**ACTIVITY: Characteristics of normal and cancerous cells**

**Activity idea**

In this activity, students complete a graphic organiser to explore the characteristics of normal and cancerous cells.

By the end of this activity, students should be able to:

* describe the characteristics of normal and cancerous cells.

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**Introduction/background**

There are many different forms of cancer, all of which involve the uncontrolled division of the body’s cells. Although cancer can develop in virtually any of the body’s tissues, all cancer cells share common characteristics. These characteristics make cancer cells different from normal cells.

In this activity, students read an article, watch a video clip and access internet resources to determine the characteristics of normal and cancerous cells.

Students will benefit from having done the activity [Cancer definitions](https://www.sciencelearn.org.nz/resources/1026-cancer-definitions) before starting this activity.

**What you need**

* Access to the article [What is cancer?](https://www.sciencelearn.org.nz/resources/989-what-is-cancer)
* Access to the video clip [Cells and cancer](https://www.sciencelearn.org.nz/videos/527-cells-and-cancer)
* Copies of student handout [Comparing normal and cancerous cells](#handout)

**What to do**

1. Hand out copies of the student handout [Comparing normal and cancerous cells](#handout) and discuss. Explain to students that they need to use the information that can be found in the article [What is cancer?,](https://www.sciencelearn.org.nz/resources/989-what-is-cancer) information from links recommended on that page and independent research using the internet to complete the graphic organiser to describe the characteristics of normal and cancerous cells. (The graphic organiser can either be downloaded and completed in Word or printed and completed using paper and pencil.)
2. Once students have completed their graphic organisers, discuss their findings. (Use [Comparing normal and cancerous cells – teacher notes](#teacher) as a guide).

**Extension ideas**

* Students use the graphic organiser as the starting point and continue to build notes in preparation for writing a ‘compare and contrast’ essay or presentation.
* Students investigate the similarities and difference between benign and malignant tumours.

**Student handout: Comparing normal and cancerous cells**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Normal cell** |  | | | **Cancer cell** |
| **Compare and contrast with regards to….** | | | | |
|  | | Cell size and shape |  | |
|  | | Cell division and death |  | |
|  | | Specialisation of cells |  | |
|  | | Obeying signals |  | |
|  | | Cells sticking together |  | |
| **What is the key difference between normal cells and cancerous cells?** | | | | |
| **Conclusion** | | | | |

**Comparing normal and cancerous cells – teacher notes**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Normal cell** |  | | | **Cancer cell** |
| **Compare and contrast with regards to….** | | | | |
| Normal cells are uniform and orderly. | | Cell size and shape | Cancer cells have large variations in cell size and shape. Often, they have a large irregularly shaped nucleus and a relatively small cytoplasm. | |
| Normal cells grow, divide and die in a controlled way and with a predictable lifespan. Normal cells destroy themselves if they become damaged (through a process called apoptosis). | | Cell division and death | Cancer cells exhibit uncontrolled growth as they have lost their normal control mechanisms. They grow and divide at a rapid rate and they outlive their normal lifespan (i.e. become immortal). They may also be able to prevent self-destruction when damaged. | |
| Normal cells become specialised or ‘mature’. They start out as immature cells (stem cells) and acquire specific functions when they mature. | | Specialisation of cells | Cancer cells do not carry on maturing once they have become cancerous. In fact, the cancer cells can become less mature over time. Cancer cells can lose specialised functions and become more and more primitive. | |
| Normal cell growth and healing is very orderly and precise. The cells know when there are enough new cells to mend the body. They send chemical messages to each other so that they stop growing and reproducing. | | Obeying signals | Something in the cancer cells overrides the normal signalling system. This may be because the genes that tell the cell to reproduce keep on and on sending signals or because the genes that normally tell the cell to stop reproducing have been damaged or lost. | |
| Cells have a natural ability to stick together in the right place. Scientists call this cell adhesion. Molecules on the surface of the cell match those on its neighbours. | | Cells sticking together | Cancer cells can lose the molecules on their surface that keep normal cells in the right place so they can become detached from their neighbours. | |
| **What is the key difference between normal cells and cancerous cells?** | | | | |
| **Conclusion**  The key difference between normal and cancerous cells is that cancer cells have lost the restraints on growth that characterise normal cells. | | | | |