

Stem Cells

Fact Sheet

Stem cells are cells that have yet to become specialised for a particular function. All cells - including muscle, bone and nerve cells - develop from stem cells in the embryo. Stem cells come from two main sources:

- Embryos (Embryonic stem cells);
- Adult tissue (Adult stem cells).

Embryonic stem cells

All the cells in our bodies develop and grow from a fertilised egg. At just 4-5 days old the embryo, which is formed from the fertilised egg contains cells that can make any cell in our body. These cells divide over and over again. Then at some point they start to specialise. They have the amazing potential to become any type of cell. They become our skin, liver, bone or brain cells for example. When we are fully formed nearly all the cells in our body are specialised. Scientists can grow this type of cell in the lab, and these cells are called embryonic STEM cells. They can multiply, producing perfect copies of themselves, but can also make specialised cells when grown in different conditions.

'Adult' stem cells

Stem cells are also found in some adult tissues including bone marrow, muscle, skin and brain. Their job is to replace cells lost through wear and tear, or damaged by disease or injury. Stem cells in the bone marrow make new blood cells every day; skin cells make new skin cells every day. When scientists discovered these 'adult' stem cells they realised they had enormous healing potential. One of their earliest uses was to treat patients with blood diseases like leukaemia.



Photo: Yorgos Nikas, Wellcome Images.

But these 'adult' stem cells can only grow into cells of the tissue in which they originate, so blood stem cells cannot specialise to become nerve cells. To study disease and to work on potential treatments scientists need to use embryonic stem cells. Cultured carefully in the lab they can produce millions of new stem cells which can then be directed to become specialised cells. They are being used to study disease and it is hoped they can one day be used to generate new tissue and organs to replace those damaged by disease or injury; to develop cures for conditions such as diabetes, multiple sclerosis, arthritis, heart disease, Parkinson's or Alzheimer's; to test new drugs; and to treat genetic disorders.

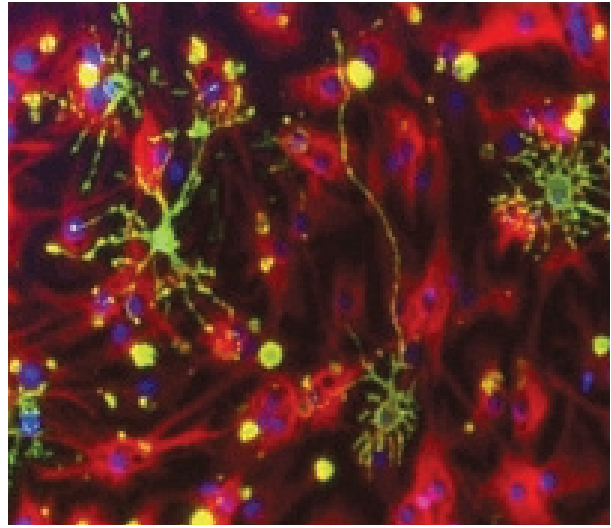


Huge advances are being made, but scientists need to work out how to control what sort of specialised cells they can make from embryonic stem cells; how to transplant the specialised stem cells into patients to ensure they reach the tissue to be repaired; how to prevent them from multiplying to become tumours, or pass on disease; and how to ensure they are not rejected by the patient's immune system.

Alternatives to embryonic stem cells?

Embryonic stem cells are made from embryos left over from fertility treatment (special stem cell banks have been set up). Using embryonic stem cells has been very controversial, because making the stem cells means destroying an embryo. Some people believe that all embryos - whether made in the lab or in the body - have the potential to become living beings and so should not be destroyed.

The question scientists began asking was whether 'adult' stem cells - or indeed any other type of cell - could be 'reprogrammed' or 'brainwashed' so they forget what type of cell they are, and can be directed to grow into something else? In 2006 a Japanese scientist managed to re-programme skin cells from a mouse.



Glial cells derived from neural stem cells. Photo: Stephen Pollard, Wellcome Images.

This has now also been done with human cells. Are these reprogrammed stem cells the same as embryonic stem cells? Scientists are trying to find out, so basic research still needs to be done on embryonic stem cells, while scientists continue to investigate reprogrammed stem cells.

Further suitable resources about Stem Cells can be found at www.eurostemcell.org/stem-cell-resources.

Stem cells are thought to hold huge potential for treating a wide range of disease and disabilities.

If someone is going to have an abortion, isn't it better that we use it for something useful?

Scientists around the world are working on techniques to refine stem cell therapy.

Scientists believe that the best stem cells come from embryos.

Many embryonic stem cells come from aborted embryos or from spare embryos in fertility treatment.

Stem cells are also found within adult organs. They have not taken on a final role and have the potential to become any of the major specialised cell types within that organ.

Stem cells are pluripotent which means they have the ability to become any type of cell. Adult cells have lost this ability.

