



STOP GM Babies

Government pushes on

The UK Government wants to legalise the creation of genetically modified (GM) babies. The genetic changes will then be passed on to future generations. This is risky science.

There are very real safety fears – for the mothers and children involved, and for their descendants. No one can be sure the plans are safe.

No other country in the world has legalised procedures which change the genetic heritage of future generations. Parliament will have to vote on this.

The plans aim to avoid mothers passing on mitochondrial disease to their children – but not by providing a cure. Instead, the technology seeks to

create new ‘disease free’ GM children.

Critics say this is a form of eugenics.

There are other grave ethical and safety concerns.

Not only would the process produce children

with three (or even four) parents, it paves the way for designer babies by manipulating the genetic characteristics of future children.

There are very real safety fears – for the mothers and children involved...

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Changing the genes of future children

The plans involve making genetic changes to humans which will in turn be passed down from generation to generation. This violates the international consensus against what is known as ‘germline modification’. Britain would become the only country in the world to legalise it.

As Friends of the Earth have said, “Any genetic manipulations administered during the early embryonic stage... would be permanent and irreversible. Any change due to the intervention would be passed on indefinitely throughout all future generations.”¹

Two techniques are being proposed (see overleaf for more detail). Both change the genetic heritage mothers pass on to their children. It is alarming that the procedures will impact future generations in ways that are completely unknown. While there are ongoing public safety concerns about GM food, it’s extraordinary that the Government wants to go ahead with GM babies.

Modifying embryos in this way involves a similar method to reproductive cloning, as the Government admits.² Ethicists believe it fosters the skills needed for

human cloning and could pave the way for full human cloning.

The Government says its proposals are not ‘genetic modification’ because most genes are not affected. But the plain truth is that the children would have modified genes. No one can deny this. The Government wants to allow scientists to create GM babies.

² Mitochondrial Donation, Department of Health consultation document, February 2014, para. 1.26

¹ Letter to the Chairman of the HFEA, 7 December 2012



The science

Mitochondria are very small entities found in every human cell. They are inherited from our mother's egg. Mitochondria provide energy for the cell and contain DNA.

The role of mitochondria is not fully understood but when they malfunction they can, in rare cases, cause serious illness. Only 1 child in 6,500 is affected by a serious mitochondrial disease which may lead to death in infancy.¹

The **nucleus** contains most of a cell's DNA. One proposal is to transfer the nucleus of a dysfunctional egg into a healthy egg from another woman. An embryo created from that egg would then have nuclear DNA from the prospective mother but mitochondria from the other woman.

Misleadingly, the Government calls the process 'mitochondrial replacement'. In reality it is the nucleus which is transferred.

The two procedures proposed are called 'Maternal Spindle Transfer' and 'Pronuclear Transfer'. See christian.org.uk/gmbabies for diagrams which explain both procedures.

The necessary research involves destroying human embryos. Pronuclear Transfer actually destroys two embryos to create a third. It also generally requires the involvement of four parents.

¹ Giles, C, Wellcome News, Issue 70, Spring 2012, page 24

Responding to arguments

X *"The techniques are just like a bone marrow transplant – no one objects to that."*

✓ A bone marrow transplant only affects individual patients. It will not affect their reproductive cells so cannot alter the DNA of any children they have. There is a fundamental difference between medical treatment which may change the genetic makeup of a person who already exists (without affecting their descendants) and creating a new person with a specifically altered set of DNA (which will be passed on to their descendants).

X *"The changes only involve a tiny amount of DNA."*

✓ No serious scientist would suggest that you measure the importance of genes by their number.¹ In some other European countries this type of research could result in a prison sentence.² Also, legalising the techniques is part of something far bigger. The procedure "would be used as a door-opening wedge towards full-out germline manipulation" and introduce 'high-tech eugenics'.³

X *"There is widespread public support for the plans."*

✓ The Government's consultation in 2014 found that 62% of those responding were opposed to the change.⁴ Over half of respondents to an earlier HFEA consultation were also against the idea.⁵ The HFEA, the UK regulator, tried to spin the results of its public consultation by giving tiny public meetings equal consideration.

