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Editorial

Editorial Note on Adult Stem Cells

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EDITORIAL

Stem cells are undifferentiated or partly differentiated cells in multicellular organisms that can divide into various types of cells and proliferate indefinitely to create more stem cells. In a cell lineage, they are the earliest type of cell. They can be found in both embryonic and adult species, but their properties vary slightly. Progenitor cells, which cannot differentiate indefinitely, and precursor or blast cells, which are normally dedicated to differentiating into one cell type, are usually separated. During the blastocyst stage of embryonic development, around days 5–14, approximately 50–150 cells make up the inner cell mass in mammals. These have the capacity to produce stem cells. In the body; they gradually divide into all cell types (making them pluripotent).

The separation of the three germ layers – ectoderm, mesoderm, and endoderm – begins during the gastrulation stage. When isolated and cultured *in vitro*, however, they can be maintained in the stem-cell stage and are referred to as embryonic stem cells. Adult stem cells can only be present in a few niches in the body, such as the bone marrow or the gonads. They are multipotent or unipotent, meaning they only divide into a few cell types or one cell type, and they function to replenish rapidly lost cell types. Hematopoietic stem cells, which replenish blood and immune cells, basal cells, which preserve the skin epithelium, and mesenchymal stem cells, which maintain bone, cartilage, muscle, and fat cells, are examples of these cells in mammals.

Adult stem cells make up a small percentage of the total cell population; they are greatly outnumbered by the progenitor cells and terminally differentiated cells from which they differentiate.

Self-renewal refers to a cell's ability to go through several cycles of cell growth and division, known as cell proliferation, while remaining undifferentiated. Potency refers to a cell's ability to divide into various cell types. In the strictest sense, totipotent or pluripotent stem cells must be able to give rise to any mature cell type, while multipotent or unipotent stem cells must be able to give rise to just one mature cell type. In practice, stem cells are classified according to their ability to regenerate tissue.

The ability to transplant bone marrow or hematopoietic stem cells (HSCs) and save a person without HSCs, for example, is a distinguishing test for these cells.

This shows that the cells will continue to develop new blood cells over time. It should also be possible to separate stem cells from the transplanted person, who can then be transplanted into another person who does not have HSCs, showing that the stem cell can self-renew. *In vitro*, stem cell properties can be demonstrated using methods such as clonogenic assays, which evaluate single cells for their ability to differentiate and self-renew. The presence of a distinct group of cell surface markers may also be used to identify stem cells. However, *in vitro* culture conditions can alter cell activity, making it difficult to predict how the cells will behave in the similar manner *in vivo*.

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