British scientists granted permission to genetically modify human embryos

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British scientists have been granted permission to [genetically modify](http://www.telegraph.co.uk/news/science/science-news/11991905/First-genetically-modified-humans-could-exist-within-two-years.html) human embryos by the fertility regulator.

The Francis Crick Institute could begin the [controversial experiments](http://www.telegraph.co.uk/news/science/science-news/12097488/British-scientists-could-genetically-edit-human-embryos-by-March.html) as early as March after the [Human Fertilisation and Embryology Authority](http://www.hfea.gov.uk/) (HFEA) gave the green light this morning.

The scientists want to deactivate genes in leftover embryos from IVF clinics to see if it hinders development.

It will only be the second time in the world that such a procedure has been undertaken and the first time it has been directly approved by a regulator. A Chinese team carried out similar experiments last year to widespread outcry.

Currently around 50 per cent of fertilised eggs do not develop properly and experts believe that faulty genetic code could be responsible.

If scientists knew which genes were crucial for healthy cell division, then they could screen out embryos where their DNA was not working properly, potentially preventing miscarriages and aiding fertility.

The initial pilot, which will also have to pass an ethics evaluation, will involve up to 30 embryos and the team would like to work on a further three genes, which could bring the total of to 120.

Critics warn that allowing embryos to be edited opens the door to designer babies and genetically modified humans.

Anne Scanlan of the charity LIFE said: “The HFEA now has the reputation of being the first regulator in the world to approve this uncertain and dangerous technology. It has ignored the warnings of over a hundred scientists worldwide and given permission for a procedure which could have damaging far-reaching implications for human beings."

But lead scientist [Dr Kathy Niakan](https://www.crick.ac.uk/) said that the research could fundamentally change our understanding of human biology and give hope to prospective parents.

“We would really like to understand the genes that are needed for an embryo to develop into a healthy baby,” she told a briefing in central London last month.

“Miscarriage and infertility are extremely common but they are not very well understood. We believe that this research could improve our understanding of the very earliest stages of human life.

“The reason why I think this is so important is that most human embryos fail to reach the blastocyst stage. Over 50 per cent will fail so this window is absolutely critical.

“If we were to understand the genes, it could really help us improve infertility treatment and provide crucial insights into the causes of miscarriage.”

The team at Francis Crick are already in talks with fertility clinics across the country to use their spare embryos.

Sir Paul Nurse, director of the Crick, said: “I am delighted that the HFEA has approved Dr Niakan’s application. Dr Niakan’s proposed research is important for understanding how a healthy human embryo develops and will enhance our understanding of IVF success rates, by looking at the very earliest stage of human development - one to seven days.”

Currently it is not illegal to edit human embryos for research purposes although it has never been done before because they technology has not been available.

When [China announced](http://www.telegraph.co.uk/news/science/11558305/China-shocks-world-by-genetically-engineering-human-embryos.html) it had carried out similar experiments last year there was a widespread outcry.

A spokesman for the HFEA said: “Our Licence Committee has approved an application from Dr Kathy Niakan of the Francis Crick Institute to renew her laboratory’s research licence to include gene editing of embryos.

“The committee has added a condition to the licence that no research using gene editing may take place until the research has received research ethics approval.

“As with all embryos used in research, it is illegal to transfer them to a woman for treatment.”

All cells in a human embryo have the same DNA code, but they divide into specialised cells depending on gene expression.

Between day five and seven of human development and embryo has around 200 cells of three different types. One set will go on to form the foetus , while another type becomes the placenta, and the third kind the yolk sac which nourishes growing baby. The aim of the new project is to find out what causes the cells to turn into different kinds, a process known as ‘lineage specification.’

The new genetic editing technique, called Crispr, acts like molecular scissors to snip out part of the DNA code so that scientists can see if it was needed.

Dr Niakan said: “If you imagine the genome as volumes in an encyclopaedia, at some point in the development some of the cells will start to read a different volume compared to its neighbour cell. One cell will read a volume slightly differently even though they have the same library.”

“Crispr is so efficient and precise that it can go inside a single volume, open up, a specific page, identify a single word, and alter a single letter,” added Prof Niakan.

The first gene that the team is planning to deactivate is OCT4, which in mice appears to be crucial for the healthy development of foetal cells.

However British scientists were among 150 experts who in November called for a worldwide ban on genetic editing of embryos claiming the practice could open the door to ‘[irrevocably altering the human species](http://www.telegraph.co.uk/news/science/science-news/12025316/Humans-will-be-irrevocably-altered-by-genetic-editing-warn-scientists-ahead-of-summit.html).’

Nola Leach of Christian charity CARE said:“This decision opens the door to full blown eugenics and you have to wonder where it will stop.

“The sanctity and equality of human life is under threat as never before it would seem as we push ahead crossing one ethical boundary after another"

Dr Calum MacKellar, Director of Research of the Scottish Council on Human Bioethics said: “Allowing the gene editing of embryos opens the road to genetically modifying all the descendants of a person as well as full blown eugenics which was condemned by all civilised societies after the Second World War.”

“It is the very future of the way in which societies accept persons with disabilities that is at play since such gene editing procedures infer that they should not have been brought into existence.”

Gene therapy has been available since the 1970s but it is only recently that scientists have developed technology which can snip out parts of genetic code

The technique could permanently remove harmful mutations which lead to inherited diseases like Huntingdon’s, cystic fibrosis and haemophilia, critics say it could have unexpected side effects any may damage healthy strands of DNA.

Alastair Kent, Director of Genetic Alliance UK, said: "“Understanding the crucial process of embryo development could help us to understand causes of infertility, miscarriage and some genetic diseases.

"The team at the Crick Institute have explained to the HFEA why they would like to use genome editing to investigate embryo development and the HFEA have authorised the research to proceed. We hope that this avenue of research is fruitful, and that genome editing is as powerful a research tool as it currently seems to be."