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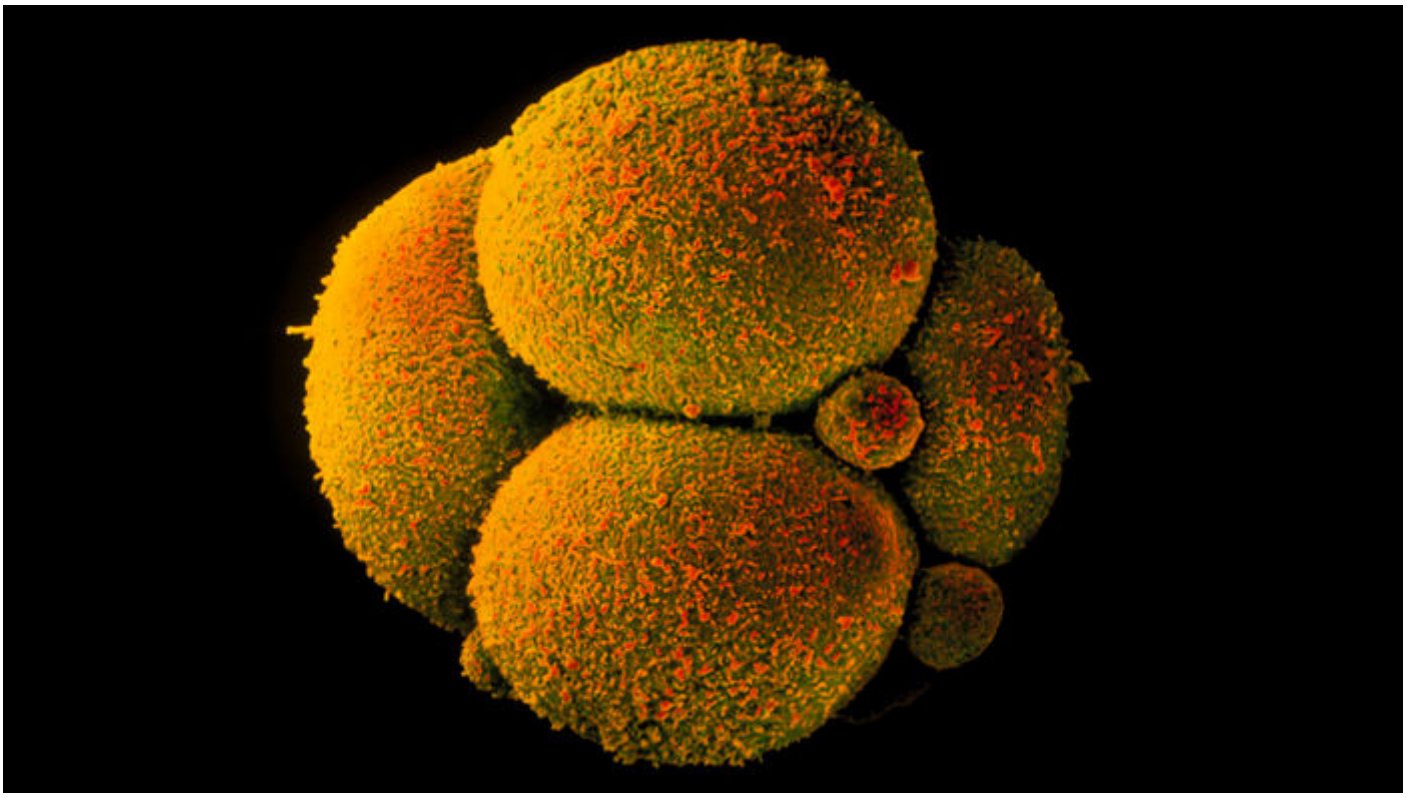

A new report says that editing the DNA of a human embryo (above) could be ethically acceptable.

Dr. Yorgos Nikas/Science Source

U.S. panel gives yellow light to human embryo editing

By **Jocelyn Kaiser** | Feb. 14, 2017 , 11:00 AM

Editing the DNA of a human embryo to prevent a disease in a baby could be ethically allowable one day—but only in rare circumstances and with safeguards in place, says a widely anticipated report released today.

