

University of Kansas Medical Center
STEM CELL RESEARCH 101

Stem Cell Research Basics: Glossary of Terms

Blastocyst: A thin-walled hollow sphere made up of an outer layer of cells, a fluid filled cavity, and an inner cell mass containing pluripotent stem cells. Also called the blastula, the blastocyst develops after cleavage and prior to implantation at approximately five days. Further reproductive development occurs only if the blastocyst is successfully implanted in the uterus.

Blastomere: A cell produced during cleavage of a fertilized egg.

Cell Culture: A technique for growing or maintaining cells on an artificial medium (substance) under laboratory conditions (e.g., Petri dish or test tube).

Cleavage: The early divisions of the fertilized egg.

Cloning: To create a copy. "Therapeutic cloning" creates a line of stem cells genetically identical to the originating cell for use in research. "Reproductive cloning" creates an organism genetically identical to the organism providing the originating cell.

Embryo: The developing human organism from the time of implantation in the uterus until the end of the eighth week after conception.

Fetus: A developing human from the eighth week of gestation to birth.

Gamete: A reproductive cell containing half of the genetic material necessary to form a complete human organism. During fertilization, male and female gametes (sperm and ovum, respectively) fuse, producing a zygote.

Germ Cells: Cells comprising actual reproductive components of a human organism (e.g., eggs, sperm).

Haematopoietic Stem Cells: Progenitor cells from which all blood cells derive. Haematopoietic stem cells give rise to distinct two cells - one a replica of the stem cell and one a cell that will further proliferate and differentiate into a mature blood cell.

In Vitro: A process that takes place in the laboratory (e.g., in cell culture).

In Vitro Fertilization (IVF): A technique in which an egg is fertilized outside the body. For use in assisted reproduction, the fertilized egg is implanted in the uterus at approximately three to four days of cell division for the purpose of development into a baby. For use in research, the fertilized egg is maintained in cell culture until it develops into the blastocyst stage at approximately five days of cell division and stem cells can be removed.

Inner Cell Mass: The cluster of cells found inside the blastocyst that gives rise to all the cells of the body in the developing human organism.

Morula: A globular solid mass of cells (called blastomeres) formed by cleavage of a zygote.

Multipotent Stem Cells: Stem cells that can give rise to a limited number of other cell types. They are committed to becoming a variety of cell types associated with specific functions or organs/tissues (e.g., blood, heart, muscle) in the body. For example, blood stem cells give rise to red blood cells, white blood cells, and platelets.

Oocyte: An egg before maturation; a female gametocyte; also called an ovocyte.

Placenta: The oval spongy structure in the uterus from which the fetus derives its nourishment and oxygen. The placenta develops from the outer cell layer of the blastocyst, called the trophoblast.

Pluripotent Stem Cells: Stem cells that can develop into all the different cell types in the body except the placenta. They give rise to multipotent and unipotent stem cells as the embryo develops.

Pre-embryos: Eggs that are fertilized and develop to approximately 2-3 days old in a laboratory (in vitro fertilization) and are ready for implantation for the purposes of human reproduction or removal of stem cells for the purposes of research.

Primitive Streak: The beginning of the vertebral column in the human embryo that develops at approximately 14 days after conception.

Somatic Cells: Cells from the body other than sperm or egg cells.

Somatic Cell Nuclear Transfer: A laboratory procedure that produces a blastocyst by replacing the nucleus of a donated egg, which has not been fertilized, with the nucleus of an ordinary body (somatic) cell (e.g., from a single skin cell), which contains all the genetic information of an adult.

Stem Cell Line: Stem cells that have been growing in cell culture for six or more months without becoming specialized and appear genetically normal.

Totipotent Stem Cells: The master cells of the body that contain all the genetic information needed to create all the cells of the body and the placenta. Totipotent cells exist only in the first three to four divisions of the fertilized egg and give rise to the next stage of development — the pluripotent stem cells.

Trophoblast: The outer layer of cells of the blastocyst that attach to the uterine wall and give rise to the placenta.

Unipotent Stem Cells: Stem cells that can renew and give rise to only a single mature cell type.

Wharton's Jelly: A gelatinous substance within the umbilical cord recently shown to be a source of potentially pluripotent stem cells.

Zygote: A cell formed by the union of two gametes.