

# Scientists want to experiment on embryos

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being the "Wild West" of science after researchers announced they had altered the DNA of embryos to modify the gene responsible for thalassaemia, a fatal blood disorder.

The Francis Crick Institute in London is seeking permission from the Human Fertilisation and Embryology Authority (HFEA) for similar experiments, although resulting embryos will only be allowed to live a few days.

Sir Mark said it was important to think about genetic engineering in a "sensible way" involving "careful discussion" of scientific and ethical issues. "There are potentially good uses and

there are potentially abuses," he said.

"People have extreme beliefs about whether it is right for humans to tamper with embryos in any way at all. Sometimes the values discussion gets conflated with the science discussion.

"We shouldn't pretend we're having an argument about science when we're having an argument about values. People need to say why they really object."

The Human Fertilisation and Embryology Act banned germline editing in 1990 but since then Parliament has given the go-ahead for babies to be created with DNA from three people, to repair genetic faults. The first "three-parent babies" are likely to be born next year

and changes in their DNA will be passed on to their own children, placing germline editing in a legal grey area.

Sally Cheshire of the HFEA said final safety and efficacy tests were continuing and the results would be published shortly. They would then be able to licence clinics and give approval on a case-by-case basis.

Gene therapy has been available since the 1970s but it is only recently that scientists have developed technology to snip out sections of genetic code. The technique could remove harmful mutations which lead to inherited diseases like cystic fibrosis, but critics say it could have unexpected side effects.

## Controversial, but with endless possibilities

**Q** What is genetic editing?

**A** Genetic editing allows changes to be made to the DNA of organisms. It can add information to create new characteristics or remove regions of code, such as those that increase vulnerability to disease.

**Q** How does it work?

**A** There are a few ways to genetically edit an organism, but scientists are most excited by a technique called Crispr, a naturally-occurring defence mechanism used by bacteria. Bacteria carry in their DNA strands of genetic code belonging to viruses. When they

spot a virus they release an enzyme which attacks, snipping away this area of code. Scientists have harnessed this mechanism to use as a kind of "molecular scissors".

**Q** What would be edited?

**A** Some diseases occur because of mutations in genes which stop cells in the body from functioning properly. By replacing the faulty gene with a correctly functioning gene, babies would be born free from disease.

**Q** Why is the technology controversial?

**A** Genetic editing fundamentally changes a person's DNA which can

then be passed to offspring. Critics also worry it could have unintended consequences for other parts of the genome and lead to designer babies.

**Q** Is genetic editing banned in Britain?

**A** Genetic editing is not banned but it is illegal to alter the germline of a human, which means scientists cannot make any changes which will be inherited by offspring. Researchers who want to carry out germline genetic tests on human embryos must apply to the Human Fertilisation and Embryology Authority, and the genetically altered embryo must be destroyed after 14 days.

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