGAGCGCACGGCTCGGCAGCGGGGAGCGCGCGGCATCGCGGGGGTGGCCGGGGCCAGGGCTTCCCACGTGCGCAG[HBV]>ACCAATTTATGCCTACAG	NA
SA501456	5	1275382	1275389	GAGACCAGCCTGGCCAACATGGAGAAACCTCGTCTCTACTAAAATTACAAAAATTAGTCAGCATGGTGGTGGGCGCCTATAATTCCAGCTACTT[HBV]>CAGCCTCCTAGTACAAAGATCATTAACCTAATCTCCTCCCCCAACTCCTCCCAGTCCTTAAACAAACAGTCTTTGAAGTATGC	AAATTCTTTATACGGGTCAATGTCCATGCCCCAAAGCCACCCAAGGCACAGCTTGGAGGCTTGAACAGTAGGACATGAACATGAGATGATTA<[HBV]GAGGCAAGAGAATTGCTTGAACTCAGGAAGCACAGGTTGCAGTGAGCCAAGATCACGCCAAACCACTCCAGCCTGGGCAAAAAAAGAGCGAGACTCTGTTATCAAAAAAA
SA501456	5	173125602	NA	AAAAGAGAGTAACTCCACAGACGCTCCAAATTCTTTATACGGGTCAATGTCCATGCCCCAAAGCCACCCAAGGCA<[HBV]CCCATTTTATTGTGCACACCTTGAGGCAAGTACAGG	NA
SA529714	18	40716643	NA	TATCTGGTATGATTGGACTGATATTTTTATAAGCAGATTAAAACTCATTCACTCTAGTGAACATTATTCTTTAAAGCAGTCTCCATA[HBV]>CCTTTATATGCATGTATACAATCCAAGCAGGCTTTCACTTTCTCGCCAACTTACAAGGCCTTTCTGTGTAAACAATATCT	NA
SA529714	3	24001321	24001412	GAGAATGAATAGGAACAGATGTCAGCAATGTCGCTTCAAAAAGTGTCTGTCTGTTGGAATGTCAAGAGATGGTATGTTCCCAGTT[HBV]>GTTGTCTGATTTTTAGGCCCATATTAACATTGACATAGCTGACTACTAATTCCCTGGAT	AATCGCCGCGTCGCAGAAGATCTCAATCTCGGGAATCTCAATGTTAGTATCCCTTGGACTCATAAGGTGGGA<[HBV]AAGGTGAAGCAGAAAACATATTTTCATGCTTTACAGGACACCAAATTGATTAAAGTCGTATTTTAGCATTATCATCCCAGAAACAGTTTTTGG
SA501460	7	155443987	155444001	TGAGATTGAGACTCCTGAGTCTGAAGGAAATTTTAATTTTCACAACTTGATTGGTGGTTTTGTTGGGTCCAGAATTT[HBV]>AGTGCTGTATGGTGAGGTGAACAATGTTCCGGAGACTCTAAGGCCTCCCGATACAGAGCAGAGGCGGTGTCGAGGAGATC	CTCTGCAATGTCAACGACCGACC<[HBV]TTTTGTACGATTTTTGGCGGTATTGTTGTGTTTTCTGGCATCCAGATCTGCTCTTGAGAAGTTTGAGGACATTCTGAT
SA501460	7	91671904	91671907	TAAATATTATACCAACCAGTATCAATTTTGTGCACAGAGGTTTCTATTTTATCTCATACCAATATA[HBV]>AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	AATATGGTGACCCACAAAATGAAGCGCTGCGTGTAGTTTCTCTTTTATATAGAATGCCAGCCTTCCACAGAGTATGTAAAT<[HBV]AA

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					TGACATGCTGTTTCCAAGTTGACAGGTTTTCTTTCTGTCTTCTCCT CTCTTCCTTTACACAAACTTAAACAGAATGGAAATGAAAACC
SA501460	8	37337657	NA	GGAAAGTATGTCAAAGAATTGTGGGTCTTTTGGGCTTTGCTGCCCCGTTT TTCA<[HBV]GTTCCCTGCCCCTTCAGCTGCATGGAGACATTTGGAGGGAT GCCCTGCCCTAGCCCACCTCACTCTCACCATGTCAACAGGTGAGGTCTTA ATCCCTGT	NA
SA501460	8	49642746	NA	AATGAAGCGCTGCGTGTAGTTTCTCTTTTATATAGAATGCCAGCCTTCCAC AGAGTATGTAAATAATGC<[HBV]AAGAACACTTGAATCAATATTCTCTAG TTTTATGGTTACAATTCAAGTAATGAAATCTGTCAAATGCTTAACATATAA ATGTATATGTACATAA	NA
SA501464	1	26783196	NA	TCCTGATCTCAGGTGATCTGCCTGNCTCAGCCTCCCAAAGTACTGGGATT ACAGGCATGAGTCACCACGCCTGGCCAAAAAAAGTTAT[HBV]>ATTGAC GATATGGGTGAGGCAGTAGTCGGAACAGGGNTTACTGTTCCGGAACTG GAGCCACCAGCANGAAAATAT	NA
SA501464	13	106702489	NA	GATTAGGTTAAAGGTCTTTGTACTAGGAGGCTGTAGGCATAAATTGGTCT GTTCACCAGCACCATGCAACTTTT<[HBV]TCTTACAGGTAGTGATAAAGC AGTGAAGCTTAAGGAAGAGATAAAAGCCACAGAGCTACAGAGCAAATTT GGAAACCATCATCNATCTGTTGATATCA	NA
SA501464	18	53691840	53691881	GCTCACTGGCTCTTGCCTGTAATCCTAGCACTTTGGGAGGCCTAGATGGG TAGGTAGATCACCTGAGGTCAGGAGTTCGAGACCAGCCTAGCCAACA[H BV]>GGTCTTGCCCACGGTCTTACATAAGAGGA	GTGGTGGACTTCTCTCAATTTTCTAGGGGGAGCACCCACGTGTC CTGGCCAAAATTCGCAGTCC<[HBV]GCATAGTGGTGGATGCTAA TAATCCCAGCTACTCTGGAGGCTGAGACAGGAGAATTGCTTGAA CCTGCGGGCGGAGGTTGCCGTG
SA501464	19	36212782	36212797	CTTCCATGCCGGTGAGTGTGGTCCCTGGGCCCAGCGGCACACCCAGCCA TCCAGCCTCCATTCTTTGCAACCCCCTAACCTTCCGC[HBV]>ATGTCAAAG ACTTGTGGGTCTTTTGGGCTTTGCTGCCCCTTTTA	AAGGTCTTTGTACTAGGAGGCTGTAGGCATAAATTGGTCTGTTC ACCAGCACCATGCA<[HBV]ACTTTTTCAGCATTGCGGGGAACCC TCAGAACCTGCCTTTCTGTGATCCCCCACCTTCCTTTGT
SA529726	3	21222310	NA	TGTTGGTTCTTCTGGACTACCAAGGTATGTTGCCCGTTTGTCCTCTACTTC CAGGAACATCAACTACC<[HBV]TTCCTTGAAGTAAAATTACTACATCAAT GTGCATAAACCTTTTTGAAAGCTCTTGATATATATTGCTGAAATGCCCTCT AGGTCGCCTCTAG	NA
SA529726	4	171417047	NA	TCTCACTTATAAGTGGGAGCTGAACAATGAGAACACATGGACACAGGGA GGGGAACAACACACACTGGGGCCTGTCAGAGGGTAGGGTTGGGGGAG CT[HBV]>TTGAAGTAATGATTAACTGCATGTTCAGGATAATAAGGTTTAA TGCCTTTATCCAAGGGCAAATAT	NA
SA529726	5	12035	NA	TGGATCTTCCAAATTACTTCCCACCCAGGTGGCCAGATTCATCAACTCAAC CCAACAGAGAATAGCTTGCCTGAGT<[HBV]GCCCCTAGCCTTCCTTGGGA GCATCTCGGTGTACAGGATTCACAGGGGCTTTTGCTTTTCCGTTTTCCACA CTGAACCGTTCTAACTGCTCTCTG	NA

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SA529726	5	1296719	NA	CTGGTTCTCTGCAGAGAAGCCAACATAGAAAACACAATTTTAAAAGAGGGAAGAGAAGAAATGGAAGCAGAAGATTATGCTGGAGTAATTAACACCAT[HBV]>CGTCCGNGGGATTCAGCGCCGACGGGACGTAGACAAAGGACGTCCCGCGCAGGATCCAGTTGGCAGCACATCCGAGCAGCC	NA
SA529726	7	80512238	NA	CGTTCGGAGCCAACTCAAACAATCCAGATTGGGACTTCAACCCCAACAAGGATCACTGGCCAGAGGCAAATCAGGT<[HBV]ATTTACCTAAACCCTCTTATATAACAACAACAACAACAACAACAACAAACTAAAGGTAAATACACCTGAAAGATACAAAAGAGGATGCCATGAGA	NA
SA529726	X	150837858	NA	TGACGATATGGGAGAGGCAGTAGTCGGAACAGGGTTTACTGTTCCGGAACTGGAGCCACCAGCAGGAAAATATAGGCCCC<[HBV]TGTTTTTTCTTTGTGTTGGGAGCATTACAATTCTTTTAGCTATTTTAAAATATACAATAGATTGTTTTAACTCTAATTTTCCTACTTGAGTACTAGAAC	NA
SA501480	19	29087481	29087658	GTCATTTTTTTTTTTTTTTTTTTTAGAAAGGCTAAATAACTCACTACATTTAGTTAGGAAGTTGTTACAAGCTGTTAATTATTTTCAGACTAGGTAAAAGAAACAAACCTG[HBV]>TTGTGGAGTTCCACTGCATGGCCTGAGGATGACTGTCTCTTAGAGGTGGAGAGATGGGAGTAGGCTGTCTTCCTGACTGCCGATTGGTGGTGGCAGG	GTAGAACATGAACATGAGATGATTAGGCAGACACACCAGACACATCTCCCAGGTGAAAAAGTTGCA<[HBV]TGAAATTTTTTCTGAGGAAAATGTACATAATTAAGGAATTGTGAGCACTCACCTCTGATTTATTATTAAAACAACACACCTAGGGCCACATTTGCTCCCTGACTCGTCGGTGCTAAACAGACA
SA501491	4	79048012	79048013	AGACACACANNANNTNTNNGNNNNGNGGAAAAAAAAATTTTTTTTTTTTTTTTTTTTTTTTTTTTTTT<[HBV]TTTTTTTTTAGTCAGTTTTTGTTCCAATTACAAGCAGATTAGTGGAACCTTGATGTGATAGCCTGAAGATAA	ATAAGTGAGAGGACAAAGGAAGAAAGTGTTATTGATATAGAGTACCATTAACCAACTTTGTGTGTATATGTGTACCTCTAGAATAGATTTATTTTG[HBV]>GTGAACAGACCAATTTATGCCTACAGCCTCCTAGTACAAAGACCTTTAACCTAATCTCCTCCCCCAACTCCTCCCAGTCTTTA
SA501491	6	68664025	NA	AGGGAATAGCTNTATCCACTATCAAAAGCATGAAGCTTATCTTGCATATTAAGACAGATATGCTGATGCAGTAGGGGTCTAGATCTGTTTTGGCTTTTGTTACTTTT[HBV]>CCGTTTGGGCCTCTACCGTCCCCTTCTTCATCTGCCGTTCCGGCCGACCACGGGGCGCACCTCTCTTTACGCGGTCTC	NA
SA501491	8	39200449	NA	GACCTTGAGGCATACTTCAAAGACTGTTTGTTTAAAGACTGGGAGGAGTTGGGGGAGGAGATTAGGTTAAAGGTCTTTG<[HBV]TCAACTGAAAATAAAATTTTTAAGAGTTAAAATGCTTTGATACCTGCATTTAAAACTGGCATTGTACAATATAAAGATAAATGGTAAAATTCATGCTAAT	NA
SA267880	10	129391638	NA	GAGGACCCTTCAATGATCAATTCTGATACTTNAANAAGCTCAAGCTTAAACGTGTTTTTGCATTGAAAATGTGTCTGTG[HBV]>CGCCCCGTGGTCGGTCGATACGGCAGACGGAGAAGCGGGCGGTAGAGCCCCAANCGGACCCGNGNGGGC	NA
SA267880	8	56030290	NA	TGTATACATGCATATAAAGGCATTAAAGCAGGATATGCACATTGTGTAAAAGGGGCAGCGAACCCCAAAAGACCCACAA<[HBV]TCCCACTATATCTTA	NA

				CTATTCCAAGTTTAACCCAAGACTCACATGGAGAAGCATTTCTTGACCTTT CAGACTGTGCTAAAAATGGTAATGAGTTCAA	
SA529759	1	234101917	NA	CCAGCCTGCCTCCACCCACAAGAGGGAAATGGTCTTCCAGTAAGTTATTT ATAGGCAACAGAGGTTGTTAGCAGCCAGCAGAAAAAGCTTACAT[HBV]> GGTGCTGGTGAACAGACCAATTTATGCCTACAGCCTCCTAGTAATCTCCT CCCCCAACTCCTCCCAGTCCTTAAATAAAC	NA
SA529759	1	234103103	NA	GAACAGAAAGATTCGTCCCTGCACCGAACTACATACTCTGTGTAATATAT GTAATATTATTATTATATGTAG<[HBV]TGTAGTTTTAACTTTACCTTATTA GATAAGAATTAATTTTTAGCTAGATTATCTGGCCGATGAACTATGATGAA TATAAACAATTGAGGATCTCA	NA
SA529759	19	30304904	NA	ACGCTGAACAGAAACAGTGTTCGACCTGAGTGCAGGGATCCCAGCTAGG TTAGCAGAGAAGCCCCTCACTTTGCAGAGCAGCAGCCAGGGTAGTTCA[HBV]>CCTCACCATACAGCTCTCAGGCAAGCTATTCTCTGTTGGGGTGAG TTGATGAATCTGGCCACCTGGGTGGGAAGTAATTTGG	NA
SA529759	19	30305249	NA	CCCCAAAGCCACCCAAGGCACAGCTTGGAGGCTTGAACAGTAGGACATG AACATGAGATGATTAGGCAGAGGTGAAAAAGTT<[HBV]CTGTTGCATTC TTGGAGTTTTAGAAGCATGTCTGTTCTCAAGGATAGCCTGAGCAGTGAC GAGGGTGCCTCCTGGGACGGATTGTGGCTCTGTCCCCTG	NA
SA529759	6	44270937	44270943	GGNTTGGGAGGCTGGGTCCAATGCATGGGCCACGGGCACCCCCACTGA TACCACCCGCACAGGGTCTGGGTAAACCTGAGGTCAAGAGGGGACAGG CCC[HBV]>AACTCCTCCCAGTCCTTAAATAAACAGTCTGTGAAGTATGCC TCAAGGTCGGTCGTTGACATTGCTGAGAGTCCAAGAGT	CAATGTCCATGCCCCAAAGCCACCCAAGGCACAGCTTGGAGGCT TGAACAGTAGGACATGAACATGAGATGATTA<[HBV]GCCAAAG GAGAAGGATAAAGCCTCCAGGTATGCCTGAAGGAGGCCCCCGA TCTCCAGCAAAAGGGCTTCCCCAACTCACCTCATCCAGAGAGCG CAGGC
SA501514	7	145783069	145783081	ATATAAAGCCACTTTTCCAAATTTGTAAACCTAGCTTGAGAAATGTAAGT ATTGGAAAAAATATTTTATATTATTACTGACTTTTTGTGTATTTTA[HBV]> CTGGGCTTTATTCTTCTACTGTACCTGTCTTTAATCCTGAGTGGCAAACTC CCTCCTTTCNTCACATT	GATTAGGTTAAAGGTCTTTGTACTAGGAGGCTGTAGGCATAAAT TGGTCTGTTCACCAGCACCATGCAACTTTTTCT<[HBV]TACCAAT TGCTCCTAGCAATAAGGTATTGAAATTGTATTTGGTACTTAGTTT TCCTTTTATTGTTTTTAATAGTCCCTTCACTTTGATTCCAAAACT
SA529818	12	58550792	58550807	TCAATTTTGGCTTGGTTTTGATGGATTGTTCTTTTTCTTCATTTTTGGTTGT ATTTTCCTAGTTCTTTTCCTGTCTGGTAATTTTTTTTC[HBV]>TTTCCTAGTA CAAAGGTTAATCTCCTCCCCTAACTCCTCCCAGTCCTTAAACAAACAGTCT TTGAAGTATG	CGACCCGTCTCGGGGCCGTTTGGGACTCTACCGTCCCCTTCTTCA TCTGCCGTTCCGGCCGACCACGGGGCGCACCTCTC<[HBV]TGTG ACTTTTTCCTTGTTGGGTGCTGGATATCTTTTTATTCTTATTAATA TTCTTGAGTTTTGTTTATTGGCAAAGTTAAGTTACTTGAAAACAT TT
SA529818	5	1295276	NA	ACCCACAAAATGAGGCGCTGCGGGTAGTTTCTCTCTTATATAGAATGCCA GCCTTCCACAGAGTATGTAAATAATGCCTA<[HBV]GCGGAGGAGGCGGA GCTGGAAGGTGAAGGGGCAGGACGGGTGCCCGGGTCCCCAGTCCCTCC GCCACGTGGGGAGCGCGGTCCTGGGCGTCTGTGCCC	NA

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SA529823	4	55244192	NA	TTTCTCACCAGGCTAGGATTTGAACCCAAGTAGTCTGGATCCAGAGCCCA ATACTGTGCTTTTCTGCCTTTCAACTATAATGCTCTGATCACG[HBV]>GAG TGGGCCTCAGTCCGTTTCTCCTGGCTCAGTTTACTAGTGCCATTNNNNNN NNNNNNNN	NA
SA529823	4	61881868	NA	CCGTCCCCTTCTTCATCTGCCGTTCCAGCCGACCACGGGGCGCACCTCTCT TTACGCGGACTCCC<[HBV]CATTCCATGCTCATGGGTAGGAAGAAACAA TGTCGTGAAAATGGCCATACTGCCCAAGGTAATTTATAGATTCAATGCCA TCGCCATC	NA
SA529823	5	19301234	NA	CTGTTGTCAATATGCCCTGAGCCTGAGGGCTCCACCCCAAAAGACCGCCG TGTGGTGGGGTGAACCCTGGCCCGAAT<[HBV]TGCATAAGATTCCCAGA GGTGCTTGTGACCCAGCTATGACCCAGCCTTCCGATTCTACTTTGAGGAA TCCANAAACTAAGTTGGTTTATA	NA
SA529830	17	14933981	NA	CAATCTAAGCAGGCTTTCACTTTCTCGCCAACTTACAAGGCCTTTCTGTGT AAACAATATTTGAACCTTTACCCCGTTG<[HBV]CAACCTTAGAGAAAAAT ACTATGGTAGTCTCCATTTTACAGATGCAAAACCTGGGGTGCAGATTTTA ATC	NA
SA529830	5	129990973	NA	ACAGTATAGGTGCTCAATGAGTATTTGATGAATAAATCTCTACTTCCTAC ATAATAACCAGTCTGGTCATACCGATAGACTTTATACAATGT[HBV]>GTT GCATGGTGCTGGTGAACAGACCAATTTATGCCTACAGCCTCCTAGTACAA AGACCTTTAACCTAATCTCCTCC	NA
SA529830	8	41308676	NA	TTTAAATGAATGTGAGGAAAGGAGGGAGTTTGCCACTCAGGATTAAAGA CAGGT<[HBV]GGTCAGGAGTTTGAGATCAGCCTGGCCAACATGGTGAAA ACTCGTCTTTACTAAAAATACAAAAATTAGCTGGGTGTGGTGGCAGGCA CCTGT	NA
SA501523	3	24499330	NA	CACCATACAGCACTCAGGCAAGCTATTCTGTGTTGGGGTGAGTTGATGA ATCTGGCCACCTGGGTGGGAAGTAATTTGGAAGACCCAGCAT<[HBV]AG TGAGGACATTTGCCTTTAGAGTAGAGTTAGGCGCATTTGAAGGCTATAG GAGCTCTTCAGAGTCATGATGGTAGT	NA
SA501523	6	88968979	NA	TTGGTGGGTCTGTAAGCTAGTTCAACCATTGTGGAAGACAGTGTGGCAA TTCCTCAAGGATCTAGAACTAGAAACACCATTTGACCCAGAGATCCCATT ACTGGG[HBV]>ATCTCTTTTTCACCTCTGCCTAATCATCTCATGTTCATGT CCTACTGTTCAAGCCTCCAAGCTGTGCCTTGGGTGGCTT	NA
SA269383	4	172915474	NA	AGCGGCCACTCAAACATTGCTAATACTGGAGCAGAAGGCTCTGTGNGGT CTTNATTGGCAATTAAATGAGCCAGCCTGGAAATGAC[HBV]>GAAAAGT TACATGGTGCTAGTGACAGACCAATTTATGCCTACAGCCTCCTATTTACA AAGGTCAGTAACCCAGTATCCA	NA

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SA269383	5	1295481	NA	GTCTCTCAGAGGTGGAGAAATGGGAGTAGGTTGCCTTCTCTTTTGCCGATTGGTGGAAGGAGGAGGAGGATC<[HBV]TGCAGGGACGCCAGCGAGGGCCCCAGCGGAGAGAGGTCGAATCGGCCTAGGCTGTGGGGTAACCCGAGGGAGGGGCCATGATGTGGAGGCCCTGGGAA	NA
SA269383	5	83888550	NA	CCCATGCCTTTTCGAGGTTTGGAAGACCAACCTCCCATGCCGTAGCTCTTGTTCCCAAGAATATGGTGACCCGCAAAAT<[HBV]GGAAGAAATGTTTTATTCAAGTACTTCAGTGACAGCTGATTCAATTTTATAAGCTTAATTTTTAAAGTAATATTTTAAAATCAGGAAGTATTCTTTG	NA
SA269383	7	19954966	NA	AGTAACATCAAAGGTCACTGATCACAGATCACCATAATAGGTATAATAATAATAAAAATATTGTAAATAATATGAGAATTATCAAAATCTGACA[HBV]>ACTTTTTCACCTCTGCCTAATCATCTCCTGTTCATGTCCTACTGTTCAAGCCTCC	NA
SA501567	8	52216259	NA	CTTGAGTCCCTTTATGCCGCTGTTACCAATTTTCTTTTGTCTTTGGGTAT<[HBV]ACAGCCAAACCATATCAGTGTCATTCGTTCTGGGTTCTCTTCCTATTTTCGC	NA
SA501571	2	202708332	NA	TTATCAATGCATTGATATTTACAGTACCTATGGATAGTCCATGTACTGAAATAAAATTGATTTAGGAATTTTGTCTTATAAGTGTTCTAAAG[HBV]>GAGACCACCGTGAACGCCCACCAGGTCTTGCCCAAGGTCTTACATAAGANNACTN	NA
SA500737	7	71061814	NA	ACTGNGCCAGGAGAAACGGACTGAGGCCCACTCCCATAGGAATCTTGCGAAAGCCCAAGATGATGGGATGGGAAT<[HBV]AGGACATGAGTTTGGGCTGGAGGAGACCCACTCAGGGTTGAGGCTTTGCCATCTGTGTACAACAAAATGACAGAGGGGCCAGGCACAGTGGTTCA	NA
SA501631	3	169023914	NA	TTGAGAAAGNCCCCCNACGAGTCTAGACTCTTTGGTATTGTGAGGATTCTTGTCAACAAGAAAACCCCCGCCTGTAA<[HBV]CACAGGTGTTTAAAGTAAAGCATTATCGAGGTAATAAAAAATTCATGATTATCTTCCTTTGTATAATTATAGCTGAATATTATGCAATAAGTTC	NA
SA501631	4	73539199	NA	AATTCTATGAAAAATGTTGTTGGTATTTTGATAGGAGTTACATTAAATCTATAGATTGCTTTGGGCAGTATATTCATTTTCACAATATTGATTCTCC[HBV]>GCATGGAGACCACCGTGAACGCCCACCAGGCCTTGCCCAAGGTCTTACATAAGAGGACTCTTGGACTCTCA	NA
SA270398	4	74108352	74108391	CTGAGAATATTTCATGGTCACGTACAAAAGANGATTCTAAAGCATGTCTGACATGTTAAATGAACAATATCCA[HBV]>GCTCTATATCGGGAGGCCTTAGAGTCTCCGGAACATTGTTCACCTCACCATACAGCACTCAGGCACAACATTCCA	AAATTGGTCTGTTCACCAGCACCATGCAACAGTAGGTATA<[HBV]CTAAGATACCAAACCATGCTAACATATTAGGCTGAATCATATGAAACCAGATATTCAATGACTTGTGGCTTAT

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SA501639	11	122939934	NA	GCTACTAAAAATACAAAAAATTAGCCAGGCGTGGTGGCAGGCGCCTGTAGTCCCAGGTACTCGGGTGGCTGAGGCAGGAGAATGGCGTGAACCCGGGGA[HBV]>TGCATGGTGCTGGTGAACAGACCAATTTATGCCTACA	NA
SA501639	17	58147104	NA	TAGAAAACACACACAACAATCTATTAAAAATAAGCCACAACTTAAATCTAAATAAACATAAATGTACCAAAGTTGGTCGAGAAGCACTGGATTCTGATT[HBV]>ATTAATAGATGTCAACAATATGTGGGCCCTCTTACAATTAATGAAAAAAGGAGATTAAAATTAATTATGCCTGCT	NA
SA501639	17	58157683	NA	AGTTATATGGATGATGTGGTATTGGGGGCCAAGTCTGTACAACATCTTGAGTCCCTTTTTACCTCTATTACCAAT<[HBV]TATGTGCGTTATATATGTGCATGTGTGTGTGTGTATTCGTGTAAAGAAATGTATTCAAGCATTTGTTCAGAGAAGATCAGGAGCTGAAACCTAGTCGT	NA
SA501643	5	173175348	NA	ATGAAGAGGAATATGATAAAACGCCGCAGACACATCCAGCGATAGCCAGGACA<[HBV]AACAGTGATTACCCCTTATGGAGAGCCTTCTCTGTACCGCCTTTTACAGTGGGTAGTGTTTTAGTTTAGGTCCCTCAGGAAGCAGACAC	NA
SA501645	10	7312350	NA	TAGCTTGCCTGAGTGCTGTATGGTGAGGTGAACAATGTTCCGGAGACTCTAAGGCCTCCCGATATAGAGCTGAGGCGGTGTC<[HBV]GAATTTGTGACAGTAGCCTTTGCAAACTAAGAAAATGGTGTTCTCACACCCTCCAAATTAAACGTGTAGATTCTCACTCATTACAAAATATAGTTAAG	NA
SA268678	20	22888104	NA	GTGCTGGGATTACAGNCGTGAGCCACCACACCTGGCCTGGGAATCTTCATTTAACCCAAGATTGAGACTCAGGGTCTCAATCCCCTGGATGGCTCA[HBV]>GTCTGTGCCTTCTCATCTGCCGGACCGTGTGCACTTCGCTTCACCTCTGCACGTCGCATGGAGACCACCGTGAACGCCCAC	NA
SA268678	4	81859531	NA	GTGATGGCCATGACACCCACGCTTGAAGGTTGTGGGTTTACCAGAATGAGGGCAAGGAACACCTGGCCCACCCAGGGCGGAAAACTGCTTAAAGGTGTT[HBV]>GAAAAAGTTGCATGGTGCTGGTGAACAGACCAATTTATGCCTACAGCCTCCTAGTACAAAGATCATTAACCTAATCTCCTCA	NA
SA268678	8	14683129	NA	TGGGGGAGGAGATTAGGTTAATGATCTTTGTACTAGGAGGCTGTAGGCATAAATTGGTCTGTTCACCAGCACCATGCAACT<[HBV]ATCCCCACATAAGCTTTATCTTAGTACAACGGAACTTGCTTATCTTACAACTGAAACACTGAACCCTTGA	NA
SA268678	8	35129704	35129759	TTGTTGTTTGAAAAAAAAATAAATTGTTTTTTAAAAAATAAAATTATAAATTATTTTTTTTATATAATTTTTATTT<[HBV]TTTTATATATGTATACATATGTATA	ATTAATGCTAGGCTGTTTTTGAAACTGTGGGATTTTCATGAAAAGAAAAAAAATAAAACATGAGGTTGAATTGCTGAGTGTTTATGGAGCCCCAAACA[HBV]>CCGCTTGGGGCTCTACCGCCCGCTCCTCCGTCTGCCGTACCGACCGACCACGGGGCGCAN
SA501649	1	106996327	106996389	CCTGGAACTTTTTCTAATATGAATTTCTC[HBV]>ATGAGATGATTAGGCAGAGGTGAAAAAGTTGCATGGTGCTGGTGAACAGACCAATTTATGCCTACAGCCTCC	AAAGAGAGGTGCGCCCCGTGGTCGGCCGGAACGGCAGATGAAGAAGGGGACGGTAGAGGCCCAAACGGCCCCGAGACGG<[HBV]GGGAATCCACCATATGCAATTG

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SA501649	1	220821610	220821618	TTCCACATTGGGGAAGTTACC[HBV]>GTAAACTGAGCCAGGAGAAACGGACTGAGGCCCACTCCCATAGGAATCTTGCGAAAGCCCAGGAAGATGGGATGGGAATA	TCAGGATGAAAGACAGGTACAGTAGAAGAGTAGAGCCCAGTAAAGTTCCCCACCTTATGAGTCCAAGGGATACTAACA<[HBV]TTTAAGAGTCTGCAAGGGTAGTT
SA270402	6	164970004	NA	TTTCAAAATATTATTTTTCTTTTGCAATAAATTGCATCTCCTTTGCTGTGTGTCTCTGTTTTTTTATTTCTTCTACAAAAACAAACA[HBV]>TGGCCTGAGGATGACTGTCTCTTAGAGGTGGAGAGATGGGAGTAGGCTGTCTTCCTGAC	NA
SA270402	8	63280968	NA	TCAAAGACTGTTTGTTTAAAGACTGGGAGGAGTTGGGGGAGGAGATTAGGCTAAAGGTCATTGTACTAGGAGGCTGTAGG<[HBV]CTGATTTTTGACAAATGTGTTGAGAACACACACAGAAAGGATCATCTTTTTAATAAATGGTGTTGGAACACCTCAATATCCACATGCACGTGAAAG	NA
SA501424	1	245547462	NA	CACAGAGAAAAACTGAAGTCGCACGCTGCTCTTGGTTTTCTCAGCCTGGAGCAGATGCCTTTGAGCAGCTACCACTTCCCGTTCCCCTGACAGT[HBV]>ACTTCAAAGACTGTGTGTTTAAAGACTGGGAAGAGTTGGGGGAGGAGAATAGGAGGCTGTAGGCATAAATTG	NA
SA501424	1	31503628	NA	TAGGCAGAACTAACACTGCAAAGCCACCCAAGNNACAGCTTGGAGGCTTGTTATCAGTAGGACATGAACATGAGATGATTAGG<[HBV]CAGAACTAACACTGCAAAAAGGANACANNTGCATTATTGTTTTCAGTCACATATTTT	NA
SA501424	11	87553673	NA	TAAATTCTTTATATGGGTCAATGTCCATGCCCCCAAAGCCACCCAAAGGCACAGCTTGGAAGCTTGAACAGTAGAGACATGAACATGGTGATTAGGCAGAGGTGAA<[HBV]ATGCATGCGCATGCTACACACACACACGCGCACCACACACACACACACACACACACACACAAATCCTTTTTATAAAAATGTTTGAGAAACAAGCA	NA
SA501424	12	93019067	NA	CTGGCCAAAATTCGCAGTCCCCAACCTCCAATCACTCACCAACCTCTTGTCCTCCAATTTGTCCTGGC<[HBV]TCACGATTATGTATTCAGTAAATGGGACTCCATGTTCAGTGTGCTATAAAAAAATTCCTAATTTCATCCAATTCTAAATATAATCTTTGACCATTGATT	NA
SA501424	19	36212667	NA	TTGCCGCTGTCTGGGGTAGAGGAGAAGATGTTCAACCTCCTCAAGAGAGCCAAAGTCCAGCTATTCAAGAT[HBV]>AGGTTAAAGGTCTTTGTACTAGGAGGCTGTAGGCATAAATTGGTCTGTTCAC	NA
SA501428	13	96965849	NA	ACTGTTTGTTTAAGGACTGGGAGGAGTTGGGGGAGGAGATTAGGTTAAAGGTCTTTGTACTAGGAGGCTGTAGGTATAAA<[HBV]TAAATGCTGTAGATTCATCCCAAGTCTACTACAAATGTAATGTCCCCCATGATAGCCTCAGATATTCTGTTCCTCACTGATGTGTTTCATTT	NA
SA501428	5	1295446	NA	TTCTTTGACATACTTTCCAATCAATAGGTCTATTTACAGGCAGTTTCCGAAAACATT<[HBV]GCTTCCCCGCCCGCGCGCCGCTCGCGCTCCCAGGGTGCAGGGACGCCAGCGAGGGCCCCAGCGGAGAGAGGTCGAATCGGCCTAGGCTGTGGGGTA	NA

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SA501428	5	152215069	NA	GTGTACTCCCTACAGTTACTAATGTGGCTCCTCATGCACCTGCAGAATCT GTAGCCACTGGCTTTGAATTACATTACTTTCAGTTTGATACATT[HBV]>AC TGGACGTAGAGGACAAACGGTCTCCTCCCCCAACTCCTCCCAGTCCTTAA NCAAACAGTCTTTGAAG	NA
SA501432	17	14633992	NA	TGGGTCTTCCAAATTACTTCCCACCCAGGTTGCCAGATTCATCAACTCACC CCAACACAGAATAGCTTGCCTGAGGGCTGT<[HBV]AGGGGTATCGCAGG AAAGTACAAGATGAGTCTGAAATATCATGCCAGGAAGTGAAGAGGAGT TTGAAGAATCAGGGACACATATCAAAAGGGGCAGGA	NA
SA501432	17	15243372	NA	TAAAGACTGGGAGGAGTTGGGGGAGGAGATTAGGAGGCTGTAGGCAT AAATTGGTCTGTTCACCAGCACCATGCA<[HBV]ATGTACCTAGAGAAATG CAAATATGTTTACAATTAGAATGTACAAGAATTCCTTTCTAGTATTTTTAA AGGGAGCAAACTAAAAGC	NA
SA501432	20	53170164	53170213	AGCGACCTTTAAAGATGACCAGTCGAGTATAATAGTGCCACTCAGACATT TGCCATCAGTAACTATTATTATTAAATTATACTCATTTGCTGGGCGC[HBV] >ATGGTGCTGGTGAACAGACCAATTTATGCCTACAGCCTCCTAGTACAAA GACCTTTAACCTAATCTCCTCCCCCAACTCCTC	TTGAGATTCCCGAGATTGAGATCTTCTGCGACGCGGCGATTGAG ACCTTCGTCTGCGAGGCGAGGGAGT<[HBV]TCATGAGGTGAGG AGTTTGAGTCCAGCCTGACCAACATGGTGAAACCCGGTCTCTAC TAAAAAAATACAAAAATTAGCTGGGCCTAGTTGTGCTTGCC
SA501432	5	64503435	NA	TGGATAAAGGCATTAAACCTTATTATCCTGAACATGCAGTTAATCATTACT TCAAAACCAGGCATTATTTACATACTCT<[HBV]AAAAGTAGGGTAGAAAA TTATCATGAATATTGCTGCATTCTGCAAAGATTCATTCTCTTAAAGAAAGT AACTTCCTAAAAAAT	NA
SA501436	13	97585947	97585962	CCCTGCATCAAATACTGCTCAGAAATCAGGTAATACAAAATATTTTGCCTT ATTTTGCAAAGTGACGGTCATTGGGAACTTCACTGAGCAGTTTTAG[HBV] >AATCATCTCATGTTCATGTCCTACTGTTCAAGCCTCCAAGCTGTGCCTTG GGTGGCTTTGGGGCATGGACATTGAC	GGGGAGGAGATTAGATTAAAGGTCTTTGTACTAGGAGGCTGTA GGCATAAATTGGTCTGCGCACCAGCACC<[HBV]AAGTGAAGAT GGAAACTCTAGTAAACTCTTTCCATGATGTTTGCTTGAAGAGAG TAAAGCAGGGTAATGGATTAGNAGCTATG
SA270416	15	37994973	37994978	TACCCTCCTGGTCTGGTGATAAAAACTAAAGAAAGGAACTTATCCAGGG ATCTAAGCCATGTTTTCCTCTCCTATAATGAACA[HBV]>ACTGACTCCACA GAAGCTCCAAATTCTTTATACGGGTCAATGTCCATGCCCCAAAGCCNCCC AAGGCACAGCTTGGAGGCT	AGAAGGCAAAAAAGAGAGTAACTCCACAGAAGCTCCAAATTCT TTATACGGGTCAATGTCCATGCCCCAAAGCCACC<[HBV]CACTT GTCTGTCAGGAAAACCAGCACCCTTCAGCCTTAATATTGACTTG AACCTCAGTCAGATCAAGTCCANCCAAAGAGTGCCA
SA501449	8	53617384	53617389	AGGCCTTTATCCAAGGGCAAATATTTGGTAAGGTTAGGATAGAACCTAG CAGGCATAATTAATTTTAATCTCCTTTTTTCAT<[HBV]TACATAAGTATTAC TTTTCACCAAATAGTCACGATTTCCTAAAATCTGACTTGATGCTCATTTTAT ATAAAGTCCTTCTTAACTTTTATAAAATG	AAGGTACAAGCACAGAAATCAACTGCTATTCAAGGAATTATAAA GTAACTTTATAAGCCTTATATAAATAAGCCTAGTACA[HBV]>CCC CAACTCCTCCCAGTCCTTAAACAAACAGTCTTTGAAGTATGCCTC AAGGTCGGTCGTTGAC
SA501453	11	65023698	NA	GGCACAGCTTGGAGGCTTGAACAGTAGGACATGAACATGAGATG<[HBV]ACCCAGGCCAGAGTGCAATGGTGCAATCTTGGCTCACTGCAACCTCCAC CTCCCAGG	NA
SA501453	15	71645723	71645731	TTTGATAAACAAGGCATGTGGATAAAAATTGTGTCCACTTTTTATTAGCA AACACTTAATCTGATTGCAAAAGAAACCATC[HBV]>TTTTTCACCTCTGCC	TTTGATAAACAAGGCATGTGGATAAAAATTGTGTCCACTTTTTAT TAGCAAACACTTAATCTGATTGCAAAAGAAACCATC[HBV]>TTTT

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				TAATCATCTCATGTTCATGTCCTACTGTTCAAGCCTCCAAGCTGTGCCTTGGGTGGCTTTGGGG	TCACCTCTGCCTAATCATCTCATGTTCATGTCCTACTGTTCAAGCCTCCAAGCTGTGCCTTGGGTGGCTTTGGGG
SA501453	19	33761713	NA	AGGCCTACTTCAAAGACTGTTTATTTAAAGACTGGGAGGAGTTGGGGGAGGAGATTAGGTTATGTAATAGGAGGCTGTAGGC<[HBV]GTCCCTGCTCCTTCCTCCTGGATAATTTCTGCTTATATTTTAAGACTTAGCTTCCAGATGTGGCGGTTCATGCCTGTAAT	NA
SA501453	19	33771850	NA	TCACCCCACTCACCCCGGGCTGCTTCTCACCACTGTTTCCTGTGCTGAAGTGGGAGTCCAGACCCC[HBV]>TTCTTCTGTACCTGTCTTTAATCCTGAGTGGCAAACTCCCTCCTTTCCTAACATTCATTTACAGG	NA
SA501453	19	4558119	NA	GACGAAGGTCTCAATCGCCGCGTCGCAGAAGATCTCAATCTCGGGAATCTCAATGTTAGTATCCCTCGGACTCATAAG<[HBV]GTCCGGGCCCGCTGCCCACAAACACGGGATAGTGGTTCAGGTCTGAGTGAGGGGGTGGAGAGGGGTGTGAGCAAAGGCTGGGGGTGAAGAGAGGGTGGC	NA
SA501453	2	105457535	105457559	GAAGTTTGCTATATTACACATGGGCATGTTATATGCAAATGTATTCAGTTGGGGTATGTATATATTTTGTTATGTTATGTACATAAACATCTACCCTT[HBV]>TATTTTCCTGCTGGTGGCTCCAGTTCCGGAACAGTAAACCCTGTTCCGACTACTGCCTCTCCCATATCGTCAATCTTCT	TCTTGCCCAAGGTCTTACATAAGAGGACTCTTGGACTCTTATAAATAAA<[HBV]ATAAATATGTGTAGTATATTACCAAACTGTACTATACTTAAGGAGGAGGAGGAGCTTCCAAGGATTGCCATACAATATTTTAGTTAACTGAGTACT
SA501453	4	122742408	122742413	AAACAGTCTTTGAAGTAGGCCTCAAGGTCGGTCGTTGACATTGCTGAGAGTCCAAGAGTCCTCTTATGTAAGACCTTGGGCA<[HBV]TCAGTATCTCTGTACATAGAACTTTGGAATGATTTTAGTTAATGAGGGAAAAAAAAAAAAAACATATTGGTAGGCCCCTAANAGGAAA	ATGTAGAATATTTTACCCTAGTCTCAG[HBV]>CATGGTGCTGGTGAACAGACCAATTTATGCCTACAGCCTCCTAGTACAAAGACCTTTAACCTAATCTCCTCCCC
SA515239	1	35838753	35838755	TGGACTCTCAGCAATGTCAACGACCGACCTTGAGGCATACTTCAAAGACTGTTTGTTTAAAGATTGGGAGGAGTTGGT<[HBV]TATCTCAAAAAAAAAGAAAGAAAATTATGTTGTACACATAGTAAATACATATAATTTATGTCAGTATAAATAAATATATATATATGCATATATATATA	CTGAGGCACAAGAAACACTTGACCCTGGGAGGTAGAGGTTGCAGTGAGCCAAGATTGCACCAATGCACTCCAGCCTGGATGACAGAGTGAGACTCT[HBV]>GGAATGGAATGGAATGGAATGGAATGGAATGGAATGGAATGGAA
SA515239	13	81850217	NA	AGCCCCAAAGNCANCCAANGCACAGCTTGGAGGCTTGAACAGTAGGACATGAACATGAGATGATTAGGCAGAGGTGAAA<[HBV]ATTGCCTTTGAAACATGTGATCTCTGTGACCCACTCCCTATTCGTACACCCCTCTCCTTTTGAAACCC	NA
SA515239	2	42456653	42456684	ACCATATGCATATTAAGTAAGTTTTTAGCTTACACATGAACTTTGTATTCCAGGAACAGTTATGTTAGTAAAATATTAAATGGTAGAGAATTTTTTC[HBV]>TCGGAAACTACCTGTAAATAGACCTATTGATTGGAAAGTATGTCAAAGAATTGTGGGTCTTTTGGGCTTTG	TTGGGGGAGGAGAATAGGTTAATGATCTTTGTACTAGGAGGCTGTAGGCATAAATTGGTCTGTTCACCAGCACCATGCAACT<[HBV]TCACCCATTCACCACGAGAGAGAAAAATAAAAGAAATGTGAGTGAGTGAGTTTAGGGCTAAATACATGTAAATACTGAGTTTGTCAGAGGAATCAGGG
SA268027	4	173136730	NA	CTCTCTTCTTGTGAAGTCTGACTTGTCTGAAATTAATTTAGCTACTTCATTTTTCTTTTGATTAGTGTTACCATGGAGTACCTTTCTCCATTTTTT[HBV]>ACC	NA

