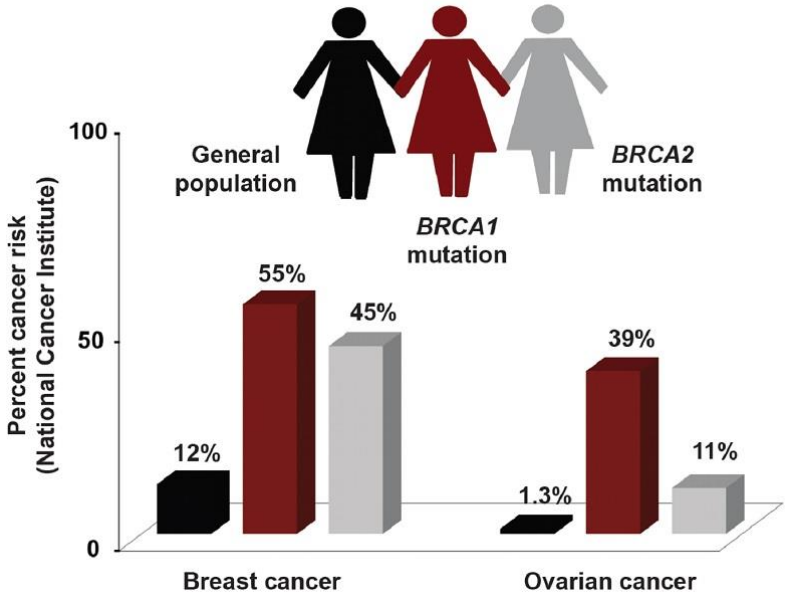
Name: Student Number/Homeroom:

Your partner:

Genetic Mutations and Breast Cancer

LO: Check predictions on whether mutated proteins will still work. SLE: Meet NGSS.



geneyouin.ca/brca-mutation-testing-can-classify-type-and-severity-of-cancer/

At this point, we have just learned about three types of genetic mutations: insertions, deletions, and substitutions. Please invent an example of each below, making it clear what has changed.

(1a) Example of an INSERTION:

(1b) Example of a DELETION:

(1c) Example of a SUBSTITUTION (MISSENSE):

(2) Which of these types (insertion, deletion, substitution/missense) seem(s) most likely to disrupt the function of the gene's protein? Briefly explain.

Each group has been assigned a specific mutation in the BRCA1 gene, as follows:

Group Number	Mutation
1	Variation 41823: c.425C>A (base 425 is changed from C to A)
2	Variation 232600: c.739A>G (base 739 is changed from A to G)
3	Variation 55461: c.5212G>A (base 5212 is changed from G to A)
4	Variation 232061: c.5277G>T (base 5277 is changed from G to T)
5	Variation 37604: c.4675G>A (base 4675 is changed from G to A)
6	Variation 183950: c.133A>C (base 133 is changed from A to C)
7	Variation 156188: c.2690C>T (base 2690 is changed from C to T)
8	Variation 267218: c.4820T>C (base 4820 is changed from T to C)
9	Variation 265622: c.5569delC (base 5569, a C, is deleted)
10	Variation 373823: c.5463_5464insT (an extra T is inserted between bases 5463 and 5464)
11	Variation 371936: c.5156delT (base 5156, a T, is deleted)
12	Variation 37623: c.5030_5033delCTAA (bases 5030 through 5033, CTAA, are deleted)
13	Variation 125539: c.2098_2099insA (an extra A is inserted between bases 2098 and 2099)

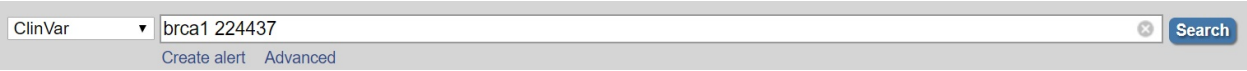
(3a) In the table above, indicate which group number and mutation are yours.

(3b) Is your mutation an insertion, a deletion, or a substitution/missense?

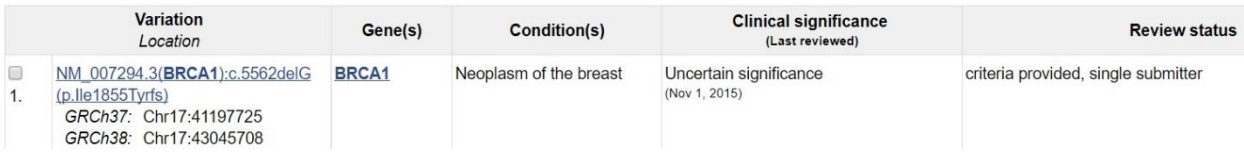
(3c) Based on the type of mutation you have (insertion, deletion, or substitution/missense), predict whether your mutation will be benign (harmless) or pathogenic (disease-causing).

(3d) Check the prediction you just made!

- Go to https://www.ncbi.nlm.nih.gov/clinvar.
- In the search box, type "BRCA1" followed by a space and your variation number, then click the Search button.



- Look at the Clinical Significance column (2nd from the right).



Variation / Location	Gene(s)	Condition(s)	Clinical significance (Last reviewed)	Review status
1. NM_007294.3(BRCA1):c.5562delG (p.Ile1855Tyrfs) GRCh37: Chr17:41197725 GRCh38: Chr17:43045708	BRCA1	Neoplasm of the breast	Uncertain significance (Nov 1, 2015)	criteria provided, single submitter

Is your mutation considered to be Benign (harmless), Likely Benign, Likely Pathogenic, or Pathogenic (disease-causing)? Be ready to tell the class what you found.