

Major types of adult stem cells.

In adults, several stem-cell types have been described.

Perhaps the most well investigated adult stem cell is the hematopoietic stem cell (HSC). This stem cell, which is found in bone marrow and umbilical cord blood, makes all the different types of blood cells. HSC have been used in therapy for decades. These are the cells that make it possible for bone marrow transplant to renew a person's complete blood system that has been damaged by disease or by exposure to drugs or radiation.

Another type of adult stem cell found within the complex cellular structure of bone marrow, is the mesenchymal stem cell (MSC). These cells have the capacity to differentiate into several types of cells, like those forming tissues such as bone, cartilage, tendon, fat and certain type of muscles. Recent studies have shown that MSC may also originate cells of other family of tissues like blood vessels (endothelia), kidney and neural.

The high differentiation capacity of MSC as well as the feasibility to obtain, multiply in the laboratory (expand) and transplant these cells, support the impact that their use is having in preclinical (animal) and clinical studies. MSC are also present in umbilical cord blood and under certain conditions in peripheral blood.

Endothelial progenitor cells (EPC's) represent another class of adult stem cell or progenitor cells. Through the proliferation of EPCs, which maintain a high duplication potential throughout adulthood, the induction and growth of new blood vessels occurs (angiogenesis). Endothelial progenitor cells exist in the adult bone marrow (BM) and circulate in the peripheral blood. The existence of a BM reservoir of EPCs and their selective involvement in the formation of new blood vessels has attracted interest in the therapeutic use of these cells.

Some types of tissue-specific stem cells are usually found deep within tissues and are harder to harvest or extract and to study. Examples are epidermal stem cells, which renew the outer layer of the skin as it gets worn away and the epithelial stem cells replacing the gut lining.

New neurons in the adult brain arise from slowly-dividing cells that appear to be the remnants of stem cells that existed during fetal brain development. Since some of these adult cells still retain the ability to generate both neurons and glial cells, which surround and support neurons, they are referred to as adult neural stem cells.

The hope is that these stem cells may be able to replenish those that are functionally lost in human degenerative diseases such as Parkinson's and Huntington's disease as well as from brain and spinal cord injuries that result from stroke or trauma.

Scientists across the world are trying to figure out exactly the biological properties as well as the clinical use of these adult stem cells