

DIFFERENT FORMS OF STEM CELLS

TOTIPOTENT STEM CELLS

- These are the most versatile of the stem cell types. When a sperm cell and an egg cell unite, they form a one-celled fertilized egg. This cell is totipotent, meaning **it has the potential to give rise to any and all human cells**, such as brain, liver, blood or heart cells. It can even give rise to an entire functional organism. The first few cell divisions in embryonic development produce more totipotent cells. After four days of embryonic cell division, the cells begin to specialize into pluripotent stem cells.

PLURIPOTENT STEM CELLS

- These cells are like totipotent stem cells in that they can give rise to all tissue types. Unlike totipotent stem cells, however, they cannot give rise to an entire organism. On the fourth day of development, the embryo forms into two layers, an an outer layer which will become the placenta, and an inner mass which will form the tissues of the developing human body. These inner cells, though **they can form nearly any human tissue**, cannot do so without the outer layer; so are not totipotent, but pluripotent. As these pluripotent stem cells continue to divide, they begin to specialize further.

MULTIPOTENT STEM CELLS

- These are less plastic and more differentiated stem cells. They give rise to a limited range of cells within a tissue type. The offspring of the pluripotent cells become the progenitors of such cell lines as blood cells, skin cells and nerve cells. At this stage, they are multipotent. They can **become one of several types of cells within a given organ.** For example, multipotent blood stem cells can develop into red blood cells, white blood cells or platelets.

ADULT STEM CELLS

- Also referred to as somatic stem cells
- An adult stem cell is a **multipotent stem cell in adult humans that is used to replace cells that have died or lost function.** It is an undifferentiated cell present in differentiated tissue. It renews itself and can specialize to yield all cell types present in the tissue from which it originated. So far, adult stem cells have been identified for many different tissue types such as hematopoietic (blood), neural, endothelial, muscle, mesenchymal, gastrointestinal, and epidermal cells.

Locations of **Somatic Stem Cells** in the body