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				TTGGGTGGCTTTGGGGCATGGACATTGACACATATAAAGAATTTGGAGC TTCTGTGGAGTTACTCTCTTTTTTG	
SA268027	8	68971987	NA	CCGAGAGAGGACAACAGAGTTNTCGGTTCCGATAAGTTTCGCTCCAGAC CGGCTGCGAGCAAAACAAGCTGCTAAGAGTTCC<[HBV]GCTTATTCAGG TGGTTGTCAGGAATCAGCTCCTCATTGAGGCTGCAAGAATGAAGTCCTTG TTTCCTTGCTGTCAGCCAATGGTTGCTCTCAGCTTCT	NA
SA501469	5	673527	NA	CAGGACCCCGTGCCAGGATCACAGGGACCCCCCGAGGGGAGTCCAAGC TGCAGGAGGGAAGGACAGTTTGAGGGTGGGAGAGAGGAGGAGGTGG GG[HBV]>ACAGGAGGACATTATTGATAGATGTCAACAATATGTGGGCCC TCTTACAGTTAATGAAAAAAGGAG	NA
SA501476	19	36212638	36212647	GCCTCCCCTGGAAAAAGCCCGGATTGCGGGCGTGGGTTCCTTGCCGCTG TCTGGGGTAGAGGAGGAGATGTTCAGCCTCCTC[HBV]>CAGTTCATGTC CTACTGTTCAA	AGGTTAAAGGTCTTTGTACTAGGAGGCTGTAGGCATAAATTGGT CT<[HBV]AAGTGCAGCTATTCAAGATCGATCAGCAGCAGCAGCA GAAGGTGGCAGCTTCCATGCCGGTGAGTGTGGTCCCTGGGCCC AGC
SA501476	4	3421281	NA	TGTGTGACAGAACAAGACTGTCTCAAAATAAATAAATAAATAAATAAATA AATGAAAGCAAACCTTGATAGCAGTGGCGCCTGGTGGCTCATGCC[HBV] >ACCAGCATAGCATAGCAGCAGGATGAAGAGGAATATGATAAAACGCC GCAGACACATCCAGCGATAGCCAGGACAA	NA
SA501476	4	3421872	NA	ATGGGATACTAACATTGAGATTCCCGAGATTGAGTTCTTCTGCGACGCGG CGATTGAGACCTTCGTCTGCGAGGCGAGGAT<[HBV]GAAAAGGACGTG GACCGAGTGGGTCTGGAGGCCGCATCCGGCTGAGAGCGCTGGCTGTTG CCACAGTTGGGGGTTTCCAGTTAGG	NA
SA501476	7	71198422	71198435	AGGCCCCCCGAGGAGGGAGGCGCCCTGAGCAGGTGTCTGCTCCTTGGA CGTCCCGCGCGGGAGCTCAGCTGGGAAGCCGGGCTCT[HBV]>CATGTTC ATGTCCTACTGTTCAAGCCTCCAAGCTGTGCC	GACTGTGTGTTTAAAGACTGGGAGGAGTTGGGGGAGGAGATTA GGTTAATGATCTTTGTACTAGGAGGCTG<[HBV]TAGCGCCCCCT GCTGGCGCCTGGCCTTGATTCCGCTGCTTCCTTTCCCCTGAAATG AAGGAAAGCAGGAGGGTTGTGAGGCTTCATTGA
SA501481	1	57256948	57257047	TATGGTAGTAAAAAACTACAGTCCTTATCTTTTTTTTTTTTT[HBV]>TTTT TTTTAAGGGGGTTTTCCCCTTTCCCCCCCACGGGGGGGGGCAGCCCCCGT GCCC	TCTACGTCCCGTCGGCGCTGAATCCCGCGGACGACCCGTCTCGG GGCCGTTTGGGCCTCTACCGTCCC<[HBV]CTTCCCGAGTAGCTG GGATTACAGGCACAGGCCACCATGTCCAGCTAATTTTTGTATTTT TAATAGAGATGGGGTTTTGCCATATTAGCCAGGCTGGT
SA501481	12	23811473	23811501	CCATTCAGGTACCAAAATAANTCAATTCTTTACAAATATAAACATTTACAA AGCNTTACAACTAAATCAGGATCTCCCAAAGTCATCGGTTTA[HBV]>AAA AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAANGGGGGGGGG GTTAATAACCCCCCCCTAAAATCCACCCA	ACGGAAACTGCACTTGTATTCCCATCCCATCATCCTGGGCTTTCG CAAGATTCCTATGGGAGTGGGCCTCAGTCCGTTTCTC<[HBV]AA GAGCTGGTCACAATAATTCTAACACAAAAAATACAGAAACCAGC TGGGCATGGTGGCTCATGCCTT
SA501481	16	72095191	NA	TTCCACCTTAGGGAATCATGCTCACTGATTGAGTGCCTATTGAATGCTAG GTCCCAGAAAGTTAACTGTTGTCCTTGTTTTACAGACAAGGAAACAGA[H	NA

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				BV]>CAGCTTCCTAGTACAAAGACCTTTAACCTAATCTCCTCCCCCAACTCCTCCCAGTCCTTAAA	
SA501481	9	24184263	NA	GTTCCGGAGACTCTAAGGCCTCCCGATACAGAGCAGAGGCGGTGTCGAGGAGATCTCGAATAGAAGGAAAGAAGTGAAAAG<[HBV]TGGTCCACTTCCTTGAGTTCTAGTTGTTCCACTTTTATCACATCTTTGGCATTGTTGGCTGTTTTAAGTTTAGCCATTCTATGTAAGAGATACAATG	NA
SA269680	1	103229235	103229249	TAAATAAGATGATTATATGTTGTAACACTGTAGCTAGATGTCAAAGAAAAAAGTTAGCATTTTTCCCTCCCTATAAGTGATGTAAAATTTCTTACACCC[HBV]>TTAAGGCATTAATGCAGGGTATCCACATTGTGTAAATGGAGCGGCAAAGCCCAAAAGACCCACAATTCTCTGACATACTA	AATCTCCTCGAGGACTGGGGACCCTGCGCCGAACATGGAGAACATCACATCAGGATTCCTAGGACCCCTGCTCGTGTTATT<[HBV]GTAATAGGTTGGTGCAAAAGTAAATGCGGTTTTTGTCACTACTTTCAATGGCAAAACACAATTACTTTTGCATCAACAGAATAGCAGAAAACCATCA
SA269680	10	1863122	NA	TCCTCCCAGTCTTTAAACACACAGTCTTTGAAGTATGCCTCAAGGTCGGTCGTTGACATCGCTGGGAGTCCAAGAGTCCT<[HBV]GAGAAGATGTGTGTCCACAGAGACTGGAGCCATGTGGCCACAAGCCAAGGAGTGCTGGCAGTCACTAAAAGCTGGAAGAGACAGGAAGACTTCCATCNT	NA
SA269680	12	124913292	NA	GGGAGCTGCCAACCACAAGCGGCTGTCGAGCTCTTGAGATGTGTCAGATGCAACCGAGGAACTGAATTGCTAATTTTATCCCATTTTAATTAA[HBV]>CCTAATCTCCTCCCCCAACTCCTCCCAGTCTTTAAACACACAGTCTTTGAAGTATGCCTCAAGGTCGGTCGTTGACAT	NA
SA269680	15	47607048	NA	TTTAATGAAGTGCCAATTATCAATTATTATCTCATGGATCCTGCCTTTGGTGTTGTATCTAAACAGTCATCATCAAACCCAAATCATCTAGGTTTTCT[HBV]>AAAAAGTTGCATGTGATGGTGCGCAGACCAATTTATGCCTACAGCCTCCTAATATTTAACTAATACAAATAAGACCA	NA
SA269680	15	47631298	NA	CGCAGACGAAGATNTCAATCGCCGCGTCGCAGAAGATCTCAATCTCGGCAATCTCAATGTTAGTATTCCTTGG<[HBV]ACGTGGAGGTTCCTGGAAGGCGGCACACCCAGAGAGAGCATGGTAGCTCCATGCTGCTTCCCCCATACCTCACCCTACACATCTCTTCATCTGTATCCN	NA
SA269680	16	83507195	NA	CTGGAACTTCAGCCAGGTCACTTACCTAACAGGTGTGGTTCTGGAGTCATCGATCATCTGTCCTGCACTACAACTCAAGGATATAGGTCCTA[HBV]>ATCATCTCTTGTACATGTCCCACTGTTCAAGCCTCCAAGCTGTGCCTTGGGTGGCTTTGGGGCATGGACATTGACCATTAT	NA
SA269680	2	198580596	NA	AGTAAAATTTCCCACCTTATGAGTCCAAGGAATACTAACATTGAGATTCCCGAGATTGAGATCTTCTGCGACGCGGCGATTG<[HBV]AGAGTTTTAAACAAATTGTCTAAACAGCTAGGGCATAAGCATGAAAATCTATTTGGTAAACGTAGGATTGTTGCTNCATTTATGTTCATTTTTCCTTA	NA
SA269680	21	15570249	NA	AAGGTTGAAATGAAAAAAAAAAATGTTAAAGGCAGCCAGAGAGAAAAACCAGGTCACCTACAAAGGGGAGCCATCAGACTAACAGAGCACCTTTCAG	NA

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				CT[HBV]>CTGCCTAATCATCTCTTGTACATGTCCCACTTTTCAAGCCTCCA AGCTGTGCCTTGGATGGCTTTGGGGCATG	
SA269680	5	1296758	NA	CGAGGAAACGCCTCCCGGCATTCAATGAAGATTGCTGATACCCAGAAGA CACCCCAGTATTATGGGTGCAGTTAGTGTGTCTTTGAAAAGCTGATGAT[HBV]>TGCACCTCTGCCTAATCATCTCTTGTACATGTCCCACTTTTCAAGCC TCCAAGCTGTGCCTTGGATGGCTTTGGGGCATGGAC	NA
SA269680	7	71492688	NA	GACGCAGAAGCAGGAAAATCACTTGAGCCTGGGAGGCAGAGGTTGCAG TGAGCTAAGATGGCACCACTGCACTCCAGCCTGGGTTGACAGAGTGAGA [HBV]>TCCATATAGCTGAAAGCCAAACAGTGGGGGAAAGCCCTACGAAT CACTGAACAAATGGCACT	NA
SA269680	8	2044140	NA	NGGCCCTCGGTAACTCCCTGGTTGTGCTTCCTTGCAGCCGTCCCATCCCA TCCTTATGGGATTACNCTCCTCAACTGTGACGGCCACTCC[HBV]>CTACCT GATCAGGATAATAAGGTTTAATTCCTTTGTCCAGGGGCAAATATTTAGTG CTGTTAGGATAAAATCTAGCAGGCAT	NA
SA269680	9	125414595	125414598	TTCAACCCCATCAAGGACCACTGGTCACAAGCCAACCAGGTAGGAGTGG GAGCATTCGGGCCAGGGTTCACTCCCCC<[HBV]ACATCTGGCTTTATCTG AAACTAGTAAACAGAATCTTGAAATTAGTTAATGTCATTTTGTTAAAGAT TTGTGTGCATTATAGTATCGGCAAAGTC	TATTACAACTTACCTACTTCTAAAATTCATCAATTAATATTCATTA AAATTAATTTTATATGACTGATTGCTAGAAAAGTTTGGGCTAAA CA[HBV]>AACCTCGCAAAGGCATGGGGACGAACCTTTCTGTTCC CAACCCTCTGGGATTCTTTCCCGATCATCAGTTGGACCC
SA501485	7	154265624	154265714	CCAGAAGCCTCAAAACAAAGTGAGGTATTGTTCTCCGGAATGTGACAGA GGGGTTCCCGCAGCCGTGTGATCGGAAGAGGCGTGCTCTAG[HBV]>CTG CATGGCCTGAGGATGACTGTCTCTTAGAGGTGGAGAGATGGGAGTAGG CTGTCTTCCTGACTGCCGATTGGTTG	AAGTGTTTGCTGACGCAACCCCCACTGGATGGGGCTTGGCCATA GGCCATCGGCG<[HBV]CATTGAACCAGAAACCATTTTGATAAAG ATCATTTTGCTAAAGATGAGTCTTCACCATGTGGAGCACT
SA501511	10	20525537	NA	GAGGATTTTTGTCAAAAAAAAAACCCCCGCCTGTAACACGAGCAGGGGT CCTAGGAATCCTGATGTTGTGTTCT<[HBV]TATACACATAAGAAGTGAAA AATGATAATGGGTTTTCCAAATATTTATTTTTGGTCTTATTTGTACTATATA TAAATACCATAAACCTTCTCTTTTTT	NA
SA501511	13	38591685	NA	TTTTTTATATACCTGTTGGCCATTTGTATGTCTTCTTTTAAGAAATGCCTGT TCATGTTCTTTACCCATTTCTGATGAGATAACTTCTTTTTTCTGT[HBV]>CG TCTCGGGGCCGTTTGGGACTCTATCGTCCCCTCCTTCATCTGCCGTTCCGG CCGACCACGGGGCGCACCTCTCTT	NA
SA501511	16	22353649	22353650	GAGGAGATTAGGCTAAAGGTCTTTGTACTAGGAGGCTGTAGGCATAAAT TGGTCTGTTCACCAGCACCAT<[HBV]GCACTGGGAGAAAATACTTGCAA ACTATATATCTAATAAGGGGTTACTAACCAAAATATATAGGGAACTCAAT AGCATTCAAATGAATAACCTGATTT	CAAAAGCACAGACAACCAAAGCAAAAACACAACAGGACTACCT CAAACAAAAGCTTCTGTACAGCAAAGGAAACAACATGAAAAGG CAGCCTAC[HBV]>CGGCCTCAGTCCGTTTCTCCTGGCTCAGTTTA CTAGTGCCATTTGTTCAGTGGTTCGTAGGGCTTTCCCCCACTGTT TGGC

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SA501511	19	36213881	36214045	GGAGAAAGCGAGAGCCAGGTTGTGGGAAAGCAGGGAAGTGAGGTAGAAGCCTGGTGGCTTTGTGGCTCCATCCCCTCCTCCC[HBV]>CAGGTTTCCTCCCATCTCT	ACAAAGGACGTCCCGCGCAGGATCCAGTTGGCAGCACACCCTAGCAGCCATGGAAAGGAGGTGTACTTCCGAGAGAGGACAA<[HBV]GGCAAGAAGATGCGCATGGCTCGATGTGGACACTGTCGGGGCTGCCTACGTG
SA501511	4	33650688	NA	GCTCTTGTTCCCAAGAATATGGTGACCCACAAAATGAGGCGCTGCGTGTAGTTTCTCTCTTATATAGAATGCCAGCCTTC<[HBV]CTTTAGATTTGGATATAGATAATGCCCTGAGGGAGATATACTGTAGAACAGTTTCTCAATTGTGACACTATTGACATTTTGGGCTGGA	NA
SA501511	8	57507935	NA	CTGTGGAGTTACTCTCGTTTTTGCCTTCTGACTTCTTTCCTTCTATTCGAGATCTCCTCGACACCGCCTCAGCTC<[HBV]CATACTGTCTATAGTTATTGGTGAAATAAAAAAGGCAGCTTTGGGCACAGTAGCTAGAAGAACAAATATGTTTTCAGAGATTTTTGTAGTAATTAATTA	NA
SA501511	8	68545531	NA	GGAGTTGGGGGAGGAGATTAGGCTAAAGGTCTTTGTACTAGGAGGCTGTAGGCATAAATTGGTCTGTTCACC<[HBV]AATACATAATATATGTGAATTTATTCTTATAATTTTTATTTTTTGTTTGTTGTAGGTTCTTATTGCCCTTTTCTTCCTCTTTCTTGGATTAATCAAT	NA
SA501511	8	123142216	NA	TGGGGGAGGAGATTAGGCTAAAGGTCTTTGTACTAGGAGGCTGTAGGCATAAATTGGTCTG<[HBV]CTCTACTTGGGGAGACCTTCTCCTAGTTACCTCAGGTGACCCTGAATTGTTTTTATTGTTGTTGTTTTGAGATGGATTCTCACTCTGTCCCCAGG	NA
SA501534	12	30301892	NA	AGAAGAATAAAGCCCAGTAAAGTTTCCCACCTTATGAGTCCAAGGGATACTAACATTGAGATCCCCGAGATTGAGATCTTC<[HBV]TGGCCTGTCTCTTAGAATGGGGGTAATGAGAGTCAGGTAATACGTGGAATCCTACCATGCTTTTGTTCATAGTGATTCCACTGGATCCACAGGCCCACCT	NA
SA501534	13	104216191	NA	CCCAAAAGACCGCCGTGTGGTGGGGTGAACCCTGGCCCGAATGCTCCCGCTCCTACCTGATTTGCCTCTGGCCA<[HBV]GTAAAATCAAAGCAAGTTAGTTACTTCTAGATACAATAGAGGTACAGGCATTGGGTAAATGCACCCATTCTAAATGGGAGAAATTATCCAAAACAA	NA
SA501534	15	48094881	48094884	CTAGGAGGCTGTAGGCATAAATTGGTCTGTTCACCAGCACC<[HBV]ATGCATGAATCAGACTTGTGCATGTCTTCTAGTAGTCAATTCTTTCCATCTCTCAGGTGCTCTGTGTTTTTATATTGTTACTATTGTTCATTATC	AGGCTGAAGTCCATGAGGGCAGGGGAGTAATAGTAGAGGGAGCAGTAGGTTGAGAGGAGAGAATTGTTAATAATAATAGTTGTTCTGAATCCAGCT[HBV]>TCAAAACTAGGCATTATTTACATACTCTGTGGAAGGCTGGCATTCTATATAAAAGAGAAACTACACGCAGCGCTTC
SA501534	15	48094993	NA	AA<[HBV]TAGGATATAATATTTGGGGAGGGGTCAGTGAGACAGCTCCCCTAGTTACTAGTTGTGTGACCTTGGGCAAGTCACTTAACCTCTCTGAGCTCCAGCCTT	NA

SA501534	2	14604533	NA	TTAGCTTGATTGTAGTGATCATTTTATAATATACATATATCAAAATAGTATATTTCAGTTTTCACTTTTCTTTTAA[HBV]>CACTTAGATTGACATACTTTCAATCAATAGGTCTATTTACAGGTAGTTTCGAAAACATTGCTTGAGTTTTAATACAATATGTTCCTGTGGCAAAAGTACCCCAA	NA
SA501534	4	63879563	NA	GGACTCTCAGCCATGGTAACGACAAACCTTGAGCTAACTTCAAAGACTGTTTGTTCAAGGACTGGGAGAGT<[HBV]TATTTGGAAAAACCTAAAACTCCACCAAAAACCTAACAAATTGATAAATTTGGTAAGTTGCAGGATACAAAAAGCAACATACAAAAATTAGTAACAA	NA
SA501541	1	80934662	80934673	AATTGATTTTTTATACAGTAGAAGGTAATGAGTAAATCAATTTGTTGAAAATTTTAGATGGTAAATGAATAATTACAATAAAATGT[HBV]>AATTACAGCACTCAGGCAAGCTATTCTGTGTTGGGGTGAGTTGATGAATCTGGCCACC	TTAGGTTAATGATCTTTGTACTAGGAGGCTGTAGGCATAAATTGGTCTGTTCACCAGCACCATGCA<[HBV]CTAGTAATGTTGCATTGAAGTCTGCTTTGACTGATATTAATGTAATTACATCAGATTTATTTTGTCAGTTATTTTTATGACATATCTTTCTATCGTTTT
SA501541	12	30643865	30643886	CTCTTACAGTATGTTTCTCAAAACAGCTTCCTAAGCTGGAGTATGGGCCTTTTAAGCTAATGCAATTTGTCTTCTTTGGCCTT[HBV]>ACAGACCAATTTATGCCTNCAGCCTCCTAGTACAAAGACCTTTAACCTAATCTCCTCCCCCAACTCCTCCCA	ACGGGTCAATGTCCATGCCCCAAAGCCACCCAAGGCACAGCTTGGAGGCTTGAACAGTAGGACATGAACATGAGATGATT<[HBV]CAAAATTAAATTGATCTTCTTAAATAGGGCAGAATGGGGAGCAAGGATGGCTTCTGCTTATCAAGGGATTAGACAAGCACAGGTCCTGCT
SA501541	6	162294373	NA	CCCGGTCCTTCCCTGTAGAAACGGTCTCTCCTACCCCAGACACTCCTTCTCGCTCCATGTTTGGAACATGCTTACTCTGAAGTTAGATATCCT[HBV]>TCATGTCCTACTGTTCAAGCCTCCAAGCTGTGCCTTGGGTGGCTTTGGGGCA	NA
SA501541	6	162298238	NA	GGGCNNNCNGGATCCTGCGGGGGACGTCCTTTGTCTACGTCCCGGCGGCGCTGAATCCCCCGGACTGGACCCGTCTCGGTGAGG<[HBV]GCAGCCCAAATCCCACTGGTGTCCCCCNNNNN	NA
SA515300	2	202708332	NA	AATGCATTGATATTTACAGTACNTATGGATAGTCCATGTACTGAAATAAAATTGATTTAGGAATTTTGTCTTATAAGTGTTCTAAAG[HBV]>GAGACCACCGTGAACGCCCACCAGGTCTTGCCCAAGGTCTTACATAAGAGGACTC	NA

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Supplementary Data 3. Clonal status of HBV insertions

This list shows the clonal state for each viral integration in three categories. clonal [early]=The integration event is clonal in the tumour sample and it has an early origin in tumour development; clonal [late]=The integration event is clonal in the tumour sample and it was originated in advanced states during tumour development; clonal [NA]=The integration event is clonal in the tumour sample but it is not possible to estimate when it was originated.

Tumor_wgs_icgc_sample_id	CHROM	POS	Clonal_state
SA515316	5	1298125	clonal [NA]
SA515318	4	181086000	clonal [NA]
SA515318	4	190730769	clonal [NA]
SA515318	5	1295647	clonal [NA]
SA515318	5	1296158	clonal [NA]
SA515318	7	729324	clonal [NA]
SA501427	5	88432443	clonal [early]
SA501427	5	88754908	clonal [late]
SA267718	1	237656520	clonal [early]
SA267718	2	118543576	clonal [NA]
SA267718	5	1295278	clonal [NA]
SA267718	9	137029137	clonal [NA]
SA540527	1	118079033	clonal [late]
SA540527	4	8437092	clonal [early]
SA515397	2	186622915	clonal [early]
SA515397	2	186641095	clonal [early]
SA515415	5	1295144	UNK
SA501456	5	1275382	clonal [early]
SA501456	5	173125602	clonal [NA]
SA529714	18	40716643	clonal [early]
SA529714	3	24001321	clonal [NA]
SA501460	7	155443987	clonal [early]
SA501460	7	91671904	clonal [NA]
SA501460	8	37337657	clonal [NA]
SA501460	8	49642746	clonal [NA]
SA501464	1	26783196	clonal [early]
SA501464	13	106702489	clonal [early]
SA501464	18	53691840	clonal [early]
SA501464	19	36212782	clonal [early]
SA529726	3	21222310	clonal [NA]
SA529726	4	171417047	clonal [NA]
SA529726	5	12035	UNK
SA529726	5	1296719	clonal [NA]
SA529726	7	80512238	clonal [NA]
SA529726	X	150837858	clonal [late]
SA501480	19	29087481	clonal [NA]
SA501491	4	79048012	clonal [NA]
SA501491	6	68664025	clonal [NA]
SA501491	8	39200449	clonal [NA]

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SA267880	10	129391638	clonal [NA]
SA267880	8	56030290	clonal [NA]
SA529759	1	234101917	clonal [NA]
SA529759	1	234103103	clonal [NA]
SA529759	19	30304904	clonal [early]
SA529759	19	30305249	clonal [early]
SA529759	6	44270937	clonal [NA]
SA501514	7	145783069	clonal [early]
SA529818	12	58550792	clonal [early]
SA529818	5	1295276	clonal [early]
SA529823	4	55244192	clonal [NA]
SA529823	4	61881868	clonal [NA]
SA529823	5	19301234	clonal [NA]
SA529830	17	14933981	clonal [NA]
SA529830	5	129990973	clonal [NA]
SA529830	8	41308676	clonal [NA]
SA501523	3	24499330	clonal [NA]
SA501523	6	88968979	clonal [NA]
SA269383	4	172915474	clonal [late]
SA269383	5	1295481	clonal [late]
SA269383	5	83888550	clonal [NA]
SA269383	7	19954966	clonal [late]
SA501567	8	52216259	clonal [NA]
SA501571	2	202708332	clonal [NA]
SA500737	7	71061814	clonal [early]
SA501631	3	169023914	clonal [late]
SA501631	4	73539199	clonal [NA]
SA270398	4	74108352	clonal [NA]
SA501639	11	122939934	clonal [early]
SA501639	17	58147104	clonal [NA]
SA501639	17	58157683	clonal [NA]
SA501643	5	173175348	clonal [NA]
SA501645	10	7312350	clonal [early]
SA268678	20	22888104	clonal [early]
SA268678	4	81859531	clonal [late]
SA268678	8	14683129	clonal [NA]
SA268678	8	35129704	clonal [early]
SA501649	1	106996327	clonal [NA]
SA501649	1	220821610	UNK
SA270402	6	164970004	clonal [NA]
SA270402	8	63280968	clonal [early]
SA501424	1	245547462	clonal [early]
SA501424	1	31503628	clonal [NA]
SA501424	11	87553673	UNK
SA501424	12	93019067	clonal [NA]
SA501424	19	36212667	clonal [NA]
SA501428	13	96965849	clonal [NA]
SA501428	5	1295446	UNK

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SA501428	5	152215069	clonal [NA]
SA501432	17	14633992	clonal [early]
SA501432	17	15243372	clonal [late]
SA501432	20	53170164	clonal [early]
SA501432	5	64503435	clonal [early]
SA501436	13	97585947	clonal [NA]
SA270416	15	37994973	clonal [NA]
SA501449	8	53617384	clonal [NA]
SA501453	11	65023698	clonal [NA]
SA501453	15	71645723	clonal [NA]
SA501453	19	33761713	clonal [NA]
SA501453	19	33771850	clonal [NA]
SA501453	19	4558119	clonal [NA]
SA501453	2	105457535	clonal [early]
SA501453	4	122742408	clonal [early]
SA515239	1	35838753	clonal [NA]
SA515239	13	81850217	clonal [NA]
SA515239	2	42456653	clonal [early]
SA268027	4	173136730	clonal [early]
SA268027	8	68971987	clonal [late]
SA501469	5	673527	clonal [NA]
SA501476	19	36212638	clonal [early]
SA501476	4	3421281	clonal [early]
SA501476	4	3421872	clonal [early]
SA501476	7	71198422	clonal [early]
SA501481	1	57256948	clonal [NA]
SA501481	12	23811473	clonal [NA]
SA501481	16	72095191	clonal [NA]
SA501481	9	24184263	clonal [NA]
SA269680	1	103229235	clonal [early]
SA269680	10	1863122	clonal [early]
SA269680	12	124913292	clonal [early]
SA269680	15	47607048	clonal [early]
SA269680	15	47631298	clonal [early]
SA269680	16	83507195	clonal [early]
SA269680	2	198580596	clonal [early]
SA269680	21	15570249	clonal [late]
SA269680	5	1296758	UNK
SA269680	7	71492688	clonal [early]
SA269680	8	2044140	clonal [early]
SA269680	9	125414595	clonal [early]
SA501485	7	154265624	clonal [early]
SA501511	10	20525537	clonal [NA]
SA501511	13	38591685	clonal [NA]
SA501511	16	22353649	clonal [NA]
SA501511	19	36213881	clonal [NA]
SA501511	4	33650688	clonal [NA]
SA501511	8	57507935	clonal [NA]

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SA501511	8	68545531	clonal [NA]
SA501511	8	123142216	UNK
SA501534	12	30301892	clonal [early]
SA501534	13	104216191	clonal [early]
SA501534	15	48094881	clonal [NA]
SA501534	15	48094993	UNK
SA501534	2	14604533	clonal [NA]
SA501534	4	63879563	clonal [NA]
SA501541	1	80934662	clonal [NA]
SA501541	12	30643865	clonal [NA]
SA501541	6	162294373	clonal [late]
SA501541	6	162298238	clonal [late]
SA515300	2	202708332	clonal [NA]

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Supplementary Data 4. Real-time timing of whole-genome duplication events along with HBV insertions clonal states

This list shows the whole-genome duplication time (expressed in years before diagnoses, WGD.time) for each sample relative to the clonal states for each viral integration in the sample. The events classified as 'early' have occurred before the WGD, whereas those classified as 'late' took place after the WGD. Integrations are also classified as single or reciprocal.

Tumor_wgs_singlegc_sample_id	CHROM	POS	WGD.time (years)	Clonal_state	Cluster_type
SA501427	5	88432443	0.47	clonal [early]	single
SA501427	5	88754908	0.47	clonal [late]	single
SA540527	1	118079033	2.11	clonal [late]	single
SA540527	4	8437092	2.11	clonal [early]	reciprocal
SA515397	2	186622915	NA	clonal [early]	single
SA515397	2	186641095	NA	clonal [early]	single
SA501464	1	26783196	3.11	clonal [early]	single
SA501464	13	106702489	3.11	clonal [early]	single
SA501464	18	53691840	3.11	clonal [NA]	reciprocal
SA501464	19	36212782	3.11	clonal [NA]	reciprocal
SA529818	12	58550792	3.88	clonal [early]	reciprocal
SA529818	5	1295276	3.88	clonal [early]	single
SA269383	4	172915474	0.64	clonal [late]	single
SA269383	5	1295481	0.64	clonal [late]	single
SA269383	5	83888550	0.64	clonal [NA]	single
SA269383	7	19954966	0.64	clonal [late]	single
SA501645	10	7312350	20.96	clonal [early]	single
SA268678	20	22888104	2.54	clonal [early]	single
SA268678	4	81859531	2.54	clonal [late]	single
SA268678	8	14683129	2.54	clonal [NA]	single
SA268678	8	35129704	2.54	UNK	reciprocal
SA270402	6	164970004	NA	clonal [NA]	single
SA270402	8	63280968	NA	clonal [early]	single
SA501432	17	14633992	6.12	clonal [early]	single
SA501432	17	15243372	6.12	clonal [late]	single
SA501432	20	53170164	6.12	clonal [early]	reciprocal
SA501432	5	64503435	6.12	clonal [early]	single
SA501453	11	65023698	0.22	clonal [NA]	single
SA501453	15	71645723	0.22	clonal [NA]	reciprocal
SA501453	19	33761713	0.22	clonal [NA]	single
SA501453	19	33771850	0.22	clonal [NA]	single
SA501453	19	4558119	0.22	clonal [NA]	single
SA501453	2	105457535	0.22	clonal [early]	reciprocal
SA501453	4	122742408	0.22	clonal [early]	single
SA268027	4	173136730	4.65	clonal [early]	single
SA268027	8	68971987	4.65	clonal [late]	single
SA501476	19	36212638	2.95	clonal [early]	reciprocal
SA501476	4	3421281	2.95	clonal [early]	single

SA501476	4	3421872	2.95	clonal [early]	single
SA501476	7	71198422	2.95	clonal [late]	reciprocal
SA269680	1	103229235	0.23	clonal [early]	reciprocal
SA269680	10	1863122	0.23	clonal [early]	single
SA269680	12	124913292	0.23	clonal [early]	single
SA269680	15	47607048	0.23	clonal [early]	single
SA269680	15	47631298	0.23	clonal [early]	single
SA269680	16	83507195	0.23	clonal [early]	single
SA269680	2	198580596	0.23	clonal [early]	single
SA269680	21	15570249	0.23	clonal [late]	single
SA269680	5	1296758	0.23	UNK	single
SA269680	7	71492688	0.23	clonal [early]	single
SA269680	8	2044140	0.23	clonal [early]	single
SA269680	9	125414595	0.23	clonal [early]	reciprocal

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Supplementary Data 5. Genomic features at HBV integration insertion sites.
This table shows the following genomic features for each integration position: REP, REPSUB and DIST= repeats and their subfamilies near the integration position are shown, together with their distance (in bp) to the breakpoint; REGION and GENE= genomic region and nearest genes to the breakpoint. For intergenic regions, the distance (dist in bp) to the nearest genes is shown; FragileSite= fragile site ID for those regions coincident with them. It is indicated if the integration is coupled with a telomeric deletion (CNV_related) and the replication time is also shown (ReplicationTimingClass). Finally, for those genes that are present in the Cancer Gene Census (CGC) or Intogen, their main characteristics are shown. CGC: genomic coordinates (Genome_Location); availability of functional annotation for the gene (Hallmark); diseases associated with somatic (Tumour_Type_Somatic) or germline (Tumour Type Germline) mutations in the gene; the affected tissue (Tissue_Type): leukaemia/lymphoma (L), Epithelial (E), Mesenchymal (M), other (O); the role of the gene in cancer (Role_in_Cancer): tumour suppressor gene (TSG), oncogene, fusion (the gene is known to be involved in oncogenic fusions); mutation type: frameshift (F), missense (Mis), Translocation (T), large deletion (D), nonsense (N), amplification (A), other (O); gene symbol of fusion partner (Translocation_Partners). Intogen: acronym of the cancer type (CANCER_TYPE); consensus mode of action of the gene (ROLE): loss of function (LoF), activating (Act), ambiguous (Amb); Gene annotated in the CGC (CGC_GENE); Gene annotated in the CGC as driver (CGC_CANCER_GENE). Note that this table is split for illustrative purposes. Thus, the information obtained from CGC and Intogen is in the second part of this table where, for simplicity, only genes included in those databases are shown.

Legend (Column letter = Column title)

A = Tumor_wgs_icgc_sample_id
B = CHROM
C = POS
D = REP
E = REPSUB
F = DIST
G = REGION
H = GENE
I = Fragile_site
J = CNVRelated
K = ReplicationTimingClass
L = Genome_Location
M = Hallmark
N = Tumour_Types(Somatic)
O = Tumour_Types(Germline)
P = Tissue_Type
Q = Role_in_Cancer
R = Mutation_Types
S = Translocation_Partner
T = CANCER_TYPE
U = ROLE
V = CGC_GENE
W = CGC_CANCER_GENE

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A	B	C	D	E	F	G	H	I	J	K
SA515316	5	1298125	Alu,ERVL-MaLR	AluSq,MLT1D	55	intergenic	TERT(dist=2963),MIR4457(dist=11197)	NA	NON	Early
SA515318	4	181086000	MIR,MIR	MIR3,MIRc	72,98	intergenic	RP11-404J23.1(dist=699541),RP11-460H9.1(dist=566316)	NA	CNV_related	Late
SA515318	4	190730769	None	None	None	intergenic	RNU1-51P(dist=99901),AF250324.1(dist=9053)	NA	NON	Mod
SA515318	5	1295647	None	None	None	upstream	TERT(dist=485)	NA	NON	Early
SA515318	5	1296158	None	None	None	upstream	TERT(dist=996)	NA	NON	Early
SA515318	7	729324	Alu	AluY	0	intronic	PRKAR1B	FRA7B	NON	Early
SA501427	5	88432443	None	None	None	ncRNA_intronic	MEF2C-AS1	NA	NON	Late
SA501427	5	88754908	None	None	None	ncRNA_intronic	MEF2C-AS1	NA	NON	Late
SA267718	1	237656520	None	None	None	intronic	RYR2	NA	NON	Mod
SA267718	2	118543576	None	None	None	ncRNA_intronic	AC009312.1	FRA2S	NON	Mod
SA267718	5	1295278	Simple_repeat	(CGGGG)n	0	upstream	TERT(dist=116)	NA	NON	Early
SA267718	9	137029137	Alu	AluSx	88	downstream	RNU6ATAC(dist=396)	NA	NON	Early
SA540527	1	118079033	L2,Alu	L2a,AluJb	29	intergenic	MAN1A2(dist=7539),AL157902.3(dist=60420)	NA	CNV_related	Mod
SA540527	4	8437092	Alu	AluY	99	NA	NA	FRA4A	NON	Mod
SA515397	2	186622915	TcMar-Tigger,L1	Tigger2a,L1MD2	98	intronic	FSIP2	FRA2H	NON	Mod
SA515397	2	186641095	Alu,Low_complexity	AluSz,AT_rich	94,74	intronic	FSIP2	FRA2H	NON	Mod
SA515415	5	1295144	Simple_repeat	(CGGGG)n	37	UTR5	TERT(ENST00000310581.5:c.-40_-41delins0,ENST00000296820.5:c.-40_-41delins0)	NA	NON	Early
SA501456	5	1275382	Alu	AluSq	0	intronic	TERT	NA	NON	Early
SA501456	5	173125602	L2	L2c	0	ncRNA_intronic	CTB-43E15.2	FRA5G	NON	Early

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SA529714	18	40716643	None	None	None	intergenic	RIT2(dist=20986),SYT4(dist=131199)	NA	CNV_related	Late
SA529714	3	24001321	None	None	None	intronic	NR1D2	FRA3A	NON	Mod
SA501460	7	155443987	L1	HAL1	0	intronic	RBM33	FRA7I	NON	Early
SA501460	7	91671904	None	None	None	intronic	AKAP9	FRA7E	NON	Mod
SA501460	8	37337657	None	None	None	ncRNA_exonic	RP11-150O12.2	NA	CNV_related	Mod
SA501460	8	49642746	None	None	None	intronic	EFCAB1	NA	NON	Mod
SA501464	1	26783196	Alu	AluSx	13	intronic	DHDDS	FRA1A	NON	Early
SA501464	13	106702489	L2	L2c	5	intergenic	SNORA25(dist=152497),AL603632.1(dist=78230)	NA	NON	Late
SA501464	18	53691840	Alu	AluSx1	0	ncRNA_intronic	CTD-2008L17.2	NA	NON	Late
SA501464	19	36212782	None	None	None	intronic	KMT2B	FRA19A	NON	Early
SA529726	3	21222310	L1	L1ME4a	0	intergenic	AC104441.1(dist=42477),AC104183.1(dist=207714)	NA	CNV_related	Late
SA529726	4	171417047	L1	L1PA10	0	intergenic	RP11-789C1.2(dist=123585),HSP90AA6P(dist=85573)	NA	CNV_related	Late
SA529726	5	12035	telo	TAR1	0	intergenic	NONE(dist=NONE),CTD-2231H16.1(dist=80230)	NA	NON	NA
SA529726	5	1296719	None	None	None	intergenic	TERT(dist=1557),MIR4457(dist=12705)	NA	NON	Early
SA529726	7	80512238	Low_complexity,Simple_repeat	AT_rich,(CAA)n	82,74	intronic	SEMA3C	NA	CNV_related	Mod
SA529726	X	150837858	L1	L1MA4	0	intronic	PASD1	FRAXF	CNV_related	Mod
SA501480	19	29087481	Simple_repeat	(T)n	88	ncRNA_intronic	AC005307.3,AC005616.1	NA	NON	Mod
SA501491	4	79048012	L2	L2a	97	intronic	FRAS1	NA	NON	Early
SA501491	6	68664025	None	None	None	intergenic	RP11-301G19.1(dist=64794),RP11-542F9.1(dist=101217)	NA	NON	Late
SA501491	8	39200449	hAT-Tip100,L1	MER45B,L1MA7	19	ncRNA_intronic	ADAM5	NA	NON	Mod
SA267880	10	129391638	None	None	None	intergenic	NPS(dist=40703),FOXI2(dist=143860)	FRA10D	CNV_related	Mod
SA267880	8	56030290	MIR	MIRc	0	intronic	XKR4	NA	NON	Late

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SA529759	1	234101917	None	None	None	intronic	SLC35F3	FRA1H	NON	Mod
SA529759	1	234103103	None	None	None	intronic	SLC35F3	FRA1H	NON	Mod
SA529759	19	30304904	None	None	None	intronic	CCNE1	NA	NON	Mod
SA529759	19	30305249	None	None	None	intronic	CCNE1	NA	NON	Mod
SA529759	6	44270937	None	None	None	intronic	AARS2,RP11-444E17.6,TMEM151B	FRA6H	NON	Early
SA501514	7	145783069	Low_complexity	AT_rich	79	intergenic	AC006007.1(dist=404607),RN7SL207P(dist=10099)	NA	NON	Late
SA529818	12	58550792	L1	L1MEc	0	intergenic	RP11-58A17.4(dist=63647),RP11-362K2.2(dist=387100)	NA	NON	Mod
SA529818	5	1295276	Simple_repeat	(CGGGG)n	0	upstream	TERT(dist=114)	NA	NON	Early
SA529823	4	55244192	MIR,Alu	MIR,AluSx1	45,46	intergenic	RP11-231C18.2(dist=1273),RP11-545H22.1(dist=62476)	FRA4B	NON	Mod
SA529823	4	61881868	L1	L1PA4	0	intergenic	MIR548AG1(dist=93466),RP11-16N2.1(dist=127505)	NA	NON	Late
SA529823	5	19301234	Simple_repeat	(TA)n	85	intergenic	RP11-124N3.3(dist=158779),CDH18(dist=171906)	FRA5E	CNV_related	Late
SA529830	17	14933981	hAT-Charlie,MIR	Cheshire,MIR	70	ncRNA_intronic	AC005772.2	FRA17A	CNV_related	Mod
SA529830	5	129990973	L2,Helitron	L2a,Helitron1Na_Mam	56,94	intergenic	RNU7-53P(dist=268600),HINT1(dist=503746)	NA	NON	Mod
SA529830	8	41308676	TcMar-Tigger,Alu	Tigger3c,AluSx1	68	intergenic	RP11-15G16.1(dist=10738),GOLGA7(dist=39238)	NA	CNV_related	Mod
SA501523	3	24499330	DNA	MER135	0	ncRNA_intronic	THRB-IT1	FRA3A	NON	Mod
SA501523	6	88968979	L1	L1PA6	0	intergenic	CNR1(dist=92901),RP11-459O1.2(dist=39689)	FRA6G	NON	Mod
SA269383	4	172915474	None	None	None	intronic	GALNTL6	NA	CNV_related	Late
SA269383	5	1295481	None	None	None	upstream	TERT(dist=319)	NA	NON	Early
SA269383	5	83888550	None	None	None	intergenic	CTD-2269F5.1(dist=101967),CTC-384G19.1(dist=519609)	NA	NON	Late
SA269383	7	19954966	TcMar-Tigger	Tigger1	0	intergenic	AC004543.2(dist=97253),AC005062.	NA	NON	Late

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							2(dist=3648)			
SA501567	8	52216259	ERVL-MaLR,MIR	THE1B,MIRb	0,16	ncRNA_intronic	RP11-401H2.1	NA	NON	Late
SA515300	2	202708332	None	None	None	NA	NA	FRA2I	NON	Mod
SA500737	7	71061814	L2,Alu	L2,AluJb	56,75	intronic	WBSCR17	FRA7J	CNV_related	Mod
SA501631	3	169023914	Low_complexity	AT_rich	98	intronic	MECOM	NA	NON	Mod
SA501631	4	73539199	L1	L1PB3	0	intergenic	ADAMTS3(dist=104683),RNU4ATAC9P(dist=291695)	NA	CNV_related	Mod
SA270398	4	74108352	L1,TcMar-Mariner	L1M5,MADE2	0,28	intronic	ANKRD17	NA	NON	Early
SA501639	11	122939934	MIR,Alu	MIRb,AluY	95	intergenic	HSPA8(dist=6891),CLMP(dist=3100)	NA	NON	Mod
SA501639	17	58147104	None	None	None	exonic	HEATR6	FRA17B	NON	Early
SA501639	17	58157683	Simple_repeat	(TG)n	0	ncRNA_intronic	CTD-2319I12.2	FRA17B	NON	Early
SA501643	5	173175348	MIR,ERVL	MIRb,LTR16C	41,55	intergenic	AC008674.1(dist=18168),CTB-43E15.4(dist=40929)	FRA5G	NON	Early
SA501645	10	7312350	ERVL-MaLR	MLT1C	0	intronic	SFMBT2	NA	CNV_related	Mod
SA268678	20	22888104	ERVL,Alu	LTR32,AluSx	0,6	intergenic	AL158175.1(dist=174165),RP4-753D10.5(dist=102741)	NA	NON	Mod
SA268678	4	81859531	ERVK	MER9a3	0	intronic	C4orf22	NA	CNV_related	Late
SA268678	8	14683129	L1	L1MA7	0	intronic	SGCZ	NA	NON	Late
SA268678	8	35129704	ERVL	LTR16A	63	intronic	UNC5D	NA	NON	Late
SA501649	1	106996327	ERVL,ERVL	MLT2F,ERVL-E-int	0,22	intergenic	RP5-947P14.1(dist=369206),RP11-233E12.1(dist=364472)	NA	NON	Late
SA501649	1	220821610	None	None	None	intronic	MARK1	NA	NON	Mod
SA270402	6	164970004	ERV1,L1	LTR43,L1PA8A	13,13	intergenic	RP11-347L18.1(dist=200327),RP11-300M24.1(dist=271234)	NA	CNV_related	Late
SA270402	8	63280968	L1,ERV1	L1M2,MER65A	0,88	intronic	NKAIN3	NA	CNV_related	Mod
SA501424	1	245547462	MIR	MIR3	96	intronic	KIF26B	FRA1I	NON	Mod
SA501424	1	31503628	Alu	AluJb	60	intronic	PUM1	NA	CNV_related	Early
SA501424	11	87553673	Simple_repeat	(CA)n	0	intergenic	RP11-720D4.3(dist=123370),RP11-164N3.1(dist=229600)	FRA11F	CNV_related	Mod
SA501424	12	93019067	TcMar-Tigger	Tigger8	0	intergenic	snoU13(dist=80304),C12orf74(dist=7	NA	NON	Mod

