



Glossary of Stem Cell Terms

Adult stem cell An undifferentiated cell found among differentiated cells in a tissue or organ that can renew itself and differentiate to yield all the specialized cell types of the tissue or organ.

Blastocoel The cavity in the blastula of the developing embryo.

Blastocyst A preimplantation embryo of about 150 cells. The blastocyst consists of a sphere made up of an outer layer of cells (the trophectoderm), a fluid-filled cavity (the blastocoel), and a cluster of cells on the interior (the inner cell mass).

Bone marrow stem cell Multipotent stem cells from bone marrow; types include hematopoietic stem cells and mesenchymal stem cells.

Bone marrow stromal cells A stem cell found in bone marrow that generates bone, cartilage, fat, and fibrous connective tissue.

Cell-based therapies Treatment in which stem cells are induced to differentiate into a specific cell type with the goal to repair damaged or depleted adult cell populations or tissues.

Chimeras Resulting progeny from injecting embryonic stem (ES) cells derived from the inner cell mass of one blastocyst into the cavity of another and then transferring the resulting embryo to the uterus of a female mouse; a mixture of tissues and organs derived from both donor ES cells and the recipient blastocyst.

Cleavage The process of cell division in the very early embryo before it becomes a blastocyst.

Clone A line of cells that is genetically identical to the originating, precursor cell.

Differentiation The process whereby an unspecialized early embryonic cell develops the

specialized functions of a cell such as a heart, liver, or muscle cell.

Directed differentiation Manipulating stem cell culture conditions to induce differentiation into a particular cell type.

Ectoderm The outer layer of cells derived from the inner cell mass of the blastocyst which give rise to skin, nerves, and brain.

Embryo In humans, the developing organism from the time of fertilization until the end of the eighth week of gestation, when it becomes known as a fetus.

Embryonal carcinoma cells A kind of pluripotent stem cell from teratocarcinoma.

Embryoid bodies Clumps of cellular structures that arise when embryonic stem cells are cultured that contain tissue from all three of the germ layers.

Embryonic germ cells Cells found in a specific part of the embryo/fetus called the gonadal ridge that normally develop into mature gametes.

Embryonic stem cells Undifferentiated cells derived from the inner cell mass of blastocysts, capable of long-term self-renewal and having the potential to differentiate into all cell types (pluripotent).

Embryonic stem cell line Embryonic stem cells which have been cultured under in vitro conditions that allow proliferation without differentiation for months to years.

Endoderm Lower layer of a group of cells derived from the inner cell mass of the blastocyst; it gives rise to lungs and digestive organs.

Feeder layer Cells used in co-culture to maintain pluripotent stem cells, usually mouse or human fibroblasts.

Germ layers The endoderm, mesoderm and ectoderm; the three precursory tissue layers of the early, primitive embryo (which form at approximately two weeks in the human) that give rise to all tissues of the body.

Hematopoietic stem cell The precursors of mature blood cells that are defined by their ability to replace the bone marrow system following its obliteration (for example, by gamma irradiation) and that can continue to produce mature blood cells.

Human embryonic stem cell A type of pluripotent stem cell derived from the inner cell mass of the blastocyst.

In vitro In a laboratory dish or test tube; an artificial environment. Literally, “in glass.”

In vivo In a living organism.

Inner cell mass The cluster of cells inside the blastocyst which give rise to the embryonic disk of the embryo.

Long-term self-renewal The ability of stem cells to renew themselves by dividing into the same nonspecialized cell type over long periods (many months to years).

Mesenchymal stem cells Cells from the immature embryonic connective tissue that give rise to a number of tissues including chondrocytes, which produce cartilage; also known as bone marrow stromal cells.

Mesoderm Middle layer of a group of cells derived from the inner cell mass of the blastocyst; it gives rise to bone, muscle, and connective tissue.

Neural stem cell A stem cell found in adult neural tissue that can give rise to neurons, astrocytes, and oligodendrocytes.

Neurons Nerve cells; the structural and functional unit of the nervous system. A neuron consists of a cell body and its processes, an axon, and one or more dendrites. Neurons function by the initiation and conduction of impulses and transmit impulses to other neurons or cells by releasing neurotransmitters at synapses.

Nuclear transfer For the generation of embryonic stem cells, the process by which the DNA-containing nucleus of any specialized cell (except eggs and sperm) is transferred into an oocyte whose own nuclear genome has been removed. The egg is activated to develop and will divide to form a blastocyst with genetic material identical to those of the donor of the specialized cell and not those of the donor of the oocyte. This process was used to generate Dolly the sheep.

Ontogeny The biological development or course of development of an individual organism.

Passage A round of cell growth and proliferation in cell culture.

Plasticity The ability of stem cells from one adult tissue to generate the differentiated cell types of another tissue.

Pluripotent Ability of a single stem cell to differentiate into most all of the cells of the body including all three germ layers.

Progenitor cells Partially differentiated cells that divide and give rise to certain types of cells, but are not thought to be capable of developing into all the cell types of a tissue.

Proliferation Expansion of a population of cells by the continuous division of single cells into two identical daughter cells.

Regenerative or reparative medicine Treatment in which stem cells are induced to differentiate into the specific cell type required to repair damaged or depleted adult cell populations or tissues.

Signals Internal and external factors that control changes in cell structure and function.

Somatic stem cells Adult stem cells.

Stem cells Cells with the ability to divide for indefinite periods in culture and to give rise to specialized cells.

Stromal cells Non-blood cells derived from blood organs, such as bone marrow or fetal liver, which are

capable of supporting growth of blood cells in vitro. Stromal cells that make the matrix within bone marrow are also derived from mesenchymal stem cells.

Subculturing The process of growing and replating cells in tissue culture for many months.

Surface markers Surface proteins that are unique to certain cell types and that can be visualized using antibodies or other detection methods.

Teratoma A tumor composed of tissues from the three embryonic germ layers, usually found in ovary and testis. Teratomas can be produced experimentally in animals by injecting pluripotent stem cells in order to determine the stem cells' abilities to differentiate into various types of tissues.

Transdifferentiation The observation that stem cells from one tissue may be able to differentiate into cells of another tissue.

Trophoblast The extraembryonic tissue responsible for implantation, developing into the placenta, and controlling the exchange of oxygen and metabolites between mother and embryo.

Undifferentiated Not having changed to become a specialized cell type.

Unipotent stem cell Usually applied to cells in adult organisms that are capable of differentiating along only one lineage.

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