

'Designer babies' debate should start, scientists say



Rapid progress in genetics is making "designer babies" more likely and society needs to be prepared, leading scientists have told the BBC.

Dr Tony Perry, a pioneer in cloning, has announced precise DNA editing at the moment of conception in mice.

He said huge advances in the past two years meant "designer babies" were no longer HG Wells territory.

Other leading scientists and bioethicists argue it is time for a serious public debate on the issue.

Designer babies - genetically modified for beauty, intelligence or to be free of disease - have long been a topic of science fiction.

Dr Perry, who was part of the teams to clone the first mice and pigs, said the prospect was still fiction, but science was rapidly catching up to make elements of it possible.

In the journal *Scientific Reports*, he details precisely editing the genome of mice at the point DNA from the sperm and egg come together.

Dr Perry, who is based at the University of Bath, told the BBC: "We used a pair of molecular scissors and a molecular sat-nav that tells the scissors where to cut.

"It is approaching 100% efficiency already, it's a case of 'you shoot you score'."

New era

It is the latest development of "Crispr technology" - which is a more precise way of editing DNA than anything that has come before.

It was named one of the top breakthroughs in 2013, hailed as the start of a new era of genetics and is being used in a wide-range of experiments in thousands of laboratories.

As well simply cutting the DNA to make mutations, as the Bath team have done, it is also possible to use the technology to insert new pieces of genetic code at the site of the cut.

It has reopened questions about genetically modifying people.

Prof Perry added: "On the human side, one has to be very cautious.

"There are heritable diseases coded by mutations in DNA and some people could say, 'I don't want my children to have these mutations.'"

This includes conditions such as cystic fibrosis and genes that increase the risk of cancer.

"There's much speculation here, but it's not completely fanciful, this is not HG Wells, you can imagine people doing this soon [in animals].

"At that time the HFEA [the UK's fertility regulator] will need to be prepared because they're going to have to deal with this issue."

He said science existed as part of a wider community and that it was up to society as a whole to begin assessing the implications and decide what is acceptable.

Time for debate

Prof Robin Lovell-Badge, from the UK Medical Research Council, has been influential in the debate around making babies from three people and uses the Crispr technology in his own lab.

He said testing embryos for disease during IVF would be the best way of preventing diseases being passed down through the generations.

However, he could see such potential uses of "germ-line therapies" for men left infertile by damaging mutations.

While they can have children through IVF, any sons would still have the mutations and would in turn need IVF. Genetic modification could fix that.

It would also be useful in circumstances when all embryos would carry the undesirable, risky genes.

Prof Lovell-Badge told the BBC News website: "Obviously in the UK, this is not allowed and there would have to be a change in regulations, which I suspect would have enormous problems.

"But it is something that needs to start to be debated.

"There has been a blanket ban on germ-line therapy, so there needs to be a debate about that and some rational thought rather than knee-jerk reactions that, 'No you can't possibly do that.'"

Such a debate would also have to move beyond therapies into the field of babies designed to have desirable traits.

Some alternations would only require small changes to DNA, such as some changes to eye colour or to make a child HIV-resistant.

The respected Nuffield Council on Bioethics is understood to be considering a report on the issue.

Its verdict in 2012 that it was ethical to create babies from three people formed a core part of the public debate on the issue.

At the time it said a much wider debate on germ-line therapy was still needed.

Complex ethics

Its director, Hugh Whittall, told the BBC: "I think this is a challenge, for all of us, we should get onto looking at this fairly rapidly now."

He said the field raised questions of social justice around techniques available only to the rich and what constituted identity as well as "issues of governance and regulation".

Dr David King, from the campaign group Human Genetics Alert, echoed calls for the public to engage with the issue.

He said: "I think it's pretty inevitable that we'll get to a point where it's scientifically possible, certainly these new techniques of genome editing have made something look much more feasible than it did five years ago.

"But that does not mean to say it's inevitably the way we have to go as a society."

This is still a matter of science fiction and there is a huge amount of research - particularly on unwanted mutations, efficiency and safety - that needs to be done before any attempt of humans would even be considered.

A spokesman for the UK's Human Fertilisation and Embryology Authority said: "We keep a watchful eye on scientific developments of this kind and welcome discussions about future possible developments."

He said it "should be remembered that germ-line modification of nuclear DNA remains illegal in the UK" and that new legislation would be needed from Parliament "with all the open and public debate that would entail" for there to be any change in the law.