Myths and Misconceptions About Stem Cell Research

En Español

There is no shortage of myths and misconceptions when it comes to stem cell research and regenerative medicine. Here we address the most common concerns.

If you have more questions that aren't addressed here, please visit our other Stem Cell FAQ pages.

Is CIRM-funded stem cell research carried out ethically?

Stem cell research, like any field within biomedicine, poses social and ethical concerns. CIRM, as well as the broader research community, takes these seriously.

As a state funding body, CIRM has comprehensive policies to govern research, similar to our national counterpart, the National Institutes of Health. CIRM-funded researchers must comply with a comprehensive set of regulations that have been carefully developed and are in accordance with national and international standards.

These regulations were among the first formal policies governing the conduct of stem cell research and are in accordance with recommendations from the National Academies and from the International Society for Stem Cell Research. CIRM's Standards Working Group meets regularly to consider new ethical challenges as the science progresses and to revise standards to reflect the current state of the research.

Find out More:

CIRM regulations
National Academies of Science guidelines
International Society for Stem Cell Research guidelines
National Academies of Science podcast about guidelines for embryonic stem cell research

More about CIRM-grantee ethics training (4:03)

Where do the embryos come from to create stem cell lines?

All the human embryonic stem cell lines currently in use come from four to five day-old embryos left over from in vitro fertilization (IVF) procedures. In IVF, researchers mix a man's sperm and a woman's eggs together in a lab dish. Some of those eggs will become fertilized. At about five days the egg has divided to become a hollow ball of roughly 100 cells called a blastocyst which is smaller than the size of the dot over an "i". It is these very early embryos that are implanted into the woman in the hopes that she becomes pregnant.

Each cycle of IVF can produce many blastocysts, some of which are implanted into the woman. The rest are stored in the IVF clinic freezer. After a successful implantation, they must decide what to do with any remaining embryos. There are a few options:

- Continue to paying to store the embryos
- Defrost the embryos, which destroys them.

- Donate the embryos for adoption (this option is rarely taken).
- Choose to donate the frozen embryos for research. ***These donated embryos are the source of human embryonic stem cell lines.***

Some embryonic stem cell lines also come from embryos that a couple has chosen not to implant because they carry harmful genetic mutations like the ones that cause cystic fibrosis or Tay Sachs disease. These are discovered through routine genetic testing prior to implantation. Still other embryos might be malformed in some way that causes them to be rejected for implantation into the mother. Embryos with genetic defects or malformations would have been discarded if the couple had not chosen to donate them to stem cell research.

People who donate leftover embryos for research go through an extensive consent process to ensure that they understand embryonic stem cell research. Under state, national and international regulations, ***no human embryonic stem cell lines can be created without explicit consent from the donor***.

Policies vary as to whether women may be paid or otherwise compensated to donate eggs. CIRM does not fund research where women have received payment to donate eggs. Most jurisdictions allow donors to be reimbursed for direct costs such as travel to the clinic or lodging. Some also allow payments or IVF services to be provided to egg donors.

Find out More:

How do scientists create stem cell lines from left over IVF embryos? (4:11)

I'm opposed to abortion. Do embryonic stem cell lines come from aborted fetuses?

No. Embryonic stem cells only come from four to five day old blastocysts or younger embryos. These are eggs that have been fertilized in the laboratory but have not been implanted in a womb.

Does creating embryonic stem cell lines destroy the embryo?

In most cases, yes. The hollow blastocyst—which is where embryonic stem cells come from—contains a cluster of 20-30 cells called the *inner cell mass*. These are the cells that become embryonic stem cells in a lab dish. The process of extracting these cells destroys the embryo.

Don't forget that the embryos were *donated* from IVF clinics. They had either been rejected for implantation and were going to be destroyed, or the couple had decided to stop storing the embryos for future use. The embryos used to create embryonic stem cell lines ***were already destined to be destroyed***

There is, however, a second method that creates embryonic stem cell lines without destroying the embryo. Instead, scientists take a single cell from a very early stage IVF embryo and can use that one cell to develop a new line. The process of removing one cell from an early stage embryo has been done for many years as a way of testing the embryo for genetic predisposition to diseases such as Tay Sachs. This process is called *preimplantation genetic testing*.

Are adult stem cells as good—or better—than embryonic stem cells?

Adult stem cells are extremely valuable and have great potential for future therapies. However, these cells are very restricted in what they can do. Unlike embryonic stem cells, which can grow into virtually any cell type in the body, adult stem cells can only follow certain paths.

For example, blood-forming stem cells can grow into mature blood cells, and brain stem cells may be able to grow into mature neurons, but a blood-forming stem cell can't grow into a neuron, and vice versa. What's more, adult stem cells don't grow indefinitely in the lab, unlike embryonic stem cells, and they aren't as flexible in the types of diseases they can treat.

While the news is full of stories about people who had great results from adult stem cell therapies, few of these therapies are part of large, well-designed clinical trials that can test whether a potential therapy is safe and effective. Until some of these large trials take place, with both adult *and* embryonic stem cells, we won't know which type of stem cell is superior. Even researchers who study adult stem cells advocate working with embryonic cells as well.

CIRM is excited about their potential for treating some diseases. However, our goal is to *accelerate* new treatments for diseases in need. At this time the most effective way of doing that is by exploring *all* types of stem cells. That's why CIRM has funded researchers pursuing

a wide range of approaches to finding cures for diseases.

See how much of CIRM's funding has gone to different types of stem cells here: Overview of CIRM Stem Cell Research Funding .

Filter our list of all funded CIRM grants to see awards using different cell types.


How are adult stem cell different from embryonic stem cells? (3:29)

Don't iPS cells eliminate the need to use embryos in stem cell research?

Induced pluripotent stem cells, or iPS cells, represent another type of cell that could be used for stem cell research. iPS cells are adult cells—usually skin cells—that scientists genetically 'reprogram' to behave like embryonic stem cells. The technology used to generate human iPS cells, pioneered by Shinya Yamanaka in 2007, is very promising, which is why CIRM has funded many grants that create and use these cells to study or treat disease. However, iPS cell technology is very new and scientists are looking into whether those cells have the same potential as human embryonic stem cells and whether the cells are safe for transplantation. Many CIRM-funded researchers are working to find better ways of creating iPS cells that are both safe and effective.

Experts agree that research on all types of stem cells is critical. In September 2008, a panel of experts convened by the U.S. National Academy of Sciences stated that the use of human embryonic stem cells is still necessary. As panel chair Richard Hynes of the Massachusetts Institute of Technology stated: "It is far from clear at this point which types of cell types will prove to be the most useful for regenerative medicine, and it is likely that each will have some utility."


See a video about creating iPS cells (3:40)

Can't stem cell research lead to human cloning?

No. Every significant regulatory and advisory body has restrictions on reproductive cloning. The National Academy of Sciences has issued guidelines banning the technique as has the International Society for Stem Cell Research. The California constitution and CIRM regulations specifically prohibit reproductive cloning with its funding.

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