

Genetics: How Far Is Too Far?

Engineers are almost always praised for the difficult work they do. NASA, Apple, IBM Microsoft, Google, and many more big companies are all anyone talks about lately in the age of technology. However, science is definitely no rookie when it comes to controversy, which is exactly what genetic engineering in human embryos is causing. Beginning with the use of [GMOs](#), this controversy has been going on since the 90s, but progressed further once the modifications extended to human genes.

What is it?

[Genetic engineering](#) is the process of modifying a substance's [genome](#) in order to benefit it in some way. This is done by combining the DNA from that organism with DNA from a totally different organism and replacing the 'bad genes' with 'good genes' from this new organism. Genetic engineering in humans has the potential to cure diseases, which is why there has been a push towards learning how to do this correctly and safely by geneticists, biologists, and engineers.



["DNA Biology Medicine Gene Microbiology Analysis"](#). 2013 via pixabay. CC0 Public Domain License.

Who is involved?

Unlike many other controversial topics where certain individuals who advocate their point of view are known, this controversy is between basically everyone in the science community. Biochemists, biologists, geneticists, biomedical engineers, and genetic engineers all are qualified to have valid opinions on this topic because they work with this stuff every single day. *Nature* has published many articles, including [this one](#) in a Q&A format with people who have used Crispr, the name of the process of planting DNA into embryos. Just a warning...it's quite a lengthy article with opinions from over 20 scientists; read only if you are *very* interested. According to a study led by students (Azar, Fazli, Firoozian, Helali, Nami, Zadeh) at the Islamic Azad University, “[the] people information rate about genetic science and [the] attitude of different people in respect to cloning [genetic engineering] is very little”. This could be the reason why the general public doesn't have as much of a voice in this controversy; they are uninformed and don't know much about it.

Why is this a controversial topic?

This topic is so controversial because a huge [list of questions](#) come up because of it; the risks, the long term effects, the loss of family genes/traits, etc. The term '[designer babies](#)' began to be thrown around in reference to babies that have had their genome modified before birth. Many began to wonder if this would make it become okay to choose the sex, hair color, eye color, personality traits, and physical traits of their unborn child. That caused an uproar because it is seen as so taboo and unethical to be able to literally design the perfect baby you want.



Tanamal, Krish. "[Rainbow Babies](#)". 2/16/09 via Deviant Art. Attribution 3.0 License.

All of these traits have always been seen as kind of sacred; you should love your child no matter what color hair they have or how tall they are. That's why people get scared and passionate about gene engineering...they feel as though we're meddling with things that should happen naturally. In a way it is seen by some as dehumanizing the birth of a human, meaning it can't be human if something was altered to make it more perfect. Humans are imperfect. Perfection can be scary for some, especially when it is believed that no one is or should be perfect.

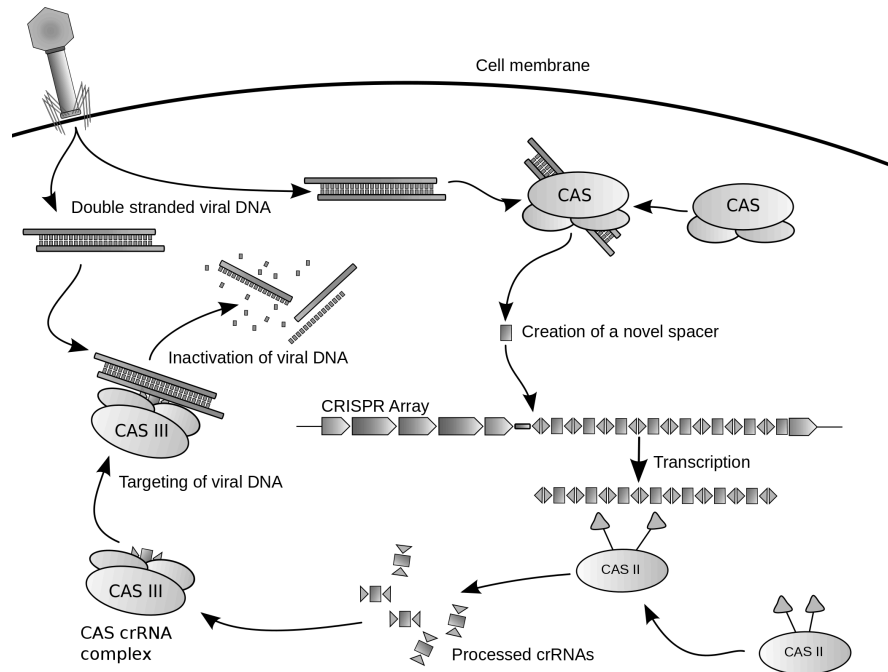
Where is this happening?

The most recent place this has happened was in China in May of this year. A team of Chinese scientists led by Junjui Huang at Sun Yat-sen University in Guangzhou had successfully modified the gene that is known to cause beta-thalassaemia, a blood disorder. The modified embryos were purposefully "abnormal and incapable of developing into healthy babies and would have been destroyed by the clinics" (Sample). The main point is that they were able to implant correct DNA without destroying the embryos.



["Guangzhou Sun Yat-sen University"](#). 5/27/06 via wikipedia. Creative Commons License.

[Crispr](#), the technology that makes this possible, was co-invented by microbiologist Dr. Jennifer Doudna of the University of California-Berkeley three years ago. Below is a diagram of how this technology could work (actual diagrams are not available for public reuse at this time).



Atmos, James. ["Diagram of the possible mechanism for CRISPR"](#). 9/15/09 via wikipedia. Attribution 3.0 License.

One side vs. the other

As stated before, hundreds of different scientists are involved in the controversy at hand. When asked about what's going on with genetic engineering in humans, Dr. Doudna reported, "Although [modifying human embryos] has attracted a lot of attention, the study simply underscores the point that the technology is not ready for clinical application, and that application of the technology needs to be on hold pending a broader societal discussion of the scientific and ethical issues surrounding such use".

Based on Doudna's words, until further testing is done, the entire scientific community does not agree with, support, or applaud the modifying of human embryos. It's interesting because she was one of the inventors of the technology that made this possible, so the fact that she is advocating a strict moratorium on the technology says a lot. It makes you wonder; what could be so wrong with the technology if the inventor herself advises not to use it?



Werther, Jacopo. "[A workbench in a chemistry laboratory](#)". 3/20/09 via wikipedia. Attribution 2.0 License.

Dartmouth ethics Professor Ronald M. Green, in favor of human genetic engineering, argues "knowing more about our genes may actually increase our freedom by helping us understand the biological obstacles-and opportunities-we have to work with...we could use gene-targeting techniques to tweak fatal DNA sequences [obesity]. The same is true for cognitive problems [dyslexia]...Why should a child struggle with reading difficulties when we could alter the genes responsible for the problem?". So, on the other hand, the professor wonders why helping children would be such an ethical issue if all they'd be doing is eliminating a bad gene.

When it comes down to it, no one really knows for sure how far genetic engineering in humans will go until it crosses the line it wasn't supposed to cross. That's a big part of why there are fears of losing the tradition of just having a child and loving him or her for what they were born to be. People don't like the idea of tampering with fate and that's a big part of the reason this is so taboo.

Why Should We Care?

Whether you like it or not, genetic engineering in humans is coming and it will sooner or later affect our lives personally. And then it will affect the next generation and the one after that and the one after that, etc. Science is the future. The technology has already been created and tested several times and it was finally a success. Not everyone is against this idea so people will absolutely start looking into it. Just because some are scared doesn't mean this will stop.