

Eugenics should no longer be a dirty word

The legalisation of 'three-person IVF' will allow us to eliminate diseases and transform lives

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On Thursday, Britain will become the first country in the world to allow "three-person IVF" - the creation of a baby with three parents. While this may sound like something out of a science fiction (or even a horror) film, the technique is relatively straightforward: it involves replacing DNA in a woman's egg with a donor's DNA in order to prevent devastating genetic diseases from being passed from mother to child.

The diseases being targeted are caused by defects in the mitochondria: a tiny organelle within a human cell that generates energy for our survival. The mitochondria have a unique set of genes, separate to the DNA in a cell's nucleus - in other words,

mitochondrial genes don't determine physical traits like hair and eye colour. But they are vital none the less. Because mitochondria power most cellular functions, genetic defects in their DNA can cause debilitating illnesses ranging from muscle wastage to diabetes, deafness and epilepsy.

From this week, though, these genetic defects can be corrected by using a donor egg from a healthy female, and replacing its nucleus with the birth mother's nucleus. This results in an egg carrying the genetic material of two women, which can be fertilised by the father's sperm. It sounds like good news. But the debate over three-parent IVF has been bitter, and the reason is clear: this is essentially eugenics, the science of improving the genetic quality of the human population.

Eugenics is a dirty word, most commonly associated with racist profiling, or Nazi experiments. But the time has come to rethink our attitude. For it can also be understood as manipulating the genome in order to solve human health crises, such as sickle cell anaemia, and so give happier and longer lives to children otherwise doomed before birth. Gene editing is the transformative technology of our generation: by


altering the building blocks of life, we can start to address large-scale problems like hunger, climate change and even human longevity.

We are already creating "eugenic" crops, ranging from golden rice which could save one million children a year from vitamin A-deficiency related deaths, to soyabean with high levels of omega-3. In fact, genetically modified crops could be our best hope for feeding an ever-hungrier planet.

And we are already engineering genes to cure, or breed resistance to, disease. There are around 2,000 human clinical trials around the world which are trialling gene therapy - inserting genes into your body - to treat a variety of illnesses from leukaemias and myelomas to Parkinson's disease and cystic fibrosis. Trials are also trying to breed resistance to HIV.

Still, there is currently an international consensus that genetic engineering should not be used to modify human embryos in a way that could alter the characteristics of future children. This new legislation concerning defective mitochondria is the only exception. For now.

Because as genetic technologies evolve in leaps and bounds, our ethical debate has to progress in tandem. We

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can't bury our heads in the sand and avoid the discussion around gene engineering and editing simply because it "seems wrong" or strange, when scientists possess powerful knowledge that could, potentially, save millions of lives.

While I am an advocate of biomedical progress, my argument is not that we should perform eugenic techniques without carefully studying the possible side effects or consequences, but that the genie is well and truly out of the bottle, and we can't put it back in.

We need to move the discussion forward on both a legislative and scientific front, allowing us to test, tweak, safeguard and implement these treatments until they become as safe as brain surgery or blood transfusions - medical breakthroughs we now take for granted.

The standard scientific pathway is to conduct safety trials first in vitro, then in animals, and humans, and finally give the experimental cure to those who would not otherwise survive. It can apply to eugenic techniques too.

For the sake of those who need it the most, we must be brave enough push the frontiers of present-day human knowledge into territories unknown.