X *"This is just like changing the battery in a laptop."*

✓ The Government's plans involve altering the DNA of a baby – something far more complex and risky: "there are profoundly important and constant interactions and communications between the mitochondria and the nucleus that are vital for the normal health of the cell".⁶ The DNA changes will be passed down to future generations and there are major safety concerns.

¹ Scolding, N, Standpoint, December 2013, page 41

² The Witherspoon Council, 'The Stem Cell Debates: Lessons for Science and Politics' The New Atlantis, 34, Winter 2012, pages 129-146

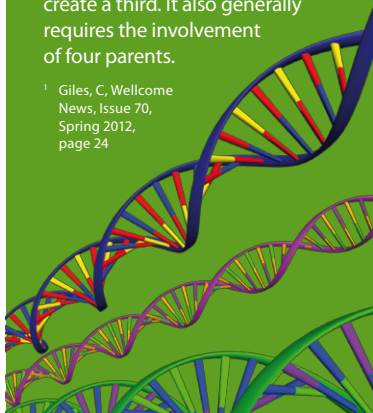
³ Darnovsky, M, Nature, Vol. 499, 11 July 2013

⁴ Mitochondrial Donation, Department of Health, July 2014, page 11

⁵ Mitochondria replacement consultation: Advice to

Government, Annex IV, Human Fertilisation and Embryology Authority, March 2013, page 76

⁶ Scolding, N, Ibid, page 41



Public safety fears

USA – ‘too soon’

In February 2014 an advisory panel to the US regulator, the Food and Drug Administration (FDA), examined the techniques.

The scientists decided it is too soon to go ahead: “many members questioned the ethics of the procedure, and whether the research into it is as far advanced as some supporters claim”. Dr Evan Snyder, head of the panel, said: “There is just not enough preclinical data to suggest how to [treat patients] and how to do it safely.”¹



Problems

The FDA’s evidence says: “The full spectrum of risks... has yet to be identified”.² These safety concerns have been highlighted by a group of 53 scientists/ethicists from around the world.³ Two of them explained: “Key worries include remnants of mutant mitochondrial DNA that persist despite the treatment, and the disruption of complex interactions between mitochondrial genes and those in the cell nucleus. There are also daunting challenges in terms of designing meaningful trials, or safe ones, because pregnancy and childbirth



pose major health risks for women with serious mitochondrial disorders.”⁴

¹ USA Today, 26 February 2014

² FDA Briefing Document, Meeting #59, 25-26 February 2014, page 15

³ Letter to the HFEA, 21 March 2014, Dr Marcy Darnovsky (Center for Genetics and Society) et al

⁴ Dickenson, D and Darnovsky, M, New Scientist, 3 June 2014

Similar procedure halted in USA

In 2001 the FDA effectively banned a similar procedure called ‘cytoplasmic transfer’.¹ This technique inserted healthy mitochondria into eggs with mutated mitochondria prior to IVF, leaving the embryos with DNA from 3 parents.

Just over two dozen babies were born as a result of cytoplasmic transfer and some had serious health problems. There were two instances of the very serious abnormality Turner’s syndrome and one diagnosis of a “pervasive developmental disorder”²



¹ abc News, 5 July 2013

² FDA Briefing Document, page 13

UK report on safety

The HFEA’s expert panel of five scientists backs the plans, but in June 2014 even they said “there are still experiments that need to be completed before clinical treatment should be offered. The panel considers that some of these experiments are critical”. The panel has recommended long-term follow-up monitoring of any genetically modified children who are born, but the Government has rejected this, citing legal “difficulties”.¹

¹ Third scientific review of the safety and efficacy of methods to avoid mitochondrial disease through assisted conception: 2014 update, HFEA, June 2014, page 4; Mitochondrial Donation, Department of Health consultation document, February 2014, page 6 and para 2.36

Concern persists about GM food

Currently no GM crops are grown commercially in Britain. Scientists continue to be divided about their implications for public health and the environment.

