

Understanding Cancer:

How does cancer start and spread?

Introduction

The Understanding Cancer worksheet introduces the abnormal division of cells involved in the formation of cancer. Students will partake in activities that primarily focus on cancer cells in the body. They will be concentrating on identifying the characteristics of a cancer cell in comparison to a normal body cell and using this knowledge to build further upon their understanding of different type of cancer in the human body.

Curriculum Outcomes: Victorian Curriculum F-10

Levels 9 and 10

Science Understanding: Biological Science

- Multicellular organisms rely on coordinated and interdependent internal systems to respond to changes to their environment (VCSSU117)

Science Inquiry Skills:

- Planning and Conducting: Select and use appropriate equipment and technologies to systematically collect and record accurate and reliable data, and use repeat trials to improve accuracy, precision and reliability (VCSIS136)

- **Recording and Processing:** Construct and use a range of representations, including graphs, keys, models and formulas, to record and summarise data from students' own investigations and secondary sources, to represent qualitative and quantitative patterns or relationships, and distinguish between discrete and continuous data (VCSIS137)

Duration of Activities

The activities would take 2 hours to complete all together. Or within two split sessions. Activities 1-4 in the first session and activity 5 and the extension in a following session.

Teaching and learning concepts

The activities are used to provide students the basic knowledge they need to know about Cancer and ensure that they are familiar with the following terms and definitions.

There are 4 activities produced for the teaching:

Activity 1 and 2: Comparing Normal Cells to Cancerous Cells

Activity 3: Interpreting graphs and drawing conclusions

Activity 4: Representation of skin cell with cancer

Activity 5: Digital animation

Learning outcomes

Cell: a basic unit of living matter separated from its environment by a plasma membrane; the fundamental structural unit of life.

Cell membrane: the outer membrane of the cell; the plasma membrane.

Nucleus: an atom's central core, containing protons and neutrons. The chromosome-containing organelle of a eukaryotic cell. A cluster of neurons.

Extracellular matrix: the substance in which animal tissue cells are embedded; consists of proteins and polysaccharides.

Basement membrane: the floor of an epithelial membrane on which the basal cells rest.

Immune response: a highly defensive reaction of the body to the invasion by a foreign substance or organisms; consists of primary responses in which the invader is recognised as foreign, or 'not-self', and eliminated and a secondary response to subsequent attacks by the same invader. Medicated by two types of lymphocyte B cells, which mature in the bone marrow and responsible for antibody production, and T cells which mature in the thymus and are responsible for cell-mediated immunity

Enzymes: cells of proteins serving as catalysts, chemical agents that change the rate of a reaction without being consumed by the reaction

Tissue: an integrated group of cells with a common structure and function

It is recommended that teachers come to know the workings of the "Virtual Lab Cell Reproduction: how can cancer cells be recognized?" site, as it may be confusing for students who are using it for the first time.

Background information

Cancer is a disease of the cells, which are the basic building blocks of the body. The body is made up of trillions of cells. These cells normally grow and divide to replace old or damaged cells as the body needs them. Sometimes this process does not occur, and cells grow, divide and die abnormally. Old cells and damaged cells may survive beyond their life cycle while new cells may form when not needed (Cancervic.org.au, 2018). This may cause blood or lymph fluid in the body to become abnormal, or form a growth called a tumour.

A tumour can be benign (restricted to one area and not able to be spread) or malignant (made of cancerous cells and able to spread or invade nearby tissue). Often when malignant tumours arise some of the cancer cells are able to break away from the tumour and travel by either the circulatory or lymphatic system to tissues far away, forming new tumours in these areas. The body regulates itself to ensure a stable state this is known as homeostasis. Cancer in this case skin cancer is an imbalance of homeostasis (National Cancer Institution, 2018).

References

Cancervic.org.au. (2018). *What is cancer? – Cancer Council Victoria*. Available at: <http://www.cancervic.org.au/about-cancer/what-is-cancer> [Accessed 19 Sep. 2018]

National Cancer Institution. (2018). *What is Cancer?* Available at: <https://www.cancer.gov/about-cancer/understanding/what-is-cancer> [Accessed 19 Sep. 2018]

Key concept

Activity 5: Digital Animation

Create a digital story to describe the progression from healthy tissue to cancerous tissue in skin melanoma. Animate the process that cells take to move from healthy tissue to skin melanoma. You may like to develop 3D models using the equipment provided or you may like to use a white board and drawing to help in student explanation.

Materials

- iPad: to access weblink
- Stop motion studio' app on iPad
- Butchers paper, A3 paper, coloured paper
- Pencils, textas, coloured pencils, crayons

- Pipe cleaners
- Modelling clay
- Pop sticks, skewer sticks, polystyrene balls
- Glue sticks, sticky tape, elastic bands, white tac, string

Methods

1. Click the links below to watch the tutorials to know what an animation looks like and to use it:
 - <https://youtu.be/X33pwiUT4IQ>
 - https://www.youtube.com/watch?v=X_M468S86HI
2. Use the storyboard template provided to construct the plan, including:
 - Visual representations
 - The narration
 - Camera actions/effects.
 - Slide titles and credits
 - References
3. Download “Stop Motion Studio” app (a free software program) to iPad.
4. Practice using the app based on the set up:
 - Positioning the camera (retort stands, rulers, masking tape)
 - Taking the shot (don’t move the iPad)
 - Watch the lighting (shadows)
 - Position the animations (tape things down)

- Use the onion skin to check the shot
 - Plan the title and credits from the start (don't plan to insert later)
5. Narrate the video showing the progression of cell changes from normal to cancerous tissue.

Risk management

There are no outstanding hazards or sharp tools with potential risks involved in this activity

Resources

A Deakin University scientist (Professor Leigh Ackland), a teacher (Mary Vamvakas) and a pre-service teacher (Esme Wright), and Deakin University Education academic (Peta White) worked in a workshop situation to develop the following activity. This work is based on Leigh's current research. Please find links to Leigh's profile page at Deakin University to find out more about her and her research and we have also recorded a video to support the understandings of her research and her passion for science.

Professor Leigh Ackland, School of Life and Environment Sciences, Deakin University

- Website: <http://www.deakin.edu.au/about-deakin/people/leigh-ackland>
- Video Link: https://video.deakin.edu.au/media/t/0_vbzakdi5

Further information

- Cancer Council Victoria:

<http://www.cancervic.org.au/about-cancer/what-is-cancer>

- National Cancer Institute:

<https://www.cancer.gov/about-cancer/understanding/what-is-cancer>

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