Module 4: Cell Biology - Growth and Reproduction

Topic 2 Content: Stem Cells Notes

Stem Cells

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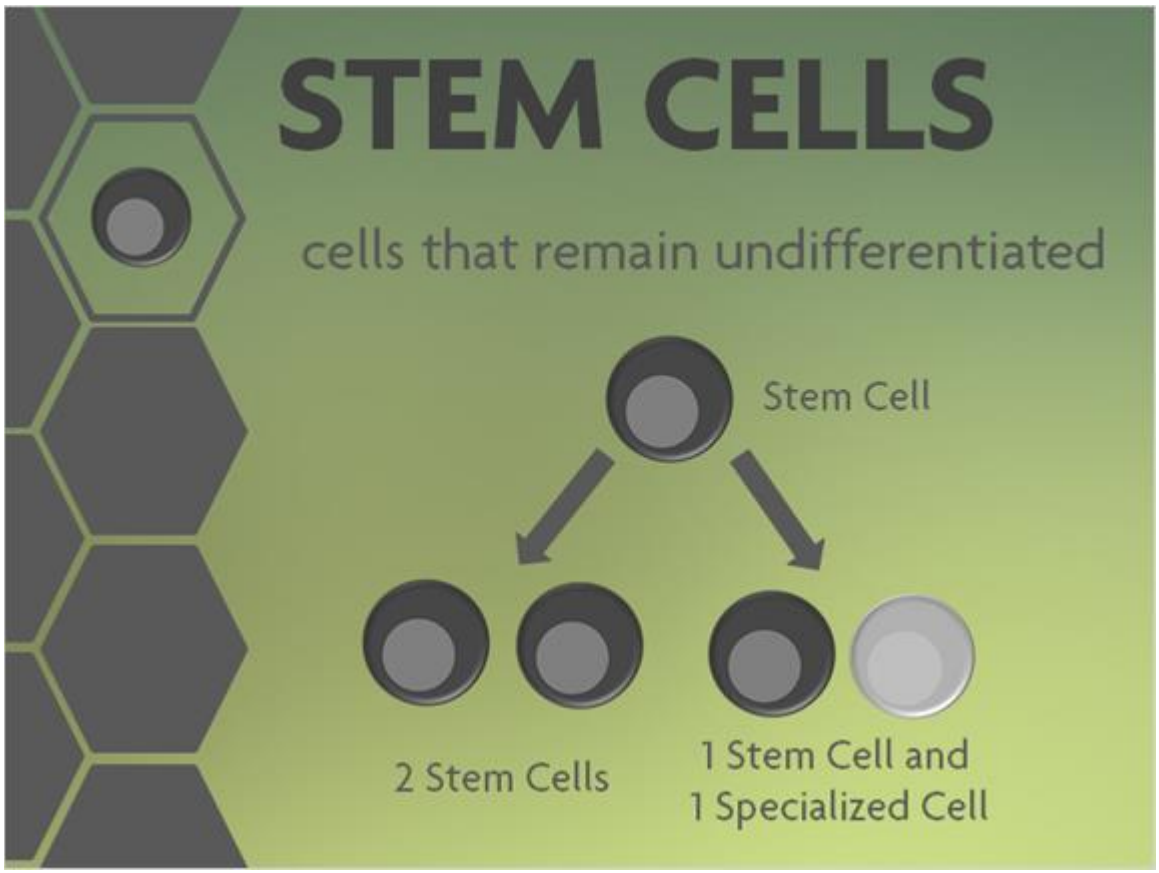

In multicellular organisms, most of the cells are specialized for specific functions. Once a cell differentiates, the cell remains in its specialized form and cannot change into a different cell type. However, there are cells in the body that remained undifferentiated. These cells are called stem cells.

When a stem cell divides, it can produce two new stem cells. A stem cell is also capable of producing one stem cell and one specialized cell.