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SA501424	19	36212667	None	None	None	exonic	KMT2B	FRA19A	NON	Early
SA501428	13	96965849	None	None	None	intronic	HS6ST3	FRA13D	NON	Mod
SA501428	5	1295446	None	None	None	upstream	TERT(dist=284)	NA	NON	Early
SA501428	5	152215069	None	None	None	intergenic	AC091969.1(dist=145980),GRIA1(dist=655036)	NA	CNV_related	Late
SA501432	17	14633992	Alu,L1	AluY,L1MC4	19	downstream	AC013248.2(dist=989)	FRA17A	NON	Mod
SA501432	17	15243372	L1	L1ME3C	0	UTR5	TEKT3(ENST00000395930.1:c.-8470_-8471delins0)	FRA17A	NON	Mod
SA501432	20	53170164	Alu	AluSg	0	intronic	DOK5	NA	NON	Mod
SA501432	5	64503435	None	None	None	intergenic	NONE(dist=NONE),ADAMTS6(dist=89599)	NA	NON	Mod
SA501436	13	97585947	L2	L2c	0	intergenic	HS6ST3(dist=100276),LINC00359(dist=7573)	FRA13D	NON	Mod
SA270416	15	37994973	None	None	None	intergenic	RP11-720L8.1(dist=211964),TMCO5A(dist=231849)	NA	NON	Mod
SA501449	8	53617384	None	None	None	intronic	RB1CC1	NA	NON	Mod
SA501453	11	65023698	Alu	AluSg4	0	intergenic	SLC22A20(dist=13470),POLA2(dist=5534)	FRA11H	CNV_related	Early
SA501453	15	71645723	None	None	None	intronic	THSD4	NA	NON	Mod
SA501453	19	33761713	L2,Alu	L2c,AluJo	0,52	intergenic	SLC7A10(dist=44957),CTD-2540B15.12(dist=13170)	FRA19A	NON	Early
SA501453	19	33771850	None	None	None	intergenic	SLC7A10(dist=55094),CTD-2540B15.12(dist=3033)	FRA19A	NON	Early
SA501453	19	4558119	L2	L2	91	exonic	SEMA6B	FRA19B	CNV_related	Early
SA501453	2	105457535	Simple_repeat	(TATATG)n	0	ncRNA_intronic	AC018730.1	FRA2S	NON	Mod
SA501453	4	122742408	None	None	None	intronic	CCNA2	NA	NON	Mod
SA515239	1	35838753	Alu,Simple_repeat	AluSz6,(TA)n	0,62	intronic	ZMYM4	NA	NON	Early
SA515239	13	81850217	ERVK	MER11B	0	ncRNA_intronic	RP11-452B18.2	NA	CNV_related	Late

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SA515239	2	42456653	MIR	MIR	84	intronic	EML4	NA	NON	Early
SA268027	4	173136730	L1	L1MC3	0	intronic	GALNTL6	NA	CNV_related	Late
SA268027	8	68971987	ERVL-MaLR	MLT1E2	0	intronic	PREX2	NA	NON	Mod
SA501469	5	673527	None	None	None	intronic	TPPP	NA	NON	Mod
SA501476	19	36212638	None	None	None	exonic	KMT2B	FRA19A	NON	Early
SA501476	4	3421281	Alu,Alu	AluSx,AluJr	40	intronic	RGS12	NA	NON	Early
SA501476	4	3421872	None	None	None	intronic	RGS12	NA	NON	Early
SA501476	7	71198422	None	None	None	intergenic	WBSCR17(dist=19838),CALN1(dist=46041)	FRA7J	NON	Mod
SA501481	1	57256948	Alu,L2	AluSz6,L2a	0,15	intronic	C1orf168	FRA1B	CNV_related	Early
SA501481	12	23811473	Alu	AluSx1	44	intronic	SOX5	NA	NON	Mod
SA501481	16	72095191	MIR	MIRb	0	intronic	HPR	NA	NON	Early
SA501481	9	24184263	L1	L1ME3	0	intergenic	RP11-321L2.2(dist=286211),IZUMO3(dist=358686)	FRA9C	CNV_related	Late
SA269680	1	103229235	TcMar-Mariner	MADE1	27	ncRNA_intronic	RP5-936J12.1	NA	NON	Late
SA269680	10	1863122	ERVL-MaLR	MLT1D	0	intergenic	ADARB2(dist=83452),LINC00700(dist=184544)	NA	CNV_related	Mod
SA269680	12	124913292	hAT-Charlie	MER3	0	intronic	NCOR2	FRA12E	CNV_related	Mod
SA269680	15	47607048	L1,Alu	L1MC1,AluY	0,1	intronic	SEMA6D	NA	NON	Late
SA269680	15	47631298	ERVL	MER21A	0	intronic	SEMA6D	NA	NON	Late
SA269680	16	83507195	None	None	None	intronic	CDH13	NA	CNV_related	Mod
SA269680	2	198580596	None	None	None	intronic	AC011997.1	FRA2I	NON	Mod
SA269680	21	15570249	L1	L1PA11	0	intronic	LIPI	NA	CNV_related	Mod
SA269680	5	1296758	None	None	None	intergenic	TERT(dist=1596),MIR4457(dist=12666)	NA	NON	Early
SA269680	7	71492688	Alu,Simple_repeat,Alu	AluSx1,(CA)n,AluY	0,47,71	intronic	CALN1	FRA7J	CNV_related	Mod
SA269680	8	2044140	None	None	None	exonic	MYOM2	NA	NON	Mod
SA269680	9	125414595	Low_complexity	AT_rich	70	intergenic	RP11-64P14.7(dist=12631),OR1L1(dist=92	NA	NON	Mod

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SA501485	7	154265624	CR1	L3	29	intronic	DPP6	FRA7I	NON	Late
SA501511	10	20525537	Alu	AluJb	86	intronic	PLXDC2	NA	CNV_related	Mod
SA501511	13	38591685	L1	L1MA4A	0	intergenic	TRPC4(dist=147123),LINC00571(dist=36149)	NA	CNV_related	Mod
SA501511	16	22353649	L1	L1MA9	0	intergenic	POLR3E(dist=7225),CDR2(dist=3607)	NA	NON	Early
SA501511	19	36213881	None	None	None	exonic	KMT2B	FRA19A	NON	Early
SA501511	4	33650688	hAT-Charlie	MER20	49	intergenic	AC079772.1(dist=112224),RNU7-131P(dist=135868)	FRA4D	CNV_related	Late
SA501511	8	57507935	MIR	MIRb	96	intergenic	RP11-17A4.1(dist=6589),RP11-17A4.4(dist=44524)	NA	CNV_related	Mod
SA501511	8	68545531	L1,L1	L1MEe,L1MEe	36	intronic	CPA6	NA	CNV_related	Mod
SA501511	8	123142216	Alu,Alu	AluSx3,AluSx	56,48	intergenic	RP11-398G24.2(dist=2793),RP11-94A24.1(dist=284354)	FRA8E	CNV_related	Mod
SA501534	12	30301892	ERVL	ERV3-16A3_I-int	0	intergenic	U3(dist=248952),RP11-776A13.1(dist=52023)	NA	CNV_related	Mod
SA501534	13	104216191	ERVL-MaLR	THE1C-int	0	intergenic	RP11-123H22.1(dist=136156),DAOA-AS1(dist=1895212)	NA	NON	Late
SA501534	15	48094881	None	None	None	intergenic	SEMA6D(dist=28461),RP11-198M11.2(dist=16941)	NA	NON	Late
SA501534	15	48094993	MIR	MIR	32	intergenic	SEMA6D(dist=28573),RP11-198M11.2(dist=16831)	NA	NON	Late
SA501534	2	14604533	L1,Low_complexity,Alu	L1MA9,AT_rich,AluSp	32,0,54	intergenic	LINC00276(dist=63451),AC011897.2(dist=152018)	NA	NON	Late
SA501534	4	63879563	L1	L1MA3	0	intergenic	AC110810.1(dist=418383),RP11-257A22.1(dist=114465)	NA	NON	Late
SA501541	1	80934662	L1,L1	L1ME3A,L1ME3A	60	intergenic	RP11-339D23.1(dist=94356),RP11-115A15.1(dist=65990)	FRA1L	NON	Late
SA501541	12	30643865	None	None	None	intergenic	RP11-155I9.1(dist=169315),IPO8(dist=138036)	NA	NON	Mod
SA501541	6	162294373	None	None	None	intronic	PARK2	FRA6E	NON	Late

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SA501541	6	162298238	None	None	None	intronic	PARK2	FRA6E	NON	Late
SA515300	2	202708332	None	None	None	intronic	CDK15	FRA2I	NON	Mod

			Cancer Gene Census							Intogen			
A	B	C	L	M	N	O	P	Q	R	S	T	U	V	W
SA515316	5	1298125	5:1253167-1295047	Yes	melanoma, glioblastoma, hepatocellular carcinoma, bladder, skin basal cell, skin squamous cell, mesothelioma, medulloblastoma, other tumour types	melanoma	E, O	oncogene, TSG	Promoter Mis					
SA515318	5	1295647	5:1253167-1295047	Yes	melanoma, glioblastoma, hepatocellular carcinoma, bladder, skin basal cell, skin squamous cell, mesothelioma, medulloblastoma, other tumour types	melanoma	E, O	oncogene, TSG	Promoter Mis					
SA515318	5	1296158	5:1253167-1295047	Yes	melanoma, glioblastoma, hepatocellular carcinoma, bladder, skin basal cell, skin squamous cell, mesothelioma, medulloblastoma, other tumour types	melanoma	E, O	oncogene, TSG	Promoter Mis					
SA267718	5	1295278	5:1253167-1295047	Yes	melanoma, glioblastoma, hepatocellular carcinoma,	melanoma	E, O	oncogene, TSG	Promoter Mis					

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					bladder, skin basal cell, skin squamous cell, mesothelioma, medulloblastoma, other tumour types									
SA515415	5	1295144	5:1253167-1295047	Yes	melanoma, glioblastoma, hepatocellular carcinoma, bladder, skin basal cell, skin squamous cell, mesothelioma, medulloblastoma, other tumour types	melanoma	E, O	oncogene, TSG	Promoter Mis					
SA501456	5	1275382	5:1253167-1295047	Yes	melanoma, glioblastoma, hepatocellular carcinoma, bladder, skin basal cell, skin squamous cell, mesothelioma, medulloblastoma, other tumour types	melanoma	E, O	oncogene, TSG	Promoter Mis					
SA501460	7	91671904	7:91940867-92110673		papillary thyroid		E	fusion	T	BRAF				
SA501464	19	36212782									OS,VV	LoF	FALSE	FALSE
SA529726	5	1296719	5:1253167-1295047	Yes	melanoma, glioblastoma, hepatocellular carcinoma, bladder, skin basal cell, skin squamous cell, mesothelioma, medulloblastoma, other tumour types	melanoma	E, O	oncogene, TSG	Promoter Mis					
SA529759	19	30304904	19:29811898-29824308	Yes	serous ovarian		E	oncogene	A					

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SA529759	19	30305249	19:29811898-29824308	Yes	serous ovarian		E	oncogene	A					
SA529818	5	1295276	5:1253167-1295047	Yes	melanoma, glioblastoma, hepatocellular carcinoma, bladder, skin basal cell, skin squamous cell, mesothelioma, medulloblastoma, other tumour types	melanoma	E, O	oncogene, TSG	Promoter Mis					
SA269383	5	1295481	5:1253167-1295047	Yes	melanoma, glioblastoma, hepatocellular carcinoma, bladder, skin basal cell, skin squamous cell, mesothelioma, medulloblastoma, other tumour types	melanoma	E, O	oncogene, TSG	Promoter Mis					
SA501631	3	169023914	3:169083499-169146305		AML, CML, MDS		L	oncogene, fusion	T	RUNX1, ETV6, PRDM16, RPN1	CM,DLBCL,SBCC,BLCA,UCEC,PRAD	Act	TRUE	FALSE
SA501645	10	7312350									MBL	Act	FALSE	FALSE
SA501424	19	36212667									OS,VV	LoF	FALSE	FALSE
SA501428	5	1295446	5:1253167-1295047	Yes	melanoma, glioblastoma, hepatocellular carcinoma, bladder, skin basal cell, skin squamous cell, mesothelioma, medulloblastoma, other tumour types	melanoma	E, O	oncogene, TSG	Promoter Mis					
SA515239	2	42456653	2:42169350-42332548	Yes	NSCLC		E	fusion	T	ALK	ESCA,SCLC	ambiguous	TRUE	FALSE

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SA268027	8	68971987	8:67952118-68237030	Yes	melanoma, pancreatic ductal adenocarcinoma		E	oncogene	Mis, N		ESCA,CM,DLBCL,BLCA,PRAD,BRCA	Act	TRUE	FALSE
SA501476	19	36212638									OS,VV	LoF	FALSE	FALSE
SA269680	12	124913292	12:124324415-124495252	Yes	prostate		E	TSG	Mis, F, N, O		BRCA,COREAD,PRAD,ESCA,HC	Act	TRUE	TRUE
SA269680	5	1296758	5:1253167-1295047	Yes	melanoma, glioblastoma, hepatocellular carcinoma, bladder, skin basal cell, skin squamous cell, mesothelioma, medulloblastoma, other tumour types	melanoma	E, O	oncogene, TSG	Promoter Mis					
SA501511	19	36213881									OS,VV	LoF	FALSE	FALSE

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Supplementary Data 6. TSG deleted by HBV coupled rearrangements

For each deletion associated with an HBV integration, genes catalogued as TSG or LoF by CGC or Intogen are shown, along with their main features (see Supplementary Data 5 for a detailed description of CGC and Intogen features).

Legend (Column letter = Column title)

A = Tumor_wgs_icgc_sample_id
B = CHROM
C = POS
D = GENE
E = Genome_Location
F = Hallmark
G = Tumour_Types(Somatic)
H = Tumour_Types(Germline)
I = Tissue_Type
J = Role_in_Cancer
K = Mutation_Types
L = Translocation_Partner
M = CANCER_TYPE
N = ROLE
O = CGC_GENE
P = CGC_CANCER_GENE

				Cancer Gene Census								Intogen			
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
SA515318	4	181086000	CASP3	4:184627696-184649475		ovarian cancer		E	TSG	D		NA	NA	NA	NA
SA515318	4	181086000	FAT1	4:186587783-186723855	Yes	oral squamous cell, chemorefractory CLL, head and neck, pancreatic acinar cell carcinoma	pancreatic	E, L	TSG	Mis, N, F, S		CLL,ESCA,CESC,BCNET,VV,UCEC,LUSC,AN,SSCC,SBCC,BLCA,MBL,HNSC,PRAD,PAAD,OV,BRCA,HC,ST,UVM	LoF	TRUE	FALSE
SA540527	1	118079033	ARHGEF10L	1:17539835-17697869		lymphoma		L	TSG	D		MBL,SBCC,ST	LoF	TRUE	FALSE
SA540527	1	118079033	ARID1A	1:26696033-26782110	Yes	clear cell ovarian carcinoma, RCC, breast		E	TSG, fusion	Mis, N, F, S, D, T	MAST2	ESCA,DLBCL,GBM,SBCC,BLCA,RCCC,UCEC,HC,MBL,SCLC,CESC,NHLY,UCS,COREAD,PIA,RPC,CLL,CH,BLY,LUAD,LUSC,NSCLC,LGG,ST,PRAD,PAAD,BRCA,OV,OS	LoF	TRUE	FALSE

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SA540527	1	118079033	ATP1A1	1:116373867-116404772	Yes	adrenal aldosterone producing adenoma		E	oncogene, TSG	Mis, O		NA	NA	NA	NA
SA540527	1	118079033	BCL10	1:85266248-85277090	Yes	MALT		L	TSG, fusion	T	IGH	DLBCL	ambiguous	TRUE	FALSE
SA540527	1	118079033	CAMTA1	1:6785324-7769706	Yes	epithelioid haemangioendothelioma		M	TSG, fusion	T	WWTR1	HC	LoF	TRUE	FALSE
SA540527	1	118079033	CASP9	1:15492270-15524295		glioma		O	TSG	D		NA	NA	NA	NA
SA540527	1	118079033	CASZ1	NA	NA	NA	NA	NA	NA	NA	NA	PRAD	LoF	FALSE	FALSE
SA540527	1	118079033	CD58	NA	NA	NA	NA	NA	NA	NA	NA	NHLY,DLBCL	LoF	FALSE	FALSE
SA540527	1	118079033	CDKN2C	1:50960745-50974633	Yes	glioma, MM		O, L	TSG	D		HGG,LGG	LoF	TRUE	TRUE
SA540527	1	118079033	EPHA2	NA	NA	NA	NA	NA	NA	NA	NA	CH	LoF	FALSE	FALSE
SA540527	1	118079033	EPS15	1:51354263-51519328	Yes	ALL		L	TSG, fusion	T	KMT2A	PRAD	Act	TRUE	FALSE
SA540527	1	118079033	FUBP1	1:77948405-77979086	Yes	oligodendroglioma		O	oncogene	F, N		CLL,LGG	LoF	TRUE	TRUE
SA540527	1	118079033	ID3	1:23557918-23559794		Burkitt lymphoma		L	TSG	Mis, N		DLBCL	LoF	TRUE	FALSE
SA540527	1	118079033	JAK1	1:64833229-64966504	Yes	ALL		L	oncogene, TSG	Mis		OV,UCEC,PRAD	ambiguous	TRUE	FALSE
SA540527	1	118079033	MUTYH	1:45329242-45340388			colorectal	E	TSG	Mis		NA	NA	NA	NA
SA540527	1	118079033	PRDM2	1:13704855-13825079		glioma, colon adenocarcinoma, gastric carcinoma, ovarian carcinoma, HNSCC		E, O	TSG	O, F		HC,RPC,AN	ambiguous	TRUE	FALSE
SA540527	1	118079033	RBM15	1:110338506-	Y	acute		L	fusion	T	MKL1	HNSC	LoF	TRUE	FALSE

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				110346677	es	megakaryocytic leukaemia								
SA540527	1	118079033	RPL22	1:6185020-6199612		AML, CML		L	TSG, fusion	T	RUNX1	HC	Act	TRUE	FALSE
SA540527	1	118079033	RPL5	1:92831983-92841924		T-ALL		L	TSG	Mis, N, F		NA	NA	NA	NA
SA540527	1	118079033	SDHB	1:17018722-17054170			paraganglioma, pheochromocytoma	O	TSG	Mis, N, F		NA	NA	NA	NA
SA540527	1	118079033	SFPQ	1:35182932-35193148	Yes	papillary renal		E	TSG, fusion	T	TFE3	NA	NA	NA	NA
SA540527	1	118079033	SPEN	1:15847864-15940460		SMZL, adenoid cystic carcinoma, DLBCL		L	TSG	F, Mis, N		CLL,CESC,DLBCL,RCCC,PRAD,PAAD,BRCA,SG,NSPH	ambiguous	TRUE	TRUE
SA540527	1	118079033	TNFRSF14	1:2556366-2563829		follicular lymphoma		L	TSG	Mis, N, F		NHLY,DLBCL,LY	LoF	TRUE	FALSE
SA540527	1	118079033	TRIM33	1:114392777-114511160		papillary thyroid		E	TSG, fusion	T	RET	MBL	ambiguous	TRUE	FALSE
SA529714	18	40716643	DCC	18:52340172-53535899		CRC, melanoma, SCC		E		Mis, N, D		ESCA,PAAD	LoF	TRUE	FALSE
SA529714	18	40716643	MALT1	18:58671386-58754477		MALT		L	oncogene, fusion	T	BIRC3	DLBCL	LoF	TRUE	FALSE
SA529714	18	40716643	SMAD2	18:47808957-47930559	Yes	colorectal carcinoma, hepatocellular carcinoma		E	TSG	Mis, N		BRCA,COREAD	LoF	TRUE	TRUE
SA529714	18	40716643	SMAD4	18:51030213-51085039	Yes	colorectal, pancreatic, small intestine	gastrointestinal polyp	E	TSG	D, Mis, N, F		ESCA,CESC,CH,COREAD,ST,HNSC,PRAD,PAAD,BRCA	LoF	TRUE	TRUE
SA501460	8	37337657	ARHGEF10	8:1824015-1958641		colon cancer		E	TSG	D		SSCC,SCLC,NSCLC,ANGS	ambiguous	TRUE	FALSE
SA501460	8	37337657	LEPROTL1	8:30095480-30138348		lung cancer, colon cancer		E	TSG	D		NA	NA	NA	NA
SA501460	8	37337657	NRG1	8:32548635-32764407		NSCLC		E	TSG, fusion	T	CD74	ST	Act	TRUE	FALSE
SA501460	8	37337657	WRN	8:31033801-31173769			osteosarcoma, meningiom	L, E, M,	TSG	Mis, N, F, S		NSPH	LoF	TRUE	FALSE

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						a, other tumour types	O							
SA529726	3	21222310	ATG7	NA	NA	NA	NA	NA	NA	NA	RCCC	LoF	FALSE	FALSE
SA529726	3	21222310	FANCD2	3:10026414-10099660	Yes	AML, leukaemia	L	TSG	D, Mis, N, F		COREAD,CM	LoF	TRUE	FALSE
SA529726	3	21222310	FBLN2	3:13549131-13638422		breast cancer, colorectal adenocarcinoma	E	TSG	Mis, S		NA	NA	NA	NA
SA529726	3	21222310	PPARG	3:12351472-12434356	Yes	follicular thyroid	E	TSG, fusion	T	PAX8	NA	NA	NA	NA
SA529726	3	21222310	VHL	3:10141008-10152220	Yes	renal, haemangioma, pheochromocytoma	renal, haemangioma, pheochromocytoma	E, M, O	TSG	D, Mis, N, F, S		RCCC,THYM	LoF	TRUE	FALSE
SA529726	3	21222310	XPC	3:14145147-14178783			skin basal cell, skin squamous cell, melanoma	E	TSG	Mis, N, F, S		HC	LoF	TRUE	FALSE
SA529726	4	171417047	CASP3	4:184627696-184649475		ovarian cancer		E	TSG	D		NA	NA	NA	NA
SA529726	4	171417047	FAT1	4:186587783-186723855	Yes	oral squamous cell, chemorefractory CLL, head and neck, pancreatic acinar cell carcinoma	pancreatic	E, L	TSG	Mis, N, F, S		CLL,ESCA,CESC,BCNET,VV,UCEC,LUSC,AN,SSCC,SBCC,BLCA,MBL,HNSC,PRAD,PAAD,OV,BRCA,HC,ST,UVM	LoF	TRUE	FALSE
SA529726	7	80512238	HOXA11	7:27181515-27185216	Yes	CML		L	oncogene, TSG, fusion	T	NUP98	UCEC	ambiguous	TRUE	FALSE
SA529726	7	80512238	HOXA9	7:27162435-27165530		AML*		L	oncogene, TSG,	T	NUP98, MSI2	NA	NA	NA	NA

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								fusion						
SA529726	7	80512238	IKZF1	7:50304669-50405101		ALL, DLBCL		L	TSG, fusion	D,T	BCL6	ALL,AML,CM,AN	ambiguous	TRUE	FALSE
SA529726	7	80512238	NT5C3A	NA	NA	NA	NA	NA	NA	NA	NA	AML	LoF	FALSE	FALSE
SA529726	7	80512238	PMS2	7:5973239-6009125	Yes		colorectal, endometrial, ovarian, medulloblastoma, glioma	E	TSG	Mis, N, F		PRAD	LoF	TRUE	FALSE
SA529726	7	80512238	SBDS	7:66987677-66995601			AML, MDS	L	TSG	F, N, O		NA	NA	NA	NA
SA529726	7	80512238	SFRP4	7:37905932-37916915		colorectal cancer, melanoma, SCC, gastric cancer, oesophageal SCC		E	TSG	Mis		NA	NA	NA	NA
SA529726	X	150837858	AMER1	X:64185117-64205744	Yes	Wilms tumour		O	TSG	F, D, N, Mis		COREAD,WT	LoF	TRUE	TRUE
SA529726	X	150837858	ATRX	X:77504878-77786269	Yes	pancreatic neuroendocrine tumours, paediatric GBM		E	TSG	Mis, F, N		ACC,CLL,PIA,PAIS,LEIS,NB,GBM,LGG,S,OV,HGG,OS	LoF	TRUE	TRUE
SA529726	X	150837858	BCOR	X:40051248-40097403	Yes	retinoblastoma, AML, APL (translocation)		L, M	TSG, fusion	F, N, S, T	RARA	ACC,CLL,ALL,CH,UCS,AML,THYM,COREAD,PIA,GBM,ST,MBL,UCEC,EWS	LoF	TRUE	FALSE
SA529726	X	150837858	BCORL1	X:130005188-130058083	Yes	AML, HNSCC		E, L	oncogene, TSG	Mis, N, F		COREAD,HGG,NB,OS,PAAD	LoF	TRUE	FALSE
SA529726	X	150837858	BTK	X:101349447-101390796	Yes	CLL, mantle cell lymphoma, WM		L	oncogene, TSG	Mis		NHLY,LUAD	Act	TRUE	FALSE
SA529726	X	150837858	DDX3X	X:41333284-41351668	Yes	CLL, medulloblastoma		L, O	TSG	Mis, N, F		CLL,MBL,NHLY,BLY,CM,DLBCL,PIA,HNSC,BRCA,MESO,LY	LoF	TRUE	FALSE
SA529726	X	150837858	EIF1AX	X:20124518-20141844		uveal melanoma, thyroid cancer		E		Mis, S		THCA,UCEC,PRAD,THYM,UVM	LoF	TRUE	TRUE

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					(PDTC and ATC), low grade serous ovarian cancer									
SA529726	X	150837858	ELF4	X:130064928-130110495	Yes	AML		L	oncogene, TSG, fusion	T	ERG	AML	Act	TRUE	TRUE
SA529726	X	150837858	FOXO4	X:71096197-71103535		AL, soft tissue sarcoma		L, M	oncogene, TSG, fusion	T	KMT2A, CIC	NA	NA	NA	NA
SA529726	X	150837858	GATA1	X:48786554-48794308	Yes	megakaryoblastic leukaemia of Downs syndrome		L	oncogene, TSG	Mis, F		BRCA	Act	TRUE	FALSE
SA529726	X	150837858	GPC3	X:133535754-133985646	Yes		Wilms tumour	O	oncogene, TSG	D, Mis, N, F, S		NA	NA	NA	NA
SA529726	X	150837858	IRS4	X:108732482-108736409		glioma, rhabdomyosarcoma, melanoma, breast cancer, T-ALL		E, O, M, L	oncogene, TSG	Mis, F, T	TRB	BLCA,PAAD	LoF	TRUE	FALSE
SA529726	X	150837858	KDM5C	X:53192152-53225422		clear cell renal carcinoma		E	TSG	N, F, S, Mis		MM,RCCC,HNSC	LoF	TRUE	TRUE
SA529726	X	150837858	KDM6A	X:44873511-45112602	Yes	renal cell carcinoma, bladder carcinoma, oesophageal SCC, MM, medulloblastoma, T-ALL, other tumour types		E, L	oncogene, TSG	D, N, F, S		ESCA,MBL,ALL,CH,SCLC,LUSC,PIA,RPC,ST,SSCC,BLCA,HNSC,PRAD,PAAD,BRCA	LoF	TRUE	FALSE
SA529726	X	150837858	LPAR4	NA	NA	NA	NA	NA	NA	NA	NA	HNSC	LoF	FALSE	FALSE
SA529726	X	150837858	MED12	X:71118723-71142447	Yes	uterine leiomyoma, fibroadenoma, phyllodes		M, E	TSG	Mis, S, O		CLL,CESC,NB,GBM,LGG,PRAD,OS	Act	TRUE	FALSE

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						tumour									
SA529726	X	150837858	NONO	X:71283583-71301168	Yes	papillary renal		E	fusion	T	TFE3	BRCA,CM	LoF	TRUE	FALSE
SA529726	X	150837858	PHF6	X:134373312-134428789		ETP ALL		L	TSG	F, N, S, Mis		ALL,AML	LoF	TRUE	FALSE
SA529726	X	150837858	RBM10	X:47145447-47186812	Yes	lung adenocarcinoma		E	TSG	Mis, F, N		CH,LUAD,COREAD,BLCA,PAAD,NSCLC	LoF	TRUE	FALSE
SA529726	X	150837858	RPS6KA3	NA	NA	NA	NA	NA	NA	NA	NA	HC	LoF	FALSE	FALSE
SA529726	X	150837858	SMARCA1	NA	NA	NA	NA	NA	NA	NA	NA	PRAD	LoF	FALSE	FALSE
SA529726	X	150837858	SMC1A	X:53374149-53422728		AML		L	TSG	Mis		AML	Act	TRUE	TRUE
SA529726	X	150837858	STAG2	X:123960519-124101498	Yes	bladder carcinoma, glioblastoma, melanoma, Ewing's sarcoma, myeloid neoplasms		E, L, M, O	TSG	Mis, N, F, S		MBL,AML,LUSC,PIA,THCA,GBM,RPC,SBCC,BLCA,RCCC,EWS	LoF	TRUE	FALSE
SA529726	X	150837858	UBE2A	NA	NA	NA	NA	NA	NA	NA	NA	DLBCL	LoF	FALSE	FALSE
SA529726	X	150837858	USP9X	NA	NA	NA	NA	NA	NA	NA	NA	HNSC	LoF	FALSE	FALSE
SA529726	X	150837858	WAS	X:48683779-48691427	Yes		lymphoma	L	oncogene	Mis, N, F, S		MBL	LoF	TRUE	FALSE
SA529726	X	150837858	WDR45	NA	NA	NA	NA	NA	NA	NA	NA	BLCA	LoF	FALSE	FALSE
SA529726	X	150837858	ZFX	NA	NA	NA	NA	NA	NA	NA	NA	CM	LoF	FALSE	FALSE
SA529726	X	150837858	ZMYM3	X:71239624-71254140		CRC, breast cancer		E	TSG	F		NA	NA	NA	NA
SA529726	X	150837858	ZRSR2	X:15790472-15823260	Yes	MDS, CLL		L	TSG	F, S, Mis		AML	LoF	TRUE	FALSE
SA529726	X	150837858	ZXDB	NA	NA	NA	NA	NA	NA	NA	NA	BRCA	LoF	FALSE	FALSE

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SA267880	10	129391638	MGMT	10:129467184-129768007		glioma		O	TSG	D		NA	NA	NA	NA
SA529823	5	19301234	SDHA	5:218241-256700	Yes	GIST, paraganglioma	paraganglioma	M, O	TSG	Mis, N		NA	NA	NA	NA
SA529823	5	19301234	TERT	5:1253167-1295047	Yes	melanoma, glioblastoma, hepatocellular carcinoma, bladder, skin basal cell, skin squamous cell, mesothelioma, medulloblastoma, other tumour types	melanoma	E, O	oncogene, TSG	Promoter Mis		NA	NA	NA	NA
SA529830	17	14933981	MAP2K4	17:12020834-12143830		pancreatic, breast, colorectal		E	oncogene, TSG	D, Mis, N		BRCA,COREAD,CH,PAAD	LoF	TRUE	TRUE
SA529830	17	14933981	PER1	17:8140472-8152435	Yes	AML, CMML		L	TSG, fusion	T	ETV6	NA	NA	NA	NA
SA529830	17	14933981	RABEP1	17:5282300-5385812	Yes	CMML		L	fusion	T	PDGFRB	SSCC	LoF	TRUE	FALSE
SA529830	17	14933981	TP53	17:7668402-7687538	Yes	breast, colorectal, lung, sarcoma, adrenocortical, glioma, Spitzoid tumour, multiple other tumour types	breast, sarcoma, adrenocortical carcinoma, glioma, multiple other tumour types	L, E, M, O	oncogene, TSG, fusion	Mis, N, F, T	NTRK1	ACC,ESCA,DLBCL,BC,GBM,SBCC,BLCA,RCC,RCH,PAIS,THCA,HC,MBL,SCLC,CESC,NHLY,UCS,AML,UCEC,COREAD,PIA,RPC,HNSC,THYM,NSPH,LY,CLL,CH,BLY,PAAD,CM,LUSC,AN,S,MESO,VV,EWS,HGG,NSCLC,ALL,MM,LEIS,LGG,ST,SSCC,WT,PRAD,LUAD,ANGS,BRCA,OV,OS	LoF	TRUE	TRUE
SA529830	17	14933981	YWHAE	17:1344272-1400378		endometrial stromal sarcoma		M	TSG, fusion	T	NUTM2A, NUTM2B	NA	NA	NA	NA

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SA529830	8	41308676	ARHGEF10	8:1824015-1958641		colon cancer		E	TSG	D		SSCC,SCLC,NSCLC,ANGS	ambiguous	TRUE	FALSE
SA529830	8	41308676	LEPROTL1	8:30095480-30138348		lung cancer, colon cancer		E	TSG	D		NA	NA	NA	NA
SA529830	8	41308676	NRG1	8:32548635-32764407		NSCLC		E	TSG, fusion	T	CD74	ST	Act	TRUE	FALSE
SA529830	8	41308676	WRN	8:31033801-31173769			osteosarcoma, meningioma, other tumour types	L, E, M, O	TSG	Mis, N, F, S		NSPH	LoF	TRUE	FALSE
SA269383	4	172915474	CASP3	4:184627696-184649475		ovarian cancer		E	TSG	D		NA	NA	NA	NA
SA269383	4	172915474	FAT1	4:186587783-186723855	Yes	oral squamous cell, chemorefractory CLL, head and neck, pancreatic acinar cell carcinoma	pancreatic	E, L	TSG	Mis, N, F, S		CLL,ESCA,CESC,BCNET,VV,UCEC,LUSC,AN,SSCC,SBCC,BLCA,MBL,HNSC,PRAD,PAAD,OV,BRCA,HC,ST,UVM	LoF	TRUE	FALSE
SA500737	7	71061814	HOXA11	7:27181515-27185216	Yes	CML		L	oncogene, TSG, fusion	T	NUP98	UCEC	ambiguous	TRUE	FALSE
SA500737	7	71061814	HOXA9	7:27162435-27165530		AML*		L	oncogene, TSG, fusion	T	NUP98, MSI2	NA	NA	NA	NA
SA500737	7	71061814	IKZF1	7:50304669-50405101		ALL, DLBCL		L	TSG, fusion	D,T	BCL6	ALL,AML,CM,AN	ambiguous	TRUE	FALSE
SA500737	7	71061814	NT5C3A	NA	NA	NA	NA	NA	NA	NA	NA	AML	LoF	FALSE	FALSE
SA500737	7	71061814	PMS2	7:5973239-6009125	Yes		colorectal, endometrial, ovarian, medulloblastoma, glioma	E	TSG	Mis, N, F		PRAD	LoF	TRUE	FALSE
SA500737	7	71061814	SBDS	7:66987677-66995601			AML, MDS	L	TSG	F, N, O		NA	NA	NA	NA

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SA500737	7	71061814	SFRP4	7:37905932-37916915		colorectal cancer, melanoma, SCC, gastric cancer, oesophageal SCC		E	TSG	Mis		NA	NA	NA	NA
SA501631	4	73539199	CASP3	4:184627696-184649475		ovarian cancer		E	TSG	D		NA	NA	NA	NA
SA501631	4	73539199	FAT1	4:186587783-186723855	Yes	oral squamous cell, chemorefractory CLL, head and neck, pancreatic acinar cell carcinoma	pancreatic	E, L	TSG	Mis, N, F, S		CLL,ESCA,CESC,BCNET,VV,UCEC,LUSC,AN,SSCC,SBCC,BLCA,MBL,HNSC,PRAD,PAAD,OV,BRCA,HC,ST,UVM	LoF	TRUE	FALSE
SA501631	4	73539199	FAT4	4:125316399-125492932	Yes	lymphoma, pancreatic, head and neck, melanoma, hepatocellular carcinoma		E, L	TSG	Mis, N		ACC,ESCA,DLBCL,GBM,SBCC,HC,PAIS,SCLC,AML,COREAD,HNSC,MGCT,LY,CLL,LUAD,CM,MESO,NSCLC,ALL,MM,ST,PRAD,PAAD,BRCA	LoF	TRUE	FALSE
SA501631	4	73539199	FBXW7	4:152320544-152536063	Yes	colorectal, endometrial, T-ALL		E, L	TSG	Mis, N, D, F		CLL,ESCA,CESC,CH,UCS,LUSC,COREAD,PIA,ST,BLCA,MBL,HNSC,PAAD,BRCA,UCEC,NSPH	LoF	TRUE	FALSE
SA501631	4	73539199	LEF1	4:108047545-108168422	Yes	B-ALL, T-ALL, eyelid sebaceous carcinoma, AML, lymphomas		L, E	oncogene, TSG	Mis, N		NA	NA	NA	NA
SA501631	4	73539199	PPP3CA	NA	NA	NA	NA	NA	NA	NA	NA	ST	LoF	FALSE	FALSE
SA501631	4	73539199	PTPN13	4:86594315-86815171	Yes	lung, NSCLC, gastric, peritoneal carcinomatosis	hepatocellular	E	TSG	Mis, N		BRCA	LoF	TRUE	FALSE
SA501631	4	73539199	TET2	4:105146293-105279816	Ye	MDS		L	TSG	Mis, N, F		NHLY,AML,MDPS,S,OS,LY	LoF	TRUE	TRUE

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					s										
SA501645	10	7312350	KLF6	10:3775996-3785275		prostate, glioma		E, O	TSG	Mis, N		NA	NA	NA	NA
SA501645	10	7312350	LARP4B	10:806914-931705		CRC, glioma		E, O	TSG	F, D		NA	NA	NA	NA
SA268678	4	81859531	CASP3	4:184627696-184649475		ovarian cancer		E	TSG	D		NA	NA	NA	NA
SA268678	4	81859531	FAT1	4:186587783-186723855	Yes	oral squamous cell, chemorefractory CLL, head and neck, pancreatic acinar cell carcinoma	pancreatic	E, L	TSG	Mis, N, F, S		CLL,ESCA,CESC,BCNET,VV,UCEC,LUSC,AN,SSCC,SBCC,BLCA,MBL,HNSC,PRAD,PAAD,OV,BRCA,HC,ST,UVM	LoF	TRUE	FALSE
SA268678	4	81859531	FAT4	4:125316399-125492932	Yes	lymphoma, pancreatic, head and neck, melanoma, hepatocellular carcinoma		E, L	TSG	Mis, N		ACC,ESCA,DLBCL,GBM,SBCC,HC,PAIS,SCLC,AML,COREAD,HNSC,MGCT,LY,CLL,LUAD,CM,MESO,NSCLC,ALL,MM,ST,PRAD,PAAD,BRCA	LoF	TRUE	FALSE
SA268678	4	81859531	FBXW7	4:152320544-152536063	Yes	colorectal, endometrial, T-ALL		E, L	TSG	Mis, N, D, F		CLL,ESCA,CESC,CH,UCS,LUSC,COREAD,PIA,ST,BLCA,MBL,HNSC,PAAD,BRCA,UCEC,NSPH	LoF	TRUE	FALSE
SA268678	4	81859531	LEF1	4:108047545-108168422	Yes	B-ALL, T-ALL, eyelid sebaceous carcinoma, AML, lymphomas		L, E	oncogene, TSG	Mis, N		NA	NA	NA	NA
SA268678	4	81859531	PPP3CA	NA	NA	NA	NA	NA	NA	NA	NA	ST	LoF	FALSE	FALSE
SA268678	4	81859531	PTPN13	4:86594315-86815171	Yes	lung, NSCLC, gastric, peritoneal carcinomatosis	hepatocellular	E	TSG	Mis, N		BRCA	LoF	TRUE	FALSE
SA268678	4	81859531	TET2	4:105146293-105279816	Yes	MDS		L	TSG	Mis, N, F		NHLY,AML,MDPS,S,OS,LY	LoF	TRUE	TRUE

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SA270402	8	63280968	ARHGEF10	8:1824015-1958641	colon cancer		E	TSG	D		SSCC,SCLC,NSCLC,ANGS	ambiguous	TRUE	FALSE
SA270402	8	63280968	LEPROTL1	8:30095480-30138348	lung cancer, colon cancer		E	TSG	D		NA	NA	NA	NA
SA270402	8	63280968	NRG1	8:32548635-32764407	NSCLC		E	TSG, fusion	T	CD74	ST	Act	TRUE	FALSE
SA270402	8	63280968	PCMTD1	NA	NA	NA	NA	NA	NA	NA	AML	LoF	FALSE	FALSE
SA270402	8	63280968	WRN	8:31033801-31173769		osteosarcoma, meningioma, other tumour types	L, E, M, O	TSG	Mis, N, F, S		NSPH	LoF	TRUE	FALSE
SA501424	1	31503628	ARHGEF10L	1:17539835-17697869	lymphoma		L	TSG	D		MBL,SBCC,ST	LoF	TRUE	FALSE
SA501424	1	31503628	ARID1A	1:26696033-26782110	clear cell ovarian carcinoma, RCC, breast		E	TSG, fusion	Mis, N, F, S, D, T	MAST2	ESCA,DLBCL,GBM,SBCC,BLCA,RCCC,UCEC,HC,MBL,SCLC,CESC,NHLY,UCS,COREAD,PIA,RPC,CLL,CH,BLY,LUAD,LUSC,NSCLC,LGG,ST,PRAD,PAAD,BRCA,OV,OS	LoF	TRUE	FALSE
SA501424	1	31503628	CAMTA1	1:6785324-7769706	epithelioid haemangioendothelioma		M	TSG, fusion	T	WWTR1	HC	LoF	TRUE	FALSE
SA501424	1	31503628	CASP9	1:15492270-15524295	glioma		O	TSG	D		NA	NA	NA	NA
SA501424	1	31503628	CASZ1	NA	NA	NA	NA	NA	NA	NA	PRAD	LoF	FALSE	FALSE
SA501424	1	31503628	EPHA2	NA	NA	NA	NA	NA	NA	NA	CH	LoF	FALSE	FALSE
SA501424	1	31503628	ID3	1:23557918-23559794	Burkitt lymphoma		L	TSG	Mis, N		DLBCL	LoF	TRUE	FALSE
SA501424	1	31503628	PRDM2	1:13704855-13825079	glioma, colon adenocarcinoma, gastric carcinoma, ovarian carcinoma, HNSCC		E, O	TSG	O, F		HC,RPC,AN	ambiguous	TRUE	FALSE

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SA501424	1	31503628	RPL22	1:6185020-6199612		AML, CML		L	TSG, fusion	T	RUNX1	HC	Act	TRUE	FALSE
SA501424	1	31503628	SDHB	1:17018722-17054170			paraganglioma, pheochromocytoma	O	TSG	Mis, N, F		NA	NA	NA	NA
SA501424	1	31503628	SPEN	1:15847864-15940460		SMZL, adenoid cystic carcinoma, DLBCL		L	TSG	F, Mis, N		CLL,CESC,DLBCL,RCCC,PRAD,PAAD,BRCA,SG,NSPH	ambiguous	TRUE	TRUE
SA501424	1	31503628	TNFRSF14	1:2556366-2563829		follicular lymphoma		L	TSG	Mis, N, F		NHLY,DLBCL,LY	LoF	TRUE	FALSE
SA501424	11	87553673	CARS	11:3000922-3057437	Yes	ALCL		L	TSG, fusion	T	ALK	ST	ambiguous	TRUE	FALSE
SA501424	11	87553673	CREB3L1	11:46277661-46321422	Yes	myxofibrosarcoma		M	TSG, fusion	T	FUS	NA	NA	NA	NA
SA501424	11	87553673	DDB2	11:47214942-47239240	Yes		skin basal cell, skin squamous cell, melanoma	E	oncogene, TSG	Mis, N		AML	LoF	TRUE	FALSE
SA501424	11	87553673	EED	11:86245223-86278813		malignant peripheral nerve sheath tumours, MDS and related, lung adenocarcinoma		E, L	TSG	Mis, F		NA	NA	NA	NA
SA501424	11	87553673	EXT2	11:44096197-44245429			exostoses, osteosarcoma	M	TSG	Mis, N, F, S		CH	LoF	TRUE	FALSE
SA501424	11	87553673	FANCF	11:22622519-22626787			AML, leukaemia	L	TSG	N, F		BLCA	LoF	TRUE	FALSE
SA501424	11	87553673	FEN1	11:61792637-61797244			breast cancer	E	TSG			NA	NA	NA	NA
SA501424	11	87553673	MEN1	11:64803524-64811294	Yes	parathyroid tumours, pancreatic neuroendocrine	parathyroid adenoma, pituitary adenoma,	E	TSG	D, Mis, N, F, S		ACC,BRCA,PAIS,LNET,HC	LoF	TRUE	TRUE

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						tumour	pancreatic islet cell, carcinoid								
SA501424	11	87553673	SDHAF2	11:61430073-61447529			paraganglioma	M	TSG	M		NA	NA	NA	NA
SA501424	11	87553673	TCIRG1	NA	NA	NA	NA	NA	NA	NA	NA	CM	LoF	FALSE	FALSE
SA501424	11	87553673	WT1	11:32387775-32435630		Wilms tumour, desmoplastic small round cell tumour	Wilms tumour	O	oncogene, TSG, fusion	D, Mis, N, F, S, T	EWSR1	ESCA,PAAD	LoF	TRUE	FALSE
SA501453	11	65023698	CARS	11:3000922-3057437	Yes	ALCL		L	TSG, fusion	T	ALK	ST	ambiguous	TRUE	FALSE
SA501453	11	65023698	CREB3L1	11:46277661-46321422	Yes	myxofibrosarcoma		M	TSG, fusion	T	FUS	NA	NA	NA	NA
SA501453	11	65023698	DDB2	11:47214942-47239240	Yes		skin basal cell, skin squamous cell, melanoma	E	oncogene, TSG	Mis, N		AML	LoF	TRUE	FALSE
SA501453	11	65023698	EXT2	11:44096197-44245429			exostoses, osteosarcoma	M	TSG	Mis, N, F, S		CH	LoF	TRUE	FALSE
SA501453	11	65023698	FANCF	11:22622519-22626787			AML, leukaemia	L	TSG	N, F		BLCA	LoF	TRUE	FALSE
SA501453	11	65023698	FEN1	11:61792637-61797244			breast cancer	E	TSG			NA	NA	NA	NA
SA501453	11	65023698	MEN1	11:64803524-64811294	Yes	parathyroid tumours, pancreatic neuroendocrine tumour	parathyroid adenoma, pituitary adenoma, pancreatic islet cell, carcinoid	E	TSG	D, Mis, N, F, S		ACC,BRCA,PAIS,LNET,HC	LoF	TRUE	TRUE
SA501453	11	65023698	SDHAF2	11:61430073-61447529			paraganglioma	M	TSG	M		NA	NA	NA	NA
SA501453	11	65023698	WT1	11:32387775-32435630		Wilms tumour, desmoplastic small round cell tumour	Wilms tumour	O	oncogene, TSG, fusion	D, Mis, N, F, S, T	EWSR1	ESCA,PAAD	LoF	TRUE	FALSE