In the UK groups such as the Soil Association and Gene Watch strongly oppose GM crops. The Government says GM organisms will not be allowed unless “a robust risk assessment indicates that it is safe for people and the environment”¹. The question is: why is it not even applying the same prohibition to GM babies?



¹ DEFRA policy statement, see <http://tinyurl.com/kkcfbg2> as at 17 July 2014

NZ lab stops cloning animals

In 2011 a research centre in New Zealand stopped its cloning trials on animals due to animal welfare concerns. The experiments on cattle, sheep and goats had elements that are similar to the GM baby techniques. Reports said that only about 10 per cent of cloned animals survived through the trials, while those that lived had serious health problems.¹ Since human embryos are more sensitive than those of most animals, the GM baby experiments could have even worse outcomes.

¹ Dominion Post, 21 February 2011



Plans conflict with God's good design

Scientists want permission to create genetically modified babies as a solution to a rare type of disease. But the Bible clearly teaches the sanctity of human life. Every human being is made in the image of God and life is sacred from conception (Genesis 1:27, 9:6; Psalm 51:5).



The Ten Commandments uphold the sanctity of life and show that humans have two parents, a father and a mother (Exodus 20:12-13). Yet by creating children with three (or four) parents the procedures fly in the face of the created order. Seeking to improve the genetic makeup of children not yet born is 'eugenics'.

As Christians, we want to show love and compassion to parents who have medical disorders which can be passed on to their children. But we also need to be vigilant in identifying and challenging attitudes in society which undermine the sanctity of human life. Both are practical outworkings

of our Lord's command to love our neighbour (Mark 12:31). The many human embryos destroyed in research for these procedures are our neighbours.

The UK's mad rush to GM babies risks ignoring ethical alternatives. Within the past two years, studies have shown potential treatments for people with mitochondrial disease involving, for example, donor bone marrow or special procedures to remove mutant mitochondria.¹

Why is time and money not being poured into these truly therapeutic options instead?

¹ Prentice, D, Letter to HFEA, 21 March 2014, citing eight separate pieces of research published in scientific journals in 2012/2013

"The two methods under consideration by the HFEA de- and reconstruct the fertilized egg in radical ways, unprecedented in the history of life".¹

Professor Stuart Newman

"Looking back 15 years from now in the midst of a designer baby marketplace, people will see this as the moment when the crucial ethical line was crossed."²

Dr David King

"It ends up being a multi-generational experiment with the lives of people... In a country nervous about genetically modified crops we are making the foolhardy move to genetically modified babies."³

Jacob Rees-Mogg MP

Speaking out against GM babies

"We believe inheritable changes to the human genetic makeup are a dangerous step that should be prohibited."⁴

Friends of the Earth

"The question raised by these proposals is whether a risky technique, which would at best benefit a small number of women, justifies shredding a global agreement with profound significance for the human future."⁵

Dr Marcy Darnovsky

"There is a Pandora's box of problems."⁶

Robert Fleelo MP

"It would create a very serious precedent, resulting in grave risks for the future."⁷

Professor Calum MacKellar

¹ Huffington Post, 11 May 2013 | ² BBC News Online, 22 July 2014 | ³ House of Commons, Hansard, 12 March 2014, col. 166WH
⁴ Letter to the Chairman of the HFEA, 7 December 2012 | ⁵ Darnovsky, M, Nature, Vol. 499, 11 July 2013 | ⁶ House of Commons, Hansard, 12 March 2014, col. 166WH | ⁷ MacKellar, C, GM babies with 3 or 4 parents, The Christian Institute, 2013, page 21