Theoretically, it should be possible to use stem cells to make healthy tissue to replace damaged or diseased tissue.

Stem cell therapy could treat Parkinson's disease, Alzheimer's disease, heart disease, stroke, arthritis, diabetes, burns and spinal cord damage.

Many believe that the use of embryonic stem cells, taken from aborted embryos is unethical.

Stem cells may also provide a useful way to test the effects of experimental drugs.

Some types of stem cells can be developed from adult cells without 'hurting' anyone.

It is also hoped that studying stem cells will provide vital clues about how body tissues develop and how they become diseased.

The two types of mammalian stem cells are: embryonic stem cells and adult stem cells.

The umbilical cord may prove to be a good source of stem cells.

Stem cells can be grown and transformed into specialised cells.

Using embryonic stem cells kills innocent embryos. This is murder.

Why should I the taxpayer fund something that I believe is unethical?

I don't mind people researching with adult stem cells. But I don't think embryonic stem cells should be used because that is ending the life of a baby. No-one dies if you use adult stem cells.

Millions of people are out there suffering. We should spend money getting the medicines we already have to people rather than spend it on making new medicines that may not work.

My husband has Alzheimer's. The research done on embryonic stem cells could find a cure.

There are pros and cons for using embryonic stem cells rather than those from adult tissues. I think it is important to research both types of stem cells.

I support the use of adult stem cells, but I have an ethical problem with the cloning of human embryos.

Everyday spare frozen IVF embryos are thrown away. Even if there is only a small chance of these embryos being used to cure disease surely that is better than them ending in the rubbish bin?

Entrepreneurs in many countries have set up clinics, labs and storage facilities for stem cells.

Stem cells may allow our ageing population to live even longer, this might be a problem!

Stem cell research should proceed as fast as possible so that we find medical solutions as well as making money and creating jobs in stem cell related industries.

Stem Cell Discussion Cards

INSTRUCTION: These cards can be used to stimulate a class or group debate; e.g. some cards could be used in a group agree/disagree/debate activity and others as starting points for further research prior to a class debate.

Roman Catholic Church

While the formal authorities for Roman Catholic Churches have come out in favour of stem cell research using adult stem cells, they have condemned stem cell research using embryo cells as immoral and illegal.

The official position of these churches is that a human person begins at conception and the human embryo has the same moral status as living beings. Consequently, research on human embryos, including stem cell research and subsequent use is unethical, and if it involves the deliberate destruction of embryos, it is homicide.

For this religion, it makes no difference if the embryos that are used would be discarded or destroyed as surplus to fertility needs. Creating excess embryos that may have to be discarded is viewed as immoral and wrong. Nor does it matter that the embryos would be used in the service of the relief of suffering. Since the underlying belief is in the embryo's right to life, any use of the embryo that is not for its own good is immoral and therefore should not be done.

The idea is that stem cell research is tainted by the immoral act of killing the embryo. To use embryos and stem cells would be an immoral act.



Protestant Church

The Protestant Church has many different branches, with no clear indication of whether stem cell research is right or wrong - this is very much down to the follower themselves in this religion and their own personal beliefs.

For example, the United Church of Christ, a branch of Protestantism has no one voice that speaks for it and there is no official position of the United Church on the status of the embryo. As Ronald Green testified before President Clinton's National Bioethics Advisory Committee, "That is not to say that we have no opinion or do not care about their rightful status before God. But officially, we have never declared that we regard embryos as persons. Some of our members would agree with that and many - perhaps most would not agree, believing instead that embryos have an important but lesser status."

Followers in the United Church have declared that they are open to embryo research but consider that the goals of the research are of paramount importance. Considerable emphasis is placed on the need for both public discussion and for oversight of the research rather than leaving it as an unregulated practice. As in many religions there is a religious concept that the benefits from this and other medical research be distributed evenly and justly to all those in need, regardless of resources or geography.

The Anglican Church, another branch of Protestant religion, is sharply divided on the ethics of stem cell research. Official positions vary from country to country on the moral status of the embryo and therefore, on the morality of embryo research in general. The Protestant Church of Germany is also similarly divided. These divisions show just how personal an issue stem cell research can be.



Judaism

The rules of the Jewish culture are shaped by both religious text and rabbinical law. Both of these sources are relevant to the explanation of Jewish attitudes to stem cell research. In contrast to the Christian religion, Orthodox Jews believe that embryos do not have the same moral status as human persons. In fact, embryos outside a human body do not have any legal status under Jewish law. The result therefore, is that embryos created by IVF have no special moral or legal status.

Under Jewish law (Halcha) the foetus does not become a person (nefesh) until the head emerges from the womb. When the embryo is implanted it is “as water” up to the fortieth day. After that time and before the foetus emerges from the woman’s body it is a potential life and has great value. There is no consensus on when it becomes a ‘person’, but generally it is thought to occur sometime after the fortieth day. It gains full human status, however, only once it emerges from the woman’s body. Since embryos used in stem cell research are outside the body, according to the Jewish faith it is possible to use excess IVF embryos in research.