The **report** from an international committee convened by the U.S. National Academy of Sciences (NAS) and the National Academy of Medicine in Washington, D.C., concludes that such a clinical trial "might be permitted, but only following much more research" on risks and benefits, and "only for compelling reasons and under strict oversight." Those situations could be limited to couples who both have a serious genetic disease and for whom embryo editing is "really the last reasonable option" if they want to have a healthy biological child, says committee co-chair Alta Charo, a bioethicist at the University of Wisconsin in Madison.

Some researchers are pleased with the report, saying it is consistent with previous conclusions that safely altering the DNA of human eggs, sperm, or early embryos—known as germline editing—to create a baby could be possible eventually. "They have closed the door to the vast majority of germline applications and left it open for a very small, well-defined subset. That's not unreasonable in my opinion," says genome researcher Eric Lander of the Broad Institute in Cambridge, Massachusetts. Lander was among the organizers of an international summit at NAS in December 2015 who called for more discussion before proceeding with embryo editing.

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But others see the report as lowering the bar for such experiments because it does not explicitly say they should be prohibited for now. "It changes the tone to an affirmative position in the absence of the broad public debate this report calls for," says Edward Lanphier,

One advocacy group opposed to embryo editing goes further. "We're very disappointed with the report. It's really a pretty dramatic shift from the existing and widespread agreement globally that human germline editing should be prohibited," says Marcy Darnovsky, executive director of the Center for Genetics and Society in Berkeley, California.

Growing debate

Modifying human DNA in ways that could be passed on to future generations has long been considered ethically off limits and is banned in many countries. But new DNA editing tools, such as CRISPR, that make genome modifications much easier have revived the discussion. In April 2015, researchers in China **reported that they had used CRISPR, with limited success, to repair a disease-causing gene in human embryos**. Although the researchers used defective embryos and had no intention of implanting them in a woman's uterus, the work sparked fears that designer babies were around the corner.

The controversy led to **the 2015 NAS summit**, where organizers concluded that "it would be irresponsible to proceed with any clinical use of germline editing" without more research on safety and societal discussion. The science and medicine acadmies then formed an international committee to look more closely at the science and ethical issues.

The committee's report finds that human embryo editing may be acceptable to prevent a baby from inheriting a serious genetic disease—but only if specific safety and ethical criteria are met. For example, the couple cannot have "reasonable alternatives," such as the option of selecting healthy embryos for in vitro fertilization (IVF) or using prenatal testing and aborting a fetus with the disease. One situation that could meet the report's criteria would be if both parents have the same disease, such as cystic fibrosis, that is caused by carrying two copies of a mutation, the report says. In that case, an embryo will also carry the harmful mutations.

Still, the panel says that strict government oversight should be in place to prevent anyone from using germline editing for other purposes, such as to give a baby desirable traits. "They want to put friction tape on the slope so the slope isn't slippery," Lander says.

Shift or status quo?

Biologist David Baltimore of the California Institute of Technology in Pasadena, who chaired the organizers of the 2015 NAS summit, says the report's recommendations essentially codify what the summit committee concluded based on the views of researchers and others. The report's authors are "in a not very different position than we were in," except that the report explicitly spells out criteria for allowing an embryo editing trial.

But Darnovsky says the report "opens the door" to embryo editing. She is concerned that once regulators have approved an embryo editing treatment for a serious disease, IVF clinics will feel free to use it to select embryos with desirable traits. She disagrees with a suggestion in the report that the criteria are so stringent that they could "have the effect of preventing all clinical trials involving germline genome editing." The report itself acknowledges that the criteria are "necessarily vague" and open to interpretation.

Like other bodies that have recently reviewed CRISPR and older genome editing methods, the committee also endorsed basic research using embryo editing to study areas such as early human development. The **United Kingdom** and **Sweden** have both approved such experiments, which do not involve implanting embryos with the aim of producing a baby. Currently, such experiments cannot be done with federal funding in the United States because of a congressional prohibition on using taxpayer funds for research that destroys human embryos. Congress has also banned the U.S. Food and Drug Administration from considering a clinical trial of embryo editing.

As for gene editing in patients' cells that aren't inherited, clinical trials are already underway for HIV, hemophilia, and leukemia. The committee found that existing regulatory systems for gene therapy are sufficient for overseeing such work. Genome editing should "not proceed at this time" for enhancement, such as to increase a healthy person's muscle strength or lower their cholesterol levels, the panel said. However, it said discussions should continue. The academies are helping to organize another international summit in China later this year to further discuss the issues.

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Jocelyn Kaiser
Jocelyn is a staff writer for *Science* magazine.
Email Jocelyn

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