stem cells

this house would ban research on embryonic 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 indefinitely, producing perfect copies of themselves every time, but can also make specialised cells when grown in different conditions.

Human embryo with inner cell mass
(photo Yorgos Nikas, Wellcome Images)

‘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 leukemia.

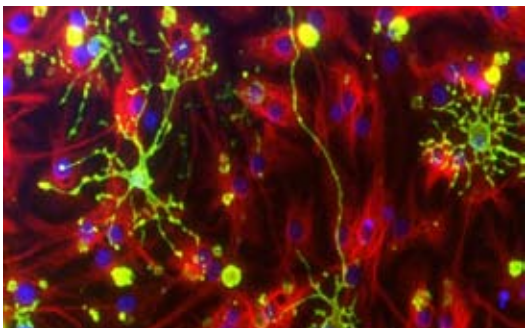
But these ‘adult’ stem cells can only grow into cells of the tissue in which they originate, so blood stem cells cannot specialise to become nerve cells. To study disease and to work on potential treatments scientists need to use embryonic stem cells. Cultured carefully in the lab they can produce millions 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, Parkinsons or Alzheimers; 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. 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.



Glial cells derived from neural stem cells
(photo Stephen Pollard, Wellcome Images)

Stem cell research (photo Wellcome Library)

stem cells

fast facts

- Embryonic stem cells, are what scientists call Pluripotent. They can specialise to become any cell in our body.

- Human embryonic stem cells come from embryos which are left over from fertility treatment; or made in the lab by the process of cloning.

- Cloning creates a genetically identical copy of an animal or plant. A sheep (called Dolly) was famously cloned at the Roslin Institute in Scotland. Cloning of humans is prohibited.

- Scientists are researching stem cells to study how tissues grow and become diseased; to develop new tissues and organs to replace damaged ones; and to discover how to cure diseases like Parkinson's, Alzheimer's, diabetes, and heart disease.

- Stem cells are already used to treat blood diseases; to make new skin for patients who have been badly burned. Many new therapies are being developed: eg stem cell trials for 150 MS patients across Europe were due to start late 2011.

- In July 2011 an artificial trachea (breathing tube) was implanted into a patient suffering from tracheal cancer. It was made in the lab and covered with stem cells taken from the patient's bone marrow. These cells grew into the types of cells found in a healthy trachea. This form of regenerative medicine holds huge potential for thousands of patients.

- Dutch scientists are trying to grow meat in the lab, from muscle stem cells. It's a slow and expensive process, so the first hamburger would cost £200,000.

questions to ask

- Does an embryo have human rights?
- Is stem cell therapy safe?
- Who decides if a therapy is safe and which patients get the treatment?
- If stem cell therapies were successful in humans and every disease or injury could be repaired- would you want to live for hundreds of years?
- Stem cell research is expensive: would it be better to spend the money in another way? for example, treating disease in poor countries .

find out more

http://www.eurostemcell.org/
Click on RESOURCES and FILMS for games, discussion and films tailored to different age groups
http://www.explorestemcells.co.uk
Has lots of articles on stem cell research including the potential of the work and possible areas of concern

cloning/gene therapy in fiction

Keep Her Safe	D.M Simons
Dr Franklin's Island	Ann Halam

alternative motions: this house...

...would not prohibit stem cell research on religious grounds
...would ban the use of stem cell technology for human enhancement
...believes scientific research and development is best pursued by private industry