

International Stem Cell Policy Program

Human stem cell research — encompassing embryonic, adult and induced pluripotent stem cell research — is viewed as a critical area of study by much of the science and medical community. While a significant amount of research is needed before embryonic or induced pluripotent stem cells can be used in therapies, these cells have the potential to cure or treat debilitating injuries and diseases such as spinal cord injury, Parkinson's disease and diabetes. Understanding stem cells can impact developmental biology, cancer biology, regenerative medicine and other fields of biomedical research.

The mission of the Baker Institute International Stem Cell Policy Program is to bring together scientists, ethicists, policymakers, media experts, and community and business leaders to find new ways to engage the general public in a dialogue on international stem cell policies and the ethical use of stem cells for research. The program includes an international conference series titled "Stem Cells: Saving Lives or Crossing Lines." The program also sponsors local events and lectures; workshops that bring together scholars and scientists from the international community and conference reports on the workshops; and major public policy research. The program is part of the Baker Institute Science and Technology Policy Program, led by senior fellow Neal Lane and fellow Kirstin Matthews.

What Are Stem Cells?

Stem Cells

- Are cells capable of dividing and renewing for long periods
- Have no tissue-specific structures; therefore, do not perform specialized functions
- Can replicate and become specialized cells

Adult Stem Cells

- Are found in small amounts among specialized cells in adult tissue or organs
- Are activated to regenerate cells in tissue or organs when disease, injury, or normal wear and tear occurs
- Can become specialized cells, usually producing cells from the residing tissue or organ
- Are rare, difficult to isolate and not readily grown outside of the body

Embryonic Stem Cells

- Are produced from a fertilized egg that has been grown *in vitro* (in a laboratory) for 5-6 days or to the 8-cell stage
- Can be obtained in large numbers from a single fertilized egg
- Have the ability to become any specialized cell in the body
- Can be produced from an unfertilized egg using somatic cell nuclear transfer (SCNT); SCNT is when genetic material from a nucleus of an unfertilized egg is removed and replaced with the nucleus of a normal cell (e.g., cell of the skin), but has not been successfully performed with human cells

Induced Pluripotent Stem Cells (iPS cells)

- Are normal cells that have been triggered to return to an earlier developmental stage by activating specific genes
- Have the potential, like embryonic stem cells, to become almost any cell type in the body
- Avoid some of the complex ethical issues surrounding embryonic stem cells, namely the destruction of a fertilized egg
- Have several research hurdles to overcome, including safety of activating genes (to produce iPS cells) and inactivating genes (to specialize iPS cells) related to cancer

How Are Stem Cells Used?

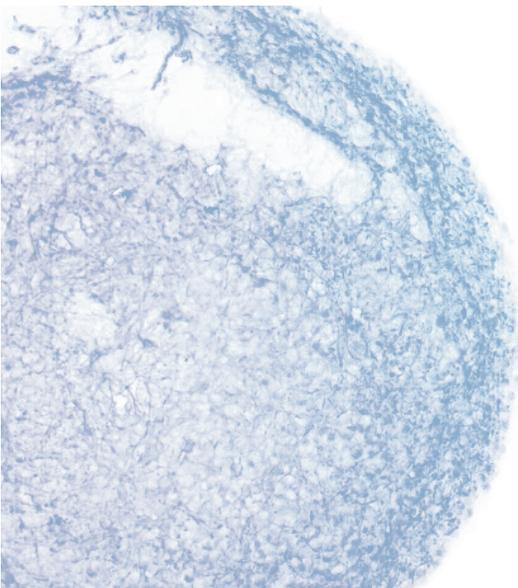
- Embryonic stem cells provide a mechanism for studying early human development, as well as the development and progression of disease.
- Adult, embryonic and induced pluripotent stem cells can be used to test new drugs or medication on specific cell types before proceeding to human trials.
- Adult, embryonic, and induced pluripotent stem cells are engineered to specialize and then can be used to replace damaged or depleted cells in an organ or tissue.
- Embryonic stem cells derived from SCNT and induced pluripotent stem cells may be used to create immunologically compatible cells.

What is Human Cloning?

- Human cloning is the implanting or attempt to implant the product of SCNT into a uterus, or the functioning equivalent of a uterus, in an attempt to produce a human being. This is also known as reproductive cloning.
- Attempts at reproductive cloning in animals have been error-prone and inefficient. Therefore, it is considered medically unsafe and morally questionable, and a broad consensus supports prohibiting this work based on our limited knowledge.

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