

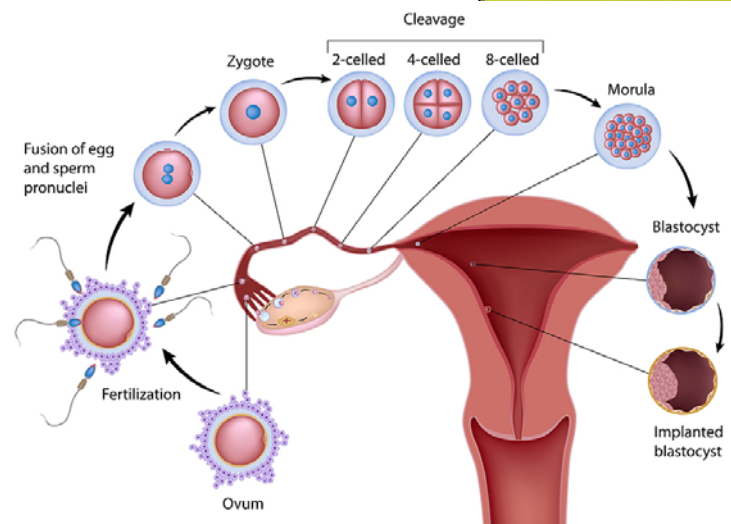
All living things are made of cells. Complex living things are made up of many cells working together. All of the cells in a complex living organism, such as a human, are not the same. The organs and tissues that make up the human body are all made of different types of cells. Each type of cell has its own specific function, or job. For example, the function of the cells that make up the skin is different from the function of the cells that make up the stomach.

The cells that make up the adult human body develop as a fertilized egg grows into a baby. After an egg is fertilized by a sperm cell, the egg divides several times and looks like a hollow ball made up of many cells. This ball of cells is called a blastocyst. The cells in a blastocyst can turn into any type of cell found in the human body. Some cells in the blastocyst will turn into skin and hair; other cells will become the brain and nerve cells. Some cells will become the bones of the skeletal system, and some will become the organs. Other cells will eventually become muscles. This is called "cell differentiation." Cell differentiation occurs when cells without a specific function turn into cells with a specific function.

## Stem Cells

Stem cells are unspecialized cells (cells that do not have a specific function). However, stem cells do have the ability to turn into different types of cells. Stem cells also have the ability to make more of themselves through cell division. Two types of stem cells are found in the human body: embryonic stem cells and somatic stem cells.

The cells in a blastocyst are called embryonic stem cells because the blastocyst is one of the first stages of development for an embryo. The term "embryo" is used to describe the growing cells during the first 8 weeks of pregnancy. Embryonic



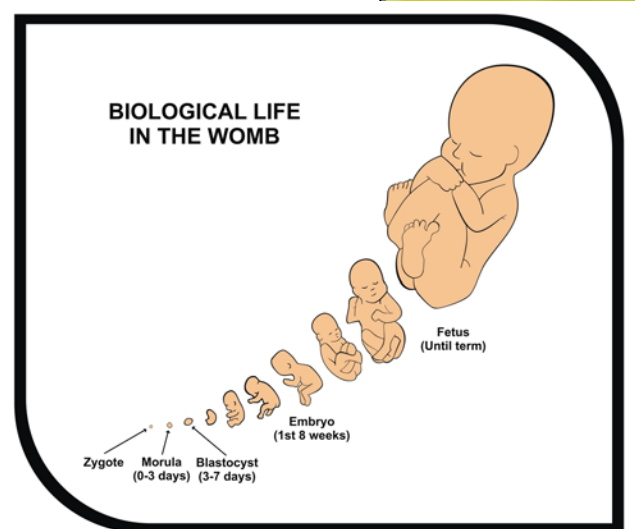
After an egg is fertilized, the egg divides many times and forms a ball of cells called a blastocyst. The cells in a blastocyst will turn into all of the cells that make up the human body.

stem cells are able to change into any of the cells found in an adult human, such as a muscle cell or a skin cell.

The other type of stem cell is called somatic, or adult, stem cells. Somatic stem cells are found in some organs and tissues of adults. Somatic stem cells are also unspecialized cells and usually can become any of the cells of the organ in which the cells are found. The function of somatic stem cells is to repair any damage to the organ or tissue in which the cells occur. They usually cannot turn into any of the other body cells. For example, somatic stem cells found in the skeletal system can turn into bone cells to help repair a broken bone but cannot turn into skin cells to repair a burn on the skin.

Scientists can create a third type of stem cell, in a lab, that allows somatic stem cells to act more like embryonic stem cells. Scientists have been able to reprogram somatic stem cells so that the cells can change into any of the human body cells. Scientists are continuing to experiment with these stem cells in order to find the best use for the cells. The scientists are mainly focused on the use of these cells in the field of medicine.

There are many benefits to the future use of these types of stem cells to heal patients. The stem cells could be used to repair or replace any organ or tissue in the body. Stem cells also have great potential benefits for people needing organ transplantation. These patients would be able to have organs or tissues made from their own cells and would not have to wait for a donated organ. In addition, when a patient receives a transplant from another person, sometimes the recipient's body will not accept the new organ or tissue. There is a much better chance that a patient's body would not reject an organ or tissue made from the patient's own cells.



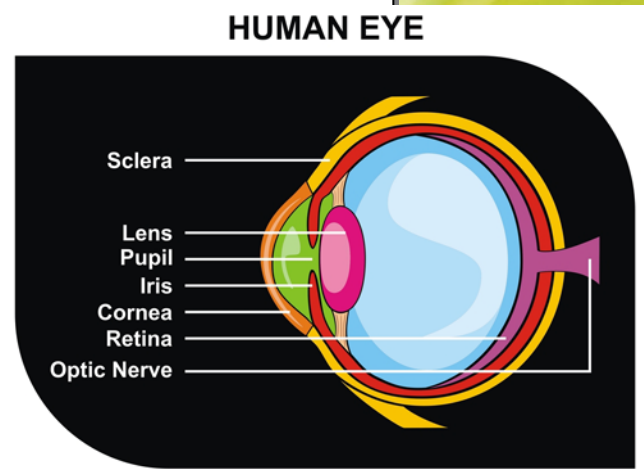
Embryonic stem cells in the blastocyst divide and become the different types of cells needed to make up the human body. Somatic stem cells are found in the organs and tissues of adults.

**Stem Cells May Cure Blindness**

Light enters the eye through the pupil and hits the area at the back of the eye called the retina. The retina collects the light and sends the information to the optic nerve. The optic nerve sends the information to the brain. The brain takes in the information from the retina and processes the information into images. When large quantities of cells in the retina die, the cells cannot send a signal to the brain. This causes blindness.

Doctors and scientists have started to use embryonic stem cells to treat a few patients who suffer from blindness. Two legally blind women in the United States were part of a trial to see how well the treatment works. Each woman received an injection of embryonic stem cells into one retina. Only treating one eye allowed the doctors to compare how well the women could see before and after the treatment. Once in place, the healthy embryonic stem cells started to divide and line the retina. With healthy new cells in the retina, the women's vision improved.

Doctors and scientists are only beginning to understand how stem cells can benefit human health. Much more research is needed before treatments using stem cells become common.



Blindness occurs when the cells in the retina die and can no longer send a signal to the brain.