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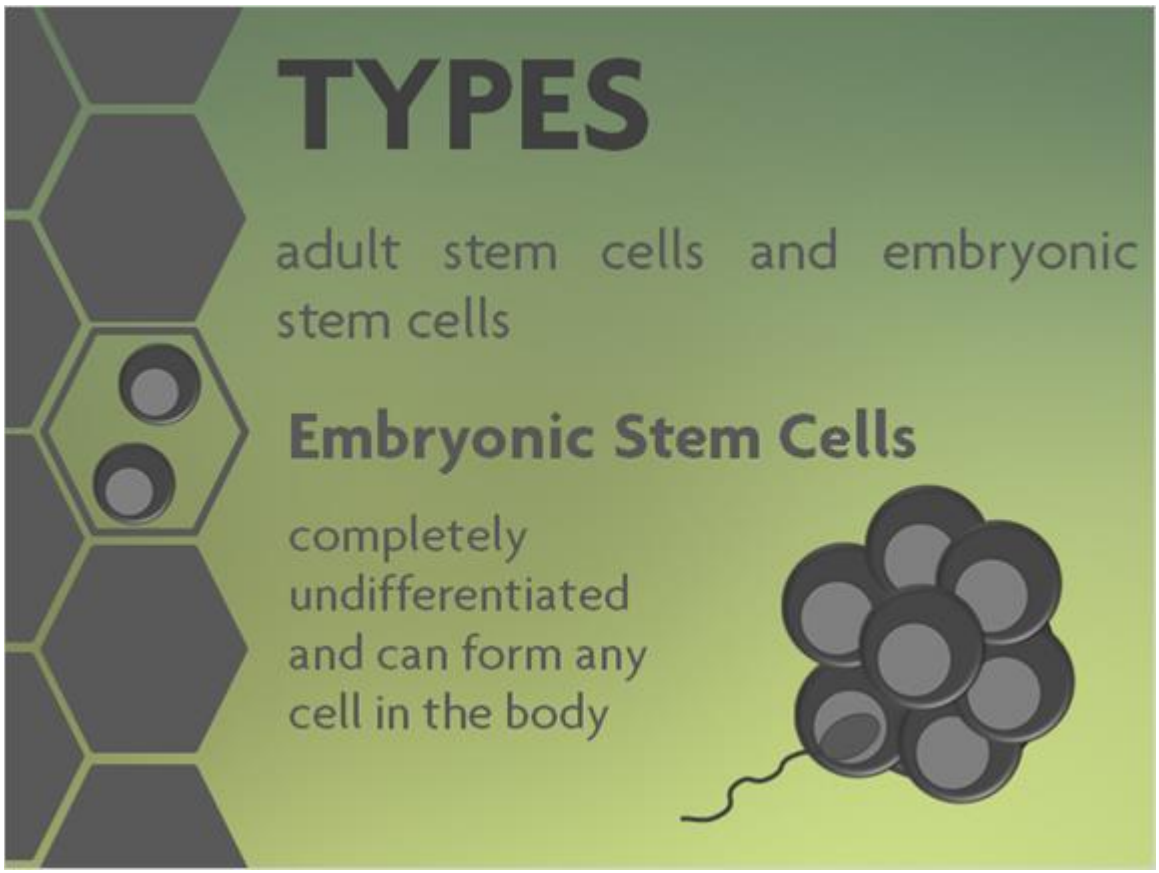

There are two types of stem cells: adult stem cells and embryonic stem cells. These cells can continue to divide and remain undifferentiated in an organism for many years.

Embryonic stem cells are the first cells that are produced from the division of a fertilized egg. These cells are completely undifferentiated and can form any type of cell in the body.

