Investigation of the Splicing of BRCA2

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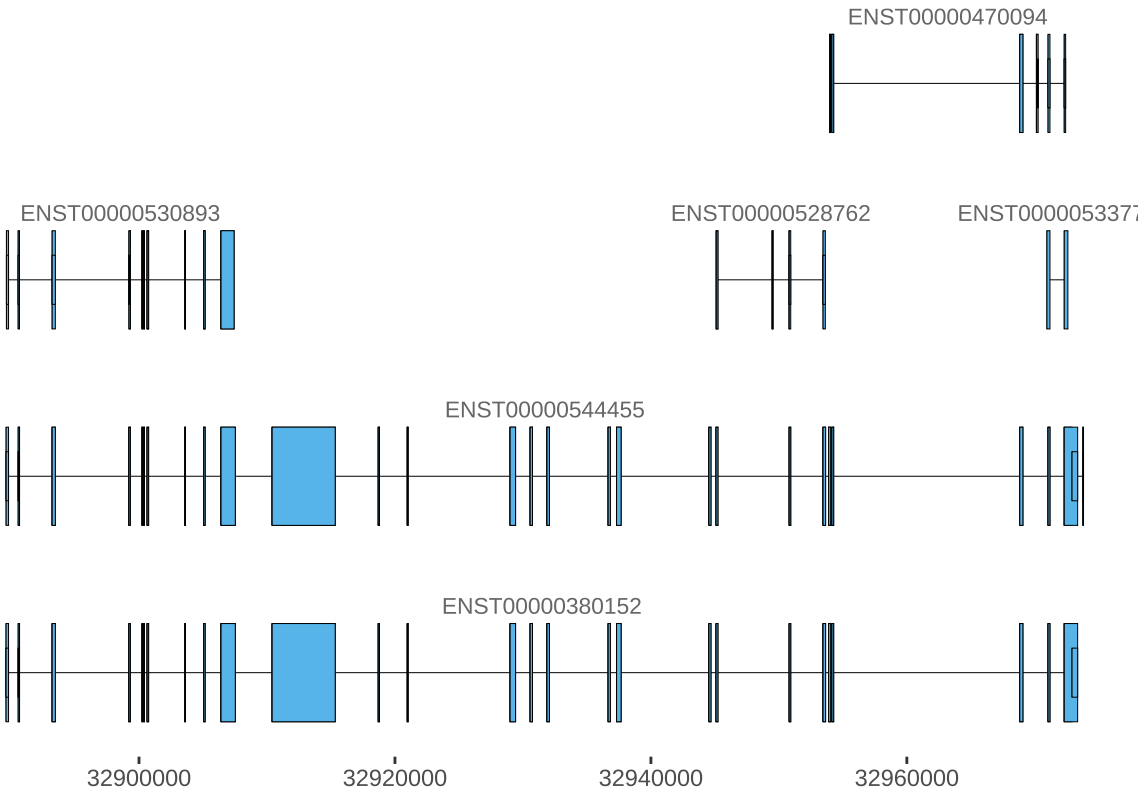
Introduction

BRCA2 is a human tumor suppressor gene (specifically, a caretaker gene), found in all humans; its protein, also called by the synonym breast cancer type 2 susceptibility protein, is responsible for repairing DNA. Inherited mutations in BRCA1 and this gene, BRCA2, confer an increased lifetime risk of developing breast or ovarian cancer. Both BRCA1 and BRCA2 are involved in the maintenance of genome stability, specifically the homologous recombination pathway for double-strand DNA repair. The largest exon in both genes is exon 11, which harbors the most important and frequent mutations in breast cancer patients. The BRCA2 gene was found on chromosome 13q12.3 in humans. The BRCA2 protein contains several copies of a 70 aa motif called the BRC motif, and these motifs mediate binding to the RAD51 recombinase which functions in DNA repair. BRCA2 is considered a tumor suppressor gene, as tumors with BRCA2 mutations generally exhibit loss of heterozygosity (LOH) of the wild-type allele. **This brief study will attempt to investigate large deletion and the exon skipping in BRCA2 splicing in different types of cancer**.

