

ARE SOME CANCERS MORE GENETIC THAN OTHERS?

RESEARCH PROJECT

STUDENT:

Overview

This project will provide an introduction to genetic diseases and cancer. This will include discussion of what makes a disease a genetic disease, and an exploration of the genetic causes behind cancer initiation and progression.

Students will use their understanding of genetic concepts to explore different types of cancer and common causes of the disease. There will also be the chance to discuss different types of cancer treatments, and how the choice of therapy reflects the type and cause of cancer present.

The end result of the project will be a scientific report style essay and a short presentation to summarise the key points and concepts learnt.

Recommended Pre-Reading

- Hanahan D, Weinberg RA. Hallmarks of cancer: the next generation. *Cell*. 2011 Mar 4;144(5):646-74. doi: 10.1016/j.cell.2011.02.013. PMID: 21376230.
- Kandoth, C., McLellan, M., Vandin, F. et al. Mutational landscape and significance across 12 major cancer types. *Nature* 502, 333-339 (2013). <https://doi.org/10.1038/nature12634>
- Blackadar CB. Historical review of the causes of cancer. *World J Clin Oncol*. 2016 Feb 10;7(1):54-86. doi: 10.5306/wjco.v7.i1.54. PMID: 26862491; PMCID: PMC4734938.
- Claussnitzer, M., Cho, J.H., Collins, R. et al. A brief history of human disease genetics. *Nature* 577, 179-189 (2020). <https://doi.org/10.1038/s41586-019-1879-7>

Session 1 & 2

Session 1: Genetic diseases and an introduction to cancer

Discussion of what constitutes a genetic disease and the different types of genetic diseases. Introduction to the basic concepts of cancer biology building on from any previous understanding at GCSE/A-level. We will also begin to explore the different types of cancer.

Session 2: The causes of cancer

We will next begin to explore the in depth mechanisms of cancer development and progression, and discuss various causes of cancer such as smoking and immune involvement, whilst also keeping the topic question in mind. The student will outline the main contributors to cancer development and discuss the importance of each. The student will be given the opportunity to pick one or two 'causes' to explore in greater depth.

Session 3 & 4

Session 3: First draft of final piece

This session will involve discussion based on the student's research of their chosen topic. The session will also be given the chance to begin to look into therapeutic options for cancer, and discuss how different treatments are developed for different cancer types and patients.

Session 4: Final draft of final piece

A final discussion of the student's finished presentation or essay.

Review Session:

A final discussion on the topics covered, and a chance for you to reflect on your piece of work. You will have the opportunity to ask any final questions.