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**2020/ASP/29**

**CLASS EXERCISE 1: Gene Bank - NCBI**

1)

a) 33449

b) 1548

2)

 The BRCA1 gene encodes a nuclear phosphoprotein that maintains genomic stability, acts as a tumor suppressor, and participates in DNA repair, transcription, and recombination through the BASC complex.

 Mutations and alternatively spliced variants of BRCA1 are responsible for a large proportion of inherited breast and ovarian cancers, with a related pseudogene also found on chromosome 17.

3) BRCA1 gene is "BRCA1 DNA Repair Associated"

4) Its unique identifier in the NCBI Gene database is Gene ID: 672

5) Genomic Context

• Chromosome Location: BRCA1 is located on chromosome 17, specifically at 17q21.31.

• It spans a large region and is involved in DNA repair, cell cycle regulation, and maintaining genomic stability.

A) Start and End of the Gene

• Start Position: 43,044,294

• End Position: 43,125,482

• These coordinates are based on the GRCh38/hg38 human genome assembly.

B) Number of Exon Regions

• The BRCA1 gene contains 24 exons.

• These exons encode the protein and are interspersed with introns that are spliced out

during mRNA processing.

C) Direction of Transcription

• BRCA1 is transcribed from the reverse (minus) strand.

• This means the gene is read in the 3' to 5' direction on the DNA template, but the resulting mRNA is synthesized in the 5' to 3' direction.

6)

Two BRCA1 Transcript Accession Numbers:

* NM\_007294.4 — This is the RefSeq mRNA for transcript variant 1 of BRCA1 (the canonical, most well-known transcript)
* NM\_007297.4 — This corresponds to transcript variant 3 of the BRCA1 gene

7) The BRCA1 protein (accession NP\_009225.1) is composed of 1,863 amino acids.

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