

Understanding Stem Cells

Every day, your hair grows a little longer, your bones become a little stronger, and your body churns out a fresh supply of red blood cells. These and countless other cellular processes originate in stem cells located throughout your tissues. When these stem cells receive the right signals, they divide and differentiate into new cells in your tissues and organs. Scientists say that because stem cells are the source of new cells, they have the potential to treat diseases caused by cellular malfunction, such as Parkinson’s disease, sickle cell anemia, diabetes, and many others.

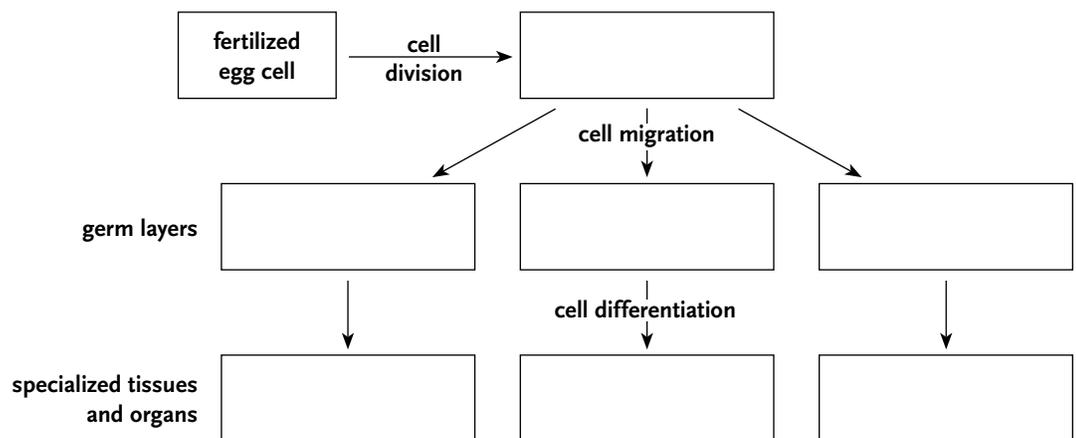
WEBSITES USED FOR THIS ACTIVITY

- Human Development and Stem Cells**
http://www.hhmi.org/biointeractive/media/human_emb_dev-lg.mov
- Mapping Cell Fates**
<http://www.hhmi.org/biointeractive/media/differentiation-lg.mov>
- What is a stem cell?**
<http://learn.genetics.utah.edu/units/stemcells/whatissc/>
- What are some different types of stem cells?**
<http://learn.genetics.utah.edu/units/stemcells/sctypes/>

Procedure

1 Visit the websites [Human Development and Stem Cells](#) and [Mapping Cell Fates](#) and watch the animations. Devise a flowchart that shows the process a fertilized egg cell goes through as it differentiates from a single cell into a multicellular organism. You may fill in the diagram below, or make up one of your own. Include the terms listed below:

- blastocyst
- mesoderm
- heart
- endoderm
- muscles
- gut tube
- ectoderm
- intestine
- skin and nervous system
- lungs



- 2 With your partner, build a clay model of the cell type your teacher assigns you. Use the websites [What is a stem cell?](#) and [What are some different kinds of stem cells?](#) as guides.
- 3 Write the name of your cell type in an appropriate place on the flowchart you made in Step 1. Add any additional information you think is necessary to explain how the process described in the chart could have led to your cell’s formation.
- 4 As a class, discuss the similarities and differences you see between your work and that of your classmates.

Questions

Write your answers on a separate sheet of paper.

- 1 What is a stem cell? Where do stem cells come from?
- 2 How do stem cells differentiate?
- 3 What role does the cell you modeled out of clay play in the body? Which embryonic tissue layer did it come from? Where in the body would you expect to find the stem cells that produce these specialized cells?
- 4 Can the process you described in your flowchart run backwards to produce stem cells from specialized cells, such as the cells that make up your bones? Why or why not? What are some steps that would need to take place for this process to run backwards?