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SA501453	19	4558119	DAZAP1	NA	NA	NA	NA	NA	NA	NA	NA	DLBCL	LoF	FALSE	FALSE
SA501453	19	4558119	DOT1L	NA	NA	NA	NA	NA	NA	NA	NA	DLBCL	LoF	FALSE	FALSE
SA501453	19	4558119	STK11	19:1206464-1228435		NSCLC, pancreatic	jejunal hamartoma, ovarian, testicular, pancreatic	E, M, O	TSG	D, Mis, N, F, S		CESC,CH,NSCLC,LUAD	LoF	TRUE	FALSE
SA501453	19	4558119	TCF3	19:1609290-1652329		pre B-ALL		L	oncogene, TSG, fusion	T	PBX1, HLF, TFPT	NA	NA	NA	NA
SA515239	13	81850217	BRCA2	13:32315474-32400266	Yes	breast, ovarian, pancreatic	breast, ovarian, pancreatic, leukaemia (FANCB, FANCD1)	L, E	TSG	D, Mis, N, F, S		MBL,VV,CM,COREAD,BLCA,HNSC,PRAD,PAAD,BRCA,OV	LoF	TRUE	FALSE
SA515239	13	81850217	CDX2	13:27962137-27971139		AML		L	TSG, fusion	T	ETV6	ESCA	Act	TRUE	FALSE
SA515239	13	81850217	DIS3	NA	NA	NA	NA	NA	NA	NA	NA	MM	LoF	FALSE	FALSE
SA515239	13	81850217	FOXO1	13:40555667-40666597		alveolar rhabdomyosarcoma		M	oncogene, TSG, fusion	T	PAX3, PAX7	NHLY,BLY	Act	TRUE	FALSE
SA515239	13	81850217	LATS2	13:20973032-21061547	Yes	malignant mesothelioma		E	TSG	D, F, N		MESO,VV,LUSC	LoF	TRUE	FALSE
SA515239	13	81850217	PCDH17	NA	NA	NA	NA	NA	NA	NA	NA	CH	LoF	FALSE	FALSE
SA515239	13	81850217	RB1	13:48303726-48481890	Yes	retinoblastoma, sarcoma, breast, small cell lung carcinoma	retinoblastoma, sarcoma, breast, small cell lung carcinoma	L, E, M, O	TSG	D, Mis, N, F, S		ACC,ESCA,GBM,BLCA,UCEC,HC,SCLC,CESC,UCS,PIA,HNSC,RB,CM,LUSC,S,NSCLC,MM,LEIS,ST,PRAD,LUAD,BRCA,OV,OS	LoF	TRUE	FALSE
SA515239	13	81850217	RNF6	NA	NA	NA	NA	NA	NA	NA	NA	COREAD	LoF	FALSE	FALSE
SA268027	4	173136730	CASP3	4:184627696-		ovarian cancer		E	TSG	D		NA	NA	NA	NA

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				184649475										
SA268027	4	173136730	FAT1	4:186587783-186723855	Yes	oral squamous cell, chemorefractory CLL, head and neck, pancreatic acinar cell carcinoma	pancreatic	E, L	TSG	Mis, N, F, S		CLL,ESCA,CESC,BCNET,VV,UCEC,LUSC,AN,SSCC,SBCC,BLCA,MBL,HNSC,PRAD,PAAD,OV,BRCA,HC,ST,UVM	LoF	TRUE	FALSE
SA501481	1	57256948	ARHGEF10L	1:17539835-17697869		lymphoma		L	TSG	D		MBL,SBCC,ST	LoF	TRUE	FALSE
SA501481	1	57256948	ARID1A	1:26696033-26782110	Yes	clear cell ovarian carcinoma, RCC, breast		E	TSG, fusion	Mis, N, F, S, D, T	MAST2	ESCA,DLBCL,GBM,SBCC,BLCA,RCCC,UCEC,HC,MBL,SCLC,CESC,NHLY,UCS,COREAD,PIA,RPC,CLL,CH,BLY,LUAD,LUSC,NSCLC,LGG,ST,PRAD,PAAD,BRCA,OV,OS	LoF	TRUE	FALSE
SA501481	1	57256948	CAMTA1	1:6785324-7769706	Yes	epithelioid haemangioendothelioma		M	TSG, fusion	T	WWTR1	HC	LoF	TRUE	FALSE
SA501481	1	57256948	CASP9	1:15492270-15524295		glioma		O	TSG	D		NA	NA	NA	NA
SA501481	1	57256948	CASZ1	NA	NA	NA	NA	NA	NA	NA	NA	PRAD	LoF	FALSE	FALSE
SA501481	1	57256948	CDKN2C	1:50960745-50974633	Yes	glioma, MM		O, L	TSG	D		HGG,LGG	LoF	TRUE	TRUE
SA501481	1	57256948	EPHA2	NA	NA	NA	NA	NA	NA	NA	NA	CH	LoF	FALSE	FALSE
SA501481	1	57256948	EPS15	1:51354263-51519328	Yes	ALL		L	TSG, fusion	T	KMT2A	PRAD	Act	TRUE	FALSE
SA501481	1	57256948	ID3	1:23557918-23559794		Burkitt lymphoma		L	TSG	Mis, N		DLBCL	LoF	TRUE	FALSE
SA501481	1	57256948	MUTYH	1:45329242-45340388			colorectal	E	TSG	Mis		NA	NA	NA	NA
SA501481	1	57256948	PRDM2	1:13704855-13825079		glioma, colon adenocarcinoma, gastric carcinoma,		E, O	TSG	O, F		HC,RPC,AN	ambiguous	TRUE	FALSE

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					ovarian carcinoma, HNSCC									
SA501481	1	57256948	RPL22	1:6185020-6199612	AML, CML		L	TSG, fusion	T	RUNX1	HC	Act	TRUE	FALSE
SA501481	1	57256948	SDHB	1:17018722-17054170		paraganglioma, pheochromocytoma	O	TSG	Mis, N, F		NA	NA	NA	NA
SA501481	1	57256948	SFPQ	1:35182932-35193148	Yes	papillary renal		E	TSG, fusion	T	TFE3	NA	NA	NA	NA
SA501481	1	57256948	SPEN	1:15847864-15940460		SMZL, adenoid cystic carcinoma, DLBCL		L	TSG	F, Mis, N		CLL,CESC,DLBCL,RCCC,PRAD,PAAD,BRCA,SG,NSPH	ambiguous	TRUE	TRUE
SA501481	1	57256948	TNFRSF14	1:2556366-2563829		follicular lymphoma		L	TSG	Mis, N, F		NHLY,DLBCL,LY	LoF	TRUE	FALSE
SA501481	9	24184263	CD274	9:5450525-5470547		PMBL, Hodgkin lymphoma		L	TSG, fusion	T	CIITA	NA	NA	NA	NA
SA501481	9	24184263	CDKN2A	9:21968056-21974866	Yes	melanoma, multiple other tumour types	melanoma, pancreatic	L, E, M, O	TSG	D, Mis, N, F, S		ESCA,CH,PAAD,CM,LUSC,VV,GBM,LGG,ST,SSCC,BLCA,RCCC,HNSC,LUAD,BRCA,HC,ACY,OS,NSCLC	LoF	TRUE	FALSE
SA501481	9	24184263	PTPRD	9:8314246-10033790		lung cancer, kidney cancer, HNSCC, glioblastoma		E, O	TSG	D, N, Mis		ESCA,BCNET,CM,DLBCL,PRAD,VV,BRCA,NSCLC	Act	TRUE	FALSE
SA269680	10	1863122	LARP4B	10:806914-931705		CRC, glioma		E, O	TSG	F, D		NA	NA	NA	NA
SA269680	12	124913292	NCOR2	12:124324415-124495252	Yes	prostate		E	TSG	Mis, F, N, O		BRCA,COREAD,PRAD,ESCA,HC	Act	TRUE	TRUE
SA269680	12	124913292	POLE	12:132623762-132687359		colorectal carcinoma, endometrioid carcinoma, stomach carcinoma, skin cancer	colorectal cancer susceptibility	E	TSG	Mis		SBCC,CESC,UCEC	ambiguous	TRUE	TRUE
SA269680	16	83507195	CBFA2T3	16:88874858-	Y	AML		L	TSG,	T	RUNX1,	CESC	Act	TRUE	FALSE

				88977204	es				fusion		GLIS2				
SA269680	16	83507195	FANCA	16:89737549-89816646			AML, leukaemia	L	TSG	D, Mis, N, F, S		VV	LoF	TRUE	FALSE
SA269680	21	15570249	IFNAR1	NA	NA	NA	NA	NA	NA	NA	NA	MM	LoF	FALSE	FALSE
SA269680	21	15570249	RUNX1	21:34787801-35049344		AML, pre B-ALL, T-ALL		L	oncogene, TSG, fusion	T	RPL22, MECOM, CBFA2T3, RUNX1T1, ETV6, AFF3	BRCA,ACY,ALL,AML	ambiguous	TRUE	FALSE
SA269680	7	71492688	CNTNAP2	7:146116359-148420998		glioma, melanoma		E, O	TSG	Mis		NA	NA	NA	NA
SA269680	7	71492688	CUX1	7:101816011-102258233	Yes	endometrial, melanoma, colorectal, AML, MDS, other tumour types		E,L,M,O	oncogene, TSG	N,F,S, Mis,O, T	CLDN7	CM,GBM,THCA,UCEC,LUAD,BRCA,NSCLC	ambiguous	TRUE	TRUE
SA269680	7	71492688	EZH2	7:148807385-148884278	Yes	DLBCL		L	oncogene, TSG	Mis		ALL,NHLY,AML,DLBCL,LUAD,EWS,LY	LoF	TRUE	FALSE
SA269680	7	71492688	KMT2C	7:152134925-152436005	Yes	medulloblastoma		O	TSG	N		ESCA,THCA,BLCA,RCCC,UCEC,PAIS,PCPG,HC,ACY,MBL,SCLC,CESC,AML,COREAD,PIA,RPC,HNSC,NSPH,CH,LUAD,CM,LUSC,AN,VV,EWS,ST,SSCC,PRAD,PAAD,BRCA,OV,SG	LoF	TRUE	FALSE
SA269680	7	71492688	POT1	7:124822386-124929981	Yes	CLL		L	TSG	Mis, N		CLL,HC,UCEC,LGG,CM	ambiguous	TRUE	FALSE
SA269680	7	71492688	TRIM24	7:138460334-138589993		APL		L	oncogene, TSG, fusion	T	RARA	PRAD	Act	TRUE	FALSE
SA501511	10	20525537	GATA3	10:8054653-8075203		breast		E	oncogene, TSG	F, N, S		BRCA,ALL	LoF	TRUE	TRUE
SA501511	10	20525537	KLF6	10:3775996-3785275		prostate, glioma		E, O	TSG	Mis, N		NA	NA	NA	NA

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SA501511	10	20525537	LARP4B	10:806914-931705		CRC, glioma		E, O	TSG	F, D		NA	NA	NA	NA
SA501511	13	38591685	DIS3	NA	NA	NA	NA	NA	NA	NA	NA	MM	LoF	FALSE	FALSE
SA501511	13	38591685	ERCC5	13:102844844-102876001	Yes		skin basal cell, skin squamous cell, melanoma	E	TSG	Mis, N, F		NA	NA	NA	NA
SA501511	13	38591685	FOXO1	13:40555667-40666597		alveolar rhabdomyosarcoma		M	oncogene, TSG, fusion	T	PAX3, PAX7	NHLY,BLY	Act	TRUE	FALSE
SA501511	13	38591685	GPC5	13:91398607-92867237		lung adenocarcinoma		E	TSG	D		NA	NA	NA	NA
SA501511	13	38591685	ING1	NA	NA	NA	NA	NA	NA	NA	NA	UCEC	LoF	FALSE	FALSE
SA501511	13	38591685	PCDH17	NA	NA	NA	NA	NA	NA	NA	NA	CH	LoF	FALSE	FALSE
SA501511	13	38591685	RB1	13:48303726-48481890	Yes	retinoblastoma, sarcoma, breast, small cell lung carcinoma	retinoblastoma, sarcoma, breast, small cell lung carcinoma	L, E, M, O	TSG	D, Mis, N, F, S		ACC,ESCA,GBM,BLCA,UCEC,HC,SCLC,CESC,UCS,PIA,HNSC,RB,CM,LUSC,S,NSCLC,MM,LEIS,ST,PRAD,LUAD,BRCA,OV,OS	LoF	TRUE	FALSE
SA501511	13	38591685	SOX21	13:94709622-94712399		multiple myeloma		L	TSG	D		PRAD	LoF	TRUE	FALSE
SA501511	4	33650688	SLC34A2	4:25655844-25678748	Yes	NSCLC		E	TSG, fusion	T	ROS1	NA	NA	NA	NA
SA501511	8	57507935	ARHGEF10	8:1824015-1958641		colon cancer		E	TSG	D		SSCC,SCLC,NSCLC,ANGS	ambiguous	TRUE	FALSE
SA501511	8	57507935	LEPROTL1	8:30095480-30138348		lung cancer, colon cancer		E	TSG	D		NA	NA	NA	NA
SA501511	8	57507935	NRG1	8:32548635-32764407		NSCLC		E	TSG, fusion	T	CD74	ST	Act	TRUE	FALSE
SA501511	8	57507935	PCMTD1	NA	NA	NA	NA	NA	NA	NA	NA	AML	LoF	FALSE	FALSE
SA501511	8	57507935	WRN	8:31033801-31173769			osteosarcoma,	L, E,	TSG	Mis, N, F, S		NSPH	LoF	TRUE	FALSE

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						meningioma, other tumour types	M, O							
SA501511	8	68545531	ARHGEF10	8:1824015-1958641		colon cancer		E	TSG	D		SSCC,SCLC,NSCLC,ANGS	ambiguous	TRUE	FALSE
SA501511	8	68545531	LEPROTL1	8:30095480-30138348		lung cancer, colon cancer		E	TSG	D		NA	NA	NA	NA
SA501511	8	68545531	NRG1	8:32548635-32764407		NSCLC		E	TSG, fusion	T	CD74	ST	Act	TRUE	FALSE
SA501511	8	68545531	PCMTD1	NA	NA	NA	NA	NA	NA	NA	NA	AML	LoF	FALSE	FALSE
SA501511	8	68545531	WRN	8:31033801-31173769			osteosarcoma, meningioma, other tumour types	L, E, M, O	TSG	Mis, N, F, S		NSPH	LoF	TRUE	FALSE
SA501511	8	123142216	ARHGEF10	8:1824015-1958641		colon cancer		E	TSG	D		SSCC,SCLC,NSCLC,ANGS	ambiguous	TRUE	FALSE
SA501511	8	123142216	CSMD3	8:112222928-113437099		ovarian cancer, oral SCC, lung cancer		E	TSG	Mis, N		NA	NA	NA	NA
SA501511	8	123142216	EIF3E	8:108201743-108248765	Yes	colorectal		E	TSG, fusion	T	RSPO3	COREAD,CESC	Act	TRUE	TRUE
SA501511	8	123142216	EXT1	8:117794490-118111853			exostoses, osteosarcoma	M	TSG, fusion	Mis, N, F, S		NA	NA	NA	NA
SA501511	8	123142216	LEPROTL1	8:30095480-30138348		lung cancer, colon cancer		E	TSG	D		NA	NA	NA	NA
SA501511	8	123142216	NBN	8:89933336-89984716			NHL, glioma, medullobla stoma, rhabdomyo sarcoma	L, E, M, O	TSG	Mis, N, F		NA	NA	NA	NA
SA501511	8	123142216	NRG1	8:32548635-32764407		NSCLC		E	TSG, fusion	T	CD74	ST	Act	TRUE	FALSE
SA501511	8	123142216	PABPC1	8:100702916-100722712		HNSCC, biliary tract carcinoma		E	oncogene, TSG	Mis, F		MM,THCA,DLBCL,LUSC	ambiguous	TRUE	FALSE
SA501511	8	123142216	PCMTD1	NA	N	NA	NA	NA	NA	NA	NA	AML	LoF	FALSE	FALSE

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					A										
SA501511	8	123142216	RAD21	8:116845935-116874866	Yes	AML, endometrium, colorectal, lung		L, E	oncogene, TSG	Mis, N, F		AML,LUSC	LoF	TRUE	TRUE
SA501511	8	123142216	RSPO2	8:107899317-108083648		colorectal		E	TSG, fusion	T	EIF3E	NA	NA	NA	NA
SA501511	8	123142216	RUNX1T1	8:91954967-92095654	Yes	AML		L	oncogene, TSG, fusion	T	KMT2A, RUNX1	SBCC,HC,SCLC,LGG,PRAD	ambiguous	TRUE	FALSE
SA501511	8	123142216	WRN	8:31033801-31173769			osteosarcoma, meningioma, other tumour types	L, E, M, O	TSG	Mis, N, F, S		NSPH	LoF	TRUE	FALSE
SA501534	12	30301892	ATF7IP	NA	NA	NA	NA	NA	NA	NA	NA	UCEC,LUAD	LoF	FALSE	FALSE
SA501534	12	30301892	CDKN1B	12:12717124-12722371		breast, small intestine neuroendocrine tumours	pituitary, parathyroid	E	TSG	F		BCNET,DLBCL,MM,PRAD,BRCA,HC	LoF	TRUE	FALSE
SA501534	12	30301892	DUSP16	NA	NA	NA	NA	NA	NA	NA	NA	COREAD	LoF	FALSE	FALSE
SA501534	12	30301892	ETNK1	12:22625075-22690665	Yes	aCML, CMML, SM-AHD, HES		L	TSG	Mis		NA	NA	NA	NA
SA501534	12	30301892	ETV6	12:11649854-11895402	Yes	congenital fibrosarcoma, multiple different leukaemia and lymphoma tumour types including ALL, secretory breast, MDS		L, E, M	TSG, fusion	T	NTRK3, RUNX1, PDGFRB, ABL1, MN1, ABL2, ACSL6, CHIC2, ARNT, JAK2, MECOM, CDX2, RNF217-AS1, MNX1,	ALL,NHLY,DLBCL	Act	TRUE	TRUE

											MDS2, PER1, SYK, TTL, FGFR3, PAX5				
SA501534	12	30301892	PTPN6	12:6951271-6961316		DLBCL		L	TSG	Mis		DLBCL,CM	LoF	TRUE	TRUE
SA501428	5	152215069	EBF1	5:158695920-159099761	Yes	lipoma		M	TSG, fusion	T	HMGA2	NA	NA	NA	NA

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Supplementary Data 7. Evaluation metrics on simulated data.
F1-score, precision and recall per VAF for VIRUNS_LR and the four short-read methods.

TOOL	VAF (%)	F1-Score	Precision	Recall
VIRUNS_LR	50	1	1	1
VIRUNS_LR	40	1	1	1
VIRUNS_LR	30	0.98989899	1	0.98000000
VIRUNS_LR	20	0.97084048	1	0.94333333
VIRUNS_LR	10	0.77300613	1	0.63000000
VIRUNS_SR	50	0.99159664	1	0.98333333
VIRUNS_SR	40	0.98819562	1	0.97666667
VIRUNS_SR	30	0.98477157	1	0.97000000
VIRUNS_SR	20	0.97610922	1	0.95333333
VIRUNS_SR	10	0.87850467	1	0.78333333
VirusFinder2	50	0.79358717	0.99497487	0.66000000
VirusFinder2	40	0.77049180	1	0.62666667
VirusFinder2	30	0.72881356	1	0.57333333
VirusFinder2	20	0.61047836	0.96402878	0.44666667
VirusFinder2	10	0.17629179	1	0.09666667
Virus-Clip	50	0.07326646	0.03830369	0.84000000
Virus-Clip	40	0.07341588	0.03838538	0.84000000
Virus-Clip	30	0.07198018	0.03763523	0.82333333
Virus-Clip	20	0.06453514	0.03375983	0.73000000
Virus-Clip	10	0.03698692	0.01936703	0.41000000
ViFi	50	0.96587031	0.98951049	0.94333333
ViFi	40	0.95918367	0.97916667	0.94000000
ViFi	30	0.93006993	0.97794118	0.88666667
ViFi	20	0.84758364	0.95798319	0.76000000
ViFi	10	0.51456311	0.94642857	0.35333333

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Supplementary Data 8. Calls per virus on simulated data.
Number of true positives (TP) and false positives (FP) per virus on simulated data at different VAFs for VIRUNS_LR and the four short-read methods.

TOOL	VAF (%)	VIRUS	TP	FP
VIRUNS_LR	50	HBV	100	0
VIRUNS_LR	40	HBV	100	0
VIRUNS_LR	30	HBV	97	0
VIRUNS_LR	20	HBV	94	0
VIRUNS_LR	10	HBV	59	0
VIRUNS_LR	50	HPV	100	0
VIRUNS_LR	40	HPV	100	0
VIRUNS_LR	30	HPV	100	0
VIRUNS_LR	20	HPV	99	0
VIRUNS_LR	10	HPV	83	0
VIRUNS_LR	50	HHV	100	0
VIRUNS_LR	40	HHV	100	0
VIRUNS_LR	30	HHV	97	0
VIRUNS_LR	20	HHV	90	0
VIRUNS_LR	10	HHV	47	0
VIRUNS_LR	50	ALL	300	0
VIRUNS_LR	40	ALL	300	0
VIRUNS_LR	30	ALL	294	0
VIRUNS_LR	20	ALL	283	0
VIRUNS_LR	10	ALL	189	0
VIRUNS_SR	50	HBV	99	0
VIRUNS_SR	40	HBV	97	0
VIRUNS_SR	30	HBV	97	0
VIRUNS_SR	20	HBV	92	0
VIRUNS_SR	10	HBV	73	0
VIRUNS_SR	50	HPV	97	0
VIRUNS_SR	40	HPV	97	0
VIRUNS_SR	30	HPV	96	0
VIRUNS_SR	20	HPV	96	0
VIRUNS_SR	10	HPV	81	0
VIRUNS_SR	50	HHV	99	0
VIRUNS_SR	40	HHV	99	0
VIRUNS_SR	30	HHV	98	0
VIRUNS_SR	20	HHV	98	0
VIRUNS_SR	10	HHV	81	0
VIRUNS_SR	50	ALL	295	0
VIRUNS_SR	40	ALL	293	0
VIRUNS_SR	30	ALL	291	0
VIRUNS_SR	20	ALL	286	0
VIRUNS_SR	10	ALL	235	0

ViFi	50	HBV	95	1
ViFi	40	HBV	93	2
ViFi	30	HBV	88	2
ViFi	20	HBV	71	1
ViFi	10	HBV	17	0
ViFi	50	HPV	93	1
ViFi	40	HPV	94	2
ViFi	30	HPV	91	2
ViFi	20	HPV	85	6
ViFi	10	HPV	50	4
ViFi	50	HHV	95	1
ViFi	40	HHV	95	2
ViFi	30	HHV	87	2
ViFi	20	HHV	72	3
ViFi	10	HHV	39	2
ViFi	50	ALL	283	3
ViFi	40	ALL	282	6
ViFi	30	ALL	266	6
ViFi	20	ALL	228	10
ViFi	10	ALL	106	6
VirusFinder2	50	HBV	99	0
VirusFinder2	40	HBV	92	0
VirusFinder2	30	HBV	89	0
VirusFinder2	20	HBV	68	5
VirusFinder2	10	HBV	14	0
VirusFinder2	50	HPV	99	1
VirusFinder2	40	HPV	96	0
VirusFinder2	30	HPV	83	0
VirusFinder2	20	HPV	66	0
VirusFinder2	10	HPV	15	0
VirusFinder2	50	HHV	0	0
VirusFinder2	40	HHV	0	0
VirusFinder2	30	HHV	0	0
VirusFinder2	20	HHV	0	0
VirusFinder2	10	HHV	0	0
VirusFinder2	50	ALL	198	1
VirusFinder2	40	ALL	188	0
VirusFinder2	30	ALL	172	0
VirusFinder2	20	ALL	134	5
VirusFinder2	10	ALL	29	0
Virus-Clip	50	HBV	92	NA
Virus-Clip	40	HBV	91	NA
Virus-Clip	30	HBV	87	NA
Virus-Clip	20	HBV	78	NA
Virus-Clip	10	HBV	40	NA

Virus-Clip	50	HPV	95	NA
Virus-Clip	40	HPV	95	NA
Virus-Clip	30	HPV	94	NA
Virus-Clip	20	HPV	93	NA
Virus-Clip	10	HPV	56	NA
Virus-Clip	50	HHV	65	NA
Virus-Clip	40	HHV	66	NA
Virus-Clip	30	HHV	66	NA
Virus-Clip	20	HHV	48	NA
Virus-Clip	10	HHV	27	NA
Virus-Clip	50	ALL	252	6327
Virus-Clip	40	ALL	252	6313
Virus-Clip	30	ALL	247	6316
Virus-Clip	20	ALL	219	6268
Virus-Clip	10	ALL	123	6228

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Supplementary Data 9. Counts of breakpoint accuracy.
Total (Counts) and Percentages of breakpoint precision on simulated data at different VAFs for VIRUNS_LR and the four short-read methods. BKPType is set to "Missing" for those breakpoints not found by the tool, "Non-precise" for those that deviate two or more base pairs from the real breakpoint coordinates and "Precise" otherwise.

TOOL	VAF (%)	BKPType	Counts	Percentage
VIRUNS_LR	50	Missing	0	0
VIRUNS_LR	40	Missing	0	0
VIRUNS_LR	30	Missing	6	2
VIRUNS_LR	20	Missing	17	5.666666667
VIRUNS_LR	10	Missing	112	37.33333333
VIRUNS_LR	50	No-precise	46	15.33333333
VIRUNS_LR	40	No-precise	55	18.33333333
VIRUNS_LR	30	No-precise	61	20.33333333
VIRUNS_LR	20	No-precise	59	19.66666667
VIRUNS_LR	10	No-precise	45	15
VIRUNS_LR	50	Precise	254	84.66666667
VIRUNS_LR	40	Precise	245	81.66666667
VIRUNS_LR	30	Precise	233	77.66666667
VIRUNS_LR	20	Precise	224	74.66666667
VIRUNS_LR	10	Precise	143	47.66666667
VIRUNS_SR	50	Missing	5	1.666666667
VIRUNS_SR	40	Missing	7	2.333333333
VIRUNS_SR	30	Missing	9	3
VIRUNS_SR	20	Missing	14	4.666666667
VIRUNS_SR	10	Missing	65	21.66666667
VIRUNS_SR	50	No-precise	23	7.666666667
VIRUNS_SR	40	No-precise	24	8
VIRUNS_SR	30	No-precise	21	7
VIRUNS_SR	20	No-precise	30	10
VIRUNS_SR	10	No-precise	38	12.66666667
VIRUNS_SR	50	Precise	272	90.66666667
VIRUNS_SR	40	Precise	269	89.66666667
VIRUNS_SR	30	Precise	270	90
VIRUNS_SR	20	Precise	256	85.33333333
VIRUNS_SR	10	Precise	197	65.66666667
ViFi	50	Missing	17	5.666666667
ViFi	40	Missing	18	6
ViFi	30	Missing	34	11.33333333
ViFi	20	Missing	72	24
ViFi	10	Missing	195	65
ViFi	50	No-precise	38	12.66666667
ViFi	40	No-precise	34	11.33333333
ViFi	30	No-precise	40	13.33333333

ViFi	20	No-precise	50	16.66666667
ViFi	10	No-precise	29	9.666666667
ViFi	50	Precise	245	81.66666667
ViFi	40	Precise	248	82.66666667
ViFi	30	Precise	226	75.33333333
ViFi	20	Precise	178	59.33333333
ViFi	10	Precise	76	25.33333333
VirusFinder2	50	Missing	102	34
VirusFinder2	40	Missing	112	37.33333333
VirusFinder2	30	Missing	128	42.66666667
VirusFinder2	20	Missing	166	55.33333333
VirusFinder2	10	Missing	271	90.33333333
VirusFinder2	50	No-precise	4	1.333333333
VirusFinder2	40	No-precise	3	1
VirusFinder2	30	No-precise	7	2.333333333
VirusFinder2	20	No-precise	6	2
VirusFinder2	10	No-precise	4	1.333333333
VirusFinder2	50	Precise	194	64.66666667
VirusFinder2	40	Precise	185	61.66666667
VirusFinder2	30	Precise	165	55
VirusFinder2	20	Precise	128	42.66666667
VirusFinder2	10	Precise	25	8.333333333
Virus-Clip	50	Missing	8	2.666666667
Virus-Clip	40	Missing	8	2.666666667
Virus-Clip	30	Missing	10	3.333333333
Virus-Clip	20	Missing	16	5.333333333
Virus-Clip	10	Missing	64	21.33333333
Virus-Clip	50	No-precise	26	8.666666667
Virus-Clip	40	No-precise	24	8
Virus-Clip	30	No-precise	28	9.333333333
Virus-Clip	20	No-precise	39	13
Virus-Clip	10	No-precise	77	25.66666667
Virus-Clip	50	Precise	266	88.66666667
Virus-Clip	40	Precise	268	89.33333333
Virus-Clip	30	Precise	262	87.33333333
Virus-Clip	20	Precise	245	81.66666667
Virus-Clip	10	Precise	159	53

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Supplementary Data 10. Distance to real breakpoint for Non-precise calls on simulated data.

Detailed list of those calls classified as Non-precise in Supplementary Data 9, with Distance2Bkp showing the number of base pairs between the breakpoint reported by the tool and the real breakpoint in the simulated genome.

TOOL	VAF (%)	CHROM	POS	VIRUS	Distance2Bkp
VIRUNS_LR	50	1	109634774	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	50	1	155127400	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	50	1	155307273	NC_027779.1HPV/VIRUS	3
VIRUNS_LR	50	1	51651612	NC_007605.1HHV/VIRUS	2
VIRUNS_LR	50	10	104843661	NC_003977.2HBV/VIRUS	6
VIRUNS_LR	50	10	134046062	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	50	10	23570007	NC_007605.1HHV/VIRUS	2
VIRUNS_LR	50	11	62079459	NC_003977.2HBV/VIRUS	5
VIRUNS_LR	50	11	90005730	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	50	11	94093344	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	50	13	96569082	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	50	16	4965756	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	50	16	83205932	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	50	17	67664594	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	50	18	28813229	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	50	18	3576192	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	50	18	60849500	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	50	18	6520694	NC_007605.1HHV/VIRUS	2
VIRUNS_LR	50	19	37943272	NC_027779.1HPV/VIRUS	3
VIRUNS_LR	50	2	149022105	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	50	2	16167336	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	50	2	23163945	NC_003977.2HBV/VIRUS	3
VIRUNS_LR	50	20	35149133	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	50	22	29946207	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	50	3	111957390	NC_007605.1HHV/VIRUS	4
VIRUNS_LR	50	3	147841183	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	50	3	7395636	NC_027779.1HPV/VIRUS	5
VIRUNS_LR	50	4	150160667	NC_007605.1HHV/VIRUS	2
VIRUNS_LR	50	4	157471826	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	50	4	57761710	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	50	4	68718229	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	50	5	123022590	NC_007605.1HHV/VIRUS	2
VIRUNS_LR	50	5	142233979	NC_027779.1HPV/VIRUS	3
VIRUNS_LR	50	5	83719544	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	50	6	126225299	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	50	6	64509133	NC_007605.1HHV/VIRUS	2
VIRUNS_LR	50	7	70051311	NC_007605.1HHV/VIRUS	2
VIRUNS_LR	50	7	97970442	NC_007605.1HHV/VIRUS	2

VIRUNS_LR	50	8	2153277	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	50	8	85428766	NC_027779.1HPV/VIRUS	3
VIRUNS_LR	50	8	884084	NC_027779.1HPV/VIRUS	4
VIRUNS_LR	50	9	112952009	NC_007605.1HHV/VIRUS	2
VIRUNS_LR	50	9	81305646	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	50	X	110906155	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	50	X	145921903	NC_007605.1HHV/VIRUS	3
VIRUNS_LR	50	X	89930898	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	40	1	155307273	NC_027779.1HPV/VIRUS	4
VIRUNS_LR	40	1	248025949	NC_007605.1HHV/VIRUS	2
VIRUNS_LR	40	1	51651612	NC_007605.1HHV/VIRUS	5
VIRUNS_LR	40	1	75647009	NC_007605.1HHV/VIRUS	2
VIRUNS_LR	40	1	80816556	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	40	10	123918167	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	40	10	20674460	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	40	10	88527026	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	40	11	113507103	NC_007605.1HHV/VIRUS	2
VIRUNS_LR	40	11	118247121	NC_007605.1HHV/VIRUS	2
VIRUNS_LR	40	11	62079459	NC_003977.2HBV/VIRUS	4
VIRUNS_LR	40	13	81756934	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	40	13	96569082	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	40	16	71862370	NC_003977.2HBV/VIRUS	3
VIRUNS_LR	40	17	67664594	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	40	17	74658638	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	40	18	47356687	NC_007605.1HHV/VIRUS	2
VIRUNS_LR	40	19	37943272	NC_027779.1HPV/VIRUS	3
VIRUNS_LR	40	2	136596312	NC_027779.1HPV/VIRUS	3
VIRUNS_LR	40	2	14050388	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	40	2	141984860	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	40	2	149022105	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	40	2	15980560	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	40	2	16167336	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	40	2	209852379	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	40	2	23163945	NC_003977.2HBV/VIRUS	4
VIRUNS_LR	40	2	238912150	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	40	22	29946207	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	40	22	38279825	NC_007605.1HHV/VIRUS	3
VIRUNS_LR	40	3	111957390	NC_007605.1HHV/VIRUS	3
VIRUNS_LR	40	3	147841183	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	40	3	50737691	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	40	3	7395636	NC_027779.1HPV/VIRUS	5
VIRUNS_LR	40	4	130597251	NC_007605.1HHV/VIRUS	3
VIRUNS_LR	40	4	57761710	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	40	4	68718229	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	40	5	111486338	NC_003977.2HBV/VIRUS	3

VIRUNS_LR	40	5	123022590	NC_007605.1HHV/VIRUS	2
VIRUNS_LR	40	5	160795828	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	40	5	44651749	NC_003977.2HBV/VIRUS	3
VIRUNS_LR	40	5	83719544	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	40	5	91956904	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	40	6	64509133	NC_007605.1HHV/VIRUS	2
VIRUNS_LR	40	7	13570315	NC_003977.2HBV/VIRUS	3
VIRUNS_LR	40	7	70051311	NC_007605.1HHV/VIRUS	2
VIRUNS_LR	40	7	9130341	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	40	8	884084	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	40	9	4145834	NC_007605.1HHV/VIRUS	2
VIRUNS_LR	40	9	81305646	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	40	X	108571383	NC_007605.1HHV/VIRUS	2
VIRUNS_LR	40	X	145921903	NC_007605.1HHV/VIRUS	3
VIRUNS_LR	40	X	223251	NC_003977.2HBV/VIRUS	27
VIRUNS_LR	40	X	35260534	NC_007605.1HHV/VIRUS	2
VIRUNS_LR	40	X	71647340	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	40	X	89930898	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	30	1	109634774	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	30	1	155307273	NC_027779.1HPV/VIRUS	3
VIRUNS_LR	30	1	185087420	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	30	1	190734460	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	30	1	225847400	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	30	1	51651612	NC_007605.1HHV/VIRUS	4
VIRUNS_LR	30	1	75647009	NC_007605.1HHV/VIRUS	2
VIRUNS_LR	30	10	104843661	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	30	10	20674460	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	30	11	100488625	NC_007605.1HHV/VIRUS	2
VIRUNS_LR	30	11	62079459	NC_003977.2HBV/VIRUS	3
VIRUNS_LR	30	11	76042765	NC_027779.1HPV/VIRUS	3
VIRUNS_LR	30	11	94093344	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	30	12	131453994	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	30	13	96569082	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	30	14	106057054	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	30	14	63176723	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	30	14	65566850	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	30	15	98807605	NC_007605.1HHV/VIRUS	2
VIRUNS_LR	30	16	71862370	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	30	17	15112508	NC_007605.1HHV/VIRUS	3
VIRUNS_LR	30	18	28813229	NC_027779.1HPV/VIRUS	3
VIRUNS_LR	30	18	34112778	NC_007605.1HHV/VIRUS	3
VIRUNS_LR	30	18	58604776	NC_027779.1HPV/VIRUS	3
VIRUNS_LR	30	18	60849500	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	30	18	6520694	NC_007605.1HHV/VIRUS	2
VIRUNS_LR	30	19	37943272	NC_027779.1HPV/VIRUS	3

VIRUNS_LR	30	2	149022105	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	30	2	219599580	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	30	2	23163945	NC_003977.2HBV/VIRUS	3
VIRUNS_LR	30	2	39241493	NC_007605.1HHV/VIRUS	2
VIRUNS_LR	30	20	35149133	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	30	21	33519236	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	30	22	38279825	NC_007605.1HHV/VIRUS	6
VIRUNS_LR	30	3	178068781	NC_007605.1HHV/VIRUS	6
VIRUNS_LR	30	3	663091	NC_027779.1HPV/VIRUS	3
VIRUNS_LR	30	3	7395636	NC_027779.1HPV/VIRUS	3
VIRUNS_LR	30	4	123315511	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	30	4	133092252	NC_007605.1HHV/VIRUS	2
VIRUNS_LR	30	4	68718229	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	30	5	113808414	NC_007605.1HHV/VIRUS	2
VIRUNS_LR	30	5	123022590	NC_007605.1HHV/VIRUS	2
VIRUNS_LR	30	5	160795828	NC_003977.2HBV/VIRUS	4
VIRUNS_LR	30	5	79369964	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	30	5	83719544	NC_027779.1HPV/VIRUS	3
VIRUNS_LR	30	6	126141761	NC_007605.1HHV/VIRUS	3
VIRUNS_LR	30	6	129538590	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	30	6	49628235	NC_007605.1HHV/VIRUS	2
VIRUNS_LR	30	6	64509133	NC_007605.1HHV/VIRUS	2
VIRUNS_LR	30	6	6938314	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	30	6	86304376	NC_007605.1HHV/VIRUS	2
VIRUNS_LR	30	7	130487372	NC_007605.1HHV/VIRUS	2
VIRUNS_LR	30	7	131834151	NC_007605.1HHV/VIRUS	2
VIRUNS_LR	30	7	152886703	NC_007605.1HHV/VIRUS	2
VIRUNS_LR	30	7	28521000	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	30	8	24560133	NC_007605.1HHV/VIRUS	2
VIRUNS_LR	30	8	28572230	NC_003977.2HBV/VIRUS	3
VIRUNS_LR	30	8	85428766	NC_027779.1HPV/VIRUS	3
VIRUNS_LR	30	9	132669762	NC_007605.1HHV/VIRUS	5
VIRUNS_LR	30	X	12637424	NC_007605.1HHV/VIRUS	2
VIRUNS_LR	30	X	35260534	NC_007605.1HHV/VIRUS	4
VIRUNS_LR	20	1	155307273	NC_027779.1HPV/VIRUS	3
VIRUNS_LR	20	1	51651612	NC_007605.1HHV/VIRUS	3
VIRUNS_LR	20	1	54169178	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	20	1	59693851	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	20	10	123918167	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	20	10	20674460	NC_003977.2HBV/VIRUS	4
VIRUNS_LR	20	10	23570007	NC_007605.1HHV/VIRUS	2
VIRUNS_LR	20	10	52108103	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	20	10	88527026	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	20	11	76042765	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	20	11	78674251	NC_027779.1HPV/VIRUS	2

VIRUNS_LR	20	11	94093344	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	20	12	104658272	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	20	12	21687170	NC_007605.1HHV/VIRUS	2
VIRUNS_LR	20	12	80964986	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	20	13	19807547	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	20	13	31736535	NC_027779.1HPV/VIRUS	3
VIRUNS_LR	20	13	96569082	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	20	16	71862370	NC_003977.2HBV/VIRUS	3
VIRUNS_LR	20	16	83205932	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	20	16	85356749	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	20	18	28813229	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	20	18	33220779	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	20	18	60849500	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	20	19	37943272	NC_027779.1HPV/VIRUS	5
VIRUNS_LR	20	2	104707755	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	20	2	139284493	NC_003977.2HBV/VIRUS	3
VIRUNS_LR	20	2	209852379	NC_027779.1HPV/VIRUS	3
VIRUNS_LR	20	2	238912150	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	20	2	39241493	NC_007605.1HHV/VIRUS	2
VIRUNS_LR	20	2	40373756	NC_007605.1HHV/VIRUS	2
VIRUNS_LR	20	2	50917884	NC_007605.1HHV/VIRUS	3
VIRUNS_LR	20	20	35149133	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	20	21	33519236	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	20	22	37306512	NC_007605.1HHV/VIRUS	2
VIRUNS_LR	20	3	112968361	NC_007605.1HHV/VIRUS	7
VIRUNS_LR	20	3	130901058	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	20	3	178068781	NC_007605.1HHV/VIRUS	3
VIRUNS_LR	20	3	39733622	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	20	3	52627548	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	20	3	7395636	NC_027779.1HPV/VIRUS	4
VIRUNS_LR	20	4	104210362	NC_007605.1HHV/VIRUS	2
VIRUNS_LR	20	4	33546783	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	20	4	75244873	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	20	5	118369701	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	20	5	142233979	NC_027779.1HPV/VIRUS	7
VIRUNS_LR	20	5	34689333	NC_007605.1HHV/VIRUS	3
VIRUNS_LR	20	5	43212542	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	20	5	44651749	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	20	6	126141761	NC_007605.1HHV/VIRUS	2
VIRUNS_LR	20	6	95631535	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	20	7	130487372	NC_007605.1HHV/VIRUS	2
VIRUNS_LR	20	7	2887016	NC_027779.1HPV/VIRUS	3
VIRUNS_LR	20	8	28572230	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	20	8	85428766	NC_027779.1HPV/VIRUS	3
VIRUNS_LR	20	9	86460072	NC_007605.1HHV/VIRUS	5

VIRUNS_LR	20	X	122641722	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	20	X	145921903	NC_007605.1HHV/VIRUS	2
VIRUNS_LR	20	X	1530038	NC_007605.1HHV/VIRUS	3
VIRUNS_LR	10	1	160338248	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	10	1	194241964	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	10	1	225847400	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	10	1	248025949	NC_007605.1HHV/VIRUS	2
VIRUNS_LR	10	10	88527026	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	10	11	118247121	NC_007605.1HHV/VIRUS	2
VIRUNS_LR	10	11	38277110	NC_007605.1HHV/VIRUS	5
VIRUNS_LR	10	13	96569082	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	10	14	106057054	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	10	14	45753938	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	10	14	46934106	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	10	15	42216453	NC_003977.2HBV/VIRUS	3
VIRUNS_LR	10	16	4965756	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	10	17	14153739	NC_007605.1HHV/VIRUS	18
VIRUNS_LR	10	18	21565161	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	10	18	3414775	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	10	18	58604776	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	10	19	30246179	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	10	2	209852379	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	10	2	23163945	NC_003977.2HBV/VIRUS	4
VIRUNS_LR	10	2	238912150	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	10	2	30214060	NC_007605.1HHV/VIRUS	2
VIRUNS_LR	10	20	19360656	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	10	3	111957390	NC_007605.1HHV/VIRUS	3
VIRUNS_LR	10	3	130901058	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	10	3	7395636	NC_027779.1HPV/VIRUS	3
VIRUNS_LR	10	4	113783137	NC_027779.1HPV/VIRUS	3
VIRUNS_LR	10	4	146019658	NC_027779.1HPV/VIRUS	4
VIRUNS_LR	10	4	150160667	NC_007605.1HHV/VIRUS	3
VIRUNS_LR	10	4	30046041	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	10	4	45330317	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	10	4	68718229	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	10	5	19191531	NC_007605.1HHV/VIRUS	2
VIRUNS_LR	10	5	40722944	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	10	5	83719544	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	10	6	129538590	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	10	6	18109177	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	10	6	95631535	NC_027779.1HPV/VIRUS	4
VIRUNS_LR	10	6	97800823	NC_003977.2HBV/VIRUS	7
VIRUNS_LR	10	7	135607367	NC_007605.1HHV/VIRUS	2
VIRUNS_LR	10	7	57320659	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	10	8	111382871	NC_027779.1HPV/VIRUS	3

