A Moratorium on Heritable Human Genome Editing: Illusory or Real?

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In March, 2019, *Nature* published a commentary penned by Eric Lander, Françoise Baylis, Feng Zhang, Emmanuelle Charpentier, and Paul Berg, and signed by 13 other notables. The name of the commentary is "Adopt a moratorium on heritable genome editing." This document requires analysis.

First, some definitions are needed. A *moratorium* is defined as a "suspension of activity," or "an authorized period of delay or waiting." *Heritable* means "capable of being passed from one generation to the next." Additionally, *clinical* can refer to a "scientifically detached" attitude or "the observation and treatment of patients directly." Each of these definitions is important.

The proposed moratorium is a global one, but the authors stipulate this is not a call for a permanent ban. The moratorium is for all "clinical uses of human germline editing — that is, changing heritable DNA (in sperm, eggs, and embryos) to make genetically modified children." The moratorium would allow time for "discussions about the technical, scientific, medical, societal, ethical and moral issues that must be considered before germline editing is permitted . . ." This would presumably result in an "international framework" for heritable human genome editing. It should be noted that the authors do not call for a moratorium on "germline editing for research uses." They are very clear about this exception.

Why should research on germline editing be exempt from a moratorium? Perhaps because four of the five authors are scientists involved in such research?

1. Eric S. Lander, Ph.D., is head of the Broad Institute, which bridges MIT and Harvard. He trained in genetics, molecular biology, and mathematics, and was "a principal leader of the Human Genome Project."
2. Feng Zhang, Ph.D., is one of the inventors of CRISPR.
3. Emmanuelle Charpentier, Ph.D., trained in microbiology and biochemistry, is co-founder of CRISPR Therapeutics.
4. Paul Berg, Ph.D., well-known for his work in recombinant DNA, is a Nobel Laureate.

The fifth author, Françoise Baylis, Ph.D., is a professor of bioethics and philosophy at Dalhousie University in Canada. She has a forthcoming book, *Altered Inheritance*, from Harvard University Press. Her earlier writing, however, is informative. In 2004, she, with Jason Scott Robert, penned a paper entitled, "The Inevitability of Genetic Enhancement Technologies," which stated in part:

> The typical response to the development and use of enhancement technologies involves a complex mix of outright 'condemnation' and what might be described as 'passive-aggressive resignation.' Policy statements and legislative or regulatory prohibitions are introduced with full knowledge (and acceptance) of the fact that these 'barriers' will not be entirely effective. The overarching pragmatic goal is not to stop the development and use of a specific technology, but rather to slow and possibly to steer basic and applied research . . . in practice the prohibitions are at most containment initiatives or speed bumps.

Baylis and Robert concluded that, even though the development and use of genetic enhancement technologies might be "fraught with moral peril," the embrace of such technologies was sure. They cited a number of possible reasons, but concluded with this chilling one: "because this is our destiny chosen by those among us who are intent on achieving self-actualisation by controlling the human evolutionary story."

The message of this moratorium is clear: don't do anything rash, like modify the human genome and bring that child/those children to birth. But do let us continue full steam ahead. After all, it is our destiny to turn future generations into scientific experiments.

There is another view. It is a view that does not comport well with such "moratoria as speed bumps" philosophy along the way to full embrace of technological hubris. It is a view that sees such self-actualisation described by Baylis and Robert as a poverty of thought and consideration. Would any of the authors or signatories on the *Nature* commentary desire to be someone else's experiment? That is highly unlikely. Yet, they are willing to make any number of succeeding generations their own experiment. C. S. Lewis was prescient when he wrote in *The Abolition of Man*, " . . . the power of Man to make himself what he pleases means . . . the power of some men to make other men what *they* please . . . we shall get at last a race of conditioners who really can cut out all posterity in what shape they please."