

# Cancer Biology Kit - Bioinformatics Lab - BRCA1 Biomarker

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This section contains information about bioinformatics and how the program BLAST can be used to analyze DNA and protein sequence information. In this kit, BLAST is used to detect the presence of a mutations in the BRCA1 gene which are associated with increased risk for the development of breast cancer. Certain mutations in BRCA1 are biomarkers for breast cancer.

The materials include information about:

- bioinformatics
- the BLAST program
- the BRCA1 biomarker
- protein modeling with iCn3D program

## A. Bioinformatics/BLAST Slide Deck

This powerpoint introduces the use of BLAST.

Cancer\_Biology\_Using BLAST\_for\_Genetic\_Testing\_PPT\_052022.pptx

## B. Bioinformatics Activity Instructions

This section contains a BRCA1 testing case study plus bioethics worksheet, instructions for the BLAST activity looking for BRCA1 mutations in the patient DNA sequences (pages 111-120 of the document).

Cancer\_Biology\_Teacher\_Instructions\_Case\_Study\_Pedigree\_BLAST\_052022.docx

Genetic\_Testing\_Lesson3\_Case\_Study.pdf

Cancer\_Biology\_Lawler\_Family\_Pedigree\_Punnett\_Squares\_052022.pdf

Cancer\_Biology\_Using\_BLAST\_for\_Genetic\_Testing\_ELL\_052022.docx

Codon-Table-Circular-Color.pdf

## C. BRCA1 sequence information

The BRCA1 DNA and protein sequences for the genetic testing scenario are listed first. The sequences for patients A - I are listed after those provided for the genetic testing.

BRCA1\_Sequences

## D. BRCA1 Protein Modeling

Instructions for the Cn3D activity looking at the structure of wild type and mutated BRCA1 protein.

iCn3D Lesson for BRCA1 Web Version

## E. Using Big Data to Study Cancer

This section contains instructions for two activities that introduce students to the big data repositories called TCGA (The Cancer Genome Atlas) and OncoKB.

TCGA Exploration \_teacher key

Tumor Suppressor and OncoGene Activity with OncoKB