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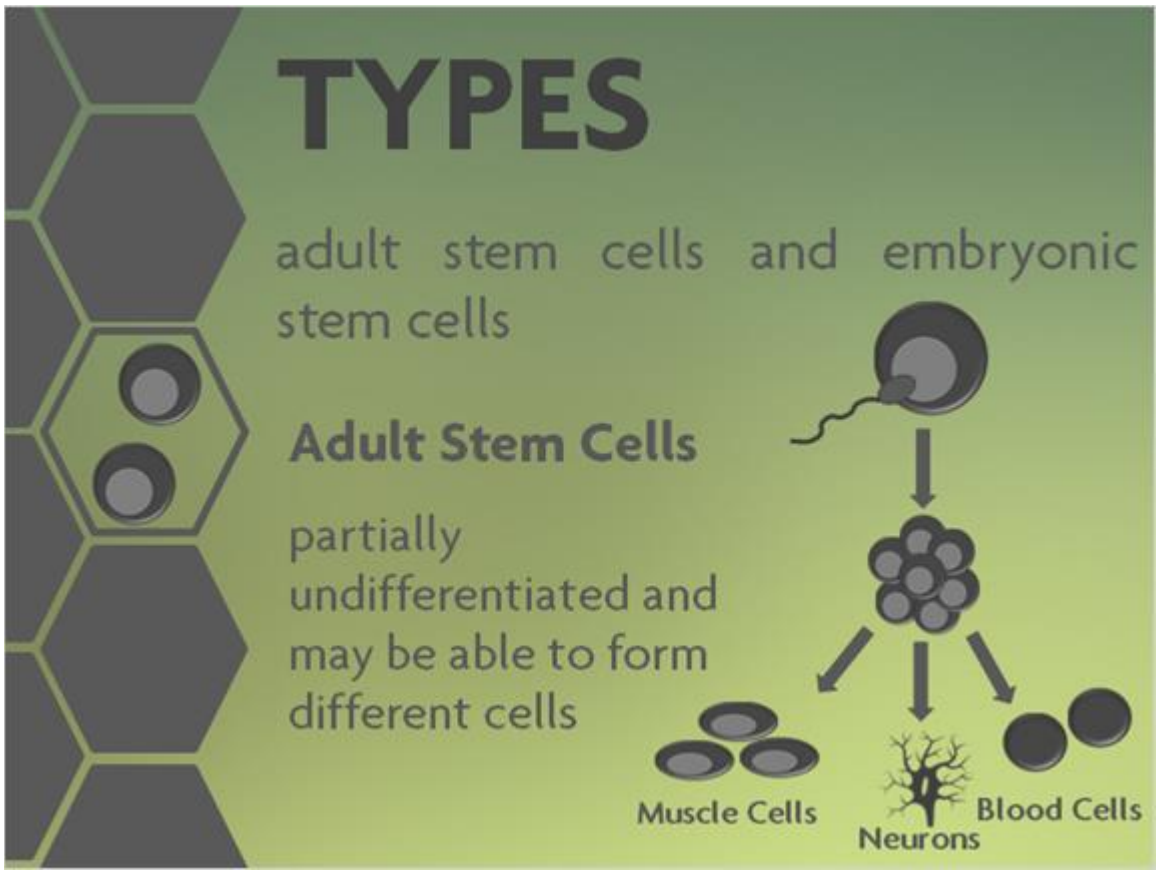

Adult stem cells are found in the various tissues of developed organisms. Stem cells are not necessarily from an adult organism. Even newborn and juvenile organisms have adult stem cells. Adult stem cells are partially undifferentiated and have long been thought to only be able to make closely related cells.

Recent research indicates that adult stem cells may be able to form many different cells. This happens when scientists control how the cells specialize by adding or removing certain molecules to the cultured stem cells in a laboratory setting.

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Stem cells are important because of their potential to treat various diseases, genetic issues, and injuries.

Stem cells have long been used to treat various types of cancers, and researchers believe that stem cell therapies can help people with Alzheimer's disease, Parkinson's disease, or spinal cord injuries. Stem cells have the potential to improve transplant medications.

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Although the beneficial uses for stem cells are promising, controversy exists around their use. Because embryonic stem cells are harvested from human embryos, questions exist about the ethics of embryonic stem cell research. Opponents believe that more effort should be made to increase adult stem cell research. Proponents contend that adult stem cells may not be as beneficial because they are not as versatile. Stem cell research and treatment are also extremely costly. Either way, stem cells offer hope for many suffering from debilitating, chronic, and often fatal diseases.

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