Fact Sheet

From ReproductiveFacts.org

The Patient Education Website of the American Society for Reproductive Medicine

Stem cell research

What are stem cells?
Embryonic stem cells are special cells found in very early stage embryos (fertilized eggs). They are undifferentiated cells. This means that they have not yet developed into a cell that performs a specialized function (such as skin, heart, or nerve cells).

The 3 types of stem cells are differentiated by what they can become:
Totipotent cells become any cell in the human body or placenta. They are found only in the first few divisions of a fertilized egg.
Pluripotent stem cells can become any type of cell in the human body and can grow indefinitely. These are found throughout the fetus's growth until it is born.
Multipotent stem cells can only become specialized kinds of cells or tissue (such as heart, blood, or lungs). These cells are found in blood from the umbilical cord and in people after birth.

Why are stem cells important?
The ability to identify and grow human embryonic stem cells (hESCs) can affect the way medical diseases are treated. Researchers predict that, if they can grow these stem cells in the laboratory, hESCs can be used to create various cells to treat a wide range of diseases and conditions, including Parkinson disease, Alzheimer disease, cancer, spinal cord injury, and juvenile-onset diabetes.

Why is stem cell research controversial?
Controversy regarding stem cell research revolves around when life is defined. Some believe the embryo should be afforded the same protection as would a child or adult and therefore no research should be allowed. Others believe the embryo is a distinct entity that has the potential for life and should be handled with special respect, which would allow for research under strict criteria.

What is the ASRM's viewpoint?
The ASRM believes that an embryo has the potential for life and is worthy of special respect. Among other things, it is expected that patients must give informed consent to donate their spare embryos for research; laboratories should not allow embryos to continue to divide for greater than 14 days after fertilization; and there should be no buying and selling of embryos. It is also expected that the research investigator will bear the burden of justifying the worthiness of the research; will use the smallest possible number of embryos; will be overseen by an Institutional Review Board; can identify no satisfactory alternative to using embryos; and expects important clinical data to result from the research.

Could stem cells be used to clone human beings?
Cloning is the process of making an identical copy of the DNA of any cell or living organism. Reproductive cloning would be to make an exact copy of an entire human being. While theoretically possible, this has not been done.

Does the ASRM approve of cloning?
The ASRM does not approve of reproductive cloning for the purpose of making another human being.

What is somatic-cell nuclear transfer and why is it important?
Somatic-cell nuclear transfer (SCNT) is a process that involves removing the nucleus of an egg cell and replacing it with the material from the nucleus of any cell from the human body that is not an egg or sperm cell.

The cell is then stimulated to begin dividing. This egg cell is never fertilized by sperm, and the genetic material within the cell is identical to the genetic material extracted from any other cell of the individual from whom it was obtained. Once these cells begin dividing, it is possible for the stem cells to be extracted 5-6 days later.

Somatic-cell nuclear transfer research is an important subset of stem cell research. It could allow researchers to develop stem cell therapies that are tailored to an individual's medical condition and that do not trigger immune rejection responses which often happen with tissue and organ transplants.

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For more information on this and other reproductive health topics, visit www.ReproductiveFacts.org

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