In addition to the Jewish views on the moral status of the human embryo, the Jewish religion places great emphasis on preventing and alleviating suffering. This leads to a deep belief in the morality of and value in pursuing medical research. As one Jewish scholar has written, “Our bodies belong to God; we have them on loan during our lease on life. God, as owner of our bodies, can and does impose conditions on our use of our bodies. Among these conditions is the requirement that we seek to preserve our lives and our health.” This commitment to preserving one’s body and health is joined by a commitment to helping others and alleviating suffering. So there is a moral imperative to help those who are suffering from diseases and to explore the potential of all types of stem cell research. This belief leads Jews to have a generally favourable view of stem cell research including stem cell research.



Islamic countries

Like other countries around the world, Islamic countries have been involved in stem cell research now for several years. Among Islamic countries Iran took the lead in stem cell research in 2003. In Iran, Turkey and other Islamic countries, embryo research policies are influenced by the religious belief that the full human life of the foetus is generally believed by Muslim scholars to take place at 120 days after conception (although a minority believe that life takes place 40 days after conception). This fact, and the importance expressed in the Quar'an of preventing human suffering and illness, means that the use of surplus IVF embryos for stem cell research is relatively uncontroversial.

What remains controversial in the Muslim world is creating embryos for the purposes of research. As with other religions, Islam and its followers have differing points of view on these issues. For example, in Egypt, a conservative religious country, the Muslim head of the Egyptian Medical Syndicate stated that embryos are early human life and should never be used in research, while the Chairman of the Islamic Law Council of North America has declared that the embryos being used in stem cell research are outside the body and therefore have no potential to become human beings. This, in his opinion, makes them acceptable under Islamic law as sources for stem cell research.



Hinduism and Buddhism

Hinduism is a dominant Asian religion that varies significantly in traditions and beliefs. Closely related to Hinduism is Buddhism. There is no central Hindu or Buddhist authority to explain their religious position on stem cell research and there is also no Hindu or Buddhist teaching that directly addresses the morality of stem cell research.

Central teachings of the religions, however, are informative of how Hindus and Buddhists think about stem cell research. In general, a fundamental belief of Hinduism and Buddhism is the importance of practicing compassion toward others. Medical research, with its aim to help others is, therefore, viewed favourably and consequently, adult stem cell research is widely accepted.

As with other major world religions, embryonic stem cell research is much more controversial. Another belief of the Hindu religion is the concept to avoid harming other living things. Life in all its forms is viewed as sacred and this belief, to avoid harm, directs followers against stem cell research since the embryo is seen as a living being.

While views on the moral status of the human embryo differ, in traditional Hindu belief, conception is the beginning of a soul's rebirth from a previous life. Some Hindu traditions place the beginning of personhood between three and five months of gestation, while few believe that the soul's rebirth can occur as late as the seventh month.

Most Buddhists have adopted the classical Hindu teaching that personhood begins at conception. Though Buddhist teachings do not directly address the issue, like Hinduism there are two main beliefs - the prohibition against harming or destroying others (ahimsa), and the pursuit of knowledge (prajña) and compassion (karua) - that divide Buddhists. Some Buddhists argue that embryonic stem cell research is in accordance with the Buddhist idea of seeking knowledge and ending human suffering, while others argue that it is a violation of the notion of not harming others.

A central belief of Hinduism and Buddhism is that an individual's soul or self is eternal. In Hinduism the soul is believed to be passed from one living being to another in a process called reincarnation. In Buddhism reincarnation is described differently as the rebirth of the self. These beliefs that the soul or the self are reborn lead to a greater acceptance of cloning. To many Hindus and Buddhists cloning appears to be closely related to the idea of a person's soul passing from one body to another or to a rebirth of the self. For this reason, although the use of embryos in stem cell research remains an issue which divides followers in these religions, the use of cloning technology in stem cell research is less controversial.



Name: _____

Class: _____

Date: _____

Myself as a Thinker

Philosophical Enquiry

1) Question:

2) First thoughts:

3) Last thoughts:

4) My thinking/listening aim for today's enquiry:	Did I achieve my aim?	
	YES (Add Always, Mostly or Sometimes)	NO

5) My speaking aim for today's enquiry:	Did I achieve my aim?	
	YES (Add Always, Mostly or Sometimes)	NO



6) As a group	Always	Mostly	Sometimes	Never
7) Were we respectful and patient with each other?				
8) Did we think deeply about the question ?				
9) By the end of the enquiry, had we considered everyone's views ?				
10) Was it an enjoyable, positive, team-building exercise ?				

11) My listening aim for the next enquiry will be:

12) My speaking aim for the next enquiry will be:

13) The most interesting things about today's enquiry were:
