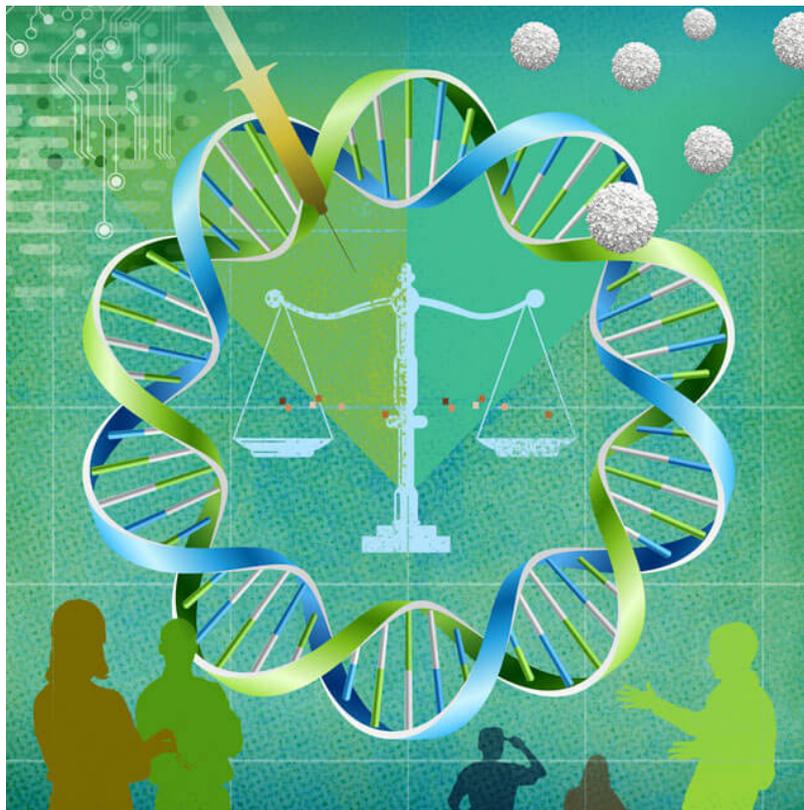




# International Bioethics Committee



**Mitchell Yang & Christopher Leung**



## Table of Contents

Letter from Your Chairs	1
How to Use This Guide	2
How to Write a Position Paper	3
<u>General Background</u>	4
<u>Topic A: Genetic Modification</u>	7
I. What is Genetic Modification?	8
II. The History of Genetic Modification	9
III. Support for GM Foods and Crops	10
IV. Opposition to GM Foods and Crops	11
V. Genetic Modification of Animals	12
VI. Accessibility of Genetic Modification	13
VII. Genetically Modifying Human Embryos	13
VIII. Why is this an Urgent Topic?	15
IX. Relevant NGOs and Third-party Organizations	15
X. Questions to Consider:	16
XI. Helpful Links	16
<u>Positions</u>	17

## Letter from Your Chairs

Hello delegates!

Hi and welcome to HMUNC! My name is **Mitchell Yang** and I am a sophomore at Herricks. This is my second year being a part of Model UN and I have been to two college conferences. Being a part of Model UN and attending conferences in my opinion is an excellent way to gain perspective of countries in the international community, and learn more about the current world we live in. Outside of Model UN, I love spending as much time as I can with friends, and when I can't I love binge watching shows. I hope you all will enjoy our simulated debate about genetic modification, and I can't wait to meet all of you at HMUNC!

My name is **Christopher Leung** and I am thrilled to chair you all at this year's HMUNC. I am a junior at Herricks High School and this is the second year I've participated in MUN and the second year I'll be chairing for HMUNC. I'm a part of my school's Asian American Cultural Club and Chess club. I am also a member of our community's Boy Scout's troop and a part of New Daft, an student-led online news organization, SOAR, an international student-led organization which teaches english to refugees, and Redefy New York, an international student-led organization that focus on promoting social justice through grass roots organizations. I like listening to music, playing video games, biking, and hanging out with my friends.

## How to Use This Guide

As your chairs, we have spent a lot of time writing and gathering research in order to create the best possible guide to help you in your research and preparation for debate. We hope that you take some time to read this, as it is a helpful guideline to the topics you will be discussing in debate as well as your potential solutions. This background guide should be the main source of information that you use to prepare for our conference!

This background guide is filled with important statistics and subtopics that you may use in debate, and it provides delegates with a holistic understanding of our topic, Genetic Modification. This background guide will help you understand the basic issues; it is your job to be creative and figure out unique and effective solutions. To help guide you in the process of writing your position papers, there are questions to consider at the end of every topic as well as descriptions of your position at the end of the background guide! We look forward to hearing the ideas that you bring to the table! The purpose of this committee includes establishing guidelines and a creation of a code of ethics for genetic modification of different organisms, with the big question in mind: is genetic modification ethical to be used on humans?

Sincerely,

Your chairs,

Chris and Mitchell

P.S. Feel free to email us at [bioethics.hmunc16@gmail.com](mailto:bioethics.hmunc16@gmail.com) if you have any questions, or would like to introduce yourself before committee!



## How to Write a Position Paper

Delegates are required to write at least ONE position paper that addresses one topic. Position papers do not need to *be longer than one page* and must be written in Times New Roman, font size 12, and with standard margins. Position papers should follow the format below:

### **Paragraph 1:**

- Who is your character? What is his or her stance on genetic modification or bioethics?
- What job position does your character hold? How is this significant?
- What political party/organizations are you affiliated with? What does this mean for your beliefs and who you support?
- What is your personal philosophy or beliefs? What does your character stand for?

### **Paragraph 2: What Happened In The Past**

- What have you done previously? Be SPECIFIC!
- List any important actions or statements your character has/made.
- Explain why this is important and how this shows your character's beliefs.
- Has your position/stance on genetic modification changed in any way? If so, why?

### **Paragraph 3: What Do You Want To Do Going Forward**

- What does your character want to do? How will they fix the problem and find a solution?
- List a few goals in committee that your character may want to accomplish.
- How are you going to specifically achieve these goals?
- Who do you plan on allying with in this committee? Who do you plan on being against?



**\*For Herricks Delegates: In order to receive extra credit in your Social Studies class, you must submit a position paper.**

**\*\*For All Delegates: In order to be eligible for awards, you must submit a position paper.**

**All position papers are due by May 26th and must be e-mailed to:**

[bioethics.hmunc16@gmail.com](mailto:bioethics.hmunc16@gmail.com)

## General Background

### What is the International Bioethics Committee?



The **International Bioethics Committee (IBC)** is a part of the United Nations Educational, Scientific and Cultural Organization (UNESCO). The IBC is a panel of scientists who track and document progress in the field of life sciences. It has monitored and assessed the use of ethical medicines since its founding. Its mission is to

**apply scientific discoveries to the human population in ways that respect human dignity and freedoms.**

This **branch of UNESCO** was created with the passing of **Resolution 27 C/5.15** on November 15, 1993, to record and study progress in the world of life sciences, and to study how new advancements could be ethically applied to the

**Bioethics:** the ethics or moral principles surrounding medical and biological research

**Human genome:** the complete set of nucleic acid sequences for humans, encoded as DNA within the 23 chromosome pairs.

human population.<sup>1</sup> The organization's primary purpose is to be an international instrument for the protection of the human genome.<sup>2</sup>



### What has the International Bioethics Committee done in the past?

The IBC's first international human rights treaty, ***The Universal Declaration on Human Genome and Human Rights***, was adopted in 1997 to protect

human genomes from improper and unethical modifications, and prevent anyone from being “subjected to discrimination based on genetic characteristics.”<sup>3</sup> In 2003, the ***International Declaration on Human Genetic Data*** was issued as an extension to discuss confidentiality and anonymity of genetic data, and the prevention of genetic discrimination.<sup>4</sup> The third instrument was the ***Universal Declaration on Bioethics and Human Rights*** created in 2005. This declaration provides “a universal framework of principles and procedures to guide States in the formulation of their legislation, policies or other instruments in the field of bioethics” and promotes “respect for human dignity and protect human rights” for the use of medicines.<sup>5</sup>

### What is the International Bioethics Committee currently working on?

The IBC is working with the **World Commission on the Ethics of Scientific Knowledge and Technology**



<sup>1</sup>International Bioethics Committee (IBC)." *Unesco.org*, en.unesco.org/themes/ethics-science-and-technology/human-genome-and-human-rights. Accessed 28 Mar. 2021.

<sup>2</sup>Universal Declaration on the Human Genome and Human Rights." *Unesco.org*, 11 Nov. 1997, en.unesco.org/themes/ethics-science-and-technology/human-genome-and-human-rights. Accessed 28 Mar. 2021.

<sup>3</sup>Universal Declaration on the Human Genome and Human Rights." *UNESCO.ORG*, 11 Nov. 1997, portal.unesco.org/en/ev.php-URL\_ID=13177&URL\_DO=DO\_TOPIC&URL\_SECTION=201.html. Accessed 28 Mar. 2021.

<sup>4</sup>International Declaration on Human Genetic Data." *UNESCO.ORG*, 16 Oct. 2003, portal.unesco.org/en/ev.php-URL\_ID=17720&URL\_DO=DO\_TOPIC&URL\_SECTION=201.html. Accessed 28 Mar. 2021.

<sup>5</sup>Universal Declaration on Bioethics and Human Rights." *UNESCO.ORG*, 19 Oct. 2005, portal.unesco.org/en/ev.php-URL\_ID=31058&URL\_DO=DO\_TOPIC&URL\_SECTION=201.html. Accessed 28 Mar. 2021.



**(COMEST)** to find efficient ways to distribute the COVID-19 vaccine. The partnership has “called for a change of course in current COVID-19 vaccination strategies, urging that vaccines be treated as a global public good to ensure they are made equitably available in all countries, and not only to those who bid the highest for these vaccines.”<sup>6</sup> In addition, in their latest press release, The IBC and COMEST have been creating a proper understanding of the bioethical effects that COVID-19 has on the world and spreading public awareness of these changes.

---

<sup>6</sup>“UNESCO Calls for COVID-19 Vaccines to Be Considered a Global Public Good.” *UNESCO*, 24 Feb. 2021, [en.unesco.org/news/unesco-calls-covid-19-vaccines-be-considered-global-public-good](https://en.unesco.org/news/unesco-calls-covid-19-vaccines-be-considered-global-public-good). Accessed 28 Mar. 2021.

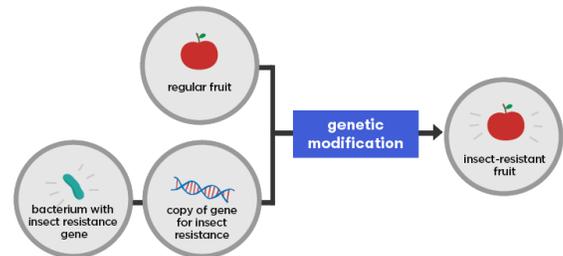
## Topic A: Genetic Modification



## What is Genetic Modification?

Genetic modification, also known as genetic engineering, genetic recombination, or genetic manipulation, has existed for almost 50 years. **Genetic modification is the process of manipulating or**

**changing an organism's DNA and characteristics.** The process of genetic modification is not easy to grasp, but a great example is Humulin, a type of insulin. A small piece of circular DNA (plasmid) is first extracted from a bacteria or yeast cell, then the gene for human insulin is inserted where the plasmid once was. After this, the genetically modified plasmid is introduced into another bacteria cell, where it rapidly divides and creates even more insulin. This sample is then fermented in order to maximize the nutrients in the insulin, and distributed to diabetes patients.<sup>7</sup>



**Genetics:** the study of heredity and the variation of inherited characteristics

**Ethics:** moral principles that govern a person's behavior or the conducting of an activity.

## The History of Genetic Modification

The use of genetic modification dates back to 1973. Before that, there was speculation about the possibilities of rearranging genes. In 1968, Swiss microbiologist Werner Arber discovered restriction enzymes, which function as DNA-cutting enzymes<sup>8</sup>. A few years later, American biochemists Herbert Boyer and Stanley Cohen were credited as the first to genetically

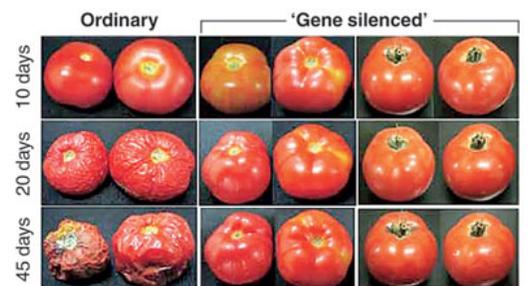


Image shows three sets of tomatoes. The ordinary control tomatoes (extreme left) soften and shrivel up, while texture of gene-silenced tomatoes remains intact for up to 45 days.

Photo credit: Asis Datta, Subhra Chakraborty, National Institute of Plant Genome Research, New Delhi

<sup>7</sup> "What Is Genetic Engineering?" *Facts*, The Public Engagement Team at the Wellcome Genome Campus, 17 Feb. 2017, [www.yourgenome.org/facts/what-is-genetic-engineering](http://www.yourgenome.org/facts/what-is-genetic-engineering).

<sup>8</sup> Britannica, T. Editors of Encyclopaedia. "Genetic Engineering." Encyclopedia Britannica, May 22, 2020. <https://www.britannica.com/science/genetic-engineering>.

modify an organism, inserting DNA from one bacteria into another<sup>9</sup>. In 1982, human insulin became the first consumer GMO (genetically modified organism) product approved by the U.S. Food and Drug Administration, and in 1994, genetically modified foods were first available on the market<sup>10</sup>. Today, many foods, produce, and livestock have been genetically engineered to benefit consumers and companies.

## Support for GM Foods and Crops

In a world always technologically advancing, GM (genetically modified) foods and crops are grown and distributed on increasingly larger

scales. **Genetic engineering in crops makes them**

**fresher, larger, and more appealing to consumers.**

**Many crops have also been engineered to be insect resistant, herbicide tolerant, drought tolerant, and**

**virus resistant.** Currently, 28 countries use GM

seeds to grow four major crops: soybeans, corn, cotton, and canola. Globally, 51% of soybeans, 31% of corn, 13% of cotton, and 5% of canola come from genetically modified seeds.<sup>11</sup> The United States leads in this production, using 70.9 million hectares of land to produce GM crops for consumption. Although the US grows a large percentage of the GM crops, Brazil (44.2 million hectares), Argentina (24.5 million hectares), India (11.6 million hectares), and Canada (11 million hectares) are also large producers of GM crops.<sup>12</sup>



FIGURE 1. GLOBAL AREA OF BIOTECH CROPS, 1996 TO 2018 (MILLION HECTARES).  
Source: ISAAA, 2018

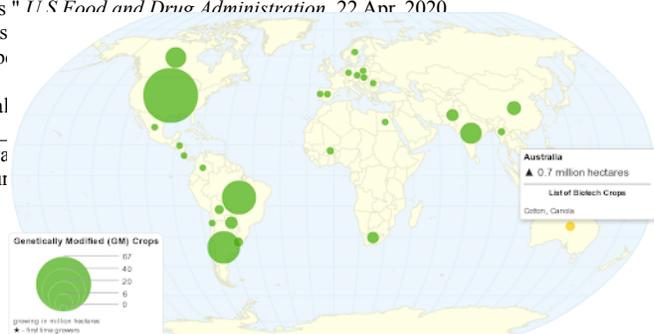
<sup>9</sup>"Science and History of GMOs and Other Food Modification Processes" *U.S. Food and Drug Administration*, 22 Apr. 2020.

<sup>10</sup> [www.fda.gov/food/agricultural-biotechnology/science-and-history-gmos](http://www.fda.gov/food/agricultural-biotechnology/science-and-history-gmos)  
Herbert%20Boyer%20and%20human%20insulin%20to%20treat%20diab-

<sup>10</sup> Ibid.

<sup>11</sup> George Silva, Michigan State University Extension. "Global Genetically Modified Crops," Mar. 2021, [www.canr.msu.edu/news/global\\_genetically\\_modified\\_crops](http://www.canr.msu.edu/news/global_genetically_modified_crops).

<sup>12</sup> Royal Society. "What GM Crops Are Being Grown and Where?," [royalsocietypublishing.org/royalsocietypublishing.org/topics-policy/projects/gm-plants/what-gm-crops-are-cu](http://royalsocietypublishing.org/royalsocietypublishing.org/topics-policy/projects/gm-plants/what-gm-crops-are-cu)



GM crops help feed families across the world and are generally cheaper than organic or sustainable crops (crops that do not damage the environment). GM crops are meant to be grown as efficiently as possible, and minimize the use of land, water and pesticides when growing them. Since less resources are used, these crops can be sold at cheaper prices to the public. Some GM crops like corn and soybean may be 15% to 30% cheaper than the organic versions.<sup>13</sup>

## Opposition to GM Foods and Crops

As demand for GM foods increases, there is also growing opposition to the use of GMOs. For example, the Non-GMO Project looks for ways to reduce the use of genetically modified foods, and proposes missions of “offering rigorous product verification and trustworthy education that empowers people to care for themselves, the planet, and future generations<sup>14</sup>.” By reducing the use of GM foods, crop growers preserve organic seeds and plants and “restore traditional seed breeding and the right of farmers to save and plant their own seeds and grow varieties of their choice<sup>15</sup>.”



Many GMOs have been banned or strictly regulated as dangers to the environment. Herbicides like Roundup contain a chemical called glyphosate, which can be harmful and potentially carcinogenic to humans<sup>16</sup>, as well as local ecosystems and wildlife.

<sup>13</sup> Kennedy, Madeline, and Samantha Cassetty. “Evidence-Based Pros and Cons of GMO Foods.” *Insider*, Insider, 20 Nov. 2020, [www.insider.com/gmo-pros-and-cons#:~:text=GMOs%20are%20usually%20cheaper.,lower%20prices%20for%20GMO%20foods](http://www.insider.com/gmo-pros-and-cons#:~:text=GMOs%20are%20usually%20cheaper.,lower%20prices%20for%20GMO%20foods).

<sup>14</sup>“Mission.” *The Non-GMO Project*, [www.nongmoproject.org/about/mission/](http://www.nongmoproject.org/about/mission/). Accessed 12 Apr. 2021.

<sup>15</sup> *Ibid*.

<sup>16</sup>Cassidy, Emily. "Are GMOs Bad for the Environment?" *Environmental Working Group*, 9 Mar. 2016, [www.ewg.org/news-insights/news/are-gmos-bad-environment#](http://www.ewg.org/news-insights/news/are-gmos-bad-environment#)

GM crops cross-pollinate with other wild plants and non-genetically modified plants. Scientists have argued that GM crops can “contaminate” such plants and alter their genetic makeup, which can severely compromise organic and non-GMO farming industries. Other sources of contamination include accidental spread of GM seeds with the use of agrotechnology (technology and processes used in agriculture), or storage mix-ups due to human error<sup>17</sup>.

## Genetic Modification of Animals

Due to the challenges of genetically modifying live organisms, the genetic modification of animals is a more recent advancement. The primary usage of genetic modification in livestock is to decrease infections from naturally occurring diseases, increase the volume of food production,



and reduce the environmental impact of livestock.<sup>18</sup> There has been a fierce opposition to certain forms of animal genetic modification. For example, in the mosquito population, many males have been genetically modified so that when they mate with a female, their children cannot survive into adulthood, thus severely curbing the mosquito population.<sup>19</sup> Many critics have cited this application of genetic modification as the slow and torturous genocide of an entire species that, in the bigger picture, are of no serious threat to humanity or any other species.

There are two primary types of use for genetic modification. The first type is more practical. For example, when scientists genetically modified mosquitoes so that their offspring

<sup>17</sup> *GMOs - Environmental Concerns*, [www.gardenorganic.org.uk/gmos-environmental-concerns](http://www.gardenorganic.org.uk/gmos-environmental-concerns).

<sup>18</sup> “Genetically Engineered Animals: Frequently Asked Questions.” *BIO*, [archive.bio.org/articles/genetically-engineered-animals-frequently-asked-questions#:~:text=Genetic%20engineering%20of%20animals%20offers,of%20cutt](http://archive.bio.org/articles/genetically-engineered-animals-frequently-asked-questions#:~:text=Genetic%20engineering%20of%20animals%20offers,of%20cutt)

<sup>19</sup> Tucker, Ian. “Genetically Modified Animals.” *The Guardian*, 24 June 2018, [www.theguardian.com/environment/2018/jun/24/genetically-engineered-animals-the-five-controvers](http://www.theguardian.com/environment/2018/jun/24/genetically-engineered-animals-the-five-controvers)



have exponentially shorter life spans, it is to decrease the spread of diseases. The second type of genetic modification in animals is for food. GMOs can be found all over the food industry, from genetically modified salmon which age faster than normal to chickens genetically modified to be fatter and meatier.

### Accessibility of Genetic Modification

Surprisingly, genetic modification is widely available. The sale of gene editing kits online has allowed for genetic modification to become widespread. However, these “CRISPR” kits do have limits. CRISPR kits (Clustered Regularly Interspaced Short Palindromic Repeats) allow users to splice parts of DNA strands and genetically modify themselves or other human beings. CRISPR is an extremely new technology, so there are no regulations currently placed on its sale,



distribution, and use. As a result, the wide accessibility has allowed people to do testing on themselves despite the fact that use of these kits by non-professionals can be fatal. One of the major risks associated with non professional use of CRISPR kits is editing genes not intended to be modified

which can cause future health implications. CRISPR Kits are advertised as experimentation kits which offer owners a hands-on learning experience of genetic modification and splicing. They are also quite cheap with an average price of \$150 to \$200.<sup>20</sup>

### Genetically Modifying Human Embryos

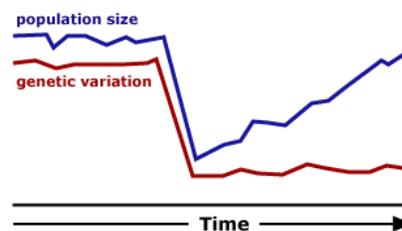
How ethical is genetically modifying a human embryo? In 2018, Chinese scientist He Jiankui announced



<sup>20</sup>Gene Editing: Last Week Tonight with John Oliver (HBO)." Youtube.com, uploaded by Le...  
www.youtube.com/watch?v=AJm8PeWkiEU. Accessed 12 Apr. 2021.

that twin baby girls were born with edited genomes<sup>21</sup>. Jiankui and his collaborators forged documents that misled doctors into implanting gene-edited embryos into women. As a result, he was sentenced to three years in prison, faced fines, and was fired by the university where he did his research<sup>22</sup>. All illegalities aside, we still face the question of whether embryos should be genetically modified, and either for medical purposes or to select for physical characteristics.

Designer babies, or babies genetically modified for their physical characteristics or heritable genes, are a concept that could become a reality in the future. Some people support genetically modifying babies because certain inheritable genes (such as genes that increase the susceptibility to HIV and diabetes) are considered to be



undesirable because they will make a person's life harder, or because we as a society have deemed them to be undesirable.<sup>23</sup> Although this may sound great in theory, there are **ethical and genetic reasons why this may be a problem**. Removing genes, like the ones that predispose people to diseases, will decrease the diversity in the “gene pool,” or the amount of genes within a population. This can lead to a population decrease and the occurrence of new mutations.<sup>24</sup> While the population of a species can steadily increase again, its genetic variation will not recover as fast.

Overall, the general public seemed to have mixed feelings about the use of genetic engineering on humans. In a recent survey, 72% of Americans agreed that changing a baby's gene to eliminate or treat a congenital disease is appropriate. 65% of Americans in a different

<sup>21</sup>Cyranoski, David. "The CRISPR-baby Scandal: What's Next for Human Gene-editing." *Nature*, 26 Feb. 2019, [www.nature.com/articles/d41586-019-00673-1](http://www.nature.com/articles/d41586-019-00673-1). Accessed 12 Apr. 2021.

<sup>22</sup>Normile, Dennis. "Chinese Scientist Who Produced Genetically Altered Babies Sentenced to 3 Years in Jail." *Science Magazine*, American Association for the Advancement of Science, 30 Dec. 2019, [www.sciencemag.org/news/2019/12/chinese-scientist-who-produced-genetically-altered-babies-sentenced-3-years-jail](http://www.sciencemag.org/news/2019/12/chinese-scientist-who-produced-genetically-altered-babies-sentenced-3-years-jail). Accessed 12 Apr. 2021.

<sup>23</sup>Pang, Ronald T.K., and P. C. Ho. "Designer Babies." *ScienceDirect*, 11 Feb. 2016, [www.sciencedirect.com/science/article/abs/pii/S1751721415300063](http://www.sciencedirect.com/science/article/abs/pii/S1751721415300063). Accessed 12 Apr. 2021.

<sup>24</sup>"Low Genetic Variation." *Understanding Evolution*, [evolution.berkeley.edu/evolibrary/article/0\\_0\\_0/conservation\\_04](http://evolution.berkeley.edu/evolibrary/article/0_0_0/conservation_04). Accessed 12 Apr. 2021.

survey believe that if genetic modification relied on embryonic testing, that would be too far<sup>25</sup>. Many surveys have also shown that Americans do not think it is ideal to use genetic engineering to make babies smarter.

### **Why is this an Urgent Topic?**

With such recent news about the advancements in genetic engineering, all of our lives will be influenced one way or another-not only through potential designer babies, but also about the food you eat or animals you encounter. Most importantly, the ethicality of genetically modifying human embryos has caused quite a stir between scientists and society as a whole. Although it has its pros and cons, ultimately it is up to you to decide the future of the use of genetic engineering on human embryos. Maybe one day you will have to decide for your own child whether or not to genetically modify them.

### **Relevant NGOs and Third-party Organizations**

- [The International Service for the Acquisition of Agri-biotech Applications \(ISAAA\)](#) is an international nonprofit organization that shares scientific knowledge and crop biotechnologies like GM seeds with farmers in developing countries. Their main goal is to achieve agricultural stability and sustainability.
- [The Non-GMO Project](#) is a U.S. based non profit organization that promotes and protects non-GMO food production. They host consumer education and outreach programs and provide support for Non-GMO Project retailers and brands.

---

<sup>25</sup> Funk, Cary, and Meg Hefferon. "Public Views of Gene Editing for Babies Depend on How It Would Be Used." *Pew Research Center*, 26 July 2018, [www.pewresearch.org/science/2018/07/26/public-views-of-gene-editing-for-babies-depend-on-how-it-would-be-used/](http://www.pewresearch.org/science/2018/07/26/public-views-of-gene-editing-for-babies-depend-on-how-it-would-be-used/). Accessed 7 May 2021.



- [The Genetic Literacy Project](#) is a nonpartisan nonprofit based in Ohio that promotes scientific and ethical regulations/laws concerning GMOs.
- [The European Network of Scientists for Social and Environmental Responsibility](#) is a nonprofit organization that promotes scientific research and protects humans and the environment from potentially negative effects of these emerging technologies. This organization often faces questions about the safety and potential issues that arise regarding genetic modification.
- [Bayer](#) is a Germany-based company that has acquired multiple companies involved in creating genetically modified seeds and plants (such as **Monsanto**). They work to provide solutions and biotechnologies to farmers struggling across the globe and maximizing the productivity and sustainability of their farms.

### **Questions to Consider:**

- What are the pros and cons of genetically modifying animals, humans, or plants?
- Do the cons outweigh the possible pros of genetic modification?
- Has genetic modification advanced far enough to be safely used in our foods?
- How would you define the ethicality of genetically modifying embryos?
- What limits do you think should be put on genetic modification, for plants, animals, and humans?
- How accessible do you think CRISPR kits should be to the public?
- Should the editing of the physical appearance of a baby be considered in genetic engineering and how could these designer babies affect the future population?

## Helpful Links

- [What Is Bioethics?](#)
- [What is bioethics?](#)
- [International Bioethics Committee \(IBC\)](#)

## Positions

### Albert Jonsen

Albert R. Jonsen has become known as one of the founding fathers in the field of bioethics. Jonsen co-founded the American Society for Bioethics and Humanities (ASBH) in 1998. From 1987 to 1999, he was Chairman of the Department of Medical History and Ethics at the University of Washington. In 2017, he was credited for his contributions to the field of bioethics and given the Henry Knowles Beecher Award for Contributions to Ethics and the Life Sciences. A pioneer in medical ethics, he has made decisions regarding involuntary treatment and involuntary commitment.



### He Jiankui

In 2018, Chinese biophysicist He Jiankui made international headlines after he announced to the world he created the first genetically modified babies to resist HIV infection. His research includes information on CRISPR, a genetic engineering technique for editing genomes of a living organism. He Jiankui worked as a professor at Southern University of Science and Technology in Shenzhen, China, but was later fired after the CRISPR controversy. In 2019, he was sentenced to three years in prison and fines totaling up to three million yuan.



### **Hugh Grant**

Hugh Grant was the CEO of Monsanto, an agrochemical company, from 2003 to 2018, when the company was acquired by Bayer. He attended the University of Glasgow, where he got degrees in agricultural zoology and molecular biology. Even throughout Monsanto's RoundUp controversy, Grant and the company had reduced its focus on chemicals and were in favor of biotechnology.



### **Denis Rebrikov**

Russian biologist and DNA specialist Denis Rebrikov made news headlines shortly after the CRISPR babies were born. Rebrikov worked at Pirogov Russian National Research Medical University. In June of 2019, he told the public that he was hopeful in continuing the use of genetic engineering, and intended to continue He Jiankui's work by experimenting on human embryos and working with genes affecting HIV transmission. In 2020, Rebrikov has announced gene editing a hearing loss mutation, so that a hearing baby is born to a deaf couple, but the international community of scientists have called for Rebrikov to halt his experiments as it is not safe yet.



### **Richard Oduor**

A plant geneticist from Kenyatta University, Richard Oduor focuses his research on modern biotechnology, mainly genetically modified crops. Oduor has degrees in molecular and cell biology, biotechnology, and biochemistry.



He believes that GM crops will be great in helping Kenya's agricultural industry. He is also a part of the World Intellectual Property Organization and chairs the Kenya University Biotechnology Consortium, a body of biotechnology experts that promote the safe use and application of modern biotechnology in Kenya.

### **Yongyuth Yuthavong**

A current member of the International Bioethics Committee, Yongyuth Yuthavong was the first president of Thailand's National Science and Technology Development Agency (NSTDA). He was also a former Minister of the Ministry of Science and Technology from 2006 to 2008. Yuthavong himself campaigned and proposed many ideas for many Thailand students and for genetic engineering and biotechnology, later one would become the National Genetic Engineering and Biotechnology Center, or BIOTEC.



### **Margaret Somerville**

Margaret Somerville is a Bioethics Professor at the University of Notre Dame Australia. In 1999, she was acting director of the McGill Centre for Medicine, Ethics and Law. She has received many rewards, including being the first recipient of UNESCO's Avicenna Prize for Ethics in Science in 2004.



Somerville has written many editorials for Catholic Weekly, and has voiced her opinions on the ethics and use of specific drugs and genetic engineering, where she has called CRISPR-cas9 ethically acceptable.

### **S. Matthew Liao**



S. Matthew Liao is an American philosopher that specializes in bioethics. He has studied at Princeton University and Oxford University, and is now an Affiliated Professor in Philosophy at New York University. He has been an editor to many works, including *The Right to be Loved*. While open to the theory of genetic engineering and modification, he has said in an interview that he was horrified to see the news of the CRISPR babies that were genetically modified in China 2018.

### **Haoyi Wang**

Haoyi Wang is a developmental biologist and has developed his own lab at the Chinese Academy of Sciences' Institute of Zoology in Beijing, China. He has worked on the development of many genome engineering techniques including the Calling Card method, TALEN-mediated genome editing, and CRISPR-mediated gene activation in human cells. After the CRISPR-babies were born, Wang said in an interview that extensive research needs to be done before genetic engineering in humans can be perfected. In addition, he also stated that individual countries should be able to move forward in the field of genetic modification on their own.



### **Derrick Aarons**

Currently a member of the International Bioethics Committee (IBC), Derrick Aarons is a family physician and consultant bioethicist. Aarons is also the Chief Executive Officer of the Health Professions Authority in the Turks and Caicos Islands. He is a graduate of the University of the West Indies and received his Masters in bioethics at the McGill Centre for Medicine, Ethics and Law. He has delivered hundreds of lectures and presentations to doctors, scientists, and healthcare



professionals throughout the Caribbean and has spoken for attorneys and high court judges in Jamaica.

### **Ames Dhai**

Ames Dhai is the Director of the Steve Biko Centre for Bioethics and is a professor of bioethics and law at Witwatersrand University in Johannesburg, South Africa. She is also a current member of the International Bioethics Committee. She is often credited with



presenting bioethics and human rights as an important part of health sciences in South Africa. Dhai has used her platform and is hopeful in collaborating with the international community in training and research projects in the field of bioethics.

### **Anne Forus**

As a current member of the International Bioethics Committee, Anne Forus has degrees in biochemistry and molecular biology from the University of Oslo in Oslo, Norway. She is a Senior Advisor at the Norwegian Directorate of Health. Forus has published books about the ethical issues related to assisted reproduction technology. She mainly focuses and works on the ethical, legal, and medical uses of biotechnologies in healthcare and biomedical research. She has also covered issues related to preimplantation genetic diagnosis and biobanks in research.



### **Allen Bale**



As the Director of Yale School of Medicine's DNA Diagnostic Lab, Allen Bale created the first pair of genetically engineered babies to be immune to HIV/AIDS back in 2018. In the past, Professor Bale has expressed his support in upholding the traditional ethical guidelines of genetic engineering as highlighted by Yale School of Medicine.

**Rebecca Brendel**

Professor Brendel has served as the Director of the Master's in Bioethics Program, the Assistant Professor of Psychiatry at Harvard Medical School, and as the Director of Law and Ethics at the Center for Law, Brain, and Behavior for Massachusetts General Hospital. During her career she has undertaken the responsibility of providing medical insight for MGH's inpatient guardianship team. In addition, she practices clinical and forensic psychiatry and has chaired on the ethics committees of the Massachusetts Medical and Psychiatric Societies and the American Academy of Psychiatry and the Law.



**Dominic Wilkinson**

Dominic Wilkinson is currently the Director of Medical Ethics and a Professor of Medical Ethics at the Oxford Uehiro Centre for Practical Ethics at Oxford University. In addition, he has published 3 books about bioethical and real life applications of bioethical standards including *Death or Disability? The 'Carmentis Machine' and Decision-Making for Critically Ill Children*, and *'Ethics, Conflict and Medical Treatment for Children'*. From 2011 to 2018 he was the Editor and Associate Editor of the Journal of Medical Ethics. During his career he has specialized in medicine, ethics, pediatrics, and bioethics.



### **Pamela Andanda**

An established researcher, Pamela Andanda is a member of the International Bioethics Committee and is a Professor of Law at the Oliver Schreiner School of Law, University of Witwatersrand in Johannesburg, South Africa. She is also an executive member of the Ethics, Law and Human Rights Working Group (ELH) of the African AIDS Vaccine Programme (AAVP). In recent years she has supervised two completion projects focused on bioethics and law, in which she has academic background in.



### **Constantinos Phellas**

Currently the Vice Rector for Faculty and Research at the University of Nicosia in Cyprus, Professor Phellas has spent nearly 20 years teaching and getting involved in research projects funded by the Cyprus Research Council, the United Nations Development Programme (UNDP), the European Commission and the Council of Europe. He has also served as the Executive Director of Research Unit in Behaviour & Social Issues at the University of Nicosia, Dean of the School of Humanities and as a consultant to various organizations including: the WHO, the European Commission, the Council of Europe, the ESF, the Belgian Science Policy Council and the Hellenic Quality Assurance and Accreditation Agency.



### **Misao Fujita**

Misao Fujita is a current member of the IBC. In her career, she has been an assistant professor at the Graduate School of Medicine, Department of



Biomedical Ethics, at the University of Tokyo, Japan. She has worked on many research topics including human-animal chimeric embryo research, genome editing, stem-cell therapies, and more. She is also a counselor of the Japan Association of Bioethics and the Ethics Committee of the International Society of Stem Cell Research.

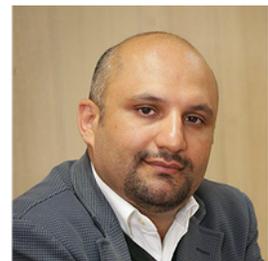
### **Paulina Onvomaha Tindana**

Serving as a Senior Lecturer at the University of Ghana School of Public Health, Dr. Tindana primarily focuses on the ethical, social, cultural and policy issues in public health, global health research and health systems research. During her career Dr. Tindana has paid special focus to the issue of the practical ethical issues arising in genetic/genomic research and biobanking in Africa. Throughout her career, Dr. Tindana has contributed to projects such as the Nuffield Council on Bioethics Report. Research in Global Health Emergencies: Ethical Issues (2020), Pregnant Women and Vaccines Against Emerging Epidemic threats.



### **Ehsan Shamsi Gooshki**

Ehsan Shamsi Gooshki is an Assistant Professor of Medical Ethics at Tehran University in Iran. He has worked as executive director of the Iranian Research Center for Ethics and Law in Medicine, and has taught multiple topics in medical ethics to graduate and undergraduate students. Gooshki is also a member of the International Bioethics Committee.



### **Hervé Michel Chneiweiss**



Herve Michel Chneiweiss is a current member of the IBC, but has a degree and specializes in neurology. He is currently the Director of Neuroscience Research at the Institute of Biology Paris Seine (IBPS) and was a former member of the National Advisory Ethics Committee for the Life Sciences. In the field of bioethics, he has made contributions in stem cell and regenerative medicine.

**Nancy Kass**

Nancy Kass is the Vice Provost for Graduate and Professional Education at John Hopkins University in Baltimore, Maryland. She is also the Phoebe R. Berman Professor of Bioethics and Public Health at the Berman Institute of Bioethics. Kass has made many contributions in the field of bioethics and health policies, including publications in fields such as international research ethics, HIV/AIDS ethics policies, and public health ethics. In the past she has worked with the World Health Organization Ethics Review Committee Secretariat in Geneva, Switzerland.



**Qiu Renzong**

The chair of the Academic Committee at the Centre for Bioethics at Peking Union Medical College and a senior research fellow emeritus at China's Institute of Philosophy, Professor Qiu has placed a special focus on animal rights, popularizing and researching the idea of speciesism. His primary focus has been animal rights in



bioethics and has supported the gradualist approach to animal activism over the abolitionist approach.

### **Kelly N Michelson**

Dr. Michelson is the Director of the Center for Bioethics and Medical Humanities at Northwestern University as well as an active physician at Ann & Robert H. Lurie Children's Hospital. Throughout her career, Dr. Michelson has conducted extensive research on communication, decision making, palliative care, bereavement support, and ethics.



### **Professor Beatrice Gabriela**

Professor Gabriela is a Professor of Legal Medicine and Bioethics at the University of Medicine and Pharmacy of Iasi in Romania. In addition, she is a senior physician at the Institute of Legal Medicine and has been a part of UNESCO's International Bioethics Committee since 2016 and is currently serving as the Chair of the Bioethics Commission of the Romanian College of Physicians. Furthermore, Professor Gabriela has been involved in several research ethics committees in Romania. During her career, Professor Gabriela has primarily focused on death and end of life issues, organ transplantation and research ethics.