Retrive the exons of BRCA2

Initially, we need to retrieve the unmber of exons for BRCA2 and their positions based on the genome reference consortium human genome build 37 (GRCh37). We will use `BioMart` from `Bioconductor package` in `R` to map the start and the end position of each exon. The `BioMart` package enables retrieval of large amounts of data in a uniform way.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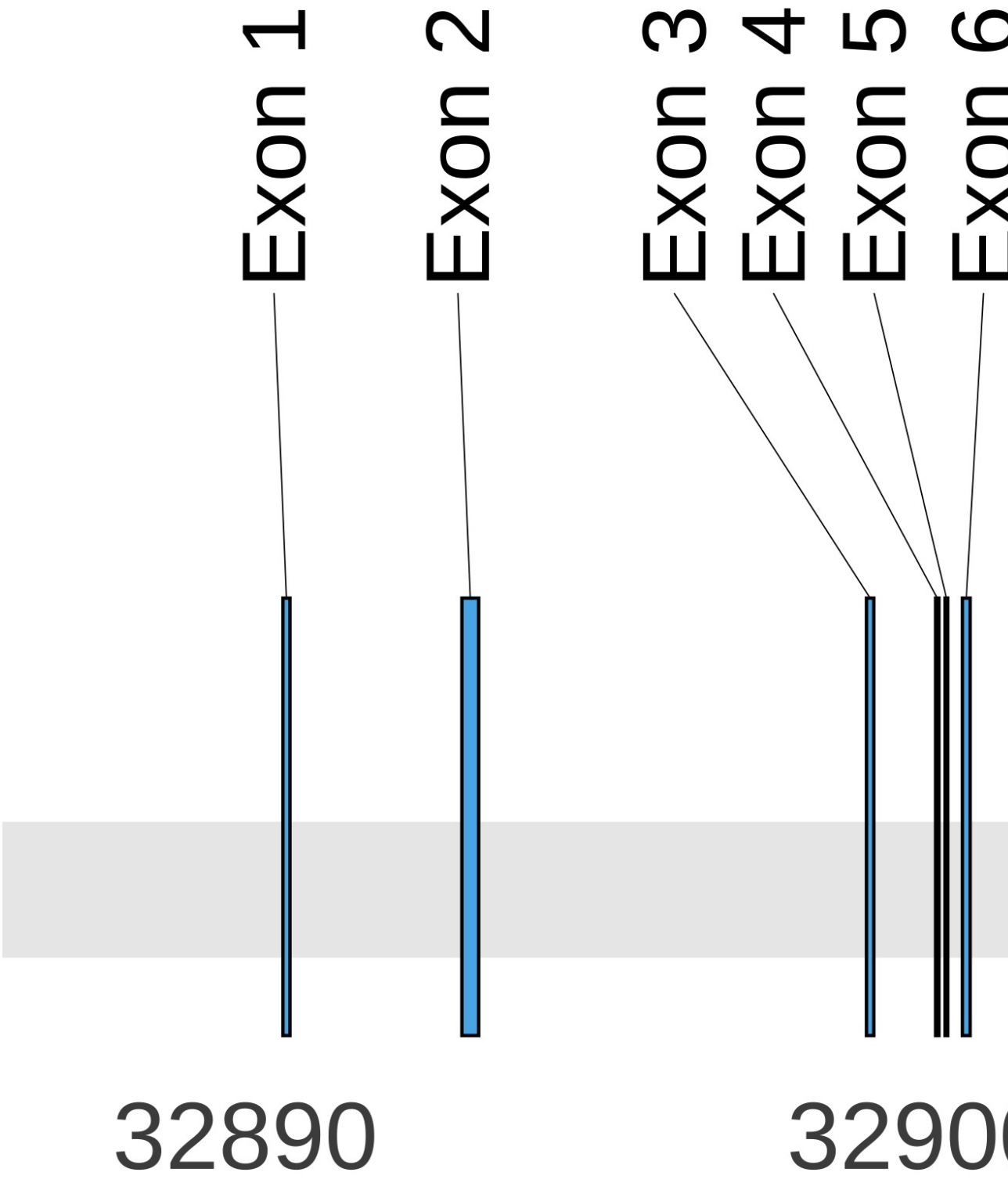

Figure 1: Mapping of the exons and introns in BRCA2 gene

Table 1: The positions of the exons boundaries of BRCA2 in chromosome 13.

Exon	Start (bp)	End (bp)	Region Length
1	32890559	32890664	105
2	32893214	32893462	248
3	32899213	32899321	108
4	32900238	32900287	49
5	32900379	32900419	40
6	32900636	32900750	114
7	32903580	32903629	49
8	32905056	32905167	111
9	32906409	32907524	1115
10	32910402	32915333	4931
11	32918695	32918790	95
12	32920964	32921033	69
13	32928998	32929425	427
14	32930565	32930746	181
15	32931879	32932066	187
16	32936660	32936830	170
17	32937316	32937670	354
18	32944539	32944694	155
19	32945093	32945237	144
20	32950807	32950928	121
21	32953454	32953652	198
22	32953887	32954050	163
23	32954144	32954282	138
24	32968826	32969070	244
25	32971035	32971181	146
26	32972299	32973347	1048
27	32973746	32973805	59