

Science and Safety

An experiment to create the world's first gene-edited babies undermines public trust

The possibilities of designing life have provoked fascination and apprehension since at least the publication of Mary Shelley's novel *Frankenstein* 200 years ago. Now they have become more tangible. A Chinese scientist, He Jiankui, claims to have helped to make the world's first genetically edited babies: twin girls, whose DNA he altered to prevent them from being infected with HIV, the virus that attacks the body's immune system. The procedure sounds intuitively humane. It is in fact a breach of scientific protocol and biomedical ethics. It is more akin to human experimentation, with unpredictable consequences.

The emerging technology of gene editing, also known as genome editing, has immense potential for human benefit but it carries risks and quandaries. Scientific researchers know the limits and dangers of premature use of the technologies, and that future applications require full public debate and scrutiny, plus tough regulation.

DNA carries genetic information. It is the hereditary material in almost all organisms. Gene-editing techniques enable scientists to alter a selected DNA sequence in the cell of an organism.

This involves cutting it, then adding or removing or replacing the DNA at that point, and allowing the cell's natural repair mechanisms to work.

These technologies could in time assist in combating disease but they are at an experimental stage. At a minimum, they require the normal scholarly process of peer review to operate. The Chinese researcher's behaviour has been far removed from that axiom of scientific method. Rather than submit his work to the scrutiny of the scientific community, Mr He announced it on a YouTube video. There is no independent verification of what he has done or the truth of his claim to have done it.

Moreover, even taking his claims at face value, there were was no reason for him to engage in this gene editing and many counter-arguments of safety. Scientists are exploring the potential for gene editing especially in the case of disorders, such as sickle cell disease, with a genomic basis. HIV is a separate issue, as there are many ways to prevent it in healthy people without the need for gene editing.

The issue of the public safety of new technologies

is paramount. As well as being unnecessary, the Chinese case is premature. So far, clinical genetics, which involves diagnosing and predicting disease due to genetic factors, is an imperfect discipline. There are documented cases of faulty diagnosis leading to a bad medical decision, such as aborting a healthy foetus for fear of its carrying a genetic disease. Gene-editing therapy is constrained by the current limits of reliable diagnosis.

Even then, the ethical issues raised by the new technologies cannot be resolved by individual fiat. When scientists accomplished the immense technical feat of splitting the atom, which, unlike a living cell, has precisely no intrinsic value, international controls and ethical reflection were vital to prevent potential catastrophe.

The reasonable fear that gene editing will be used not only to prevent disease but to breed new generations with desirable traits recalls some of the worst violations of human dignity of the last century. These vital technologies require vigorous public debate. The caprice of an individual researcher is exactly the wrong way to exploit scientific advance.

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