Cell Division - Mitosis - Tissues

Cell division is required for Growth and Repair but ONLY stem cells can go through mitosis

Embryonic stem cells - these cells have the ability to become any type of cell.

Cell Differentiation - Embryonic stem cells become different types of stem cells, called adult stem cells.

Adult stem cells can only divide and make one type of tissue (for example skin stem cells can only make skin)

Cell specialization is the term describing when a stem cell becomes a specific type of cell to form tissue

Tissue describes a collection of cells performing a specific function (skin, muscle, nerves)

Once a cell has become specialized it can no longer go through mitosis

All stem cells have a limited life span and when they are damaged beyond repair they die - called apoptosis

Cell Division - Mitosis - Cancer

Cell division is a difficult process. The cell performs many checks along the way to ensure the DNA is copied properly. If there are any mistakes the cell will not divide.

Unfortunately sometimes errors in the DNA are not found and if the cell continues to divide the resulting cells may be cancerous

Cancer describes a type of tissue that:

1. Divides at an increased rate because it does not spend much time in interphase.
2. Creates large masses of tissue that do not perform a function, we call that a tumour.
3. Benign tumours stick together and can be surgically removed
4. Malignant tumours do not stick together very well - can move to other parts of the body through the blood stream (metastasis)
5. Does not goes through a normal cell death - apoptosis

Factors that increase the chances of forming cancer cells:

1. Genetics - Some cancers are linked to the DNA
2. Environmental - UV rays and X-rays, smoking, alcohol, pollutants
3. Infection- Human Papilloma Virus (HPV) - we get vaccinated

Cancerous tissue interferes with normal body function. It uses the body energy because it is recognized as part of your body. Screening tests are used to check to see if cancer is present

Curing cancer

1. Surgery - removal of tumours
2. Chemotherapy - drinking poison and hoping the cancer tissues dies before you do
3. Radiation - gamma radiation targeted at tumour or general radiation which hopefully kills the cancer before you, impacts your immune system so infections can be worse
4. Viruses - still be researched but there has been some success using viruses to target the cancer cells and destroy them

Cells can be specialized to perform specific functions. The shape and the types of organelles inside the cell help the cell perform its specific duties

Nerve cells

White blood cells

Muscle cells

Skin cells

Intestinal cells

Red blood cells

Cell Division

1. Organisms need to grow
2. Organisms need to repair damage
3. Organisms need to replace worn out parts
4. Cells divide to become more specialized

Cell division occurs only with stem cells. They are specialized cells that have not lost the ability to divide.

Adult stem cells are specialized cells that can only divide into one type of cell like a skin stem cell

> If somebody has had a really bad burn we can replace their skin with skin grown in a lab from a skin stem cell

Embryonic stem cells have the ability to divide into different types of cells they can become red blood cells skin cells more muscle cells

> In order to replace some organs we might use an embryonic stem cells from the patient to grow different types of organs for that person

To obtain embryonic stem cells we need to create embryos and then harvest the cells. Embryos are formed when a sperm and

egg unite. There is also embryonic stem cells found in the umbilical cord. This leads to lots of controversy because of the creation of embryos and then disposal of embryos in order to repair a living person.