

Stem Cells

If you have listened to the news lately you have probably heard about stem cell research. So what are stem cells and why do they receive so much attention?

Stem cells have the unique ability to do two things: (1) renew themselves through cell division and remain undifferentiated (meaning simply that they remain stem cells), while (2) producing new cells that differentiate to form different, more specialized types of cells.

There are three main types of stem cells, totipotent, pluripotent and multipotent stem cells. Totipotent stem cells have the ability to create any new type of cell in the organism. In humans, totipotent cells exist only briefly in the first two or three days the egg is fertilized (see figure 2). Pluripotent stem cells are similar to totipotent cells in that they can make most types of differentiated cells. Human embryos at very early stages (four to five days after fertilization_ contain a mass of pluripotent cells. These cells are capable of differentiating into any type of cells except placenta cells. Human pluripotent stem cells are also known as embryonic stem cells.

Multipotent stem cells can only produce specialized cells of a s specific tissue type. For example there are multipotent stem cells in bone marrow that produce many types of blood cells, but they cannot produce any other types of cells. Similarly, your liver contains multipotent stem cells, but they can only make new liver cells. Multipotent stem cells are also referred to as adult stem cells.

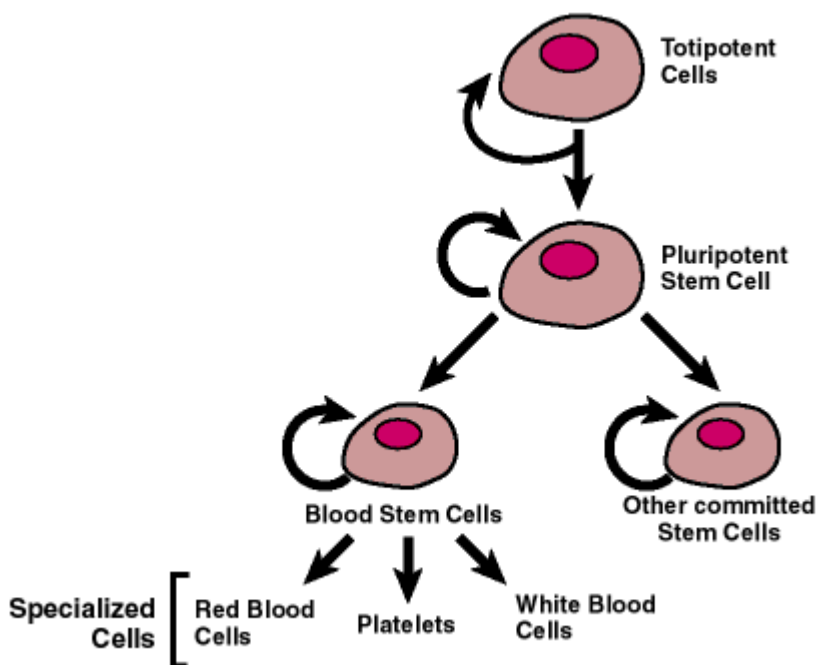
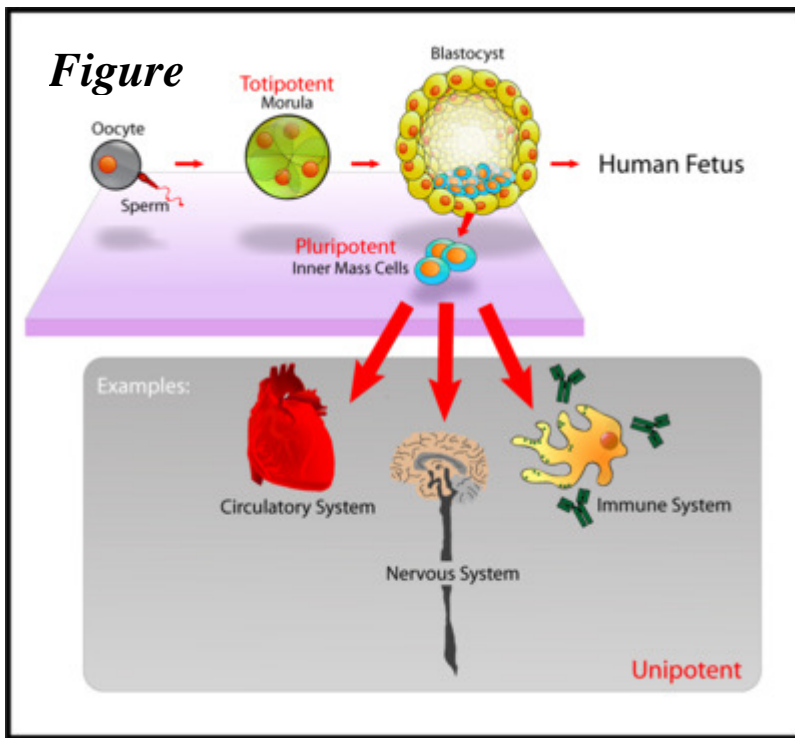


Figure 1. The blood stem cells in this diagram are examples of what type of stem cells (totipotent, pluripotent or multipotent)?



Assignment:

Answer the following questions using complete sentences and your own words.

1. Think back to the beginning. Where does it all start? Every cell in your body descended from what?
2. What defines a stem cell? Explain.
3. What does the word differentiate mean? Explain.
4. What is the difference between an embryonic stem cell and an adult stem cell? Explain.
5. Why do you think many scientists are conducting research on stem cells? What possible benefits could there be for society? Explain.
6. Why do you think there is controversy around using stem cells for cloning organisms? Explain.
7. Create a table similar to the one below to summarize and compare different types of stem cells in your journal.

Stem Cell Type	Found in...	Can become...	Cannot become...
Totipotent			
Pluripotent			
Multipotent			