VIRUNS_LR	10	8	884084	NC_027779.1HPV/VIRUS	2
VIRUNS_LR	10	X	121907443	NC_003977.2HBV/VIRUS	2
VIRUNS_LR	10	X	145921903	NC_007605.1HHV/VIRUS	2
VIRUNS_SR	50	1	155307273	NC_027779.1HPV/VIRUS	3
VIRUNS_SR	50	10	20674460	NC_003977.2HBV/VIRUS	2
VIRUNS_SR	50	10	66923	NC_007605.1HHV/VIRUS	77
VIRUNS_SR	50	13	81756934	NC_027779.1HPV/VIRUS	3
VIRUNS_SR	50	13	96569082	NC_003977.2HBV/VIRUS	2
VIRUNS_SR	50	16	71862370	NC_003977.2HBV/VIRUS	2
VIRUNS_SR	50	17	67664594	NC_027779.1HPV/VIRUS	2
VIRUNS_SR	50	18	21565161	NC_027779.1HPV/VIRUS	2
VIRUNS_SR	50	18	60849500	NC_003977.2HBV/VIRUS	2
VIRUNS_SR	50	2	15980560	NC_027779.1HPV/VIRUS	2
VIRUNS_SR	50	2	23163945	NC_003977.2HBV/VIRUS	4
VIRUNS_SR	50	2	238912150	NC_027779.1HPV/VIRUS	2
VIRUNS_SR	50	2	39241493	NC_007605.1HHV/VIRUS	2
VIRUNS_SR	50	3	147841183	NC_003977.2HBV/VIRUS	2
VIRUNS_SR	50	3	41870555	NC_027779.1HPV/VIRUS	100
VIRUNS_SR	50	4	75244873	NC_003977.2HBV/VIRUS	3
VIRUNS_SR	50	5	142233979	NC_027779.1HPV/VIRUS	2
VIRUNS_SR	50	5	160795828	NC_003977.2HBV/VIRUS	4
VIRUNS_SR	50	5	29444707	NC_007605.1HHV/VIRUS	270
VIRUNS_SR	50	7	70051311	NC_007605.1HHV/VIRUS	294
VIRUNS_SR	50	8	85428766	NC_027779.1HPV/VIRUS	5
VIRUNS_SR	50	X	145921903	NC_007605.1HHV/VIRUS	2
VIRUNS_SR	50	X	89930898	NC_003977.2HBV/VIRUS	2
VIRUNS_SR	40	1	155307273	NC_027779.1HPV/VIRUS	3
VIRUNS_SR	40	10	20674460	NC_003977.2HBV/VIRUS	2
VIRUNS_SR	40	10	66923	NC_007605.1HHV/VIRUS	86
VIRUNS_SR	40	13	81756934	NC_027779.1HPV/VIRUS	3
VIRUNS_SR	40	13	96569082	NC_003977.2HBV/VIRUS	2
VIRUNS_SR	40	15	100334628	NC_003977.2HBV/VIRUS	262
VIRUNS_SR	40	17	67664594	NC_027779.1HPV/VIRUS	2
VIRUNS_SR	40	18	21565161	NC_027779.1HPV/VIRUS	2
VIRUNS_SR	40	18	60849500	NC_003977.2HBV/VIRUS	2
VIRUNS_SR	40	2	15980560	NC_027779.1HPV/VIRUS	2
VIRUNS_SR	40	2	23163945	NC_003977.2HBV/VIRUS	4
VIRUNS_SR	40	2	238912150	NC_027779.1HPV/VIRUS	2
VIRUNS_SR	40	2	39241493	NC_007605.1HHV/VIRUS	2
VIRUNS_SR	40	3	111957390	NC_007605.1HHV/VIRUS	230
VIRUNS_SR	40	3	147841183	NC_003977.2HBV/VIRUS	2
VIRUNS_SR	40	4	75244873	NC_003977.2HBV/VIRUS	3
VIRUNS_SR	40	5	142233979	NC_027779.1HPV/VIRUS	2
VIRUNS_SR	40	5	160795828	NC_003977.2HBV/VIRUS	4
VIRUNS_SR	40	5	29444707	NC_007605.1HHV/VIRUS	261

VIRUNS_SR	40	6	122723800	NC_007605.1HHV/VIRUS	276
VIRUNS_SR	40	7	70051311	NC_007605.1HHV/VIRUS	2
VIRUNS_SR	40	8	85428766	NC_027779.1HPV/VIRUS	5
VIRUNS_SR	40	X	145921903	NC_007605.1HHV/VIRUS	2
VIRUNS_SR	40	X	89930898	NC_003977.2HBV/VIRUS	2
VIRUNS_SR	30	1	155307273	NC_027779.1HPV/VIRUS	3
VIRUNS_SR	30	10	20674460	NC_003977.2HBV/VIRUS	2
VIRUNS_SR	30	13	81756934	NC_027779.1HPV/VIRUS	3
VIRUNS_SR	30	13	96569082	NC_003977.2HBV/VIRUS	2
VIRUNS_SR	30	16	71862370	NC_003977.2HBV/VIRUS	2
VIRUNS_SR	30	17	67664594	NC_027779.1HPV/VIRUS	2
VIRUNS_SR	30	18	21565161	NC_027779.1HPV/VIRUS	2
VIRUNS_SR	30	18	60849500	NC_003977.2HBV/VIRUS	2
VIRUNS_SR	30	2	15980560	NC_027779.1HPV/VIRUS	2
VIRUNS_SR	30	2	23163945	NC_003977.2HBV/VIRUS	4
VIRUNS_SR	30	2	238912150	NC_027779.1HPV/VIRUS	2
VIRUNS_SR	30	2	39241493	NC_007605.1HHV/VIRUS	2
VIRUNS_SR	30	3	147841183	NC_003977.2HBV/VIRUS	2
VIRUNS_SR	30	3	149325274	NC_007605.1HHV/VIRUS	172
VIRUNS_SR	30	3	178068781	NC_007605.1HHV/VIRUS	286
VIRUNS_SR	30	4	75244873	NC_003977.2HBV/VIRUS	3
VIRUNS_SR	30	5	142233979	NC_027779.1HPV/VIRUS	2
VIRUNS_SR	30	5	158482538	NC_003977.2HBV/VIRUS	158
VIRUNS_SR	30	8	85428766	NC_027779.1HPV/VIRUS	5
VIRUNS_SR	30	X	145921903	NC_007605.1HHV/VIRUS	2
VIRUNS_SR	30	X	89930898	NC_003977.2HBV/VIRUS	2
VIRUNS_SR	20	1	155307273	NC_027779.1HPV/VIRUS	3
VIRUNS_SR	20	1	160338248	NC_003977.2HBV/VIRUS	209
VIRUNS_SR	20	1	51651612	NC_007605.1HHV/VIRUS	134
VIRUNS_SR	20	1	75647009	NC_007605.1HHV/VIRUS	235
VIRUNS_SR	20	10	20674460	NC_003977.2HBV/VIRUS	2
VIRUNS_SR	20	13	81756934	NC_027779.1HPV/VIRUS	3
VIRUNS_SR	20	13	96569082	NC_003977.2HBV/VIRUS	2
VIRUNS_SR	20	14	65566850	NC_003977.2HBV/VIRUS	192
VIRUNS_SR	20	16	71862370	NC_003977.2HBV/VIRUS	2
VIRUNS_SR	20	17	67664594	NC_027779.1HPV/VIRUS	2
VIRUNS_SR	20	18	21565161	NC_027779.1HPV/VIRUS	2
VIRUNS_SR	20	18	58604776	NC_027779.1HPV/VIRUS	235
VIRUNS_SR	20	18	60849500	NC_003977.2HBV/VIRUS	2
VIRUNS_SR	20	2	15980560	NC_027779.1HPV/VIRUS	2
VIRUNS_SR	20	2	199583070	NC_003977.2HBV/VIRUS	217
VIRUNS_SR	20	2	23163945	NC_003977.2HBV/VIRUS	4
VIRUNS_SR	20	2	238912150	NC_027779.1HPV/VIRUS	2
VIRUNS_SR	20	2	39241493	NC_007605.1HHV/VIRUS	2
VIRUNS_SR	20	3	100811357	NC_003977.2HBV/VIRUS	238

VIRUNS_SR	20	3	147841183	NC_003977.2HBV/VIRUS	2
VIRUNS_SR	20	3	31926127	NC_007605.1HHV/VIRUS	247
VIRUNS_SR	20	3	55472386	NC_007605.1HHV/VIRUS	207
VIRUNS_SR	20	4	130597251	NC_007605.1HHV/VIRUS	265
VIRUNS_SR	20	4	75244873	NC_003977.2HBV/VIRUS	3
VIRUNS_SR	20	5	142233979	NC_027779.1HPV/VIRUS	2
VIRUNS_SR	20	8	85428766	NC_027779.1HPV/VIRUS	5
VIRUNS_SR	20	X	122641722	NC_027779.1HPV/VIRUS	204
VIRUNS_SR	20	X	145921903	NC_007605.1HHV/VIRUS	2
VIRUNS_SR	20	X	35260534	NC_007605.1HHV/VIRUS	246
VIRUNS_SR	20	X	89930898	NC_003977.2HBV/VIRUS	2
VIRUNS_SR	10	1	153891729	NC_007605.1HHV/VIRUS	219
VIRUNS_SR	10	1	155307273	NC_027779.1HPV/VIRUS	173
VIRUNS_SR	10	1	160338248	NC_003977.2HBV/VIRUS	200
VIRUNS_SR	10	1	51651612	NC_007605.1HHV/VIRUS	280
VIRUNS_SR	10	1	6315264	NC_007605.1HHV/VIRUS	230
VIRUNS_SR	10	10	125018204	NC_027779.1HPV/VIRUS	221
VIRUNS_SR	10	10	20674460	NC_003977.2HBV/VIRUS	2
VIRUNS_SR	10	11	38277110	NC_007605.1HHV/VIRUS	212
VIRUNS_SR	10	11	77630985	NC_007605.1HHV/VIRUS	219
VIRUNS_SR	10	13	81756934	NC_027779.1HPV/VIRUS	3
VIRUNS_SR	10	14	63176723	NC_027779.1HPV/VIRUS	119
VIRUNS_SR	10	14	70263656	NC_027779.1HPV/VIRUS	119
VIRUNS_SR	10	15	25082642	NC_007605.1HHV/VIRUS	269
VIRUNS_SR	10	17	67664594	NC_027779.1HPV/VIRUS	2
VIRUNS_SR	10	18	21565161	NC_027779.1HPV/VIRUS	2
VIRUNS_SR	10	18	34112778	NC_007605.1HHV/VIRUS	190
VIRUNS_SR	10	18	60849500	NC_003977.2HBV/VIRUS	2
VIRUNS_SR	10	19	50398970	NC_003977.2HBV/VIRUS	50
VIRUNS_SR	10	2	15980560	NC_027779.1HPV/VIRUS	2
VIRUNS_SR	10	2	190437368	NC_007605.1HHV/VIRUS	151
VIRUNS_SR	10	2	39241493	NC_007605.1HHV/VIRUS	2
VIRUNS_SR	10	2	40579755	NC_007605.1HHV/VIRUS	240
VIRUNS_SR	10	21	33519236	NC_027779.1HPV/VIRUS	110
VIRUNS_SR	10	3	147841183	NC_003977.2HBV/VIRUS	2
VIRUNS_SR	10	3	149325274	NC_007605.1HHV/VIRUS	237
VIRUNS_SR	10	3	178068781	NC_007605.1HHV/VIRUS	218
VIRUNS_SR	10	3	55472386	NC_007605.1HHV/VIRUS	255
VIRUNS_SR	10	4	113783137	NC_027779.1HPV/VIRUS	2
VIRUNS_SR	10	4	133092252	NC_007605.1HHV/VIRUS	179
VIRUNS_SR	10	4	158137270	NC_007605.1HHV/VIRUS	174
VIRUNS_SR	10	4	75244873	NC_003977.2HBV/VIRUS	3
VIRUNS_SR	10	5	123022590	NC_007605.1HHV/VIRUS	224
VIRUNS_SR	10	5	142233979	NC_027779.1HPV/VIRUS	2
VIRUNS_SR	10	5	29444707	NC_007605.1HHV/VIRUS	16

VIRUNS_SR	10	5	86893476	NC_007605.1HHV/VIRUS	105
VIRUNS_SR	10	8	28511954	NC_007605.1HHV/VIRUS	265
VIRUNS_SR	10	8	85428766	NC_027779.1HPV/VIRUS	5
VIRUNS_SR	10	X	145921903	NC_007605.1HHV/VIRUS	2
ViFi	50	1	155307273	NC_027779.1HPV/VIRUS	3
ViFi	50	1	225931235	NC_003977.2HBV/VIRUS	56
ViFi	50	1	6315264	NC_007605.1HHV/VIRUS	300
ViFi	50	10	20674460	NC_003977.2HBV/VIRUS	2
ViFi	50	10	30894812	NC_027779.1HPV/VIRUS	31
ViFi	50	10	52108103	NC_027779.1HPV/VIRUS	2
ViFi	50	11	55548695	NC_027779.1HPV/VIRUS	2
ViFi	50	11	73950210	NC_003977.2HBV/VIRUS	2
ViFi	50	11	77630985	NC_007605.1HHV/VIRUS	24
ViFi	50	11	80691543	NC_007605.1HHV/VIRUS	3
ViFi	50	12	105059779	NC_003977.2HBV/VIRUS	24
ViFi	50	13	19807547	NC_003977.2HBV/VIRUS	15
ViFi	50	13	81756934	NC_027779.1HPV/VIRUS	3
ViFi	50	13	96569082	NC_003977.2HBV/VIRUS	2
ViFi	50	14	45753938	NC_003977.2HBV/VIRUS	3
ViFi	50	14	53310018	NC_003977.2HBV/VIRUS	48
ViFi	50	15	100334628	NC_003977.2HBV/VIRUS	300
ViFi	50	16	71862370	NC_003977.2HBV/VIRUS	2
ViFi	50	17	67664594	NC_027779.1HPV/VIRUS	2
ViFi	50	18	21565161	NC_027779.1HPV/VIRUS	2
ViFi	50	18	60849500	NC_003977.2HBV/VIRUS	2
ViFi	50	19	36291264	NC_007605.1HHV/VIRUS	2
ViFi	50	19	39380728	NC_007605.1HHV/VIRUS	2
ViFi	50	2	15980560	NC_027779.1HPV/VIRUS	2
ViFi	50	2	23163945	NC_003977.2HBV/VIRUS	4
ViFi	50	2	238912150	NC_027779.1HPV/VIRUS	2
ViFi	50	2	39241493	NC_007605.1HHV/VIRUS	2
ViFi	50	3	147841183	NC_003977.2HBV/VIRUS	2
ViFi	50	3	67307272	NC_003977.2HBV/VIRUS	2
ViFi	50	5	142233979	NC_027779.1HPV/VIRUS	2
ViFi	50	5	40722944	NC_003977.2HBV/VIRUS	297
ViFi	50	7	22473181	NC_007605.1HHV/VIRUS	48
ViFi	50	7	28521000	NC_003977.2HBV/VIRUS	46
ViFi	50	7	68514965	NC_003977.2HBV/VIRUS	2
ViFi	50	7	70051311	NC_007605.1HHV/VIRUS	2
ViFi	50	8	85428766	NC_027779.1HPV/VIRUS	5
ViFi	50	X	145921903	NC_007605.1HHV/VIRUS	2
ViFi	50	X	89930898	NC_003977.2HBV/VIRUS	2
ViFi	40	1	185087420	NC_027779.1HPV/VIRUS	5
ViFi	40	1	225931235	NC_003977.2HBV/VIRUS	72
ViFi	40	10	20674460	NC_003977.2HBV/VIRUS	3

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ViFi	40	10	23570007	NC_007605.1HHV/VIRUS	18
ViFi	40	10	30894812	NC_027779.1HPV/VIRUS	47
ViFi	40	11	117671466	NC_027779.1HPV/VIRUS	31
ViFi	40	11	77630985	NC_007605.1HHV/VIRUS	27
ViFi	40	12	105059779	NC_003977.2HBV/VIRUS	31
ViFi	40	13	19807547	NC_003977.2HBV/VIRUS	11
ViFi	40	13	81756934	NC_027779.1HPV/VIRUS	3
ViFi	40	13	96569082	NC_003977.2HBV/VIRUS	2
ViFi	40	14	53310018	NC_003977.2HBV/VIRUS	40
ViFi	40	14	65566850	NC_003977.2HBV/VIRUS	7
ViFi	40	15	100334628	NC_003977.2HBV/VIRUS	300
ViFi	40	17	67664594	NC_027779.1HPV/VIRUS	2
ViFi	40	18	21565161	NC_027779.1HPV/VIRUS	2
ViFi	40	18	60849500	NC_003977.2HBV/VIRUS	2
ViFi	40	2	136596312	NC_027779.1HPV/VIRUS	4
ViFi	40	2	15980560	NC_027779.1HPV/VIRUS	2
ViFi	40	2	23163945	NC_003977.2HBV/VIRUS	4
ViFi	40	2	238912150	NC_027779.1HPV/VIRUS	2
ViFi	40	2	39241493	NC_007605.1HHV/VIRUS	2
ViFi	40	2	50917884	NC_007605.1HHV/VIRUS	3
ViFi	40	3	112968361	NC_007605.1HHV/VIRUS	21
ViFi	40	3	147841183	NC_003977.2HBV/VIRUS	2
ViFi	40	3	149325274	NC_007605.1HHV/VIRUS	12
ViFi	40	5	142233979	NC_027779.1HPV/VIRUS	2
ViFi	40	5	40722944	NC_003977.2HBV/VIRUS	299
ViFi	40	5	43163554	NC_007605.1HHV/VIRUS	3
ViFi	40	7	158957045	NC_027779.1HPV/VIRUS	300
ViFi	40	7	70051311	NC_007605.1HHV/VIRUS	2
ViFi	40	8	85428766	NC_027779.1HPV/VIRUS	5
ViFi	40	9	81305646	NC_027779.1HPV/VIRUS	2
ViFi	40	X	145921903	NC_007605.1HHV/VIRUS	3
ViFi	30	1	109634774	NC_003977.2HBV/VIRUS	12
ViFi	30	1	155307273	NC_027779.1HPV/VIRUS	3
ViFi	30	1	217929752	NC_003977.2HBV/VIRUS	35
ViFi	30	10	20674460	NC_003977.2HBV/VIRUS	3
ViFi	30	10	88527026	NC_027779.1HPV/VIRUS	2
ViFi	30	11	77630985	NC_007605.1HHV/VIRUS	46
ViFi	30	13	81756934	NC_027779.1HPV/VIRUS	3
ViFi	30	13	96569082	NC_003977.2HBV/VIRUS	2
ViFi	30	14	53310018	NC_003977.2HBV/VIRUS	48
ViFi	30	15	100334628	NC_003977.2HBV/VIRUS	300
ViFi	30	15	49508615	NC_007605.1HHV/VIRUS	40
ViFi	30	16	71862370	NC_003977.2HBV/VIRUS	2
ViFi	30	16	83205932	NC_003977.2HBV/VIRUS	11
ViFi	30	17	67664594	NC_027779.1HPV/VIRUS	2

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ViFi	30	18	21565161	NC_027779.1HPV/VIRUS	2
ViFi	30	18	60849500	NC_003977.2HBV/VIRUS	2
ViFi	30	19	15157836	NC_007605.1HHV/VIRUS	9
ViFi	30	2	15980560	NC_027779.1HPV/VIRUS	2
ViFi	30	2	213881695	NC_027779.1HPV/VIRUS	34
ViFi	30	2	23163945	NC_003977.2HBV/VIRUS	4
ViFi	30	2	238912150	NC_027779.1HPV/VIRUS	2
ViFi	30	2	39241493	NC_007605.1HHV/VIRUS	2
ViFi	30	20	35149133	NC_003977.2HBV/VIRUS	298
ViFi	30	3	147841183	NC_003977.2HBV/VIRUS	2
ViFi	30	3	194364387	NC_003977.2HBV/VIRUS	5
ViFi	30	3	50737691	NC_027779.1HPV/VIRUS	21
ViFi	30	4	104210362	NC_007605.1HHV/VIRUS	47
ViFi	30	4	133092252	NC_007605.1HHV/VIRUS	10
ViFi	30	5	142233979	NC_027779.1HPV/VIRUS	2
ViFi	30	5	44651749	NC_003977.2HBV/VIRUS	2
ViFi	30	6	126225299	NC_003977.2HBV/VIRUS	2
ViFi	30	6	64509133	NC_007605.1HHV/VIRUS	3
ViFi	30	6	90635588	NC_003977.2HBV/VIRUS	13
ViFi	30	7	130487372	NC_007605.1HHV/VIRUS	37
ViFi	30	7	22473181	NC_007605.1HHV/VIRUS	37
ViFi	30	7	70051311	NC_007605.1HHV/VIRUS	3
ViFi	30	8	85428766	NC_027779.1HPV/VIRUS	5
ViFi	30	X	12637424	NC_007605.1HHV/VIRUS	2
ViFi	30	X	145921903	NC_007605.1HHV/VIRUS	2
ViFi	30	X	89930898	NC_003977.2HBV/VIRUS	2
ViFi	20	1	155307273	NC_027779.1HPV/VIRUS	3
ViFi	20	1	51651612	NC_007605.1HHV/VIRUS	300
ViFi	20	1	75647009	NC_007605.1HHV/VIRUS	20
ViFi	20	10	123918167	NC_027779.1HPV/VIRUS	18
ViFi	20	10	20674460	NC_003977.2HBV/VIRUS	2
ViFi	20	11	90005730	NC_003977.2HBV/VIRUS	2
ViFi	20	12	21687170	NC_007605.1HHV/VIRUS	77
ViFi	20	12	33422133	NC_027779.1HPV/VIRUS	2
ViFi	20	12	59371506	NC_003977.2HBV/VIRUS	84
ViFi	20	12	7673570	NC_027779.1HPV/VIRUS	2
ViFi	20	13	81756934	NC_027779.1HPV/VIRUS	3
ViFi	20	13	96569082	NC_003977.2HBV/VIRUS	2
ViFi	20	15	100334628	NC_003977.2HBV/VIRUS	300
ViFi	20	15	68506708	NC_003977.2HBV/VIRUS	14
ViFi	20	16	71862370	NC_003977.2HBV/VIRUS	2
ViFi	20	16	85356749	NC_003977.2HBV/VIRUS	26
ViFi	20	17	67664594	NC_027779.1HPV/VIRUS	2
ViFi	20	18	21565161	NC_027779.1HPV/VIRUS	2
ViFi	20	18	28813229	NC_027779.1HPV/VIRUS	4

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ViFi	20	18	33220779	NC_027779.1HPV/VIRUS	47
ViFi	20	18	47356687	NC_007605.1HHV/VIRUS	8
ViFi	20	18	60849500	NC_003977.2HBV/VIRUS	2
ViFi	20	2	15980560	NC_027779.1HPV/VIRUS	2
ViFi	20	2	198086424	NC_007605.1HHV/VIRUS	23
ViFi	20	2	213881695	NC_027779.1HPV/VIRUS	34
ViFi	20	2	23163945	NC_003977.2HBV/VIRUS	4
ViFi	20	2	238912150	NC_027779.1HPV/VIRUS	2
ViFi	20	2	39241493	NC_007605.1HHV/VIRUS	2
ViFi	20	2	40579755	NC_007605.1HHV/VIRUS	27
ViFi	20	20	45100214	NC_027779.1HPV/VIRUS	43
ViFi	20	20	47358607	NC_027779.1HPV/VIRUS	61
ViFi	20	3	124966244	NC_003977.2HBV/VIRUS	32
ViFi	20	3	31926127	NC_007605.1HHV/VIRUS	300
ViFi	20	4	57761710	NC_003977.2HBV/VIRUS	14
ViFi	20	5	113808414	NC_007605.1HHV/VIRUS	42
ViFi	20	5	118369701	NC_027779.1HPV/VIRUS	2
ViFi	20	5	142233979	NC_027779.1HPV/VIRUS	2
ViFi	20	5	160795828	NC_003977.2HBV/VIRUS	25
ViFi	20	6	148784890	NC_003977.2HBV/VIRUS	9
ViFi	20	7	124927769	NC_003977.2HBV/VIRUS	17
ViFi	20	7	131834151	NC_007605.1HHV/VIRUS	59
ViFi	20	7	68514965	NC_003977.2HBV/VIRUS	4
ViFi	20	8	18014962	NC_003977.2HBV/VIRUS	2
ViFi	20	8	85428766	NC_027779.1HPV/VIRUS	5
ViFi	20	9	132669762	NC_007605.1HHV/VIRUS	24
ViFi	20	X	108571383	NC_007605.1HHV/VIRUS	4
ViFi	20	X	110906155	NC_003977.2HBV/VIRUS	21
ViFi	20	X	134054540	NC_003977.2HBV/VIRUS	4
ViFi	20	X	145921903	NC_007605.1HHV/VIRUS	2
ViFi	20	X	30012896	NC_003977.2HBV/VIRUS	17
ViFi	10	1	153891729	NC_007605.1HHV/VIRUS	299
ViFi	10	10	123918167	NC_027779.1HPV/VIRUS	29
ViFi	10	10	20674460	NC_003977.2HBV/VIRUS	2
ViFi	10	11	24299218	NC_003977.2HBV/VIRUS	5
ViFi	10	13	31736535	NC_027779.1HPV/VIRUS	300
ViFi	10	13	81756934	NC_027779.1HPV/VIRUS	3
ViFi	10	15	98807605	NC_007605.1HHV/VIRUS	7
ViFi	10	18	21565161	NC_027779.1HPV/VIRUS	2
ViFi	10	19	15157836	NC_007605.1HHV/VIRUS	60
ViFi	10	2	15980560	NC_027779.1HPV/VIRUS	2
ViFi	10	2	198086424	NC_007605.1HHV/VIRUS	10
ViFi	10	2	39241493	NC_007605.1HHV/VIRUS	2
ViFi	10	2	40373756	NC_007605.1HHV/VIRUS	3
ViFi	10	2	40579755	NC_007605.1HHV/VIRUS	91

ViFi	10	22	33167502	NC_007605.1HHV/VIRUS	22
ViFi	10	3	100811357	NC_003977.2HBV/VIRUS	4
ViFi	10	3	130901058	NC_027779.1HPV/VIRUS	18
ViFi	10	4	123315511	NC_027779.1HPV/VIRUS	2
ViFi	10	4	130597251	NC_007605.1HHV/VIRUS	43
ViFi	10	4	150319281	NC_003977.2HBV/VIRUS	22
ViFi	10	5	111486338	NC_003977.2HBV/VIRUS	37
ViFi	10	5	142233979	NC_027779.1HPV/VIRUS	2
ViFi	10	5	34689333	NC_007605.1HHV/VIRUS	60
ViFi	10	6	90635588	NC_003977.2HBV/VIRUS	64
ViFi	10	6	95631535	NC_027779.1HPV/VIRUS	4
ViFi	10	7	124927769	NC_003977.2HBV/VIRUS	12
ViFi	10	7	131834151	NC_007605.1HHV/VIRUS	2
ViFi	10	8	18014962	NC_003977.2HBV/VIRUS	64
ViFi	10	X	145921903	NC_007605.1HHV/VIRUS	2
VirusFinder2	50	10	20674460	NC_003977.2HBV/VIRUS	2
VirusFinder2	50	11	73950210	NC_003977.2HBV/VIRUS	2
VirusFinder2	50	15	71270677	NC_003977.2HBV/VIRUS	2
VirusFinder2	50	X	89930898	NC_003977.2HBV/VIRUS	2
VirusFinder2	40	11	73950210	NC_003977.2HBV/VIRUS	2
VirusFinder2	40	20	35149133	NC_003977.2HBV/VIRUS	2
VirusFinder2	40	6	18109177	NC_027779.1HPV/VIRUS	2
VirusFinder2	30	11	73950210	NC_003977.2HBV/VIRUS	2
VirusFinder2	30	13	81756934	NC_027779.1HPV/VIRUS	3
VirusFinder2	30	15	71270677	NC_003977.2HBV/VIRUS	2
VirusFinder2	30	18	60849500	NC_003977.2HBV/VIRUS	2
VirusFinder2	30	20	35149133	NC_003977.2HBV/VIRUS	2
VirusFinder2	30	4	146019658	NC_027779.1HPV/VIRUS	2
VirusFinder2	30	X	89930898	NC_003977.2HBV/VIRUS	2
VirusFinder2	20	10	20674460	NC_003977.2HBV/VIRUS	2
VirusFinder2	20	11	55548695	NC_027779.1HPV/VIRUS	5
VirusFinder2	20	13	96569082	NC_003977.2HBV/VIRUS	2
VirusFinder2	20	15	71270677	NC_003977.2HBV/VIRUS	2
VirusFinder2	20	2	23163945	NC_003977.2HBV/VIRUS	4
VirusFinder2	20	X	89930898	NC_003977.2HBV/VIRUS	2
VirusFinder2	10	10	20674460	NC_003977.2HBV/VIRUS	2
VirusFinder2	10	2	15980560	NC_027779.1HPV/VIRUS	2
VirusFinder2	10	3	147841183	NC_003977.2HBV/VIRUS	2
VirusFinder2	10	5	160795828	NC_003977.2HBV/VIRUS	3
Virus-Clip	50	1	160338248	NC_003977.2HBV/VIRUS	180
Virus-Clip	50	1	190734460	NC_003977.2HBV/VIRUS	185
Virus-Clip	50	1	235296700	NC_003977.2HBV/VIRUS	2
Virus-Clip	50	10	20674460	NC_003977.2HBV/VIRUS	157
Virus-Clip	50	10	30894812	NC_027779.1HPV/VIRUS	2
Virus-Clip	50	10	88527026	NC_027779.1HPV/VIRUS	2

Virus-Clip	50	11	76042765	NC_027779.1HPV/VIRUS	239
Virus-Clip	50	11	94093344	NC_027779.1HPV/VIRUS	215
Virus-Clip	50	15	98807605	NC_007605.1HHV/VIRUS	131
Virus-Clip	50	18	33220779	NC_027779.1HPV/VIRUS	2
Virus-Clip	50	18	3576192	NC_027779.1HPV/VIRUS	227
Virus-Clip	50	18	44600383	NC_027779.1HPV/VIRUS	188
Virus-Clip	50	2	145770160	NC_027779.1HPV/VIRUS	2
Virus-Clip	50	2	209852379	NC_027779.1HPV/VIRUS	225
Virus-Clip	50	2	219599580	NC_027779.1HPV/VIRUS	209
Virus-Clip	50	2	52455631	NC_027779.1HPV/VIRUS	2
Virus-Clip	50	3	151480389	NC_007605.1HHV/VIRUS	2
Virus-Clip	50	4	123315511	NC_027779.1HPV/VIRUS	230
Virus-Clip	50	4	68718229	NC_003977.2HBV/VIRUS	2
Virus-Clip	50	5	123022590	NC_007605.1HHV/VIRUS	2
Virus-Clip	50	7	2887016	NC_027779.1HPV/VIRUS	210
Virus-Clip	50	7	9130341	NC_027779.1HPV/VIRUS	3
Virus-Clip	50	8	28511954	NC_007605.1HHV/VIRUS	2
Virus-Clip	50	8	48166159	NC_003977.2HBV/VIRUS	139
Virus-Clip	50	8	884084	NC_027779.1HPV/VIRUS	203
Virus-Clip	50	X	71647340	NC_027779.1HPV/VIRUS	234
Virus-Clip	40	1	160338248	NC_003977.2HBV/VIRUS	142
Virus-Clip	40	1	190734460	NC_003977.2HBV/VIRUS	128
Virus-Clip	40	1	235296700	NC_003977.2HBV/VIRUS	2
Virus-Clip	40	10	20674460	NC_003977.2HBV/VIRUS	229
Virus-Clip	40	10	88527026	NC_027779.1HPV/VIRUS	2
Virus-Clip	40	11	94093344	NC_027779.1HPV/VIRUS	239
Virus-Clip	40	15	98807605	NC_007605.1HHV/VIRUS	145
Virus-Clip	40	18	33220779	NC_027779.1HPV/VIRUS	2
Virus-Clip	40	18	3576192	NC_027779.1HPV/VIRUS	3
Virus-Clip	40	18	44600383	NC_027779.1HPV/VIRUS	208
Virus-Clip	40	19	30246179	NC_027779.1HPV/VIRUS	2
Virus-Clip	40	2	145770160	NC_027779.1HPV/VIRUS	195
Virus-Clip	40	2	52455631	NC_027779.1HPV/VIRUS	2
Virus-Clip	40	3	151480389	NC_007605.1HHV/VIRUS	2
Virus-Clip	40	4	30046041	NC_003977.2HBV/VIRUS	170
Virus-Clip	40	4	68718229	NC_003977.2HBV/VIRUS	2
Virus-Clip	40	5	123022590	NC_007605.1HHV/VIRUS	193
Virus-Clip	40	7	20156217	NC_007605.1HHV/VIRUS	187
Virus-Clip	40	7	2887016	NC_027779.1HPV/VIRUS	218
Virus-Clip	40	7	9130341	NC_027779.1HPV/VIRUS	3
Virus-Clip	40	8	28511954	NC_007605.1HHV/VIRUS	2
Virus-Clip	40	8	48166159	NC_003977.2HBV/VIRUS	2
Virus-Clip	40	8	884084	NC_027779.1HPV/VIRUS	203
Virus-Clip	40	X	71647340	NC_027779.1HPV/VIRUS	235
Virus-Clip	30	1	160338248	NC_003977.2HBV/VIRUS	2

Virus-Clip	30	1	190734460	NC_003977.2HBV/VIRUS	120
Virus-Clip	30	1	235296700	NC_003977.2HBV/VIRUS	2
Virus-Clip	30	1	59693851	NC_003977.2HBV/VIRUS	2
Virus-Clip	30	10	20674460	NC_003977.2HBV/VIRUS	148
Virus-Clip	30	10	88527026	NC_027779.1HPV/VIRUS	2
Virus-Clip	30	11	76042765	NC_027779.1HPV/VIRUS	205
Virus-Clip	30	15	98807605	NC_007605.1HHV/VIRUS	111
Virus-Clip	30	18	33220779	NC_027779.1HPV/VIRUS	2
Virus-Clip	30	18	44600383	NC_027779.1HPV/VIRUS	90
Virus-Clip	30	19	30246179	NC_027779.1HPV/VIRUS	179
Virus-Clip	30	2	145770160	NC_027779.1HPV/VIRUS	2
Virus-Clip	30	2	199583070	NC_003977.2HBV/VIRUS	159
Virus-Clip	30	2	209852379	NC_027779.1HPV/VIRUS	195
Virus-Clip	30	2	50917884	NC_007605.1HHV/VIRUS	145
Virus-Clip	30	2	52455631	NC_027779.1HPV/VIRUS	2
Virus-Clip	30	3	130901058	NC_027779.1HPV/VIRUS	4
Virus-Clip	30	3	151480389	NC_007605.1HHV/VIRUS	2
Virus-Clip	30	4	68718229	NC_003977.2HBV/VIRUS	2
Virus-Clip	30	5	113808414	NC_007605.1HHV/VIRUS	2
Virus-Clip	30	5	123022590	NC_007605.1HHV/VIRUS	2
Virus-Clip	30	5	34689333	NC_007605.1HHV/VIRUS	111
Virus-Clip	30	7	2887016	NC_027779.1HPV/VIRUS	214
Virus-Clip	30	7	9130341	NC_027779.1HPV/VIRUS	3
Virus-Clip	30	8	28511954	NC_007605.1HHV/VIRUS	2
Virus-Clip	30	8	48166159	NC_003977.2HBV/VIRUS	193
Virus-Clip	30	8	884084	NC_027779.1HPV/VIRUS	102
Virus-Clip	30	X	71647340	NC_027779.1HPV/VIRUS	205
Virus-Clip	20	1	190734460	NC_003977.2HBV/VIRUS	183
Virus-Clip	20	1	235296700	NC_003977.2HBV/VIRUS	2
Virus-Clip	20	1	29262438	NC_007605.1HHV/VIRUS	213
Virus-Clip	20	1	59693851	NC_003977.2HBV/VIRUS	2
Virus-Clip	20	10	20674460	NC_003977.2HBV/VIRUS	191
Virus-Clip	20	10	23570007	NC_007605.1HHV/VIRUS	204
Virus-Clip	20	10	88527026	NC_027779.1HPV/VIRUS	179
Virus-Clip	20	11	76042765	NC_027779.1HPV/VIRUS	239
Virus-Clip	20	11	90005730	NC_003977.2HBV/VIRUS	4
Virus-Clip	20	11	94093344	NC_027779.1HPV/VIRUS	229
Virus-Clip	20	12	80964986	NC_027779.1HPV/VIRUS	195
Virus-Clip	20	14	106057054	NC_003977.2HBV/VIRUS	174
Virus-Clip	20	14	53310018	NC_003977.2HBV/VIRUS	2
Virus-Clip	20	15	44443008	NC_007605.1HHV/VIRUS	165
Virus-Clip	20	15	98807605	NC_007605.1HHV/VIRUS	127
Virus-Clip	20	18	3576192	NC_027779.1HPV/VIRUS	3
Virus-Clip	20	18	44600383	NC_027779.1HPV/VIRUS	156
Virus-Clip	20	18	60849500	NC_003977.2HBV/VIRUS	109

Virus-Clip	20	19	30246179	NC_027779.1HPV/VIRUS	193
Virus-Clip	20	19	36291264	NC_007605.1HHV/VIRUS	129
Virus-Clip	20	2	145770160	NC_027779.1HPV/VIRUS	2
Virus-Clip	20	2	209852379	NC_027779.1HPV/VIRUS	189
Virus-Clip	20	2	219599580	NC_027779.1HPV/VIRUS	239
Virus-Clip	20	2	52455631	NC_027779.1HPV/VIRUS	195
Virus-Clip	20	20	47358607	NC_027779.1HPV/VIRUS	173
Virus-Clip	20	4	104210362	NC_007605.1HHV/VIRUS	2
Virus-Clip	20	4	150160667	NC_007605.1HHV/VIRUS	103
Virus-Clip	20	4	68718229	NC_003977.2HBV/VIRUS	2
Virus-Clip	20	5	123022590	NC_007605.1HHV/VIRUS	189
Virus-Clip	20	6	148784890	NC_003977.2HBV/VIRUS	181
Virus-Clip	20	7	109569885	NC_007605.1HHV/VIRUS	80
Virus-Clip	20	7	20156217	NC_007605.1HHV/VIRUS	161
Virus-Clip	20	7	2887016	NC_027779.1HPV/VIRUS	224
Virus-Clip	20	7	9130341	NC_027779.1HPV/VIRUS	3
Virus-Clip	20	8	28511954	NC_007605.1HHV/VIRUS	2
Virus-Clip	20	8	48166159	NC_003977.2HBV/VIRUS	141
Virus-Clip	20	8	884084	NC_027779.1HPV/VIRUS	102
Virus-Clip	20	8	98279027	NC_007605.1HHV/VIRUS	135
Virus-Clip	20	X	71647340	NC_027779.1HPV/VIRUS	197
Virus-Clip	10	1	155127400	NC_003977.2HBV/VIRUS	183
Virus-Clip	10	1	190734460	NC_003977.2HBV/VIRUS	2
Virus-Clip	10	1	198084223	NC_003977.2HBV/VIRUS	223
Virus-Clip	10	1	217929752	NC_003977.2HBV/VIRUS	151
Virus-Clip	10	1	225847400	NC_003977.2HBV/VIRUS	133
Virus-Clip	10	1	235296700	NC_003977.2HBV/VIRUS	2
Virus-Clip	10	1	248025949	NC_007605.1HHV/VIRUS	226
Virus-Clip	10	1	27631535	NC_003977.2HBV/VIRUS	156
Virus-Clip	10	1	75647009	NC_007605.1HHV/VIRUS	181
Virus-Clip	10	10	20674460	NC_003977.2HBV/VIRUS	235
Virus-Clip	10	10	88527026	NC_027779.1HPV/VIRUS	2
Virus-Clip	10	11	113507103	NC_007605.1HHV/VIRUS	2
Virus-Clip	10	11	117671466	NC_027779.1HPV/VIRUS	164
Virus-Clip	10	11	69793704	NC_007605.1HHV/VIRUS	3
Virus-Clip	10	11	76042765	NC_027779.1HPV/VIRUS	207
Virus-Clip	10	11	78674251	NC_027779.1HPV/VIRUS	65
Virus-Clip	10	11	80691543	NC_007605.1HHV/VIRUS	127
Virus-Clip	10	12	104658272	NC_027779.1HPV/VIRUS	203
Virus-Clip	10	12	21687170	NC_007605.1HHV/VIRUS	213
Virus-Clip	10	14	53310018	NC_003977.2HBV/VIRUS	234
Virus-Clip	10	14	74283719	NC_027779.1HPV/VIRUS	105
Virus-Clip	10	15	44443008	NC_007605.1HHV/VIRUS	67
Virus-Clip	10	15	98807605	NC_007605.1HHV/VIRUS	229
Virus-Clip	10	17	15112508	NC_007605.1HHV/VIRUS	88

Virus-Clip	10	17	40197933	NC_003977.2HBV/VIRUS	2
Virus-Clip	10	18	33220779	NC_027779.1HPV/VIRUS	157
Virus-Clip	10	18	34112778	NC_007605.1HHV/VIRUS	85
Virus-Clip	10	18	3576192	NC_027779.1HPV/VIRUS	3
Virus-Clip	10	19	30246179	NC_027779.1HPV/VIRUS	157
Virus-Clip	10	19	39380728	NC_007605.1HHV/VIRUS	211
Virus-Clip	10	2	145770160	NC_027779.1HPV/VIRUS	2
Virus-Clip	10	2	198086424	NC_007605.1HHV/VIRUS	2
Virus-Clip	10	2	213881695	NC_027779.1HPV/VIRUS	209
Virus-Clip	10	2	216226935	NC_007605.1HHV/VIRUS	227
Virus-Clip	10	2	36839381	NC_007605.1HHV/VIRUS	203
Virus-Clip	10	2	40579755	NC_007605.1HHV/VIRUS	113
Virus-Clip	10	2	50917884	NC_007605.1HHV/VIRUS	205
Virus-Clip	10	2	52455631	NC_027779.1HPV/VIRUS	105
Virus-Clip	10	20	35149133	NC_003977.2HBV/VIRUS	2
Virus-Clip	10	22	39368507	NC_003977.2HBV/VIRUS	133
Virus-Clip	10	3	112968361	NC_007605.1HHV/VIRUS	119
Virus-Clip	10	3	151480389	NC_007605.1HHV/VIRUS	4
Virus-Clip	10	3	55472386	NC_007605.1HHV/VIRUS	4
Virus-Clip	10	4	113783137	NC_027779.1HPV/VIRUS	2
Virus-Clip	10	4	130597251	NC_007605.1HHV/VIRUS	115
Virus-Clip	10	4	133092252	NC_007605.1HHV/VIRUS	75
Virus-Clip	10	4	33546783	NC_027779.1HPV/VIRUS	125
Virus-Clip	10	4	68718229	NC_003977.2HBV/VIRUS	2
Virus-Clip	10	4	75244873	NC_003977.2HBV/VIRUS	209
Virus-Clip	10	5	111486338	NC_003977.2HBV/VIRUS	211
Virus-Clip	10	5	123022590	NC_007605.1HHV/VIRUS	2
Virus-Clip	10	5	14088228	NC_027779.1HPV/VIRUS	139
Virus-Clip	10	5	179277323	NC_003977.2HBV/VIRUS	123
Virus-Clip	10	5	19191531	NC_007605.1HHV/VIRUS	132
Virus-Clip	10	6	49628235	NC_007605.1HHV/VIRUS	111
Virus-Clip	10	6	65016904	NC_007605.1HHV/VIRUS	135
Virus-Clip	10	6	86304376	NC_007605.1HHV/VIRUS	231
Virus-Clip	10	6	90635588	NC_003977.2HBV/VIRUS	69
Virus-Clip	10	6	97800823	NC_003977.2HBV/VIRUS	206
Virus-Clip	10	7	109569885	NC_007605.1HHV/VIRUS	152
Virus-Clip	10	7	135607367	NC_007605.1HHV/VIRUS	161
Virus-Clip	10	7	28521000	NC_003977.2HBV/VIRUS	227
Virus-Clip	10	7	9130341	NC_027779.1HPV/VIRUS	3
Virus-Clip	10	8	18014962	NC_003977.2HBV/VIRUS	2
Virus-Clip	10	8	28511954	NC_007605.1HHV/VIRUS	2
Virus-Clip	10	8	28572230	NC_003977.2HBV/VIRUS	105
Virus-Clip	10	8	85428766	NC_027779.1HPV/VIRUS	4
Virus-Clip	10	9	4145834	NC_007605.1HHV/VIRUS	165
Virus-Clip	10	9	8189928	NC_027779.1HPV/VIRUS	231

Virus-Clip	10	9	86460072	NC_007605.1HHV/VIRUS	215
Virus-Clip	10	X	108571383	NC_007605.1HHV/VIRUS	209
Virus-Clip	10	X	122786020	NC_003977.2HBV/VIRUS	141
Virus-Clip	10	X	12637424	NC_007605.1HHV/VIRUS	3
Virus-Clip	10	X	134054540	NC_003977.2HBV/VIRUS	173
Virus-Clip	10	X	1530038	NC_007605.1HHV/VIRUS	2
Virus-Clip	10	X	71647340	NC_027779.1HPV/VIRUS	169
Virus-Clip	10	X	89930898	NC_003977.2HBV/VIRUS	203

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Supplementary Data 11. VIRUNS computational resources consumption.
VIRUNS SR and LR were executed using a different number of processes, ranging from 1 to 24. Three replicates were run for each condition, and the time (RawTime; in hours, minutes and seconds) and Maximum Resident Set Size in Gb (MaxRSS_Gb) were measured for each run.

