Designing Life: Should Babies Be Genetically Engineered?

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NEW YORK — The increasing power and accessibility of genetic technology may one day give parents the option of modifying their unborn children, in order to spare offspring from disease or, conceivably, make them tall, well muscled, intelligent or otherwise blessed with desirable traits.

Would this change mean empowering parents to give their children the best start possible? Or would it mean designer babies who could face unforeseen genetic problems? Experts debated on Wednesday evening (Feb. 13) whether prenatal engineering should be banned in the United States.

Humans have already genetically modified animals and crops, said Sheldon Krimsky, a philosopher at Tufts University, who argued in favor of a ban on the same for human babies. "But in the hundreds of thousands of trails that failed, we simply discarded the results of the unwanted crop or animal."

Unknown consequences

Is this a model that society wants to apply to humans, making pinpoint genetic modifications, only to "discard the results when they don't work out?" Krimsky asked during an Intelligence Squared Debate held in Manhattan. He added that assuming no mistakes will occur would be sheer hubris.

He and fellow ban proponent Lord Robert Winston, a professor of science and society and a fertility expert at Imperial College in London, focused on the uncertainty associated with the genetic underpinnings of traits. The two also addressed the consequences of manipulating genes.

"Even [for] height, one of the most heritable traits known, scientists have found at least 50 genes that account for only 2 to 3 percent of the variance in the samples," Krimsky said. "If you want a tall child, marry tall."

Mother Nature doesn’t care

Meanwhile, their opponents, who opposed the ban, talked of empowering parents to give their children a healthy life, even if it meant giving their offspring traits they themselves could not pass down.

Lee Silver, a professor of molecular biology and public policy at Princeton University, urged the audience members to look at someone sitting next to them.

"That person and you differ at over 1 million locations in your DNA [deoxyribonucleic acid]. Most [of these variations] don't do anything," Silver said. "[But] even if you are a healthy adult, 100 [of these] can cause deadly childhood disease in your children or grandchildren."

"Mother Nature is a metaphor," he continued. "And it is a bad metaphor, because in reality inheritance is a game of craps … It won't have to be that way in the future."

His fellow ban opponent, Nita Farahany, a professor of law and of genome sciences and policy at Duke University, attacked the idea that uncertainty should prevent the use of the technology, pointing out that reproduction, completely unaided by technology, involves much uncertainty.

"We are not going to ban natural sex," Farahany said.

Already possible

A significant portion of the debate focused on a particular technology known as mitochondrial transfer. While the majority of DNA resides in a cell's nucleus, a small amount is contained in the cell's energy factories, called mitochondria. This mitochondrial DNA is passed from mother to child. In rare cases, women have mitochondrial defects they can pass down to their children, causing devastating problems or even death.

Mitochondrial transfer can replace such defective mitochondrial DNA with that from a donor, allowing affected mothers to avoid passing these defects on to their children, who then carry genetic material from three parents (the father and two mothers, including the donor).

Opponents of a ban argued it would prevent women with mitochondrial disorders from having healthy children of their own.

"I am not here to defend every type of genetic engineering. I don't think we are ready as a society to embrace it all," Farahany said.

Rather than an outright ban, she and Silver argued for a middle ground, which would allow for certain procedures once they had been shown to be safe and effective. An emerging scientific consensus says mitochondrial transfer would fit into this category, she said.

Winston disagreed.

"We know fiddling with mitochondrial DNA may make a massive difference to what happens to nuclear DNA. … Abnormal children have been born as result of mitochondrial transfer," he said. "I think, in preventing one genetic disease, you are likely to cause another genetic disease."

Society should instead focus on the enormous importance of environmental influences in health, Winston said. "What we should be trying to do, rather than risk making abnormal babies, is to improve the environment so the DNA functions in the best possible ways."

Neither Farahany nor Silver argued in favor of allowing parents to modify their children to ensure other traits that are less medically necessary, but nevertheless desirable, such as higher intelligence or blue eyes.

"What I think parents care about most is promoting the health of their children," Silver said.

Leading to eugenics?

Both sides referred to the specter of eugenics, an idea embraced by the Nazis, which holds that selective breeding can be used to improve the human race.

Winston and Krimsky pointed out that genetically modifying children to choose desirable traits evoked this approach. Meanwhile, Farahany noted that some of the worst abuses of government in recent history involved attempts to control reproduction. How would a ban on the genetic modification of children be enforced, she asked, would all babies be forcibly tested?

An audience vote declared the opponents of the ban the winners.