Notes for teachers

At a glance

Some people have inherited faulty genes that increase their risk of developing particular types of cancer. The link between the BRCA1 gene and breast cancer was discovered in the 1990s using early genome sequencing techniques. Fast-forward to the present day and researchers at the Oxford Genomics Centre are working at the cutting edge of disease prevention and treatment using new faster and more efficient methods of sequencing.

This activity is suitable for extending the more able and asks students to take the role of a genetic counsellor advising someone who has the faulty BRAC1 gene and therefore an increased risk of developing breast and ovarian cancer.

Learning Outcomes

- Students learn how a mutation can increase the risk of developing cancer
- Students interpret information in order to advise a person in the role of a genetic counsellor

Each student will need

- Copy of student worksheet page 1
- Copy of student worksheet page 2
- Cards cut from student worksheet page 3
Possible Lesson Activities

1. Starter activity
   - Ask students to write down a list of what can increase the chance of a person developing cancer.
   - Ask students to read out some things on their list and highlight if anyone mentions genes or genetics. Discuss that some cancers are linked to faulty genes, or mutations.
   - Mention that the famous actress Angelina Jolie has a faulty gene called BRAC1, which puts her at greater risk of developing breast and ovarian cancer. Either play the class the news story about this, or read out the article (see weblinks).
   - Explain that the link between the faulty BRAC1 gene and cancer was made in the 1990s using early genetic sequencing technology. Play the class the animation 'How to Read DNA', which outlines the work on genome sequencing being carried out today at the Oxford Genomics Centre.

2. Main activity: Being a genetic counsellor
   - Ask students to read through the information on page 1 of the student sheet. This introduces the fictional story about Charlotte, who discovers by using a genetic test that she has the faulty BRAC1 gene.
   - You may like to show the students the homepage of a company that sells genetic tests like the one Charlotte used (see weblinks). NB: this particular company used to test for the BRAC1 and BRAC2 genes, but they no longer do. You could discuss with the class reasons why.
   - Introduce the task. The students will act as a genetic counsellor advising Charlotte about her options.
   - Give each student a copy of page 2 of the student worksheet plus cards cut from page 3. They read through the information and answer Charlotte's questions.

3. Plenary
   - Ask student's to share their answers with a partner so they can peer-assess their work.
   - Refer back to the 'How to read DNA animation' and discuss how using genome sequencing to discover pre-emptive treatments for people that are at a higher risk of cancer and developing personalised medicines could help Charlotte and others like her with the faulty BRAC1 gene.

Weblinks

How to Read DNA animation  https://www.oxfordsparks.ox.ac.uk/content/how-read-dna

News story about Angelina Jolie's decisions about surgery
https://www.youtube.com/watch?v=PKBnEhajNU

Article written by Angeline Jolie  http://www.nytimes.com/2013/05/14/opinion/my-medical-choice.html

Homepage of 23 and me, a company that sells genetic testing kits  https://www.23andme.com/en-gb/