TOOL	Processes	RawTime	MaxRSS_Gb
VIRUNS_LR	1	11:30:08	8.502512
VIRUNS_LR	2	06:14:20	8.229296
VIRUNS_LR	4	03:22:11	7.112708
VIRUNS_LR	6	02:32:51	7.75196
VIRUNS_LR	8	02:03:07	7.00154
VIRUNS_LR	10	01:42:51	7.802952
VIRUNS_LR	12	01:30:53	7.921276
VIRUNS_LR	14	01:22:55	7.56746
VIRUNS_LR	16	01:18:13	6.812128
VIRUNS_LR	18	01:08:45	6.552748
VIRUNS_LR	20	01:11:47	8.366984
VIRUNS_LR	22	01:00:07	6.132968
VIRUNS_LR	24	01:05:23	7.835432
VIRUNS_LR	1	11:32:47	8.497252
VIRUNS_LR	2	06:11:53	7.695732
VIRUNS_LR	4	03:16:59	7.090716
VIRUNS_LR	6	02:30:05	7.238944
VIRUNS_LR	8	01:57:28	6.836392
VIRUNS_LR	10	01:37:32	6.555932
VIRUNS_LR	12	01:23:18	8.063712
VIRUNS_LR	14	01:14:41	7.449112
VIRUNS_LR	16	01:18:45	8.394332
VIRUNS_LR	18	01:15:43	6.845092
VIRUNS_LR	20	01:11:26	7.467592
VIRUNS_LR	22	00:58:43	6.542984
VIRUNS_LR	24	00:56:59	6.664764
VIRUNS_LR	1	11:24:17	8.46988
VIRUNS_LR	2	06:02:53	7.719876
VIRUNS_LR	4	03:15:17	6.54914
VIRUNS_LR	6	02:24:04	6.452516
VIRUNS_LR	8	01:56:19	6.55128
VIRUNS_LR	10	01:42:07	7.13626
VIRUNS_LR	12	01:30:00	7.47434
VIRUNS_LR	14	01:23:11	6.568532
VIRUNS_LR	16	01:18:10	8.474196
VIRUNS_LR	18	01:15:33	7.181348
VIRUNS_LR	20	01:12:01	7.382904
VIRUNS_LR	22	00:58:51	7.745004

VIRUNS_LR	24	00:56:22	7.637176
VIRUNS_SR	1	00:52:21	6.956144
VIRUNS_SR	2	00:27:39	7.658104
VIRUNS_SR	4	00:17:49	7.072864
VIRUNS_SR	6	00:19:37	7.675908
VIRUNS_SR	8	00:15:21	6.9455
VIRUNS_SR	10	00:15:12	7.435636
VIRUNS_SR	12	00:14:47	7.298164
VIRUNS_SR	14	00:14:22	6.888624
VIRUNS_SR	16	00:15:01	6.879556
VIRUNS_SR	18	00:14:27	6.588336
VIRUNS_SR	20	00:17:16	7.422996
VIRUNS_SR	22	00:14:08	6.340516
VIRUNS_SR	24	00:13:55	6.805148
VIRUNS_SR	1	00:52:13	7.1835
VIRUNS_SR	2	00:26:44	7.527304
VIRUNS_SR	4	00:18:12	7.500664
VIRUNS_SR	6	00:17:20	7.251144
VIRUNS_SR	8	00:16:10	7.59542
VIRUNS_SR	10	00:15:51	7.020884
VIRUNS_SR	12	00:15:20	7.11692
VIRUNS_SR	14	00:15:14	7.4208
VIRUNS_SR	16	00:08:58	4.820172
VIRUNS_SR	18	00:09:05	6.773688
VIRUNS_SR	20	00:08:53	6.02608
VIRUNS_SR	22	00:08:44	6.992076
VIRUNS_SR	24	00:08:43	6.972004
VIRUNS_SR	1	00:39:44	7.303412
VIRUNS_SR	2	00:26:41	7.432696
VIRUNS_SR	4	00:18:05	7.863772
VIRUNS_SR	6	00:11:09	7.601376
VIRUNS_SR	8	00:10:16	6.457488
VIRUNS_SR	10	00:09:50	6.5518
VIRUNS_SR	12	00:09:24	5.951348
VIRUNS_SR	14	00:15:03	6.42124
VIRUNS_SR	16	00:14:35	6.474476
VIRUNS_SR	18	00:14:39	7.597452
VIRUNS_SR	20	00:14:01	6.622864
VIRUNS_SR	22	00:15:19	7.299568
VIRUNS_SR	24	00:14:31	6.380916

Supplementary Data 12. Time and maximum memory used by each tool through different sequencing coverages.
Time (TimeMin, in minutes) and Maximum Resident Set Size in Gb (MaxRSS_Gb) were measured for each tool at different sequencing coverage.

TOOL	Coverage	TimeMin	MaxRSS_Gb
VIRUNS_LR	50	219.917	7.410196
VIRUNS_LR	40	155.867	6.6446
VIRUNS_LR	30	98.25	6.541888
VIRUNS_LR	20	54.367	7.851324
VIRUNS_LR	10	23.617	6.480716
VIRUNS_SR	50	14.833	6.59902
VIRUNS_SR	40	19.5	6.825492
VIRUNS_SR	30	15.55	6.670596
VIRUNS_SR	20	11.767	7.106148
VIRUNS_SR	10	8.017	6.474228
ViFi	50	11738.666	18.34168
ViFi	40	9397.05	18.272824
ViFi	30	6996.266	18.123532
ViFi	20	4673.767	18.270832
ViFi	10	2349.334	18.269584
VirusFinder2	50	4177.533	12.897148
VirusFinder2	40	3529.266	13.844652
VirusFinder2	30	2764.767	12.882596
VirusFinder2	20	1539.933	12.296252
VirusFinder2	10	990.366	12.862196
Virus-Clip	50	1760.3	1.128132
Virus-Clip	40	1462.283	1.112084
Virus-Clip	30	1158.583	2.324348
Virus-Clip	20	801.65	1.50548
Virus-Clip	10	518.75	1.100904

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Supplementary Data 13. Evaluation metrics of viral integrations search in real data. Number of true positives (TP), false negatives (FN) and false positives (FP) are shown for each tool in two cell lines (CaSki and PLC/PRF/5). From these values, Precision, Recall and F1-Score were calculated.

CellLine	TOOL	TP	FN	FP	Precision	Recall	F1-Score
CaSki	VIRUNS_LR	38	1	0	1	0.974358974	0.987012987
CaSki	VIRUNS_SR	39	0	0	1	1	1
CaSki	VirusFinder2	21	18	0	1	0.538461538	0.7
CaSki	Virus-Clip	36	3	6592	0.005431503	0.923076923	0.01079946
CaSki	ViFi	37	2	6	0.860465116	0.948717949	0.902439024
PLC	VIRUNS_LR	5	6	0	1	0.454545455	0.625
PLC	VIRUNS_SR	11	0	0	1	1	1
PLC	VirusFinder2	4	7	0	1	0.363636364	0.533333333
PLC	Virus-Clip	11	0	6532	0.001681186	1	0.003356729
PLC	ViFi	11	0	0	1	1	1

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Supplementary Data 14. Detection of HBV integrations by VIRUNS in previously analysed samples

VIRUNS VCF output from the analysis of nine samples from Sung, W. K. et al. (2012). The first and second columns indicate sample ID and integrations coordinates reported by Sung, W. K. et al. (2012). Then, the next columns follow the VCF format that VIRUNS gives as output: chromosome (CHROM); first breakpoint coordinates (POS); reference base at the integration breakpoint (REF); alternate base (insertion in all cases); filter status (PASS in all cases). ID and QUAL fields are necessary for complying with the VCF format but they are out of the scope of VIRUNS analysis. Finally, a detailed explanation of the INFO field can be found in the Methods section.

Legend (Column letter = Column title)

A = ID_Sung_et_al
B = Integration_coord_Sung_et_al
C = CHROM
D = POS
E = ID
F = REF
G = ALT
H = QUAL
I = FILTER
J = INFO

A	B	C	D	E	F	G	H	I	J
101T	chr1: 3190800	1	3190562	.	A	<INS>	.	PASS	NBTOTAL=17;NBDISC=14;NBCLIP=3;IDENT=Hepadnaviridae;ORIENT=PLUS;DISCMAPQ=60;CLIPMAPQ=60;SPECIDENT=EU306668.1:2,KU576377.1:4,KU576959.1:8;DISCDUP=14.29;CLIPDUP=0;CLIPTYPE=DISC;REFSeq=AAAAAAAAAAAGCCACTGAA;BKPRSEQ=TGTGCGTGTGTCCCAGGCACCGTTCTCTCACCGTGGACTTGGTATGGGGAGGTAAAAAAAAAAAAAAAAAAAAAA[INT]>CCACAAAAAGGGAAA;DISC=ERR092383.sra.43745931,ERR092381.sra.691978,ERR092381.sra.22222714,ERR092384.sra.19236473,ERR092382.sra.60788006,ERR092384.sra.60457000,ERR092381.sra.23431687,ERR092381.sra.24381254,ERR092382.sra.27261679,ERR092384.sra.59256998,ERR092382.sra.52168992,ERR092382.sra.52168995,ERR092384.sra.2952532,ERR092387.sra.65833427;CLIP=ERR092382.sra.27261679,ERR092386.sra.42568876,ERR092381.sra.39220240
101T	chr1: 151503456	1	151503387	.	A	<INS>	.	PASS	NBTOTAL=14;NBDISC=10;NBCLIP=4;IDENT=Hepadnaviridae;ORIENT=MINUS;DISCMAPQ=57;CLIPMAPQ=44;SPECIDENT=KU576377.1:10;DISCDUP=50.00;CLIPDUP=25.00;CLIPTYPE=DISC;REFSeq=AGGCTGAGGTAGGCAGATAC;BKPRSEQ=GGTCACCATATTCTTGGGAACAAGAGCTACAGCATGGG<[INT]AGGCAGATACCCGAGGTCAGGAGTTTGAGACCAGCCTGGCCAACATAGCAAA;DISC=ERR092387.sra.66124067,ERR092385.sra.61409055,ERR092381.sra.45413944,ERR092382.sra.27767729,ERR092383.sra.39305739,ERR092383.sra.39305740,ERR092383.sra.40969324,ERR092383.sra.40969326,ERR092383.sra.55880628,ERR092382.sra.57441315;CLIP=ERR092381.sra.25819562,ERR092383.sra.28517270,ERR092384.sra.63390985,ERR092387.sra.66124067
101T	chr1: 151509234	1	151509483	.	T	<INS>	.	PASS	NBTOTAL=15;NBDISC=11;NBCLIP=4;IDENT=Hepadnaviridae;ORIENT=MINUS;DISCMAPQ=60;CLIPMAPQ=60;SPECIDENT=KU576377.1:6,KU576377.1_KU576959.1:1,KU576959.1:4;DISCDUP=27.27;CLIPDUP=25.00;INTBKP=KU576959.1:296;CLIPTYPE=DISC;REFSeq=TAGTCACTTGTTTCTGGTTG;BKPCSEQ=CTCGTTGTCTAACAACAGTAGTTTCCGGAAGTGTTGATAAGATAGGGGCATTTGGTA<[INT]CTTGTTTCAGATGTGTGGACAGTATATTTATTTATTGGTATCTCAGCCACCATCCTGTACCTCCCCAAATCTGCCCAGCTAGGGA;DISC=ERR092386.sra.5005389,ERR092381.sra.11796015,ERR092382.sra.29629486,ERR092384.sra.66560435,ERR092384.sra.66560437,ERR092384.sra.66560440,ERR092384.sra.39700301,ERR092382.sra.44120621,ERR092382.sra.8353839,ERR092384.sra.67596340,ERR092384.sra.67596348;CLIP=ERR092386.sra.5005389,ERR092383.sra.9116647,ERR092382.sra.29629486,ERR092383.sra.9116644
101T	chr18:	18	45256947	.	G	<INS>	.	P	NBTOTAL=10;NBDISC=5;NBCLIP=5;IDENT=Hepadnaviridae;ORIENT=MINUS;DISCMAPQ=60;CLIPMAPQ=60;SPECIDENT=KR811803.1:

	45256947							ASS	2,KU575936.1:2,KU576182.1:1;DISCDUP=20.00;CLIPDUP=40.00;CLIPTYPE=DISC;REFSeq=AATAAAGCAGGAGAAGGGAA;BKPCSEQ=ACCATGCAACTTTTTC<[INT]GAGAAGGGAATCCAACTGAGCAATGATCACCGTGATGATAATACTTTATGCACACGAGCACCTGTCATCCCTCAGCCCTCATC;DISC=ERR092385.sra.52883402,ERR092386.sra.1551939,ERR092384.sra.35193649,ERR092384.sra.65571812,ERR092384.sra.20473645;CLIP=ERR092383.sra.17698313,ERR092384.sra.18103638,ERR092381.sra.40409376,ERR092385.sra.52883402,ERR092386.sra.1551939
101T	chr23: 14603890; chr23: 14603891	X	14603544	.	A	<INS>	.	PASS	NBTOTAL=48;NBDISC=36;NBCLIP=12;IDENT=Hepadnaviridae;ORIENT=RECIPROCAL;BKP2=14603890;DISCMAPQ=59;CLIPMAPQ=59;SPECIDENT=KU576377.1:25,KU576377.1_KU576959.1:1,KU576959.1:10;DISCDUP=50.00;CLIPDUP=16.67;INTBKP=KU576377.1:128;INTBKP2=KU576377.1:658;CLIPTYPE=DISC;REFSeq=TATGTGATCAAAATATTGTC;BKP2CSEQ=GCCAGATTCATCAACTCACCCCAACACAGAATAGCTTGCCTGAGTGCTGT<[INT]ATGAAGAAAGGTTGGGAAAGATACAAGGAAGGGGCTAGAAGTACCAAATAAAAACCCTAAAACTGTCTCCACATACAC;BKPRSEQ=CTCTAATTTTGCAAATGAAGTATGTGATCA[INT]>TTAATAATGTCCTCCTGTAAATGAATGTGAGGAAAGGAGGGAGTTTGCCACTCAGGATTA;CLIPTYPE2=DISC;DISC=ERR092381.sra.32521839,ERR092384.sra.52712632,ERR092384.sra.63060514,ERR092383.sra.5648275,ERR092383.sra.5648280,ERR092383.sra.31837983,ERR092385.sra.21240415,ERR092385.sra.14747708,ERR092385.sra.48254592,ERR092387.sra.66356365,ERR092381.sra.17023111,ERR092383.sra.12312306,ERR092383.sra.12312308,ERR092384.sra.16294928,ERR092384.sra.16294929,ERR092381.sra.49628877,ERR092381.sra.40776100,ERR092382.sra.6755643,ERR092382.sra.6755644,ERR092384.sra.42169703,ERR092384.sra.58560055,ERR092384.sra.38740034,ERR092384.sra.38740073,ERR092381.sra.31385392,ERR092384.sra.13874627,ERR092383.sra.45624439,ERR092384.sra.53191842,ERR092384.sra.53191845,ERR092381.sra.4429600,ERR092381.sra.50310484,ERR092384.sra.60793224,ERR092384.sra.53646735,ERR092383.sra.61456461,ERR092383.sra.61459218,ERR092384.sra.61755620,ERR092384.sra.67437537;CLIP=ERR092381.sra.5783930,ERR092386.sra.1774013,ERR092382.sra.3972393,ERR092384.sra.4250692,ERR092386.sra.68397021,ERR092383.sra.4374845,ERR092383.sra.4377584,ERR092385.sra.21240415,ERR092388.sra.62560492,ERR092385.sra.14747708,ERR092385.sra.48254592,ERR092387.sra.66356365
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117T	chr13: 56044273	13	56044273	.	T	<INS>	.	PASS	NBTOTAL=4;NBDISC=2;NBCLIP=2;IDENT=Hepadnaviridae;ORIENT=MINUS;DISCMAPQ=60;CLIPMAPQ=60;SPECIDENT=AB206817.2:2;DISCDUP=0;CLIPDUP=0;CLIPTYPE=DISC;REFSeq=TACATTTTGTTCTATGTCTT;BKPRSEQ=TAGACTCTGTGGTATTGTGAGGATTCTTG<[INT]TCTATGTCTTGTTTTATAATTGATTTAGTCTTCTGTGTTTTATAGGTTCAATTGAAATGGT;DISC=ERR092517.sra.42027968,ERR092517.sra.71604334;CLIP=ERR092519.sra.82380434,ERR092517.sra.42027968
117T	chr2: 220807737; chr2: 220807986	2	220807813	.	C	<INS>	.	PASS	NBTOTAL=33;NBDISC=29;NBCLIP=4;IDENT=Hepadnaviridae;ORIENT=RECIPROCAL;DISCMAPQ=60;CLIPMAPQ=60;SPECIDENT=AB206817.2:1,GQ857842.1:2,KU576377.1:11,LC101676.1:15;DISCDUP=41.38;CLIPDUP=0;REFSeq=TTGTAAATCTCAGTATGTTT;BKPCSEQ=TGTATAATATTTTTTGTATAAGACTGTCTCTTAGAGGTGGACTTTGTCAAAAA<[INT]CAGTATGTTTTGTTTACATTTTGTTTGTCTCAGGATATATGTATTTTTAATTTCCCT;DISC=ERR092516.sra.27340990,ERR092513.sra.4333778,ERR092513.sra.44026015,ERR092516.sra.27080821,ERR092514.sra.57526151,ERR092515.sra.18769560,ERR092515.sra.71092220,ERR092514.sra.15227062,ERR092513.sra.12266679,ERR092514.sra.55336544,ERR092516.sra.59973081,ERR092514.sra.11133717,ERR092514.sra.11133722,ERR092514.sra.65613744,ERR092514.sra.65613748,ERR092515.sra.26982734,ERR092516.sra.46519315,ERR092516.sra.46519317,ERR092513.sra.24856941,ERR092516.sra.56911681,ERR092515.sra.27334783,ERR092515.sra.25693680,ERR092515.sra.25693685,ERR092513.sra.14211861,ERR092515.sra.6134120,ERR092514.sra.39573734,ERR092514.sra.39573736,ERR092514.sra.39573737,ERR092515.sra.931243;CLIP=ERR092513.sra.5198721,ERR092519.sra.66952346,ERR092520.sra.43945034,ERR092520.sra.33004435
117T	chr4: 157678671	4	157678671	.	T	<INS>	.	PASS	NBTOTAL=10;NBDISC=3;NBCLIP=7;IDENT=Hepadnaviridae;ORIENT=PLUS;DISCMAPQ=60;CLIPMAPQ=60;SPECIDENT=KX631768.1:3;DISCDUP=0;CLIPDUP=0;CLIPTYPE=DISC;REFSeq=TGTGTTAATCTCTGTAACTT;BKPRSEQ=TCATACTATGGAAAAAGTGTCTAAGATACAAATAATACATAAATGTGTTAATC[INT]>GGTAGTCCACAAGAACCAACAAGAAGATGAGGCATAG;DISC=ERR092520.sra.73653508,ERR092518.sra.23858784,ERR092519.sra.56890757;CLIP=ERR092518.sra.59082920,ERR092518.sra.57824710,ERR092519.sra.56890757,ERR092516.sra.48161261,ERR092516.sra.9041515,ERR092516.sra.9041522,ERR092517.sra.68343465
117T	chr8: 10875912	8	10875912	.	A	<INS>	.	PASS	NBTOTAL=51;NBDISC=40;NBCLIP=11;IDENT=Hepadnaviridae;ORIENT=MINUS;DISCMAPQ=60;CLIPMAPQ=60;SPECIDENT=EU306668.1:2,KU576377.1:22,KU576377.1_KU576959.1:6,KU576959.1:10;DISCDUP=47.50;CLIPDUP=27.27;CLIPTYPE=DISC;REFSeq=TCCCCTGCACAAACTCAGGA;BKPCSEQ=CGNTCCCCAGAAGCTNNNNTC<[INT]CCTGCCNCNANGNNCNNCTGGAGATNACACTCTGCAANNNTGCGATCCCCAGAGAGNGGAGGCCANANGACANNTACCTCCATTCCTGGAGCTCAAAGCTACTCCT;DISC=ERR092514.sra.56074073,ERR092515.sra.41192325,ERR092519.sra.58422903,ERR092515.sra.28439401,ERR092515.sra.28439402,ERR092515.sra.66913615,ERR092513.sra.34207298,ERR092516.sra.55635178,ERR092515.sra.23911516,ERR092515.sra.23911518,ERR092515.sra.70617115,ERR092514.sra.14108498,ERR092516.sra.9731831,ERR092513.sra.5090870,ERR092513.sra.27189539,ERR092513.sra.10608827,ERR092515.sra.46202115,ERR092515.sra.46202118,ERR092516.sra.50629984,ERR092516.sra.50629985,ERR092514.sra.64709749,ERR092516.sra.23975962,ERR092513.sra.31550359,ERR092515.sra.55404897,ERR092514.sra.46305694,ERR092515.sra.30651344,ERR092516.sra.66896414,ERR092515.sra.30651341,ERR092515.sra.60486271,ERR092514.sra.996502,ERR092516.sra.28958898,ERR092516.sra.2836742,ERR092513.sra.33605338,ERR092514.sra.19127905,ERR092516.sra.34717581,ERR092516.sra.34717583,ERR092516.sra.6466680,ERR092514.sra.53664625,ERR092515.sra.15200319,ERR092515.sra.49165889;CLIP=ERR092515.sra.57487555,ERR092518.sra.52525958,ERR092520.sra.21234692,ERR092520.sra.29325828,ERR092514.sra.56074073,ERR092515.sra.41192325,ERR092519.sra.58422903,ERR092516.sra.55635178,ERR092513.sra.12849006,ERR092515.sra.60486271,ERR092516.sra.6466680
117T	chr8: 12270963								

Supplementary Data 15. Counts of somatic HPV integration events per tumour.
For each analysed sample, ID (Tumour_wgs_icgc_sample_id) and tumour type (Histology_abbreviation; Head-SCC= head and neck squamous cell carcinoma, Cervix-SCC= cervical squamous cell carcinoma) are shown. Also, counts of two-breakpoints pattern integrations (Canonical_HPV_integrations), one-breakpoint integrations having the viral sequence downstream (Human-HPV, Plus_HPV), one-breakpoint with the viral sequence upstream (HPV-Human, Minus_HPV) and total integration counts (Total_HPV_Integrations) are indicated.

Legend (Column letter = Column title)
A = Tumour_wgs_icgc_sample_id
B = Histology_abbreviation
C = Canonical_HPV_integrations
D = Plus_HPV
E = Minus_HPV
F = Total_HPV_Integrations

A	B	C	D	E	F
SA492581	Cervix-SCC	0	0	0	0
SA492657	Cervix-SCC	0	1	1	2
SA517453	Cervix-SCC	0	1	1	2
SA517532	Cervix-SCC	1	1	1	3
SA517715	Cervix-SCC	1	0	0	1
SA517730	Cervix-SCC	0	1	1	2
SA517802	Cervix-SCC	0	1	1	2
SA517839	Cervix-SCC	0	1	1	2
SA524949	Cervix-SCC	0	1	0	1
SA524966	Cervix-SCC	0	1	1	2
SA525054	Cervix-SCC	0	0	0	0
SA534389	Cervix-SCC	0	0	0	0
SA534431	Cervix-SCC	5	1	1	7
SA534591	Cervix-SCC	1	0	0	1
SA84360	Cervix-SCC	0	1	1	2
SA84489	Cervix-SCC	0	1	1	2
SA84668	Cervix-SCC	0	1	1	2
SA84896	Cervix-SCC	0	1	2	3
SA188108	Head-SCC	0	0	0	0
SA189208	Head-SCC	0	0	0	0
SA190261	Head-SCC	0	0	0	0
SA191115	Head-SCC	0	0	0	0
SA191335	Head-SCC	0	0	0	0
SA192727	Head-SCC	0	0	0	0
SA192967	Head-SCC	0	0	0	0
SA194253	Head-SCC	0	0	0	0
SA194387	Head-SCC	2	2	6	10
SA195307	Head-SCC	3	0	1	4
SA195328	Head-SCC	0	2	1	3
SA195822	Head-SCC	2	1	0	3
SA195900	Head-SCC	0	0	0	0

SA199271	Head-SCC	5	9	4	18
SA200524	Head-SCC	0	0	0	0
SA200796	Head-SCC	0	1	1	2
SA201351	Head-SCC	0	2	1	3
SA201430	Head-SCC	1	0	1	2
SA201581	Head-SCC	0	0	0	0
SA201809	Head-SCC	0	0	0	0
SA202848	Head-SCC	0	0	0	0
SA202903	Head-SCC	1	0	0	1
SA203048	Head-SCC	0	0	0	0
SA203543	Head-SCC	0	0	0	0
SA203853	Head-SCC	0	0	0	0
SA494058	Head-SCC	0	0	0	0
SA494078	Head-SCC	0	0	0	0
SA494082	Head-SCC	0	0	0	0
SA494084	Head-SCC	0	0	0	0
SA494103	Head-SCC	0	0	0	0
SA494116	Head-SCC	0	0	0	0
SA494127	Head-SCC	0	0	0	0
SA494168	Head-SCC	0	0	0	0
SA494229	Head-SCC	0	0	0	0
SA494251	Head-SCC	0	0	0	0
SA494253	Head-SCC	0	0	0	0
SA494271	Head-SCC	0	0	0	0
SA494284	Head-SCC	0	0	0	0
SA494343	Head-SCC	0	0	0	0
SA494351	Head-SCC	0	0	0	0
SA494399	Head-SCC	0	0	0	0
SA494401	Head-SCC	0	0	0	0
SA494507	Head-SCC	0	0	0	0
SA539321	Head-SCC	1	1	5	7
Total		23	31	33	87

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Supplementary Data 16. HPV integrations characterisation.
For each found HPV integration several features are shown: chromosome (CHROM); first breakpoint coordinates (POS); pattern (ORIENT): two-breakpoints integrations (RECIPROCAL), one-breakpoint integrations having the viral sequence downstream (Human-HPV, PLUS), and upstream (HPV-Human, MINUS); second breakpoint coordinates (BKP2); closest repeats family, subfamily and distance (in bp) to integration breakpoint (REP, REPSUB, DIST); genic region and nearest genes together with distance (in bp) to the breakpoint (REGION, GENE); histological cancer subtype (Histology_abbreviation); tumoural samples identifiers (Tumour_wgs_icgc_sample_id) and sequencing depth changes at first and second breakpoints, where values are positive if depth increases upstream and negative otherwise (ChangeCovBkp1 and ChangeCovBkp2). In addition, integrations also found in the work done by Zapatka, M. et al. (2018) are marked as YES. Similarly, those found in Deshpande, V. et al. (2019) are marked as YES in the Integration_Deshpande_et_al column, where NO means that integrations were not reported because they were not detected or the sample was not analysed. As in this paper only Cervix-SCC samples were analysed, data for Head-SCC do not apply here. The presence of ecDNA signatures is indicated following the same structure. Finally, first and second breakpoint consensus sequences (BKPCSEQ and BKP2CSEQ) are shown; for those integrations with no consensus, first and second breakpoint representative sequences are shown (BKPRSEQ and BKP2RSEQ). Note that breakpoint sequence reconstructions are displayed in the second part of the table for illustrative purposes.

Legend (Column letter = Column title)

A = CHROM
B = POS
C = ORIENT
D = BKP2
E = REP
F = REPSUB
G = DIST
H = REGION
I = GENE
J = Histology_abbreviation
K = Tumour_wgs_icgc_sample_id
L = ChangeCovBkp1
M = ChangeCovBkp2
N = Zapatka_et_al.
O = Integration_Deshpande_et_al.
P = ecDNA_Deshpande_et_al.
Q = BKPCSEQ
R = BKP2CSEQ
S = BKPRSEQ
T = BKP2RSEQ

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
2	195586245	MINUS	None	L1,ERV1	L1MC2,MER50C	58	intergenic	SNORD59(dist:57347),AC006196,1(dist:8710)	Cervix-SCC	SA492657	257	NA	YES	YES	YES
3	126849187	PLUS	None	L1	L1MEe	0	intergenic	PLXNA1(dist:92952),C3orf56(dist:62787)	Cervix-SCC	SA492657	237,25	NA	YES	YES	YES
4	87469333	MINUS	None	ERV1,ERVL-MaLR	LTR12C,MSTA	0	intergenic	MIR4452(dist:5628),NONE(dist:NONE)	Cervix-SCC	SA517453	15	NA	NO	NO	NO
4	87536253	PLUS	None	None	None	None	intronic	PTPN13	Cervix-SCC	SA517453	21	NA	NO	NO	NO
10	116445369	RECIPROCAL	116445377	None	None	None	intronic	ABLIM1	Cervix-SCC	SA517532	2	8	YES	YES	NO
11	747142	MINUS	None	Low_complexity	GC_rich	65	upstream	TALDO1(ENST00000319006,3:c,-153_-106delins0)	Cervix-SCC	SA517532	46,75	NA	YES	YES	YES
11	754703	PLUS	None	Alu,Alu	AluSx,AluJb	0,72	intronic	TALDO1	Cervix-SCC	SA517532	60	NA	YES	YES	YES
15	84040546	RECIPROCAL	84040552	Alu,L2	AluSx1,L2	30,54	ncRNA_intronic	RP11-382A20,4	Cervix-SCC	SA517715	40	27	YES	YES	NO
4	74538776	MINUS	None	Alu	AluSq2	0	intergenic	RASSF6(dist:52428),AC112518,3(dist:37037)	Cervix-SCC	SA517730	-2	NA	YES	YES	NO
4	74668660	PLUS	None	L1	L1PA15	0	intergenic	IL8(dist:59227),CXCL6(dist:33554)	Cervix-SCC	SA517730	8	NA	YES	YES	NO
4	29069629	PLUS	None	ERVL	LTR40a	0	intergenic	RP11-769N22,1(dist:19242),RP11-472K22,1(dist:50301)	Cervix-SCC	SA517802	32,3	NA	NO	YES	NO
4	29071064	MINUS	None	L1	L1MA6	0	intergenic	RP11-769N22,1(dist:20677),RP11-472K22,1(dist:48642)	Cervix-SCC	SA517802	42	NA	NO	YES	NO
10	97268882	MINUS	None	Simple_repeat	(A)n	71	intronic	SORBS1	Cervix-SCC	SA517839	49,3	NA	YES	YES	NO
10	97518528	PLUS	None	None	None	None	ncRNA_intronic	ENTPD1-AS1	Cervix-SCC	SA517839	60	NA	YES	YES	NO

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13	21031963	PLUS	None	MIR	MIR	0	intronic	CRYL1	Cervix-SCC	SA524949	25	NA	NO	YES	NO
1	38487335	MINUS	None	Alu,MIR	AluSx1,MIR3	0,31	intronic	UTP11L	Cervix-SCC	SA524966	126,8	NA	YES	YES	YES
1	38612935	PLUS	None	ERVL	HERVL-int	0	intergenic	RP5-884C9,2(dist:41529),RP11-214L19,1(dist:61473)	Cervix-SCC	SA524966	62,05	NA	YES	YES	YES
8	34837108	RECIPROCAL	34837122	None	None	None	intergenic	AC098612,1(dist:9291),UNC5D(dist:255811)	Cervix-SCC	SA534431	2	14	YES	YES	NO
10	43054280	RECIPROCAL	43054290	Alu	AluSc5	0	intergenic	ZNF37BP(dist:6038),NONE(dist:NONE)	Cervix-SCC	SA534431	10	28	YES	YES	NO
10	43060704	RECIPROCAL	43061241	Satellite,L1	HSATI,L1M5	0	intergenic	ZNF37BP(dist:12462),NONE(dist:NONE)	Cervix-SCC	SA534431	-5	18	YES	YES	NO
13	88479175	RECIPROCAL	88479161	MIR	MIRc	0	intergenic	RP11-471M2,3(dist:15688),RP11-545P6,2(dist:315751)	Cervix-SCC	SA534431	11	1	YES	YES	NO
13	88495990	PLUS	None	CR1,Low_complexity	L3,AT_rich	36	intergenic	RP11-471M2,3(dist:32503),RP11-545P6,2(dist:299132)	Cervix-SCC	SA534431	3	NA	YES	NO	NO
X	149548813	MINUS	None	L1,Alu	L1MC4a,AluJo	0	intronic	MAMLD1	Cervix-SCC	SA534431	15	NA	YES	YES	YES
X	149550333	RECIPROCAL	149550454	L1	L1MD2	0	intronic	MAMLD1	Cervix-SCC	SA534431	202	169	YES	YES	YES
1	10698481	RECIPROCAL	10698491	None	None	None	UTR3	CASZ1(ENST00000377022,3:c,*518_*446delins0)	Cervix-SCC	SA534591	-122	-156	YES	YES	YES
7	130618782	MINUS	None	MIR,MIR	MIR,MIR3	0,34	intergenic	RP11-138A9,1(dist:1817),RP11-138A9,2(dist:2121)	Cervix-SCC	SA84360	157,6	NA	YES	YES	YES
7	130636821	PLUS	None	None	None	None	ncRNA_intronic	MKLN1-AS1	Cervix-SCC	SA84360	122	NA	YES	YES	YES
18	61276726	MINUS	None	L1,L1	L1ME2,L1ME2	0,95	intergenic	SERPINB13(dist:10293),SERPINB4(dist:27176)	Cervix-SCC	SA84489	35,2	NA	NO	YES	YES

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18	61373829	PLUS	None	ERVL-MaLR	MLT1L	82	intronic	SERPINB11	Cervix-SCC	SA84489	39,55	NA	NO	YES	YES
3	189609086	MINUS	None	MIR	MIR3	0	intronic	TP63	Cervix-SCC	SA84668	-75	NA	NO	YES	YES
3	189632026	PLUS	None	None	None	None	intergenic	TP63(dist:16958),LEPREL1(dist:42491)	Cervix-SCC	SA84668	51	NA	NO	YES	YES
3	130289750	MINUS	None	None	None	None	exonic	COL6A6	Cervix-SCC	SA84896	278,8	NA	YES	YES	YES
3	189811501	MINUS	None	None	None	None	intronic	LEPREL1	Cervix-SCC	SA84896	80,15	NA	YES	YES	YES
3	189856186	PLUS	None	Alu,L2	AluY,L2a	0,91	ncRNA_intronic	LEPREL1-AS1	Cervix-SCC	SA84896	35	NA	YES	YES	YES
7	77783419	MINUS	None	MIR	MIR3	164	intronic	MAGI2	Head-SCC	SA194387	15	NA	NO	NA	NA
7	77817655	RECIPROCAL	77818256	CR1	X7B_LINE	0	intronic	MAGI2	Head-SCC	SA194387	-32	-73	NO	NA	NA
X	12052362	RECIPROCAL	12054180	Alu	AluSp	247	intronic	FRMPD4	Head-SCC	SA194387	-60	-375	NO	NA	NA
X	12273709	MINUS	None	None	None	None	intronic	FRMPD4	Head-SCC	SA194387	143,85	NA	NO	NA	NA
X	12279924	MINUS	None	L1,Low_complexity	L1MC5, AT_rich	50,73	intronic	FRMPD4	Head-SCC	SA194387	184	NA	NO	NA	NA
X	46529355	MINUS	None	Simple_repeat	(TG)n	562	intronic	SLC9A7	Head-SCC	SA194387	349,8	NA	NO	NA	NA
X	46530235	MINUS	None	MIR,L1,Alu	MIRb,L1MC3,AluY	0,0,0	intronic	SLC9A7	Head-SCC	SA194387	314	NA	NO	NA	NA
X	46537461	PLUS	None	L1	L1M5	0	intronic	SLC9A7	Head-SCC	SA194387	16	NA	NO	NA	NA
X	46542623	PLUS	None	Alu	AluSx1	78	intronic	SLC9A7	Head-SCC	SA194387	0,75	NA	NO	NA	NA
X	48069409	MINUS	None	L1,L1,Alu	L1MEd,L1M5,AluSx	0,0,0	intergenic	RNA5SP503(dist:3600),SSX1(dist:44903)	Head-SCC	SA194387	5	NA	NO	NA	NA
21	43067880	MINUS	None	None	None	None	intergenic	snoU13(dist:43037),LINC00111(dist:31116)	Head-SCC	SA195307	154,45	NA	YES	NA	NA

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21	43084795	RECIPROCAL	43087534	hAT-Charlie,hAT-Charlie	MER58A,Charlie4a	0	intergenic	snoU13(dist:59952),LINC00111(dist:10565)	Head-SCC	SA195307	-465	-90	YES	NA	NA
21	43098021	RECIPROCAL	43098071	Alu	AluJo	78	upstream	LINC00111(dist:867)	Head-SCC	SA195307	2	66	YES	NA	NA
21	43113136	RECIPROCAL	43114866	MIR,Simple_repeat,L2,ERV1,Alu,ERV1	MIRc,(TCCA)n,L2c,MER34A,AluSx,MER34A	0,0,0,63,0,0	ncRNA_intronic	LINC00111	Head-SCC	SA195307	-119	-247	YES	NA	NA
13	43504602	PLUS	None	None	None	None	intronic	EPSTI1	Head-SCC	SA195328	24	NA	NO	NA	NA
13	43506889	MINUS	None	L1	L1MC4a	0	intronic	EPSTI1	Head-SCC	SA195328	46,8	NA	NO	NA	NA
13	43679088	PLUS	None	Alu,ERVL	AluJb,LTR67B	0,85	intronic	DNAJC15	Head-SCC	SA195328	17	NA	NO	NA	NA
9	131845205	PLUS	None	L2,L2	L2b,L2b	76	intronic	DOLPP1	Head-SCC	SA195822	158,9	NA	YES	NA	NA
9	131856422	RECIPROCAL	131857931	MIR,L2,L2,Simple_repeat,RTE,MIR,Alu,L2,MIR,MIR,Alu,L2	MIRb,L2b,L2b,(TGAA)n,L4,MIR3,AluSx1,L2b,MIRb,MIRc,AluSx1,L2b	25,0,0,0,0,0,0,0,0,0,0	intronic	CRAT	Head-SCC	SA195822	-1.057	-122	YES	NA	NA
9	131860981	RECIPROCAL	131861341	Alu,Alu,Alu,MIR	AluJb,AluSx1,AluSz,MIR	0,0,0,0	intronic	CRAT	Head-SCC	SA195822	146	223	YES	NA	NA
1	191331460	RECIPROCAL	191331493	ERVL-MaLR	MLT1A	0	intergenic	LINC01680(dist:133832),RGS18(dist:796099)	Head-SCC	SA199271	844	-884	NO	NA	NA
1	191334416	RECIPROCAL	191334421	ERVL,L1	MER70C,L1M1	0	intergenic	RP11-309H21,2(dist:136819),RP11-541F9,1(dist:493068)	Head-SCC	SA199271	306	90	NO	NA	NA
3	21449942	MINUS	None	ERVL,ERVL-MaLR	LTR86A2,MLT1C	0	intergenic	AC104183,1(dist:19833),RP11-180N14,1(dist:3611)	Head-SCC	SA199271	4	NA	NO	NA	NA
3	117670031	PLUS	None	L1	L1PA16	0	ncRNA_intronic	RP11-384F7,2	Head-SCC	SA199271	7	NA	NO	NA	NA
4	161729092	RECIPROCAL	161729097	MIR,hAT-Charlie	MIRc,MER58B	59	intergenic	RP11-502M1,2(dist:221123),AC106860,1(dist:195532)	Head-SCC	SA199271	104,1	172	NO	NA	NA
4	161738499	PLUS	None	Low_complexity	AT_rich	58	intergenic	RP11-502M1,2(dist:230530),AC106860,1(dist:186156)	Head-SCC	SA199271	20	NA	NO	NA	NA

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4	161739760	PLUS	None	None	None	None	intergenic	RP11-502M1,2(dist:231791),AC106860,1(dist:185269)	Head-SCC	SA199271	84	NA	NO	NA	NA
4	161746789	PLUS	None	L2,ERV1	L2a,MER50	0	intergenic	RP11-502M1,2(dist:238820),AC106860,1(dist:177740)	Head-SCC	SA199271	11	NA	NO	NA	NA
5	3863128	MINUS	None	MIR	MIRc	96	intergenic	IRX1(dist:261611),CTD-2287N17,1(dist:149244)	Head-SCC	SA199271	-234	NA	NO	NA	NA
5	3878132	PLUS	None	ERVL-MaLR	MLT1A0	350	intergenic	IRX1(dist:276615),CTD-2287N17,1(dist:134289)	Head-SCC	SA199271	4,5	NA	NO	NA	NA
5	3886481	PLUS	None	None	None	None	intergenic	IRX1(dist:284964),CTD-2287N17,1(dist:126147)	Head-SCC	SA199271	184	NA	NO	NA	NA
5	3905747	PLUS	None	None	None	None	intergenic	IRX1(dist:304230),LINC02114(dist:867847)	Head-SCC	SA199271	-32	NA	NO	NA	NA
5	3909228	PLUS	None	None	None	None	intergenic	IRX1(dist:307711),CTD-2287N17,1(dist:103333)	Head-SCC	SA199271	102	NA	NO	NA	NA
8	77742847	MINUS	None	Low_complexity	AT_rich	76	intronic	ZFHX4	Head-SCC	SA199271	3	NA	NO	NA	NA
14	45574865	MINUS	None	Alu,Alu	AluSx1,AluSx	0,45	intronic	PRPF39	Head-SCC	SA199271	4	NA	NO	NA	NA
15	91044731	RECIPROCAL	91045197	None	None	None	UTR3	IQGAP1(ENST00000268182,5:c,*1391_*1937delins0)	Head-SCC	SA199271	-33	-9	NO	NA	NA
16	8014995	RECIPROCAL	8015220	Simple_repeat,hAT-Charlie	(TG)n,MER33	0	intergenic	AC093515,1(dist:65562),RP11-279O17,2(dist:311270)	Head-SCC	SA199271	6	10	NO	NA	NA
19	43100419	PLUS	None	None	None	None	ncRNA_intronic	LIPE-AS1	Head-SCC	SA199271	8	NA	NO	NA	NA
16	1607718	PLUS	None	None	None	None	intronic	IFT140	Head-SCC	SA200796	-36	NA	YES	NA	NA
16	1611951	MINUS	None	L1	L1ME4a	356	intronic	IFT140	Head-SCC	SA200796	28	NA	YES	NA	NA
21	40187057	PLUS	None	Simple_repeat	(TG)n	38	intronic	ETS2	Head-SCC	SA201351	60,3	NA	NO	NA	NA
21	40190627	MINUS	None	L2,L1	L2a,L1ME3	80	intronic	ETS2	Head-SCC	SA201351	73,7	NA	NO	NA	NA
X	126094024	PLUS	None	Alu	AluSg	0	intergenic	PRR32(dist:138255),ACTRT1(dist:1090917)	Head-SCC	SA201351	-22	NA	NO	NA	NA
9	5388152	MINUS	None	L1,L2,L2	L1ME3,L2,L2	49,0,0	intronic	PLGRKT	Head-SCC	SA201430	15	NA	YES	NA	NA

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9	5464246	RECIPROCAL	5464508	hAT-Blackjack,MIR,MIR,L2,Alu,MIR,MIR,Simple_repeat,MIR	MER81,MIRc,MIRc,L2c,AluSz,MIRb,MIRb,(GA)n,MIRb	0,0,0,0,0,0,0,0	intronic	CD274	Head-SCC	SA201430	882	837	YES	NA	NA
19	9331190	RECIPROCAL	9331197	Alu,L1	AluY,L1MA8	59	intergenic	OR7D4(dist:5648),OR7E24(dist:29997)	Head-SCC	SA202903	-66	-67	YES	NA	NA
9	102664848	MINUS	None	ERVL-MaLR,ERVL-MaLR	THE1A-int,THE1A	0	ncRNA_intronic	STX17-AS1	Head-SCC	SA539321	112,1	NA	YES	NA	NA
9	102668896	MINUS	None	Simple_repeat	(CGGGGG)n	0	UTR5	STX17-AS1	Head-SCC	SA539321	21	NA	YES	NA	NA
9	102714438	MINUS	None	RTE,L1	L4,L1PA3	0	intronic	STX17	Head-SCC	SA539321	106,1	NA	YES	NA	NA
9	102720372	PLUS	None	L2	L2c	64	intronic	STX17	Head-SCC	SA539321	147,35	NA	YES	NA	NA
9	103083285	MINUS	None	CR1	L3	0	intronic	TEX10	Head-SCC	SA539321	79,35	NA	YES	NA	NA
9	103085219	RECIPROCAL	103085223	Alu	AluSq2	22	intronic	TEX10	Head-SCC	SA539321	-80	-142,25	YES	NA	NA
13	114848854	MINUS	None	hAT-Blackjack	MER63C	0	intronic	RASA3	Head-SCC	SA539321	16,65	NA	YES	NA	NA

A	B	Q	R	S	T
2	195586245	GCATAGACCATTGGTACAACTAAAATGCCCTCCATTATTAATTACATCTAACATTAATGCTGGTACAGATTCTAGGTGGCNAC<[INT]GCCAAGGGCTGAGTGGGGCACTTAATCTCTCAAATTGCCTGCTTAGTCTTCTTCCAAGTGTCCTTTGCTTCTTTCAATGTACCTTTGTCTCTGCT	None	None	None

