Adult stem cell

Adult stem cells are undifferentiated cells, found throughout the body after development, that multiply by cell division to replenish dying cells and regenerate damaged tissues. Also known as **somatic stem cells**, they can be found in juvenile, adult animals, and humans, unlike embryonic stem cells.

Structure

Defining properties
A stem cell possesses two properties

•***Self-renewal*** is the ability to go through numerous cycles of cell division while still maintaining its undifferentiated state. Stem cells are able to replicate several times and can result in the formation of two stem cells, one stem cell more differentiated than the other, or two differentiated cells.[3]

•***Multipotency*** or ***multidifferentiative potential*** is the ability to generate progeny of several distinct cell types, (for example glial cells and neurons) as opposed to unipotency, which is the term for cells that are restricted to producing a single cell type.

Properties

Cell division

- To ensure self-renewal, stem cells undergo two types of cell division.
- Symmetric division gives rise to two identical daughter stem cells,
- whereas asymmetric division produces one stem cell and one progenitor cell with limited self-renewal potential. Progenitors can go through several rounds of cell division before finally differentiating into a mature cell.
- Under normal conditions, tissue stem cells divide slowly and infrequently. They exhibit signs of quiescence, or reversible growth arrest.[6] The niche the stem cell is found in plays a large role in maintaining quiescence.

Plasticity

- Discoveries in recent years have suggested that adult stem cells might have the ability to differentiate into cell types from different germ layers. For instance, neural stem cells from the brain, which are derived from ectoderm, can differentiate into ectoderm, mesoderm, and endoderm.[8] Stem cells from the bone marrow, which is derived from mesoderm, can differentiate into liver, lung, GI tract and skin, which are derived from endoderm and mesoderm.[9] This phenomenon is referred to as stem cell transdifferentiation or plasticity.

Aging

- Stem cell function becomes impaired with age, and this contributes to progressive deterioration of tissue maintenance and repair.[17] A likely important cause of increasing stem cell dysfunction is age-dependent accumulation of DNA damage in both stem cells and the cells that comprise the stem cell environment.

TYPES

- **Intestinal stem cells**

Main article: Intestinal gland

Intestinal stem cells divide continuously throughout life and use a complex genetic program to produce the cells lining the surface of the small and large intestines.[26] Intestinal stem cells reside near the base of the stem cell niche, called the crypts of Lieberkuhn. Intestinal stem cells are probably the source of most cancers of the small intestine and colon.

- **Endothelial stem cells**[edit]

Main article: Endothelial stem cell

Endothelial stem cells are one of the three types of multipotent stem cells found in the bone marrow. They are a rare and controversial group with the ability to differentiate into endothelial cells, the cells that line blood vessels as well as lymphatic vessels. Endothelial stem cells are an important aspect in the vascular network, even influencing the motion relating to white blood cells.

- **Neural crest stem cells**

See also: Neural crest

Hair follicles contain two types of stem cells, one of which appears to represent a remnant of the stem cells of the embryonic neural crest. Similar cells have been found in the gastrointestinal tract, sciatic nerve, cardiac outflow tract and spinal and sympathetic ganglia. These cells can generate neurons, Schwann cells, myofibroblast, chondrocytes and melanocytes.