3	126849187	CTTGCCCTTCTCACTTTCTCTCTCTCTCCATGC ATACATACACACCCAAACACAATAATATATTGTG TTTAATACAATTCAAGGTTTTATTGTGTATATTA ATAATAGCCCTTCTCACTTTCTCTCTCTCTCCA TGCATACATAAACACCCAAACA[INT]>AAATAAT GTATATCTATGGATTACAAACAAACACAATTGT GTTTAATTGGTTGCAAACCACCTATAGGGGAAC ACTGGGGCAA	None	None	None
4	87469333	TCCCACCAATATTTGTACACTATCTGGG<[INT]G ACCACGAACCCACCGGGAGGAACAAACAACTCC AGACGCGCTGCCTTAAGAGCTGTAACACTCACC ACAAAGGTCCGCAGTTTCACTCNTGAGCC	None	None	None
4	87536253	CTAGCATATATTATAGTACACAATTTGTTTTTAG CAGATTTTTCAAGTTCCTAGGAATTAATGGACCC ATTAGTTGTAGGTTTTAAGAGTA[INT]>CAATGC TGCTTCTCCGCGAGTCCACAGTGTCCAGGTCGT GTAGCAGCCGACGTCTGGCCG	None	None	None
10	116445369	GACTCGGGTAGACAGCCATCCTCATGGGTCACC CTATGTGCCCTTCCCCTGGTCCAGGCTACTGCCT GGAACTTGGTGCCTCTGATAAC[INT]>CATGTCC TTTCAAAAAAACATTTCCAATTTTTGTCATTTATT TCATATACTGGATTGC	None	None	CTGGAGTCCTCTATTAATGTAA CAATAGATGGGTCTGTGGGGC CCACAGGTTCAATAACCACTG GGGG<[INT]ACTTGGCTGTAG CACCAGGCGCCAGACAAAGA
11	747142	AGCTATATTTGGAGTAAACCCAACAATAGCAGA AGGATTTAAAACACTAATACAGCCATTTATATTA TATGCCCACAT<[INT]CAGGTCCATCTCCTCCAG CCCTCCCGGTGCGTCCCGCGGGGCAGGAAGGA GGCGAGGCCCAGCCGCCCCGTGTCGTGCAGGT GTTTTCCCGGGC	None	None	None
11	754703	ACGGGCATGTGTCACCACACCCAGCTCATTTTTG TATTTTTAGTAGAGACTGGGTTTCACCATTTTGG CCAGGCTGGTTTCAAACTCCTGACC[INT]>ATAA GCAGACACAGTTATGTATTTTGGGCTGTGCCCC TGCTATTGGGGAACAC	None	None	None
15	84040546	AGAGCGAGACTCCGTCTCAAAGAAAGACAAAA	AAGGATGGCCACTAATGCCCACACC	None	None

		AACAAAACAAAAGAAAGAGGAAGACAGTCACC TGAGGATTCCCTGT[INT]>TTGTCATCTATGTAG TTCCAACAGGGCACTGTAGCATCATCTAACATAC CTATTTTGGCATCTGCTA	TAATGGCTGACCTCGGCCTACCTCAA CACCTACACAGGCCCA<[INT]AACAG GGCAGGTATATAATAAATGTTTTCTG AACTGA		
4	74538776	AATATTTGGGCATCAGAGGTAACCATAGAACCA CTAGGTGTAG<[INT]TGGAGATGGAGTTTCGCT CGTGTCACTGAGGCGGGAGGGCAATGGCACGA TCTCAGCTCACTGCAACCTCTGCCCTCTGGGTTC AAGCTAT	None	None	None
4	74668660	TGAACATTTCCCTTTGCAGTAGCTTTATGTCTGT TGAGGTGGAGCTTGCAGAAGCAACTGACAACC CCTTTTCCACTGCTGCTACAGCAGTACCCACCCT TGCTGCCACAA[INT]>TTCAAATTACAAACCCTTT TTCCATAGCTCCTAAAGCAGAACCCCCCCT	None	None	None
4	29069629	ACATATGTGTGTATACATGTAAGGAATGATGAG TTTAGGAAATGCAAATCTTTTAAAACAGCTTCTA GCAAAG[INT]>ACCTTTCAAGTAAAGTGTCATTT GGGAATAATGTAATTGATTGTAATGACTCTATG TGCAGTAC	None	None	None
4	29071064	CACGTGTTGGACATACTTTGATACCTATATGAGA AATGCGTTAGTGTCATTGTTGCAAGTCTCCTGCT CAATA<[INT]GCTTTTGCTATTGAGTTGTTTGGG TTCCTAGCGAGTCTGGATATTAACCCCTTGTCAG GTGCATAATTTGTAAAGATTTTTT	None	None	None
10	97268882	None	None	None	None
10	97518528	None	None	None	None
13	21031963	AGGACCAAAAGCTGTGGCCCACTTTGCTGGGCT TGTTCTGCACCAGGCCCTGCTCCAAGTGCTGAC ATGGGCTCGTTTAACTTTCACTCAC[INT]>ATTGT TAAAAGCCAAAACAATGTTTTAAAAAAAAAGGT GTTACAGTGGAGGTGTGGT	None	None	None
1	38487335	ATAAAAACACTATTACAACAANCTCNGGTNGAT TNNCNCNNANAAAGTACCGCCGCCCCNGAGAC TGGGGGACAGAAAAAGG<[INT]TGAGNNAGGT	None	None	None

		GGATCACTTGAGGTCAGGAGTTCGAGATTGTAG CGAGCCGAGATAGTGCCACTGCACTCCAGCCTG GGCGACAGAGCAAGACCCCGTCTCAGAAAAAA AAAAAAAAAGAAGAAAGATCCCAAAGCTTTCAT CAGTTTCTCTGAGGTTGATGATTCCCCAAAATGT AAGGACCCCACTGATCTT			
1	38612935	ACACAGGGGTGGGGATTCCCAACACATCCCCAT TCGGTTTTCCTATTTGGCAGAGACATACTTAGCA GCTGTGCAGAANNCCCACACTGGCTNNNNGAC AGGTGGATCTTGGAGAATGTTGCATCCACAGGG CTGGAATT[INT]>AATGAAGGAGCTTGGTCAGT TAAATCTATAGGNNCTACAGNACCTNATACTNA TGATTT	None	None	None
8	34837108	None	None	AAGTATTGCTTCTCTAAACCGT GAGGCAATTACTCAGACTCATT CGTAGC[INT]>AAATTGTTATG TTTTTAAGGTATCAAGGTGTAG AGTTTATGTCATTTTTA	ACTAAATGTCACCCTAGTTCAT ACATGAACTGTGTAAAGGTTA GTCATACATTGTAGC<[INT]AT TTTTCCATTGCTTGTTCTGTAG ACTATGAGCAACACACTT
10	43054280	AAACTAATAATCAATTGAAGTGGCCAGGCATGG TGGCTCACACCTGTAATCCCAGCACTTTGGAAG GCTGAGGCTGGTGGATCACAAGGTCAG[INT]>A CCTTAATCTAGGACTAATATTATTGTCTACACA	None	None	TAATGAAAAGTGGACATTACA AGACGTTAGCCTTGAAGTGTA TTTAACTGCACCAACAGGATGT TGATT<[INT]CCATCCTGGCCA ACACGGTGACACTCTGTCT
10	43060704	GCAAGGAACTCCTTTTATTCTCAACACATTAGCT TTTTCCCTCTTCACTCTAAAATGTTCACTATCAAA TATAATTGAGAGGTCTTTTTT[INT]>GGAAATCC TTTTTCTCAAGGACGTGGTCCAGATTAAGTTTGC ANGAGGACGAGGACAAGG	None	None	TAATGTCAGGTGGACATGTAC CTGCCTGTTTGCAGGTACATGT TG<[INT]CTTTTGTACACAATGT TTCATAGGATACAGAAAAAAC CCAACCACACTGTCTTCA
13	88479175	GCTGTCTCTGTTTCTGCCTGTGTTAAATAATCAT TATCATTTACTATAAAATCTACCAAATCTTCACCT GT<[INT]TCAGATTCAGGAACTTAAGATACTTAA CAAAAATTTAAATTAAGTTTTATAGGGCTTTCCA AATTCATTTCCCACGTGTTCGCTGCCTA	None	None	NGACATTCTGAATAATCCTTGC CATAATCGTGGCTCAGATATAT AATAATTTTCACTGTACAG[INT]>CAGCAGCATTATATTGGTAT AAAACAGGTATATCAAA
13	88495990	TTACATCTTTATACTAGACAAGTCATAAAACATG	None	None	None

		GAACCTGAGAAAGTTACAATCACTTCAGGTATC ACCTACATATATTTTTTA[INT]>GTCTCAAAAAAA AAAAAAACTATTACAACAATATTGTTTATATTTA CACATTC			
X	149548813	None	None	None	None
X	149550333	TAATTTGAAAATACTTTCTCTCAGTCTGTATCTTA TCTTTCCCTCCTTTTAATAGGTTCTTTCACAAAAA GACTATTTTGGGGGTCAGATTTTTGTGGTTGAG TCTAAGAACTCTACCC[INT]>AAGTGGCACGCCT AGGATTATATAGTCGCACAACACAACAAGTTAA AGTTGTAGACCCTGCTTTTGTAACCA	ACGTTTAAATGTGTGTCAGGACAAA ATACTAACACATTATGAAAATGATAG TACAGACCTACGTGACCATATAGACA <[INT]TATTTTTTTGCCTATGGATGCT CA	None	None
1	10698481	ACATTCACTTTTAAATTCTATATAAAACGTGTTG TACCCTTCCTTTACATAATACAATCCC<[INT]CCA CGGTCCCTGTAGTGTCACCCGTGCTGACTGCCTT CTGCCCGTCTCCCCCTGGGC	TACTCTGGGTTTTGGACGCAGNNNC NGNNNNNNTNNNGNNNANNNTNN NNCNCCAGNGTGGCCAAACAGACCC NACCCAGGCCTGGGGGAGCTGGAG CTCCGCGGGCNNCNCTCCNTTTTGG CCNCCNCCACGGTCCCCCTGGGCCG GAG[INT]>CGGGGGCCCGGNGGGG CCATTTGCAGTTCAATAGCTTTATGT GCTTTACTTTTTGAAATGTTATAGGC TGGCACC	None	None
7	130618782	GACAGCCAAATACAGTATTGGCAACTAATACGT TGGGAAAATGCAATATTCTTTGCAGCAAGGGAA CATGGCATACAGACATG<[INT]CATTAAGCTGA GAAGCGGTGGAGTAGTCAATAGCACAACCTCTG CAGCCAGGCTGCCTGAGTCTTCAGTCCAGCTCT GTCACTCACTAGCTGTGTAGCAATGACCACATC GCTCACTGG	None	None	None
7	130636821	ACCCTACTAAATGTGGGCAGGTGATCACAGTCC AGGCTCTTCCTGGCTGCCCGGGTGATGGTGGGA AGCTGAGTGGGGAGAGGC[INT]>TNGGCACTG TGCGGCGTGTAGCAGGTCCCCGCCTTTACAGTA GGGCCTACCAACAAGTGTCAGTGGCTAACCCTG TGTTTCT	None	None	None

18	61276726	ATGAGGGACGTGTTAAAAACTGTGAGGTGGAC ACACGGACCTGTTGATTAGCCCTACTATACAGG CGGGGACATAG<[INT]CTATCAGCAATGCACGA GCAGTCCAGCAGCTCTGTGTCCTCTCTAATATTT AGTATGGTCAGTCTTCTTTATTATAGCCATTCTA CTTGCTAT	None	None	None
18	61373829	AAAAGAGGGCAAAGCTGTAATCTAGAAGATAG GAGGTAAAAGAATCAAATATTTCTGTATTCCAG GTGGACTAAACAAGGGAATAATGTA[INT]>TGT CCCATACTACATAGTTCATACAGTTGTCCTTGTT GCCATCAAAGTATACGTGCACGGTTTTACCGCCT TT	None	None	None
3	189609086	None	None	TAATCATTGGGCATTATCAATG GCTATGGGGTCAAATCCCA[INT]>CTTTCACTGACCCATCTGTAT TGCAGCCTCCAACACCTGCAGA AACTGGAGGGCATTTT	None
3	189632026	None	None	None	None
3	130289750	AACATAAAAGTGCAATTGTTACACTTACATATGA TAGTGAATGTCAACGTGAACAATTTTTGTCTCAA GTGACAAAATGNNTT<[INT]CATTTATGATTGGC TTAGCCGCCTGAAAAAAGTGGTCCCTTAACTCCT CACTGATGTGGGCAAGAATCAGGTCCGGTTTGG GGCTCTGAAGTATGCTGATGACCCAGAGGTGCT GTTTTA	None	None	None
3	189811501	GAGGTAACCATAGAACCACTAGGTGTAGGAAA ATAATTTGAACTGGCTAAATTTGCAGTAGACCC AGGACTTTA<[INT]TGTTTGTTTGCTTTGTTTTGG GTTTGGTTTAACATTGTTGTCAAAATGATTTGCA GTAGATACACTGAAAATAATTAATATGCTGGTG GCTTT	None	None	None
3	189856186	TTTTTTTGAGATGGAGTCNCACTCTGTCACCCAG GCTGGAGTGATCTACCCAGTGACGTGATCTCGG GTCACTGCAAACTCCGCCTCTACTGGACAACTCT	None	None	None

		CTTTTTTTTTTT[INT]>AGTCTACACCTTGATANN NTAAAAACATAACAATTT			
7	77783419	TGTGTCATCCAATTTATTTAATAAAGGATGGCCA CTAATGCCCACACCTAATGGTT<[INT]CCTTTTAG GAACCATACTCTAAAATGTCATAAAAGACCTGTT AGTGAAGTTTTAAAATCTCTAGGATAAGTTTTAA TCT	None	None	None
7	77817655	AGCCAAAGAGACATCTGAAAAAAAATATGGTA AACGTTTACGTCGTTTTCGTAACATGTAATAACT AGGATGTAAA<[INT]TAATGCACAATGTGATAT ATTAGAAAATCCAGCTGAAAGGCAAATTTTTTTC ACAGATCAAATCATAACATACATTATACTAAGG ATAACAATA	TAATTACGTGGGAAAAGGAGACTTG GAGTCAGGAAGGCTTGAGCTGAAAG ATTTCCACAGGCTTCAGNGCTCTGGT TTTGAGCACCCTAGACAGAT[INT]>T GAGCACCCTAGACCCTGTTCCAATTC CTAACCCACCAAAAAATACACCCATA CTTCCATATTGTAATATTTGAT	None	None
X	12052362	TATTGTGNATAACAGCAGCCTCTGCGTTTAGGT GTTTTATTGTATATATTGTATTTGTTTATATACCA TTATTTTTAA<[INT]TGGTCAGAGTGGGAAGACA ACTGAGACAAAAAGGTAATGCAGTCTTCGTTGT AGGGCTGCAGTGGTCGGGATAGAGAGAGAGA GAT	ATTATACTTTACAATGTCATAATATTT GAATGTTAAAATATATGTAANNGAA NNAANTTATATGCTATCAAATGTNG TACTTTACATGGATCATTTATTA[INT] >ANNTTNNNANNGTTATAGTGTTGG TATGGTACAACATTAGAACAGNANN ANANCAAACCGTTGTGTGATTTGTTA ATTAGGTGTATTAACTGT	None	None
X	12273709	GAATTCGGTTGCATGCTTTTTGGCACAAAATGT GTTTTTTTAAATAGTTCTATGTCAGCAACTATAG TTTAAACTTGGCATT<[INT]ACATTCAACAAATG GGTCTTGTACAACATTATTCTACTTCTGTTTGTTT TTAAGTACTTTATATGTTTCAAAAAACAAATTTA AATATTTTGGGCATTCAAAA	None	None	None
X	12279924	None	None	TAAACTTATTGTTTCAACACCTA CTAATTGTGTTGTGGTTATATG AAAACTTTGACTG<[INT]TCTGT CAAAGTTTTCATTTTGCATATTC AAAAGCACAAATGTC	None
X	46529355	GTCTGCAGAAAACTTTTCCTTTAAATTTACTTCCC	None	None	None

		AAAAAGTGTATTTTTATATGAAAACTTCGACAG GTGCTGGAGGTG<[INT]CAGCTGAGCTGTGACT GCACCACTGCACTCTAGCTTGGGCAACAGCTAA AGCAACAGTGAGATCCTGTCTCAAAAAAGGAAA AAGGAAAAGAAAAGCCATCTAAGTCTGTT			
X	46530235	AATCCATATGCTGTATGTGATAAATGTTTAAAGT TTTATTCTAAAATTAGTGAGTATAGACATTATTG TTATAGTCCAA<[INT]TTTCACAGGAATTGTATG TTACAGATTTGATTTGCCCTTTGTTGCTTATCAA AGGCTTCTTTCATGTACCCTTTAAACATTCCTGG AACAAGACCT	None	None	None
X	46537461	TTTCAAGGAATTTGTCCATTTCACCTGGGTTGCC AGATTTATTTTTCTTTTTTTGAGTTGTTTTTCACG GCAAGATCTCATCATGATGTTGTCA[INT]>GATT TTGGAGGACTGGAATTTTGGTCTACAACCTCCC CCAGGAGGCACACTAGAAGATACTTATAGGTTT GTAACATCCC	None	None	None
X	46542623	None	None	GCCAGCCCTGTGACCACTTTTA ACACCTGAGCATGTCTCATTTC TCAGGCTTCTAGTGGAGGAAG ATGGGATGACAAGCAG[INT]> GATTGAAGGCCAAACCAAAA	None
X	48069409	TGCTTGTAGTAAAAATTTGCGTCCTAAAG<[INT] TCCTGCCTCAGTCCCTTGAGTAGCTGGGACCAC AGGCATGTGACACTATGCCTGACTAATTTTTGTA TTTTTGTAGAGACG	None	None	None
21	43067880	GCTGCACCATATAGTAATATGCAATTTTTTTTAG GTATGCCTTGCAAAAATCNTNTTAANGCAGNTA AAAATGACATAAACC<[INT]TAGAGTTTGAACA GGTGAATGTCNNNNCNCNNAACANCCCCAGTA TTGTGNAAAAAATCATTNATTNGCGACTTAATTT AACCCCTAAAGTCACAGGCTNANAANGGTGATT CAATGTCTTNTTCCTTNANTGTGCCAATTNNTTN TAANNNNTCAGTA	None	None	None

21	43084795	GGAGATTATTTGAAAGCGAAGACAGCGGGTAT GGCAATACTGANGTGGAAACNCACNAANAGCC NNNGGTAGANCATTNTAGGG<[INT]TGACAGT CCCCCGCTAGCAAGCGTGTTGAATTTTCTGGAG TACGGGCTTAAATCGNGANNACCACCTCCCAGG GTTCAACAGCAGCTTGACAGTCCNCCACCNACT TCAAGATATGAAGATAACTCCTCAGAAGGNAG NNAAGTCTATAAAATATCACAGAAACAGCA	TNNNNNTGTNNCAGAANNAGCANG GNNNATNTNNNNNNAGNNNNNNG NAGGCCNGGNNGNNCTNNNNNNT GNCACAGGNNCATCAGCTTTAGCCC TGGGGGNACNNNNNNAAANNCTGT GTCGGNGGNCNCANNNCCCACCAG AAGCAG[INT]>CNNGGNNCACTCCG CCGNGACCNANACNGATNCCTTCAN NTTGGNCANCAAGGAANCACAGAC GACTATCCAGCGACCAANANANGGT CGGGTACAGGCGGA	None	None
21	43098021	GCTCGGTGTGGTGGCAAGNNNNNNNGTCNCN ANGAAATCTTTGCTGNANGGGTATNATGGCTC GTGGTTAGCTCCGCCTNNNGNNTTNNNGTCAN GNNCNTATCCNAGCAGCCTNAGAGGNNAAGG NANTATGNNNNNGNTGANATANNTCTNCNATT GTTGTAT[INT]>CGTATGGCTAACCNCNTNNNN ANNAGNNTANGANCTGNNTTCNGTAGGTTTTN NNNGNNGTNCNNNCTGTNTNTNNANAGGCGG NNGNGGANNNNNTNGGNGNNTTNTNNNNTN	None	None	AACGGAAAACGCAAATCAAAA AAATAGT<[INT]GATTTCTGCC ACTATCATGAGGCAGTGGACT GCATGTCGCAGAATTGACTCA TCCACCGTGACTTAAACTCGT
21	43113136	None	CTCATAAAGAGTTATTGTTGTTATAA TATATTAAAATCNAAGTNGNANCAT ANATGAGAAATCCTGGCCAAGNATT GGGGAGATAGACTCATAAAGAGTTA TTGTTGCACCCATCCATACAGGAGGC TGAGGCAGGAGAATCGCTTGCACCT ATCCATCCATCCGCAATAATAATTAA ATCCCGGGTGTCCTCACTCNAAAACA TNCTGAATGTTGTCAGTGAGTGTAA ATATCATGGAATAGGAGAAAAGGGT CCCNNNAN[INT]>GAACNNNGNGG CTATAGCACTGACATAAAGCAACTAT ATCCAAAAAGTCAGGATCTGGAGCT ATATTAATACTATTATCATTACTAGA	None	None

			AAAATAT		
13	43504602	GTCAGTTTCACATAACTGGGTATGAGCAAATGACATTCACACACCTATAAGCACTCACAGAGCCT[INT]>GTATCTTAAACATTTTAAACTATTTGATTCACCTTTTAAATGCACTATAGGTGCAACGTTAGAA	None	None	None
13	43506889	TACTCTTGTTGTGTCATATGCTGTGCATGAAAATTAATCTTATCTTAAAGATAAG<[INT]AAAACAATAACTTAACAGTGGAGACCACCTTACCAAATGATCCAAGTAATATCACCAGTGATAAGGATACTGATCATCATGTACCCTC	None	None	None
13	43679088	TACAGGGGTGCACCACCACNNNCNNNTNNTTTNTTNNTTTTTTNTNGAGACAGAGTCTTATTATGTTGCCCAGGCTGGTCTCAGACTCCTGGGCTCAAGTGNTNCNNTCANNNCNCNCTNCCAAAG[INT]>CNNCNNNANNNNNCCTACTNANNGN	None	None	None
9	131845205	GACCCTGTCTCTACTCCCAGATGCTGTCCTGATATCTACATTAGTGGATCATGAACTGAGTCTGGATGGCAGATTCTCCCGTCAGACCTCAAGCT[INT]>ACTGACGGGATCTTCTTTAGGTGCTGGAGGTGTATGTTTTTGACAAGCAATTGCCTGGGATGTTACAAACCTATAAGTATCTT	None	None	None
9	131856422	TATATAAGTTGCTTGTAAATGTGTAACCCAAAACGCCATGTTTGCACACACCCATGTGCAGATTTACAAATGAGCANATGTATGAT<[INT]TGCTTCAACCTCACAGGCGGAGGTTGCAGCCCTTGAACCTGGAACCAAGGCCCCCAGCCCACCCCGGCATCCGCCCTTGTGGTTTCACACAGGCCTTCCTCACAGGNCAGTGTCCTANTGGG	GNATGAAATCCCGTTTCTACTAAAAATACAAAAATTAGCCTGACTTGGNGGCAGGCNANTGNCNCCCTGGGNNNCNNCCCCCNCCTGGGTACGGCAGGATGAAAGCTATTAGCAACATTCGGTTTNCNCGAACCCNCCNCATNGGCCAGGGACNNAGTCGAGANCAC[INT]>NGTNNNNNNNNNGCGCTNNNTNCCNCNCTTNNNNANNGNTTGAGAAAAAGGATTTNCAGNTCTTATCATTAAGCTCATACACTGGATTTCCGTTTTCGTCAAATGGAAACTTGTGCTTTG	None	None
9	131860981	GGCAGGGGCACCATGGGAGACCGCACAAGCTC	TTGCTTGANCCCGGGAGGTGGAGGT	None	None

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		GGGTTCNGCTTTGCCTTCTTCTTCCTGCACAGTAAACGGGGCCTCAGGCAGCNNNNTCATGCTGGTGTCCTCTAGAGCCTGGGTAGTGTNNNTNTT[INT]>CNGNNTANCATGAGCGNTTTTCTNTGTCNNCCNGTTTATTTNANATGGTGGGGTCTCTACTGCNNACGNNNNNNGNCTGACCACGA	TGCAGTGAGTCGANATCACTTTCAAATAAT<[INT]CTCCTGGGTTCTTTTTTTGAAAGTGATTCTTGTGCCTTAGCCTAGGCTTGAGTACAATGCTGNGATNNCAGGCACCCACCACCACNCNNNGCNANCTNTNN		
1	191331460	None	None	CTAATTCTGTAAAACTCACCCCGTATAACTCTTACATAAACAACAGTTTATAACAATTACATAAACAACAG<[INT]TAAAATGTTGTTTATGTAATTGTTATAAAC	GTTGTTTATGTAATTGTTATAAACTGT[INT]>TGTTTATGTAAGAGTTATACGGGGTGAGTTTTACAGAATTAGTAAGACCATTTAAAAGTAATAAATCAACGTGT
1	191334416	CAACCCAACTCCTATATCTATNNCANATGNNNNNTATATTANNTNANNAAAGNTNTGNANTNGCCTGAGCTGNGNAGACTNNNTCGTCTCATTTNNGCCAGACAATGTATANACTTNNNNTNNANNANATAAGTTNTTCTTTGTTTTGAGTAAANCANANANACNNTCNNNN[INT]>CTANNNCNANAGATTTTTGGTTACAAAACCATTAGCAGATGCCAAAATAGGTATGTTAGATGATGCTACAGTGCCCTGTTGGAACTACATAGAT	GCATGACACAATAGTTACACAAGCATTTAAAAACNNATNNNTNCGNNTTTTTTGTNGCATANATANAAACACACCCATTCCCCATGAACACGCTAAACTTTGTCCTACATCTG<[INT]GGCAAGACCAACTGGCCCTGGGNAACCCCACTCCTATGTCTACCCCTGCGTGGTNANACTNGNGCTCCATTNCTNTGGAACATTTGNGNAACAATNCATNNAGTGNNTTGACATCCTGTACNANNNNNTCCNNGANGTGGGCAT	None	None
3	21449942	GTCAGTTACGGTTATGGGTTNAANNNNNNCNCNACCAAAAAAGATATCTTGCAGTTCTAATAAAGGGTATTTC<[INT]GCAAATGTCTCCTTAAAGGGAAGGGTACAAATTGAATGTGAGTTCTCGAGGAAGGGTAAGAGAAACCTAATGTTGTGGGTTGATTTGATTCTCC	None	None	None
3	117670031	TGGCTACTTAGGTGATGGGATCCATACTCCAAATACCAGTATCACACAATATTCCCATGTATAAAATCTGCACATGTACCCTCTGTATCTAA[INT]>CGATGTAGCACGTTAGATACAGGCCCAAACCAGCCGCTGTGTATCTGGATTGTAAAATG	None	None	None
4	161729092	GNNTTNANAGNTTTTNGTTTGTTTCACAATTTA	TGATATAATATTAGAATGTGTGTACT	None	None

		CAAAATTNNNNNNNNANNTNTCAGATTTTTTTGTAAAACTGTCAAATGCNNANNANTNNTNNNTNA[INT]>AACATGTAACAATGTTGCAGTAACTCCAGGTGATTGTCCACCATTAGAGTTAATAAACACAGTTATTC	GCAAGCAACAGTTACTGCGACGTGAGGTATATGACTTTGCTTTTCGGGATTTA<[INT]TGTCATCTATTAAGGTAGTACA		
4	161738499	AAAAGTTAAATACATATACAAAATCATTATTCAAATTGCTCTTTAAAATCTATTTTAAATACAGCTCCCAGAATATATTGCTGTGTGTG[INT]>ATAGTGGAAAATCTATAGGTGCTAAGGTACATTATTATTATGATTTAAGTACTATTAATCCTGCAGAAGAAATA	None	None	None
4	161739760	ATTTTTTTACCCTTCAGTGACACTTCTGTCNATNNNANNNNTNTCCCTTANAAATNACCCAGTCTTGAGAATGTCTTTATCNGCAGCNTGNGAAGGGAATGAAGAATAAGCNNTNGGTNTNNNATTTCAGGGGCTGA[INT]>TGTGTAAGCGAAACACCACTTACAAATATTTTTGAAACGAAAATGTACTAAAAACTAGTAATGCAAAGGCAGCAATGCTAGCAAAATTTAAA	None	None	None
4	161746789	AACGCACTACCCCTGCCTGTAATATCCGTGTGGATATCCTCTTGTTTCTATCCTAAAAGTATAAACAAAATTC[INT]>AGAAAAAATAGAGAAACANNNNNNNNNNNNNNNNNNNNNNNNNNN	None	None	None
5	3863128	ANCTAGTAATGCAAAGGNAGNAATGCTAGCAAAATTTAAAGAGTTATACGGGGTGAGTTTTACAGAATTAGTAAGATAAGCCC<[INT]GCCAAAGCTTATCTCCATGAGTAGAACAAAGTAATGGGGCCGATGGCAGAGCCACTCCTTCCTCTTAGCACGATTGCCTCAGGGACATGAGTCAAC	None	None	None
5	3878132	GACGGATCCACTNANNTGGAGNANGNNNNATTCANGACTCTAAGNTNTTNANTTGNGAANNCCAGTGGACNANAGNAGTTTTCATATGGATGTATTGTTAGCACANCNNCCNNGTA[INT]>NNCNNNNNGGGANAANGNTTCCCACANCNTCAGATNNANTTGCTCCTGTAAGACCCCCTTTAACAGTA	None	None	None

5	3886481	CTGGGCCCTCTTTTATTTGTTTGACCAGGGAATG AAAGGCTGTTTCTCCTGGGACAGGAACAGCCCG TTGCCTTAGGCGAGGTGGGCTNTGGGAGACAA NCNNNGGTGAGGTCCTGATGCTTTGCATGCTAT CTAANGGCATCTGTGCTGTGGCTCACA[INT]>AT TATATTCCCTATCAGGTTATATTCCTGCAAATAC AACAATTCCTTTTGGTGGTGCANACNANATTCA TTTAGTATCAGG	None	None	None
5	3905747	None	None	AAAACATGTATCTTTAAGGCAA AGAAGAGTGTGAG[INT]>CATT GTAAATTGTATACAGCAGTGTC GTCCACATGGCATTGGACAGG ACATAATGTAAAACATAAA	None
5	3909228	ATTTCCCGATTTAGATGGCCTTTGTCCATTATAA AACCCCCTTAATGGCTTGCCTGGGTCTAGTTTTT CTTCTCCCCGGCCTGTTTCCCGATTTAGATGGCC TCTGTCTCTGGTTAGAAAACCCCCTTAGTTCTTT ATCTAAAACNCAGAGATGATCTTTTAAGGGGCT TCTGGGTCCCCAT[INT]>ATCCGGGCTCNNCNTN ANTGCTTNNNNGTNNNCCAGTTTTTGCCCATTC AGTATGATATTGGCTGTGGGTT	None	None	None
8	77742847	None	None	GTTCAGCAGCAGCATTATATTG GTATA<[INT]AAACATTATTGA GGATCTAAACATTCTTTTATGA AATTATTTGTACAAGTAGCTCT CATTGGAGCAGTCTCTAA	None
14	45574865	TGTGCCTCCTGGAGGAGGTTGTAAACCAAAATT CCAGTCCTCCAAAATAGTGGAATTCATAGAATG TATGTATGAC<[INT]ATTACAGGTGCCCGCCCCG ACACGGAGCTAATTTTTGTATTTTTGGTACAGAT GGGTTTCAGCGTGTTTGCCAGGCTGGTCT	None	None	None
15	91044731	TAATGATTGTACATTTGAATTATCACAGATGGTA CAATGGGCCTATTTATTACAAGGCCAGAGAA<[I NT]ATTTAAAAATTCACTGATGTACATTAAGCCA	AATAAAATGTGTCAGTAATTTTAAGG TTTATAGTTCCCTCAACACAATTGCTA ATGCAGAATAGTGTAAAATGCGCTT	None	None

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		ATAAACTGCTTTAATGAATAACAAACTATGTAGTGTGTCCCTATTAT	CAAGA[INT]>TGTTGAACCGGTTTCGGTTCAACCGATTTCGGTTACGCCCTTAGTTTTATACATGAAT		
16	8014995	TTCCCTGAGGCACACAACTGAGGTGTCNTTGANTNNTGCGANANGCCACAGCATCCNGTNTACATNANCAAACTTAACACTCGGATCCGGTGTAATGTTTTCNNGNNT[INT]>CGTGCCAAATCCCTGTTTTCCTGACCTGCACTGCTTGCCAACCATTCCATTGTTTTTTACANNGCACTA	None	None	TGCATGCTTTTTGGCACAAACTGTATTTTTTTAAATAGTTCTATGTCAGCAACTATA<[INT]GTGTGTAATTTTAAGTTTGCCAGTAGCCACATTTAAAAAAAGAT
19	43100419	GGGTGCCTGGCTGATNCNCCAGAGAGCACTGTGGGCCCTCCTGGCTTCACGAAGGACAGCAGGGGGCAGGCAGCTGTGGTTCTGTCAGNGCNNGGGAGTGAC[INT]>GGGTGCTGGATTACAATATTATAATGGNNTCNGTCCGGTNCTGCTTGTCCNGNTGGACCATC	None	None	None
16	1607718	TGTTTAGGAGCAATTATTCCCAGAGGGATGGGTATTATAGATGTTTAGGAACGGCAGAACTTTCCAGAGGGGCTAGGAAGCAGCTAAACAG[INT]>ACAATCCGATGTGTGCCCCATCTGTTCTCAGANANNANAANNNATCACGNCNGNTNNTTTACTTACCA	None	None	None
16	1611951	None	None	TTGTAAATTCTAAAAGCCATTTTTGGTTACAACCATTAGCAGATGCCAAAATAGGTAGTA<[INT]CAGAAGACACCTGTGCGGATGTCGTGGCTTCGTACCTTTCT	None
21	40187057	ACGTGGGTGTTCTTCAACCTTAGGGTTGCCNNNNNAAATGANNNANAGTACCTTGCCTCAAAATGCCACTTAAGTGAGTCAGGAT[INT]>TTACGGAGATAAAGCATCCTAGTTATTTACATCCTAGTTATTACATGTTACGAAAACGACGTAAACGTTTACCATNTTTTT	None	None	None
21	40190627	TTAATTACATCTAACATTAATGTCGGTCCGTATTCTAGGNGGTCAAAGTCGATNTTCTANGTAGNA	None	None	None

		GTTNGGTGGTGTTNCNTAATAAACCTCTTAATA AATACCTCCCAGCCCTATTGCTTGCAA<[INT]CC ATAATAAACCTCTTAATAAGTACTTCCTGGNTTC AGGCATTAGNCNAGGNACTCCAGGNCCATNNT NNAAGTGGATTTCCAACAAGCATA			
X	126094024	None	None	CTGATTGCAACTTCCGCCTCCC AGATTCAAGTGATTC[INT]>CA GATGTATCAGGATTTAGTATTA CTACTTCAACTGATACCACACC TGCTATATTGGATATTAA	None
9	5388152	NAANNNNNGTAGAAATCAAGNNNCTNGNNTA AGAGTCGTGCCAGTGAAGACGTGGAGAGANG NNTNNATNNNNGNTATANTTNNANNTNNGAG C[INT]>AGGGCTTGNGCTACAATCAGGANNNCN GATAGTTTACTACACCACTCAACCAGTAAACAAT CAGTAGCCTNGTGATGT	None	None	None
9	5464246	AATGATGGGGATGCTCTTACTGGGGTACGAGTC CTCAGGTATTGAACTGGCTTTCAGTAAAAGCTA GATTAGTGGGTTCCTGCCATTTAAGCCCACCCTG GGCAACAGAGAAAGAAGCTGTTTTATGACAACA NNNAGNNNGAAANAACTTTAGAAAATGATGG GGATGCTATNN[INT]>TGGGCNNNNGNNCCCG NNNNNNCANCTTNNTNCNCNNNNNANGNNN TNTTTACCTGACCCATGTGCAGTTTTACAAATGA ACAATGTATGACTAACCTTTACACAGTTCATGTA TGAACTAGGGTGACATTTAGTTGGCCNTNC	TCCTCCAAAATAGTGGAATTCATAGA ATGTATGTATGTCATAACGTCTGCAG TTAAGGTTANANCTTTTGCACAGTTG AAAAANNTATTACGGG<[INT]TGGA GGGAGNCCNNNAGACTTNCATTTTA CTGTAGNGCANNNTTNNTTNTAAGG GNNTTNNCNNNANNNNGTGAGAG GNTANTTGGGAGNCCCTANNATTAG CAGCCTCTGAACATCTGTGTGCCATG GGANCTCCTTTCCTCCTGCATGNTAC NCCAGACANNNAGCCTA	None	None
19	9331190	AAATATTTTAAATGTACTAAAAACTAGTAATGCA AAGGCAGCAAT<[INT]GTTCATCCATGTTGCAAA TGACAGGATTTCCTTGTGTTTTATGGATGAATCA TATTCCATTGTGTATATATACTACATTTTCTTTAT CCATTC	CCTTCGTTAGATTCCACATATGAGTG AGATCATGTGATATTTGTCTTTCTGT GCCTCCCTTATTTCACTTAACACAATG TTCTCTGAGTTCATC[INT]>ATTGCTA TTATGTGTGTCTCCAATGTGTATGAT GATAGAGCCTCCAAAATTGCGTAGT ACAGCAGCAGCATTATAT	None	None

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9	102664848	None	None	None	None
9	102668896	CAGTTCTCTTTTGGTGCATAAAATGTCTGCTTTTATACTAACCGGTTTCGGTTCAACACCTAAAT<[INT]GCGGGGCGGGGGCGGGGGCGGGGGCGGGGCCCAACCCTGCCCACCCCTCGTGATGCCCCGCCCCGTCGCTCCTGCGCCTGCGCCGTGCCCACCGACCGGCCTCGAGCGCCCCGGCGGGAGGTA	None	None	None
9	102714438	TACTAATTCTGTAAAACTCACCCCGTATAACTCTTTAAATTTTGCTAGCATTGCTGCCTTTGCATTACTAGTTTTTACAA<[INT]TGGAGTATAAGTAAGTTACAAATTAGAATAGAATCTTAGAGATGTTACAAAAAGTGGGCGAAGAGCATGAACAGACACTTCTCAAAAGAAGACATT	None	None	None
9	102720372	TTCCCAGTAGTCTCCAACTATTTTTAATAGTAACATATTGATCTTTTGTGAAAAGCAAAACTGTTTAACATAGTTTACAAATGCCATGAATAAT[INT]>CTATAAAATTGCTGTACTACGCAATTTTGGAGGCTCTATCATCATACACATTGGAGACACACATAATAGTTTAGACATCA	None	None	None
9	103083285	CCCTATAGGTGGTTTGCAACCAATTAAACACAATTGTGTTTGTTTGTAATCCATAGATATACATTCTCTATT<[INT]ATGTTCAAATCACTATACTTCTGTAAGCACTACCTAAAGAGGCATCATCTAGTTTGATAGCCATGTCATAGTACTGACTCCCAATGAGCTT	None	None	None
9	103085219	GGATGCAGTATCAAGGTTTGTCATATAGACATAAATCCAGTAGACACTGTAATAGTTTTTGGTATTTTCACTTGA<[INT]GACAGGCATAAAATAACCTCCACCTCCTGGGTTGAAAACACTCTTCTNNNNNNNNCNTNCNNAGNNGNTNNGNAAAGGTCTATGGGGACAATAGCACATGCTAAGGGGGTTA	AATAGCACATGCTAAGGGNNTNAGGTGATCCACCCGCCTCGGTCTCCCAGAGTTCNNAAATAGTGGTTGAAAAACAAAGCACCCAGCCCTATTAATCTTCTTGACGAGGGGACA[INT]>TATTACAGTTAATCCGTCCTTTGTGTGAGCTGTTAACTGCAGTGAGGATTGGAGCACTGTCCACNGANNCNNA	None	None
13	114848854	AGAGGCTGTAGTGGAAAAAAAAACAGGGGATGCTATATCAGATGACGAGAACGAAAATGACAGTG	None	None	None

		ATACAGGTGAA<[INT]CGACCAGTGTGGCCCCA AAGCCAGAGAGAGGAGAGCAGGGCCCCGTTCA GAGGCACCCACACCTCCAGAAGCACCCAGCCAG ACA			

Supplementary Data 17. Detailed list of the closest genes to each HPV integration breakpoint.
For each found HPV integration: histological cancer subtype (Histology_abbreviation; C: Cervix-SCC, H: Head-SCC); tumoural samples identifiers (Tumour_wgs_icgc_sample_id); chromosome (CHROM); first breakpoint coordinates (POS); pattern (ORIENT): two-breakpoints integrations (R: RECIPROCAL), one-breakpoint integrations having the viral sequence downstream (Human-HPV, P: PLUS), and upstream (HPV-Human, M: MINUS); nearest genes together with distance (in bp) to breakpoint and genic region (REGION, GENE, dist); records in Cancer Gene Census (CGC) and Intogen. CGC: Gene name (GENE); genomic coordinates (Genome_Location); availability of functional annotation for the gene (Hallmark); diseases associated with somatic (Tumour_Type_Somatic) or germline (Tumour Type Germline) mutations in the gene; the affected tissue (Tissue_Type): leukaemia/lymphoma (L), Epithelial (E), Mesenchymal (M), other (O); the role of the gene in cancer (Role_in_Cancer): tumour suppressor gene (TSG), oncogene, fusion (the gene is known to be involved in oncogenic fusions); mutation type: frameshift (F), missense (Mis), Translocation (T), large deletion (D), nonsense (N), amplification (A), other (O); gene symbol of fusion partner (Translocation_Partners). Intogen: Gene name (GENE); acronym of the cancer type (CANCER_TYPE); consensus mode of action of the gene (ROLE): loss of function (LoF), activating (Act), ambiguous (Amb); Gene annotated in the CGC (CGC_GENE); Gene annotated in the CGC as driver (CGC_CANCER_GENE). Note that this table is split for illustrative purposes. Thus, the Intogen information is in the second part of the table where, for simplicity, only genes included in the database are shown.

Legend (Column letter = Column title)

A = Histology_abbreviation
B = Tumour_wgs_icgc_sample_id
C = CHROM
D = POS
E = ORIENT
F = REGION
G = GENE
H = dist
I = GENE
J = dist
K = GENE
L = Genome_Location
M = Hallmark
N = Tumour_Types(Somatic)
O = Tumour_Types(Germline)
P = Tissue_Type
Q = Role_in_Cancer
R = Mutation_Types
S = Translocation_Partner
T = CANCER_TYPE
U = ROLE
V = CGC_GENE
W = CGC_CANCER_GENE

										Cancer Gene Census								
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
C	SA492657	2	195586245	M	intergenic	SNORD59	57347	AC006196.1	8710	NA	NA	NA	NA	NA	NA	NA	NA	NA
C	SA492657	3	126849187	P	intergenic	PLXNA1	92952	C3orf56	62787	NA	NA	NA	NA	NA	NA	NA	NA	NA
C	SA517453	4	87469333	M	intergenic	MIR4452	5628	NONE	NONE	NA	NA	NA	NA	NA	NA	NA	NA	NA
C	SA517453	4	87536253	P	intronic	PTPN13	NA	NA	NA	PTPN13	4:86594315-86815171	Yes	lung, NSCLC, gastric, peritoneal carcinomatosis	hepatocellular	E	TSG	Mis, N	
C	SA517532	10	116445369	R	intronic	ABLIM1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C	SA517532	11	747142	M	upstream	TALDO1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C	SA517532	11	754703	P	intronic	TALDO1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C	SA517715	15	84040546	R	ncRNA_intronic	RP11-382A20.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C	SA517730	4	74538776	M	intergenic	RASSF6	52428	AC112518.3	37037	NA	NA	NA	NA	NA	NA	NA	NA	NA
C	SA517730	4	74668660	P	intergenic	IL8	59227	CXCL6	33554	NA	NA	NA	NA	NA	NA	NA	NA	NA
C	SA517802	4	29069629	P	intergenic	RP11-769N22.1	19242	RP11-472K22.1	50301	NA	NA	NA	NA	NA	NA	NA	NA	NA
C	SA517802	4	29071064	M	intergenic	RP11-769N22.1	20677	RP11-472K22.1	48642	NA	NA	NA	NA	NA	NA	NA	NA	NA
C	SA517839	10	97268882	M	intronic	SORBS1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C	SA517839	10	97518528	P	ncRNA_intronic	ENTPD1-AS1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C	SA524949	13	21031963	P	intronic	CRYL1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C	SA524966	1	38487335	M	intronic	UTP11L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C	SA524966	1	38612935	P	intergenic	RP5-884C9.2	41529	RP11-214L19.1	61473	NA	NA	NA	NA	NA	NA	NA	NA	NA
C	SA534431	8	34837108	R	intergenic	AC098612.1	9291	UNC5D	255811	NA	NA	NA	NA	NA	NA	NA	NA	NA
C	SA534431	10	43054280	R	intergenic	ZNF37BP	6038	NONE	NONE	NA	NA	NA	NA	NA	NA	NA	NA	NA
C	SA534431	10	43060704	R	intergenic	ZNF37BP	12462	NONE	NONE	NA	NA	NA	NA	NA	NA	NA	NA	NA
C	SA534431	13	88479175	R	intergenic	RP11-471M2.3	15688	RP11-545P6.2	315751	NA	NA	NA	NA	NA	NA	NA	NA	NA
C	SA534431	13	88495990	P	intergenic	RP11-471M2.3	32503	RP11-545P6.2	299132	NA	NA	NA	NA	NA	NA	NA	NA	NA
C	SA534431	X	149548813	M	intronic	MAMLD1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

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C	SA534431	X	149550333	R	intronic	MAMLD1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C	SA534591	1	10698481	R	UTR3	CASZ1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C	SA84360	7	130618782	M	intergenic	RP11-138A9.1	1817	RP11-138A9.2	2121	NA	NA	NA	NA	NA	NA	NA	NA	NA
C	SA84360	7	130636821	P	ncRNA_intronic	MKLN1-AS1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C	SA84489	18	61276726	M	intergenic	SERPINB13	10293	SERPINB4	27176	NA	NA	NA	NA	NA	NA	NA	NA	NA
C	SA84489	18	61373829	P	intronic	SERPINB11	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C	SA84668	3	189609086	M	intronic	TP63	NA	NA	NA	TP63	3:189631427-189897279	Yes	HNSCC, DLBCL	NSCLC	E	oncogene, TSG	Mis, N, T	TBL1XR1
C	SA84668	3	189632026	P	intergenic	TP63	16958	LEPREL1	42491	TP63	3:189631427-189897279	Yes	HNSCC, DLBCL	NSCLC	E	oncogene, TSG	Mis, N, T	TBL1XR1
C	SA84896	3	130289750	M	exonic	COL6A6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C	SA84896	3	189811501	M	intronic	LEPREL1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C	SA84896	3	189856186	P	ncRNA_intronic	LEPREL1-AS1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
H	SA194387	7	77783419	M	intronic	MAGI2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
H	SA194387	7	77817655	R	intronic	MAGI2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
H	SA194387	X	12052362	R	intronic	FRMPD4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
H	SA194387	X	12273709	M	intronic	FRMPD4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
H	SA194387	X	12279924	M	intronic	FRMPD4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
H	SA194387	X	46529355	M	intronic	SLC9A7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
H	SA194387	X	46530235	M	intronic	SLC9A7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
H	SA194387	X	46537461	P	intronic	SLC9A7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
H	SA194387	X	46542623	P	intronic	SLC9A7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
H	SA194387	X	48069409	M	intergenic	RNA5SP503	3600	SSX1	44903	SSX1	X:48255317-48267444		synovial sarcoma		M	oncogene, fusion	T	SS18
H	SA195307	21	43067880	M	intergenic	snoU13	43037	LINC00111	31116	NA	NA	NA	NA	NA	NA	NA	NA	NA
H	SA195307	21	43084795	R	intergenic	snoU13	59952	LINC00111	10565	NA	NA	NA	NA	NA	NA	NA	NA	NA
H	SA195307	21	43098021	R	upstream	LINC00111	867	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
H	SA195307	21	43113136	R	ncRNA_intronic	LINC00111	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
H	SA195328	13	43504602	P	intronic	EPSTI1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
H	SA195328	13	43506889	M	intronic	EPSTI1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

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H	SA195328	13	43679088	P	intronic	DNAJC15	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
H	SA195822	9	131845205	P	intronic	DOLPP1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
H	SA195822	9	131856422	R	intronic	CRAT	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
H	SA195822	9	131860981	R	intronic	CRAT	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
H	SA199271	1	191331460	R	intergenic	LINC01680	133832	RGS18	796099	NA	NA	NA	NA	NA	NA	NA	NA	NA
H	SA199271	1	191334416	R	intergenic	RP11-309H21.2	136819	RP11-541F9.1	493068	NA	NA	NA	NA	NA	NA	NA	NA	NA
H	SA199271	3	21449942	M	intergenic	AC104183.1	19833	RP11-180N14.1	3611	NA	NA	NA	NA	NA	NA	NA	NA	NA
H	SA199271	3	117670031	P	ncRNA_intronic	RP11-384F7.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
H	SA199271	4	161729092	R	intergenic	RP11-502M1.2	221123	AC106860.1	195532	NA	NA	NA	NA	NA	NA	NA	NA	NA
H	SA199271	4	161738499	P	intergenic	RP11-502M1.2	230530	AC106860.1	186156	NA	NA	NA	NA	NA	NA	NA	NA	NA
H	SA199271	4	161739760	P	intergenic	RP11-502M1.2	231791	AC106860.1	185269	NA	NA	NA	NA	NA	NA	NA	NA	NA
H	SA199271	4	161746789	P	intergenic	RP11-502M1.2	238820	AC106860.1	177740	NA	NA	NA	NA	NA	NA	NA	NA	NA
H	SA199271	5	3863128	M	intergenic	IRX1	261611	CTD-2287N17.1	149244	NA	NA	NA	NA	NA	NA	NA	NA	NA
H	SA199271	5	3878132	P	intergenic	IRX1	276615	CTD-2287N17.1	134289	NA	NA	NA	NA	NA	NA	NA	NA	NA
H	SA199271	5	3886481	P	intergenic	IRX1	284964	CTD-2287N17.1	126147	NA	NA	NA	NA	NA	NA	NA	NA	NA
H	SA199271	5	3905747	P	intergenic	IRX1	304230	LINC02114	867847	NA	NA	NA	NA	NA	NA	NA	NA	NA
H	SA199271	5	3909228	P	intergenic	IRX1	307711	CTD-2287N17.1	103333	NA	NA	NA	NA	NA	NA	NA	NA	NA
H	SA199271	8	77742847	M	intronic	ZFHX4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
H	SA199271	14	45574865	M	intronic	PRPF39	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
H	SA199271	15	91044731	R	UTR3	IQGAP1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
H	SA199271	16	8014995	R	intergenic	AC093515.1	65562	RP11-279O17.2	311270	NA	NA	NA	NA	NA	NA	NA	NA	NA
H	SA199271	19	43100419	P	ncRNA_intronic	LIPE-AS1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
H	SA200796	16	1607718	P	intronic	IFT140	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
H	SA200796	16	1611951	M	intronic	IFT140	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

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H	SA201351	21	40187057	P	intronic	ETS2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
H	SA201351	21	40190627	M	intronic	ETS2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
H	SA201351	X	126094024	P	intergenic	PRR32	138255	ACTRT1	1090917	NA	NA	NA	NA	NA	NA	NA	NA	NA
H	SA201430	9	5388152	M	intronic	PLGRKT	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
H	SA201430	9	5464246	R	intronic	CD274	NA	NA	NA	CD274	9:5450525-5470547	NA	PMBL, Hodgkin lymphoma		L	TSG, fusion	T	CIITA
H	SA202903	19	9331190	R	intergenic	OR7D4	5648	OR7E24	29997	NA	NA	NA	NA	NA	NA	NA	NA	NA
H	SA539321	9	102664848	M	ncRNA_intronic	STX17-AS1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
H	SA539321	9	102668896	M	UTR5	STX17-AS1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
H	SA539321	9	102714438	M	intronic	STX17	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
H	SA539321	9	102720372	P	intronic	STX17	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
H	SA539321	9	103083285	M	intronic	TEX10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
H	SA539321	9	103085219	R	intronic	TEX10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
H	SA539321	13	114848854	M	intronic	RASA3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

A	B	C	D	GENE	T	U	V	W
Cervix-SCC	SA517453	4	87536253	PTPN13	BRCA	LoF	TRUE	FALSE
Cervix-SCC	SA534591	1	10698481	CASZ1	PRAD	LoF	FALSE	FALSE
Cervix-SCC	SA84668	3	189609086	TP63	UCEC,BLCA,HNSC,NB	ambiguous	TRUE	FALSE
Cervix-SCC	SA84668	3	189632026	TP63	UCEC,BLCA,HNSC,NB	ambiguous	TRUE	FALSE

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Supplementary Data 18. Genomic features of HPV integration sites.
Genomic features for each HPV integration site: histological cancer subtype (Histology_abbreviation); tumoral samples identifier (Tumour_wgs_icgc_sample_id); chromosome (CHROM); first breakpoint coordinates (POS); chromatin state (ChromatineStates) according to ENCODE segmentation of the genome of HeLa cell line: R = "Predicted Repressed or Low Activity region", T = "Predicted transcribed region", CTCF = "CTCF enriched element, WE = "Predicted weak enhancer or open chromatin cis regulatory element", TSS = "Predicted promoter region including TSS"; replication timing by Repli-seq from ENCODE of HeLa cell line (ReplicationTiming); replication timing categories (ReplicationTimingClass) classified as follows: ReplicationTiming >70 "Early", ReplicationTiming <20 "Late" and "Middle" otherwise.

Legend (Column letter = Column title)
A = Histology_abbreviation
B = Tumour_wgs_icgc_sample_id
C = CHROM
D = POS
E = ChromatinStates
F = ReplicationTiming
G = ReplicationTimingClass

A	B	C	D	E	F	G
Cervix-SCC	SA492657	2	195586245	R	42.50699615	Middle
Cervix-SCC	SA492657	3	126849187	R	51.70920944	Middle
Cervix-SCC	SA517453	4	87469333	R	67.42179108	Middle
Cervix-SCC	SA517453	4	87536253	R	66.61888885	Middle
Cervix-SCC	SA517532	10	116445369	WE	74.86083984	Early
Cervix-SCC	SA517532	11	747142	TSS	78.56650543	Early
Cervix-SCC	SA517532	11	754703	T	78.6315918	Early
Cervix-SCC	SA517715	15	84040546	R	38.76397324	Middle
Cervix-SCC	SA517730	4	74538776	R	70.17546082	Early
Cervix-SCC	SA517730	4	74668660	R	65.58370972	Middle
Cervix-SCC	SA517802	4	29069629	R	37.56967926	Middle
Cervix-SCC	SA517802	4	29071064	R	37.5776062	Middle
Cervix-SCC	SA517839	10	97268882	R	44.79011917	Middle
Cervix-SCC	SA517839	10	97518528	NA	45.93264008	Middle
Cervix-SCC	SA524949	13	21031963	T	59.07302094	Middle
Cervix-SCC	SA524966	1	38487335	T	77.3039856	Early
Cervix-SCC	SA524966	1	38612935	T	63.71253967	Middle
Cervix-SCC	SA534431	8	34837108	R	17.41171455	Late
Cervix-SCC	SA534431	10	43054280	R	26.71959496	Middle
Cervix-SCC	SA534431	10	43060704	R	26.97887611	Middle
Cervix-SCC	SA534431	13	88479175	R	51.36023712	Middle
Cervix-SCC	SA534431	13	88495990	R	51.82760239	Middle
Cervix-SCC	SA534431	X	149548813	R	54.99565887	Middle
Cervix-SCC	SA534431	X	149550333	R	54.99884033	Middle
Cervix-SCC	SA534591	1	10698481	R	68.83019257	Middle
Cervix-SCC	SA84360	7	130618782	T	72.76589966	Early
Cervix-SCC	SA84360	7	130636821	T	72.83161163	Early

Cervix-SCC	SA84489	18	61276726	R	73.01940155	Early
Cervix-SCC	SA84489	18	61373829	R	69.93461609	Middle
Cervix-SCC	SA84668	3	189609086	R	63.87401199	Middle
Cervix-SCC	SA84668	3	189632026	NA	64.27658844	Middle
Cervix-SCC	SA84896	3	130289750	R	42.02804947	Middle
Cervix-SCC	SA84896	3	189811501	R	64.31437683	Middle
Cervix-SCC	SA84896	3	189856186	R	62.95681381	Middle
Head-SCC	SA194387	7	77783419	R	37.22940826	Middle
Head-SCC	SA194387	7	77817655	R	33.85686493	Middle
Head-SCC	SA194387	X	12052362	R	13.33895779	Late
Head-SCC	SA194387	X	12273709	R	15.54698467	Late
Head-SCC	SA194387	X	12279924	R	15.54518	Late
Head-SCC	SA194387	X	46529355	R	67.52422333	Middle
Head-SCC	SA194387	X	46530235	T	67.54204559	Middle
Head-SCC	SA194387	X	46537461	R	67.67153168	Middle
Head-SCC	SA194387	X	46542623	CTCF	67.78974152	Middle
Head-SCC	SA194387	X	48069409	R	47.36746216	Middle
Head-SCC	SA195307	21	43067880	R	64.23186493	Middle
Head-SCC	SA195307	21	43084795	NA	65.35930634	Middle
Head-SCC	SA195307	21	43098021	NA	66.11620331	Middle
Head-SCC	SA195307	21	43113136	R	66.85774994	Middle
Head-SCC	SA195328	13	43504602	R	69.50580597	Middle
Head-SCC	SA195328	13	43506889	T	69.55088806	Middle
Head-SCC	SA195328	13	43679088	R	74.53419495	Early
Head-SCC	SA195822	9	131845205	NA	77.71767426	Early
Head-SCC	SA195822	9	131856422	NA	77.54779053	Early
Head-SCC	SA195822	9	131860981	NA	77.45653534	Early
Head-SCC	SA199271	1	191331460	R	8.98724	Late
Head-SCC	SA199271	1	191334416	T	9.004676819	Late
Head-SCC	SA199271	3	21449942	T	22.69154739	Middle
Head-SCC	SA199271	3	117670031	R	10.69844246	Late
Head-SCC	SA199271	4	161729092	R	30.95717049	Middle
Head-SCC	SA199271	4	161738499	R	31.0876236	Middle
Head-SCC	SA199271	4	161739760	R	31.09915161	Middle
Head-SCC	SA199271	4	161746789	R	31.17134094	Middle
Head-SCC	SA199271	5	3863128	R	6.499741077	Late
Head-SCC	SA199271	5	3878132	T	6.447363853	Late
Head-SCC	SA199271	5	3886481	NA	6.438227177	Late
Head-SCC	SA199271	5	3905747	R	6.46837	Late
Head-SCC	SA199271	5	3909228	T	6.478728771	Late
Head-SCC	SA199271	8	77742847	R	42.46630096	Middle
Head-SCC	SA199271	14	45574865	T	67.00054932	Middle
Head-SCC	SA199271	15	91044731	T	77.34371948	Early
Head-SCC	SA199271	16	8014995	R	16.85447311	Late
Head-SCC	SA199271	19	43100419	CTCF	60.40309143	Middle
Head-SCC	SA200796	16	1607718	T	75.27708435	Early
Head-SCC	SA200796	16	1611951	T	75.0985	Early
Head-SCC	SA201351	21	40187057	T	75.30145264	Early

Head-SCC	SA201351	21	40190627	T	75.41947937	Early
Head-SCC	SA201351	X	126094024	T	8.23682	Late
Head-SCC	SA201430	9	5388152	R	51.11816788	Middle
Head-SCC	SA201430	9	5464246	R	57.07472229	Middle
Head-SCC	SA202903	19	9331190	R	63.44174194	Middle
Head-SCC	SA539321	9	102664848	R	57.21948624	Middle
Head-SCC	SA539321	9	102668896	TSS	57.10663223	Middle
Head-SCC	SA539321	9	102714438	T	54.85902023	Middle
Head-SCC	SA539321	9	102720372	T	54.46572495	Middle
Head-SCC	SA539321	9	103083285	T	56.89494324	Middle
Head-SCC	SA539321	9	103085219	CTCF	57.01482391	Middle
Head-SCC	SA539321	13	114848855	T	68.71863	Middle

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Supplementary Data 19. HPV integrations with breakpoints close to SVs and/or CNVs

HPV integrations with breakpoints close to structural variants (SVs) and/or copy number variants (CNVs) are shown. Histological cancer subtype is displayed for each sample (Histology_abbreviation); tumoural samples identifiers (Tumour_wgs_icgc_sample_id); chromosome (CHROM); first breakpoint coordinates (POS); pattern (ORIENT): two-breakpoints integrations (RECIPROCAL), one-breakpoint integrations having the viral sequence downstream (Human-HPV, PLUS), and upstream (HPV-Human, MINUS); SVs column contains SV events separated by commas. For each SV event, coordinates are shown together with the distance (in bp) to the integration breakpoint (diffPos), the SVTYPE and SVCLASS (BND=break-end, TRA=translocation, DUP=duplication, DEL=deletion, h2hINV=head-to-head inversion, t2tinv=tail-to-tail inversion); similarly, CNVs column contains CNV coordinates together with the estimated copy number of the region (cn) and the distance (in bp) to the integration breakpoint (diffPos).

Legend (Column letter = Column title)
A = Histology_abbreviation
B = Tumour_wgs_icgc_sample_id
C = CHROM
D = POS
E = ORIENT
F = SVs
G = CNVs

A	B	C	D	E	F	G
Cervix-SCC	SA534431	X	149548813	MINUS	X:149548112_diffPos:-701_SVTYPE:BND_SVCLASS:DUP	X:149548112_cn8_diffPos:-701
Cervix-SCC	SA84489	18	61373829	PLUS	18:61373180_diffPos:-649_SVTYPE:BND_SVCLASS:DUP	18:61373180_cn2_diffPos:-649
Cervix-SCC	SA84896	3	130289750	MINUS	NA	3:130289203_cn8_diffPos:-547
Head-SCC	SA194387	7	77783419	MINUS	NA	7:77782803_cn5_diffPos:-616
Head-SCC	SA194387	7	77817655	RECIPROCAL	NA	7:77818002_cn3_diffPos:347
Head-SCC	SA194387	X	12279924	MINUS	X:12280602_diffPos:678_SVTYPE:BND_SVCLASS:t2tINV, X:12280609_diffPos:685_SVTYPE:BND_SVCLASS:h2hINV	X:12280602_cn_2_diffPos:678
Head-SCC	SA194387	X	46529355	MINUS	X:46529362_diffPos:7_SVTYPE:BND_SVCLASS:h2hINV	X:46529362_cn2_diffPos:7
Head-SCC	SA194387	X	46530235	MINUS	X:46529362_diffPos:-873_SVTYPE:BND_SVCLASS:h2hINV, X:46530473_diffPos:238_SVTYPE:BND_SVCLASS:h2hINV	X:46529362_cn2_diffPos:-873, X:46530473_cn2_diffPos:238

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Head-SCC	SA195307	21	43067880	MINUS	21:43068359_diffPos:479_SVTYPE:BND_SVCLASS:DEL	21:43068359_cn17_diffPos:479
Head-SCC	SA195307	21	43113136	PLUS	21:43113137_diffPos:1_SVTYPE:BND_SVCLASS:DEL, 21:43113615_diffPos:479_SVTYPE:BND_SVCLASS:h2hINV	21:43113137_cn3_diffPos:1, 21:43113615_cn3_diffPos:479
Head-SCC	SA195822	9	131845205	PLUS	9:131844237_diffPos:-968_SVTYPE:BND_SVCLASS:DUP	9:131844237_cn2_diffPos:-968
Head-SCC	SA195822	9	131856422	RECIPROCAL	9:131857120_diffPos:698_SVTYPE:BND_SVCLASS:h2hINV	9:131857120_cn10_diffPos:698
Head-SCC	SA195822	9	131860981	RECIPROCAL	9:131861342_diffPos:361_SVTYPE:BND_SVCLASS:DEL	9:131861342_cn10_diffPos:361
Head-SCC	SA199271	1	191331460	RECIPROCAL	1:191332281_diffPos:821_SVTYPE:BND_SVCLASS:DEL	1:191332281_cn_19_diffPos:821
Head-SCC	SA199271	4	161729092	RECIPROCAL	4:161729029_diffPos:-63_SVTYPE:BND_SVCLASS:DUP	4:161729029_cn1_diffPos:-63
Head-SCC	SA199271	4	161746789	PLUS	4:161747138_diffPos:349_SVTYPE:BND_SVCLASS:DUP	4:161747138_cn1_diffPos:349
Head-SCC	SA199271	5	3886481	PLUS	5:3886503_diffPos:22_SVTYPE:BND_SVCLASS:DEL	5:3886503_cn19_diffPos:22
Head-SCC	SA199271	5	3905747	PLUS	5:3906310_diffPos:563_SVTYPE:BND_SVCLASS:DEL	5:3906310_cn_19_diffPos:563
Head-SCC	SA199271	19	43100419	PLUS	19:43100161_diffPos:-258_SVTYPE:BND_SVCLASS:t2tINV, 19:43101182_diffPos:763_SVTYPE:BND_SVCLASS:t2tINV	19:43100161_cn3_diffPos:-258, 19:43101182_cn3_diffPos:763
Head-SCC	SA201430	9	5388152	MINUS	9:5387202_diffPos:-950_SVTYPE:BND_SVCLASS:TRA', '9:5387988_diffPos:-164_SVTYPE:BND_SVCLASS:TRA', '9:5388145_diffPos:-7_SVTYPE:BND_SVCLASS:h2hINV', '9:5388581_diffPos:429_SVTYPE:BND_SVCLASS:DEL'	9:5387202_cn_5_diffPos:-950', '9:5387988_cn_5_diffPos:-164', '9:5388145_cn_5_diffPos:-7', '9:5388581_cn_9_diffPos:429
Head-SCC	SA539321	9	102664848	MINUS	9:102664849_diffPos:1_SVTYPE:BND_SVCLASS:DUP	9:102664849_cn6_diffPos:1
Head-SCC	SA539321	9	103085219	RECIPROCAL	9:103084660_diffPos:-559_SVTYPE:BND_SVCLASS:t2tINV, 9:103085301_diffPos:82_SVTYPE:BND_SVCLASS:DUP	9:103084660_cn1_diffPos:-559, 9:103085301_cn3_diffPos:82

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Supplementary Data 20. Cancer genes spanned by HPV associated amplification of chr3 in the SA84896 sample.
For each of the affected genes, the Cancer Genome Census (CGC) and Intogen features are described. CGC: Gene name (GENE); genomic coordinates (Genome_Location); availability of functional annotation for the gene (Hallmark); diseases associated with somatic (Tumour_Type_Somatic) or germline (Tumour Type Germline) mutations in the gene; the affected tissue (Tissue_Type): leukaemia/lymphoma (L), Epithelial (E), Mesenchymal (M), other (O); the role of the gene in cancer (Role_in_Cancer): tumour suppressor gene (TSG), oncogene, fusion (the gene is known to be involved in oncogenic fusions); mutation type: frameshift (F), missense (Mis), Translocation (T), large deletion (D), nonsense (N), amplification (A), other (O); gene symbol of fusion partner (Translocation_Partners). Intogen: acronym of the cancer type (CANCER_TYPE); consensus mode of action of the gene (ROLE): loss of function (LoF), activating (Act), ambiguous (Amb); Gene annotated in the CGC (CGC_GENE); Gene annotated in the CGC as driver (CGC_CANCER_GENE).

Legend (Column letter = Column title)

A = GENE
B = Genome_Location
C = Hallmark
D = Tumour_Types(Somatic)
E = Tumour_Types(Germline)
F = Tissue_Type
G = Role_in_Cancer
H = Mutation_Types
I = Translocation_Partner
J = CANCER_TYPE
K = ROLE
L = CGC_GENE
M = CGC_CANCER_GENE

	Cancer Gene Census								Intogen			
A	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**	**M**
ATR	3:142449237-142578826	Yes	endometrial, gastric, epithelial ovarian, myeloma	oropharyngeal	E, L	TSG	F, Mis		UCEC,CM	LoF	TRUE	TRUE
BCL6	3:187721377-187745727		NHL, CLL		L	oncogene , fusion	T, Mis	IG loci, ZNFN1A1, LCP1, PIM1, TFRC, CIITA, NACA, HSPCB, HSP90AA1, HIST1H4I, IL21R, POU2AF1, RHOH, EIF4A2, SRSF3	NHLY,DLBCL	Act	TRUE	TRUE
EIF4A2	3:186783547-186789900	Yes	NHL		L	fusion	T	BCL6	NA	NA	NA	NA
ETV5	3:186046308-186109112		prostate		E	oncogene , fusion	T	TMPRSS2, SCL45A3	BRCA,AML	Act	TRUE	FALSE

FOXL2	3:138944224-138947140	Yes	granulosa-cell tumour of the ovary		O	oncogene, TSG	Mis		OV	Act	TRUE	TRUE
GMPS	3:155870536-155944026		AML		L	fusion	T	KMT2A	HC	LoF	TRUE	FALSE
IGF2BP2	3:185643975-185825012		lymphoma		L	TSG	D		NA	NA	NA	NA
KLHL6	NA	NA	NA	NA	NA	NA	NA	NA	NHLY	LoF	FALSE	FALSE
LPP	3:188212933-188890671		lipoma, leukaemia		L, M	oncogene, fusion	T	HMGA2, KMT2A, C12orf9	UCS,HNSC	Act	TRUE	FALSE
MAP3K13	3:185363120-185489097	Yes	breast		E	oncogene, TSG	F		NA	NA	NA	NA
MB21D2	3:192796815-192918161		lung cancer		E		Mis		HNSC,LUAD,LUSC	LoF	TRUE	FALSE
MECOM	3:169083499-169146305		AML, CML, MDS		L	oncogene, fusion	T	RUNX1, ETV6, PRDM16, RPN1	CM,DLBCL,SBCC, BLCA,UCEC,PRAD	Act	TRUE	FALSE
MLF1	3:158582835-158606459		AML		L	TSG, fusion	T	NPM1	NA	NA	NA	NA
MUC4	3:195746765-195812277		HNSCC		E	oncogene	Mis, O		NA	NA	NA	NA
PAK2	NA	NA	NA	NA	NA	NA	NA	NA	THCA	Act	FALSE	FALSE
PIK3CA	3:179148523-179240093	Yes	colorectal, gastric, glioblastoma, breast		E, O	oncogene	Mis		ESCA,GBM,SBCC, BLCA,RCCC,UCEC, HC,ACY,EPD,MBL, CESC,UCS,COREAD,PIA,RPC,HNSC, MGCT,CH,PAAD,CM,LUSC,AN,S,MESO,VV,HGG,NSCLC,LEIS,LGG,ST,PRAD,LUAD,ANGS,BRCA,OV,OS	Act	TRUE	FALSE
PIK3CB	3:138652699-138759359	Yes	SCC, NSCLC		E	oncogene	Mis		BLCA,GBM,PRAD	Act	TRUE	FALSE
RASA2	NA	NA	NA	NA	NA	NA	NA	NA	DLBCL	LoF	FALSE	FALSE
SOX2	3:181711924-181714436		NSCLC, oesophageal squamous carcinoma		E	oncogene	A		NA	NA	NA	NA

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STAG1	3:136336233-136752368		colorectal cancer, AML		E, L	TSG	Mis, N		NA	NA	NA	NA
TBL1XR1	3:177019355-177196478	Yes	splenic marginal zone lymphoma, primary central nervous system lymphoma, colorectal carcinoma, gallbladder carcinoma		L, E, M	oncogene, TSG, fusion	F, Mis		ALL,DLBCL	LoF	TRUE	FALSE
TFRC	3:196049284-196082189		NHL		L	fusion	T	BCL6	NA	NA	NA	NA
TP63	3:189631427-189897279	Yes	HNSCC, DLBCL	NSCLC	E	oncogene, TSG	Mis, N, T	TBL1XR1	UCEC,BLCA,HNSC,NB	ambiguous	TRUE	FALSE
WWTR1	3:149517235-149703273		epithelioid haemangioendothelioma		M	oncogene, fusion	T	CAMTA1	NA	NA	NA	NA

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Supplementary Data 21. Characterisation of KSHV insertions in PEL cell lines found by VIRUNS

VIRUNS_SR VCF output from the analysis of the two PEL cell lines BC-1 and BC-3. The first column indicates the cell line where the integration is found. Then, the next columns follow the VCF format: chromosome (CHROM); first breakpoint coordinates (POS); reference base at the integration breakpoint (REF); alternate base (insertion in all cases); filter status (PASS in all cases). ID and QUAL fields are necessary for complying with the VCF format but they are out of the scope of VIRUNS analysis. Finally, a detailed explanation of the INFO field can be found in the Methods section.

Legend (Column letter = Column title)

A = Cell line
B = CHROM
C = POS
D = ID
E = REF
F = ALT
G = QUAL
H = FILTER
I = INFO

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BC-1	1	12706473	.	T	<INS>	.	PASS	NBTOTAL=4;NBDISC=2;NBCLIP=2;IDENT=Herpesvirales;ORIENT=MINUS;DISCMAPQ=60;CLIPMAPQ=60;SPECIDENT=JX228174.1:1,KF588566.1:1;DISCDUP=50.00;CLIPDUP=50.00;DEPTHDIFF=['12706373:38', '12706374:38', '12706375:38', '12706376:37', '12706377:37', '12706378:37', '12706379:39', '12706380:39', '12706381:38', '12706382:38', '12706383:39', '12706384:39', '12706385:39', '12706386:39', '12706387:39', '12706388:39', '12706389:37', '12706390:37', '12706391:37', '12706392:38', '12706393:38', '12706394:38', '12706395:39', '12706396:39', '12706397:39', '12706398:39', '12706399:39', '12706400:39', '12706401:39', '12706402:39', '12706403:38', '12706404:39', '12706405:39', '12706406:39', '12706407:38', '12706408:38', '12706409:38', '12706410:39', '12706411:39', '12706412:36', '12706413:36', '12706414:36', '12706415:38', '12706416:38', '12706417:38', '12706418:38', '12706419:38', '12706420:38', '12706421:38', '12706422:38', '12706423:37', '12706424:38', '12706425:36', '12706426:36', '12706427:36', '12706428:37', '12706429:36', '12706430:36', '12706431:38', '12706432:37', '12706433:37', '12706434:37', '12706435:37', '12706436:37', '12706437:38', '12706438:37', '12706439:36', '12706440:36', '12706441:36', '12706442:37', '12706443:37', '12706444:38', '12706445:38', '12706446:39', '12706447:40', '12706448:40', '12706449:40', '12706450:40', '12706451:40', '12706452:40', '12706453:41', '12706454:41', '12706455:41', '12706456:41', '12706457:41', '12706458:41', '12706459:37', '12706460:38', '12706461:37', '12706462:37', '12706463:37', '12706464:37', '12706465:38', '12706466:38', '12706467:38', '12706468:36', '12706469:36', '12706470:36', '12706471:36', '12706472:36', '12706473:35', '12706474:36', '12706475:36', '12706476:36', '12706477:36', '12706478:36', '12706479:36', '12706480:36', '12706481:37', '12706482:37', '12706483:37', '12706484:37', '12706485:38', '12706486:38', '12706487:38', '12706488:38', '12706489:37', '12706490:37', '12706491:37', '12706492:38', '12706493:38', '12706494:39', '12706495:39', '12706496:37', '12706497:37', '12706498:37', '12706499:37', '12706500:37', '12706501:36', '12706502:36', '12706503:36', '12706504:36', '12706505:36', '12706506:35', '12706507:35', '12706508:35', '12706509:35', '12706510:35', '12706511:37', '12706512:38', '12706513:38', '12706514:38', '12706515:38', '12706516:37', '12706517:37', '12706518:37', '12706519:37', '12706520:37', '12706521:38', '12706522:42', '12706523:44', '12706524:44', '12706525:44', '12706526:43', '12706527:44', '12706528:44', '12706529:44', '12706530:42', '12706531:43', '12706532:43', '12706533:43', '12706534:42', '12706535:42', '12706536:42', '12706537:44', '12706538:44', '12706539:44', '12706540:44', '12706541:44', '12706542:45', '12706543:44', '12706544:44', '12706545:44', '12706546:43', '12706547:43', '12706548:43', '12706549:44', '12706550:44', '12706551:44', '12706552:44', '12706553:44', '12706554:44', '12706555:43', '12706556:43', '12706557:43', '12706558:43', '12706559:43', '12706560:43', '12706561:42', '12706562:43', '12706563:43', '12706564:42', '12706565:42', '12706566:40', '12706567:43', '12706568:43', '12706569:43', '12706570:43', '12706571:42',

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BC-1	1	21942928	.	T	<INS>	.	PASS	NBTOTAL=6;NBDISC=3;NBCLIP=3;IDENT=Herpesvirales;ORIENT=PLUS;DISCMAPQ=60;CLIPMAPQ=60;SPECIDENT=GQ994935.1:1,HQ404500.1:1,NC_009333.1:1;DISCDUP=66.67;CLIPDUP=66.67;DEPTHDIFF=['21942828:59', '21942829:58', '21942830:57', '21942831:57', '21942832:57', '21942833:57', '21942834:55', '21942835:54', '21942836:55', '21942837:55', '21942838:55', '21942839:55', '21942840:55', '21942841:55', '21942842:54', '21942843:54', '21942844:52', '21942845:52', '21942846:50', '21942847:50', '21942848:50', '21942849:49', '21942850:47', '21942851:50', '21942852:49', '21942853:49', '21942854:48', '21942855:48', '21942856:47', '21942857:47', '21942858:47', '21942859:46', '21942860:45', '21942861:44', '21942862:44', '21942863:44', '21942864:44', '21942865:44', '21942866:44', '21942867:45', '21942868:45', '21942869:45', '21942870:45', '21942871:45', '21942872:47', '21942873:47', '21942874:51', '21942875:50', '21942876:51', '21942877:53', '21942878:53', '21942879:54', '21942880:54', '21942881:54', '21942882:54', '21942883:54', '21942884:52', '21942885:52', '21942886:52', '21942887:52', '21942888:52', '21942889:52', '21942890:52', '21942891:50', '21942892:50', '21942893:52', '21942894:52', '21942895:52', '21942896:52', '21942897:50', '21942898:50', '21942899:50', '21942900:50', '21942901:51', '21942902:51', '21942903:52', '21942904:52', '21942905:52', '21942906:52', '21942907:52', '21942908:52', '21942909:52', '21942910:52', '21942911:51', '21942912:51', '21942913:52', '21942914:52', '21942915:49', '21942916:45', '21942917:44', '21942918:45', '21942919:43', '21942920:42', '21942921:42', '21942922:44', '21942923:44', '21942924:44', '21942925:44', '21942926:42', '21942927:42', '21942928:41', '21942929:38', '21942930:38', '21942931:37', '21942932:39', '21942933:40', '21942934:40', '21942935:40', '21942936:40', '21942937:42', '21942938:42', '21942939:40', '21942940:40', '21942941:40', '21942942:40', '21942943:39', '21942944:39', '21942945:39', '21942946:39', '21942947:39', '21942948:38', '21942949:37', '21942950:37', '21942951:36', '21942952:36', '21942953:36', '21942954:36', '21942955:37', '21942956:37', '21942957:37', '21942958:37', '21942959:37', '21942960:37', '21942961:37', '21942962:37', '21942963:38', '21942964:38', '21942965:38', '21942966:38', '21942967:38', '21942968:38', '21942969:39', '21942970:39', '21942971:39', '21942972:38', '21942973:39', '21942974:39', '21942975:39', '21942976:38', '21942977:38', '21942978:37', '21942979:38', '21942980:38', '21942981:38', '21942982:39', '21942983:39', '21942984:39', '21942985:39', '21942986:39', '21942987:38', '21942988:38', '21942989:38', '21942990:38', '21942991:39', '21942992:39', '21942993:39', '21942994:39', '21942995:39', '21942996:39', '21942997:39', '21942998:39', '21942999:42', '21943000:42', '21943001:43', '21943002:45', '21943003:45', '21943004:45', '21943005:45', '21943006:45', '21943007:44', '21943008:45', '21943009:45', '21943010:45', '21943011:45', '21943012:45', '21943013:45', '21943014:45', '21943015:45', '21943016:45', '21943017:46', '21943018:47', '21943019:47', '21943020:47', '21943021:47', '21943022:47', '21943023:45', '21943024:45', '21943025:41', '21943026:41', '21943027:40'];REP=MIR,MIR;REPSUB=MIRb,MIR;DIST=61,0;REGION=intronic;GENE=RAP1GAP;CLIPTYPE=DISC;REFSeq=GCTTTGCGTGTACTTTTATT;BKPCSEQ=AATTATGAAGACATGAAAACAGCTAACATTAACTGAGTATTTACCATGTGCCAGGTGTGGTTCTAGAAGCTTTGCGTG[INT]>CTTTCGACGTCCAGGCGGCTGGCACACGGGCCGTGAGCGCCAGCAACATGGGATCATGGTAGTAAGATACAGC;DISC=ST-E00114:822:HM5N7CCXY:7:1204:15138:21315,ST-E00114:822:HM5N7CCXY:7:1204:15331:21508,ST-E00114:822:HM5N7CCXY:8:1120:15016:60343;CLIP=ST-E00114:822:HM5N7CCXY:7:1204:15138:21315,ST-E00114:822:HM5N7CCXY:7:1204:15331:21508,ST-E00114:822:HM5N7CCXY:8:1120:15016:60343;
BC-1	1	94318746	.	T	<INS>	.	PASS	NBTOTAL=4;NBDISC=2;NBCLIP=2;IDENT=Herpesvirales;ORIENT=PLUS;DISCMAPQ=60;CLIPMAPQ=60;SPECIDENT=KT271461.1:1,KT271462.1:1;DISCDUP=50.00;CLIPDUP=50.00;DEPTHDIFF=['94318646:43', '94318647:43', '94318648:42', '94318649:41', '94318650:41', '94318651:42', '94318652:42', '94318653:44', '94318654:43', '94318655:43', '94318656:43', '94318657:43', '94318658:44', '94318659:44', '94318660:43', '94318661:43', '94318662:42', '94318663:42', '94318664:42', '94318665:42', '94318666:42', '94318667:42', '94318668:42', '94318669:42', '94318670:43', '94318671:43', '94318672:43', '94318673:43', '94318674:43', '94318675:43', '94318676:43', '94318677:43', '94318678:43', '94318679:43', '94318680:43', '94318681:44', '94318682:43', '94318683:43', '94318684:42', '94318685:41', '94318686:41', '94318687:42', '94318688:43', '94318689:44', '94318690:44', '94318691:44', '94318692:44', '94318693:45', '94318694:45', '94318695:45', '94318696:44', '94318697:44', '94318698:44', '94318699:44', '94318700:44', '94318701:44', '94318702:44', '94318703:46', '94318704:46', '94318705:45', '94318706:47', '94318707:47', '94318708:48', '94318709:48', '94318710:46', '94318711:46', '94318712:45', '94318713:46', '94318714:46', '94318715:45', '94318716:45', '94318717:45', '94318718:45', '94318719:43', '94318720:43', '94318721:43', '94318722:43', '94318723:43', '94318724:44', '94318725:44', '94318726:44', '94318727:44', '94318728:44', '94318729:44', '94318730:45', '94318731:45', '94318732:45', '94318733:48', '94318734:48', '94318735:47', '94318736:47', '94318737:48', '94318738:48', '94318739:46', '94318740:49', '94318741:49', '94318742:49', '94318743:49', '94318744:50', '94318745:49', '94318746:49', '94318747:47', '94318748:47', '94318749:47', '94318750:47', '94318751:47', '94318752:47', '94318753:47', '94318754:45',

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USC UNIVERSIDADE DE SANTIAGO DE COMPOSTELA

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USC UNIVERSIDADE DE SANTIAGO DE COMPOSTELA

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USC UNIVERSIDADE DE SANTIAGO DE COMPOSTELA

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USC UNIVERSIDADE DE SANTIAGO DE COMPOSTELA

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USC UNIVERSIDADE DE SANTIAGO DE COMPOSTELA

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USC UNIVERSIDADE DE SANTIAGO DE COMPOSTELA

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USC UNIVERSIDADE DE SANTIAGO DE COMPOSTELA

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USC UNIVERSIDADE DE SANTIAGO DE COMPOSTELA

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USC UNIVERSIDADE DE SANTIAGO DE COMPOSTELA

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USC UNIVERSIDADE DE SANTIAGO DE COMPOSTELA

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USC UNIVERSIDADE DE SANTIAGO DE COMPOSTELA

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BC-3	2	13356020	.	A	<INS>	.	PASS	NBTOTAL=4;NBDISC=2;NBCLIP=2;IDENT=Herpesvirales;ORIENT=PLUS;DISCMAPQ=60;CLIPMAPQ=60;SPECIDENT=AF179929.1:1,AF179930.1:1;DISCDUP=50.00;CLIPDUP=50.00;DEPTHDIFF=['13355920:37', '13355921:37', '13355922:38', '13355923:39', '13355924:39', '13355925:37', '13355926:37', '13355927:35', '13355928:36', '13355929:36', '13355930:34', '13355931:34', '13355932:34', '13355933:34', '13355934:34', '13355935:34', '13355936:34', '13355937:38', '13355938:39', '13355939:39', '13355940:39', '13355941:38', '13355942:38', '13355943:38', '13355944:38', '13355945:38', '13355946:38', '13355947:40', '13355948:41', '13355949:40', '13355950:40', '13355951:41', '13355952:41', '13355953:41', '13355954:41', '13355955:41', '13355956:40', '13355957:41', '13355958:41', '13355959:41', '13355960:41', '13355961:40', '13355962:40', '13355963:40', '13355964:40', '13355965:40', '13355966:41', '13355967:40', '13355968:39', '13355969:39', '13355970:40', '13355971:41', '13355972:41', '13355973:41', '13355974:41', '13355975:41', '13355976:41', '13355977:41', '13355978:41', '13355979:41', '13355980:41', '13355981:41', '13355982:41', '13355983:42', '13355984:42', '13355985:41', '13355986:40', '13355987:43', '13355988:43', '13355989:43', '13355990:43', '13355991:43', '13355992:43', '13355993:43', '13355994:45', '13355995:45', '13355996:46', '13355997:46', '13355998:45', '13355999:46', '13356000:46', '13356001:46', '13356002:46', '13356003:46', '13356004:46', '13356005:46', '13356006:45', '13356007:45', '13356008:45', '13356009:45', '13356010:45', '13356011:45', '13356012:45', '13356013:42', '13356014:41', '13356015:41', '13356016:42', '13356017:42', '13356018:42', '13356019:43', '13356020:43', '13356021:42', '13356022:42', '13356023:42', '13356024:42', '13356025:42', '13356026:41', '13356027:43', '13356028:43', '13356029:43', '13356030:43', '13356031:44', '13356032:44', '13356033:45', '13356034:45', '13356035:45', '13356036:45', '13356037:45', '13356038:45', '13356039:45', '13356040:46', '13356041:45', '13356042:45', '13356043:46', '13356044:47', '13356045:48', '13356046:48', '13356047:48', '13356048:48', '13356049:48', '13356050:49', '13356051:49', '13356052:49', '13356053:50', '13356054:50', '13356055:50', '13356056:49', '13356057:49', '13356058:49', '13356059:49', '13356060:48', '13356061:49', '13356062:50', '13356063:51', '13356064:54', '13356065:54', '13356066:54', '13356067:55', '13356068:55', '13356069:53', '13356070:53', '13356071:53', '13356072:53', '13356073:53', '13356074:52', '13356075:52', '13356076:52', '13356077:52', '13356078:52', '13356079:52', '13356080:52', '13356081:52', '13356082:53', '13356083:53', '13356084:53', '13356085:53', '13356086:53', '13356087:53', '13356088:50', '13356089:49', '13356090:49', '13356091:50', '13356092:50', '13356093:50', '13356094:50', '13356095:53', '13356096:53', '13356097:53', '13356098:53', '13356099:53', '13356100:53', '13356101:54', '13356102:53', '13356103:53', '13356104:53', '13356105:53', '13356106:53', '13356107:53', '13356108:52', '13356109:53', '13356110:53', '13356111:53', '13356112:53', '13356113:53', '13356114:53', '13356115:53', '13356116:54', '13356117:53', '13356118:53', '13356119:53'];REP=ERVL-MaLR,ERVL-MaLR;REPSUB=THE1B,THE1B-int;DIST=70,0;REGION=intergenic;GENE=AC064875.2(dist=208882),AC092635.1(dist=321778);CLIPTYPE=DISC;REFSeq=CCTGTTACCCAGTTCCAAAG;BKPCSEQ=CTCAGCCTGGATTTCATTGTCCATATCATTATCAGCATTTTGGTCAAAGCCATTCAACAAGTCTCTAGGGAGTTTCAAAATTTCTCACATTATCCCGTGTTTTTTTTGAGCCCTCCAAACTGTTCCA

USC UNIVERSIDADE DE SANTIAGO DE COMPOSTELA

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USC UNIVERSIDADE DE SANTIAGO DE COMPOSTELA

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Some oncogenic viruses' nucleic acid may become integrated into the human genome. The present work aims to shed light on viral integrations in cancer, characterising somatic Hepatitis B virus (HBV) integrations in hepatocellular carcinoma (HCC) samples from the Pan-Cancer Analysis of Whole Genomes (PCAWG). In addition, a tool for the detection of viral integrations in both, Next Generation and Third Generation Sequencing data, is presented here. This work shows that non-canonical HBV insertions can cause the loss of tumour suppressor genes and that somatic insertions in HCC are typically acquired early in tumour evolution. In addition, VIRUNS (VIral-Reference UNions Search) was developed. It successfully characterised Human Papillomavirus integrations and detected Kaposi's Sarcoma Herpesvirus-human DNA junctions.