

**Committee:** World Health Organization (WHO)

**Topic:** Regulating Genetic Modification of Embryos



### **Theme of AUSMUN 2024**

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The theme for this year's AUSMUN is "Forging Tomorrow with Yesterday's Lessons". Dating back to 500 BC, great minds such as Confucius have spread this ideal: "Study the past, if you would divine the future". During a typical Model United Nations conference, delegates are expected to learn from their country's past and, in many cases, actively rewrite it. Historical knowledge when used effectively can lead to informed decisions; by reflecting on what has and has not worked in the past, collectively we are able to gain perspective on current and future policy. We encourage delegates to keep this ideal in mind while wrestling with the nuances and complications inherent in the ideas of modern day problems.

AUSMUN is committed to actively serving its community and combating pressing issues. As we continue to expand in numbers, we further seek to expand our positive impact on the world around us. We are proud to announce that we have partnered with Dress for Success, a non-profit organization that enables women to become economically independent by offering professional clothing, a network of support, and the resources necessary for both personal and professional growth. By participating in AUSMUN 2024, in addition to debating "model" policy, you are actively bettering society and changing the world.

The 2024 AUSMUN board is honored to host all delegates for our largest conference yet. We cannot wait to see what delegates bring forward to each committee in their efforts to embody values of collaboration and this year's theme. Looking twenty twenty-forward to seeing you!

## **Rationale**

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The genetic modification of embryos is a rapidly emerging controversy in the medical world today. As advanced technologies are becoming more widely utilized to promote health and prevent disease, the solution of genetic modification of embryos has become increasingly appealing, as it can achieve its goals at one of the earliest stages of life possible. Despite offering control, prevention, and a cure for many serious genetic illnesses, the long-term effects of these modifications have yet to be explored ("Playing with Genes..." 2019). Moreover, the costly nature of these technologies is creating an imbalance and inequality in global healthcare resources. If wealthy nations and individuals are the select few able to utilize genetic modification technologies, the divide in medical opportunities and outcomes for developed and developing countries will widen further (Ibid). As these issues arise, the question of sustainability of medical operations on genomes becomes increasingly prevalent. There is a growing fear that due to the fundamental nature of the procedure, a so-called "superior race" could come into existence through cosmetic and functional genetic modifications. Access to these technologies could give way to unnecessary alterations that are sure to change the course of evolution and create an artificial human race.

## Background

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The history of genetically modified embryos dates back to the early 1950s. Arthur Kornberg was the first to successfully synthesize DNA, paving the way for a future of groundbreaking discoveries in the field of gene modification. By the 1970s, genetic engineering unexpectedly took off with a greater understanding of restriction enzymes. There are two types of restriction enzymes, one that can identify and cut foreign DNA and a “modification” enzyme that recognizes host DNA and protects it (“History of Genetic Engineering...” 2019). When scientists were able to fundamentally understand how these enzymes work, this became the foundation for modern genetic therapies (Ibid). With this discovery, scientists were able to develop CRISPR, a technology that can locate a specific gene in one’s DNA, edit it, and then replace it. Additionally, CRISPR is also used for turning on and off certain genes which in turn could potentially prevent incurable diseases (“What is CRISPR?”). It wasn’t until the 1980s that genetic engineering switched from being closed off from the world and only in labs to being used in the formulation of vaccines and vaccine distribution. The following decade would consist of editing animal genomes with the use of a technique known as “DNA microinjection,” which can take a gene from another species and transfer it into a different animal. Following the end of a very successful decade, the human genome was mapped, opening an array of doors into the gene modification of humans. After this discovery, scientists created the first synthetic life form, a life form built instead of born (“History of Genetic Engineering...” 2019).

With new scientific discoveries comes the topic of regulations and ethics regarding the

research of the human genome. One of the biggest concerns is the protection of human rights as well as the overall clinical care of the patients, leading many researchers and scientists to have ethical concerns (“Oversight of Human Genome Editing...” 2017). Much is still unknown about the effects of genetic modification long term. Many compare the death of embryos in a lab to abortion, but scientists say that only a couple hundred embryos die during the research, which isn’t comparable to the millions that are destroyed each year when women get abortions (Rosenstiel 2020). With this argument, the discussion turns into more of a political and religious debate, causing many to question their morals and beliefs.

## **Contemporary Evidence**

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Genetic mutation technology, first discovered in 1970, uses restriction enzymes to alter DNA. Gene modification technology has more recently evolved into Clustered Regularly Interspaced Short Palindromic Repeats, or CRISPR. Discovered by Jennifer Doudna in 2012, it can alter DNA strands to become less susceptible to certain diseases. In 2018, it was announced in China that He Jiankui used this technology on human embryos to make them less susceptible to HIV (Cyranoski 2020). The embryo was carried to term and a pair of twins were born in China but not without a large public outcry. This technology has been used worldwide; in the United States, it has been used to remove a mutation called hypertrophic cardiomyopathy in no less than 42 embryos (Blakemore 2021). Recently, this technology was used to detect coronavirus in cells (“How CRISPR is Changing Cancer...” 2020).

Although gene editing can be very beneficial to those with diseases, it can be a very expensive process. This makes the technology open to only a few people. Using CRISPR technology to alter DNA ranges from \$900-16,000 for the gene targeting package. For the sickle cell treatment, one that can make life-saving alterations to cells, it costs around \$2 million. This pricing makes CRISPR very exclusive.

Another controversy to this technology is deciding what is a disorder vs a disability and determining what makes gene editing a necessity. How do you distinguish between beneficial and detrimental gene editing? Gene editing can be extremely beneficial to those who have life-threatening diseases. Gene editing can also be used for those who can afford to alter DNA even when it is not deemed “necessary.”

CRISPR technology is a major advancement in technology for the medical field. The introduction of this technology can open up opportunities for some to have a better quality of life. The ethics of new technologies such as these is something to be heavily considered when discussing the topic.

## **Directive**

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In this committee, delegates are urged to consider the position of their nation in advocating for the continuation, advancement, regulation, or elimination of genetic modification technologies.

Delegates present should weigh the medical benefits of having access to potentially life-sustaining genetic treatments while also understanding the ethical components that should be considered when discussing the topic of altering the genetic makeup of embryos. Delegates must also consider the long-term effects that these modern technologies could have on evolution and how to prevent their capabilities from being taken too far. Discussion should only pertain to genetic modification of embryos and not stray to genetic modification of other forms like that of food or the genetic modification post the embryonic stage such as stem cell treatment. Some questions to consider when crafting your position include:

- 1.) Is there a potential for unequal access to these technologies due to economic constraints?
  - a.) What could the implications of this be, and how should it be addressed if nations continue to utilize genetic modification of embryos?
- 2.) What are the medical benefits of genetic modification technologies?
- 3.) What are the impacts that genetic modification may have on evolution?
- 4.) What are the ethical implications of embryo deaths in labs?
- 5.) Is there a way to regulate genetic modification?
- 6.) Should these procedures be covered by healthcare?
  - a.) Are they considered cosmetic, or life-saving?
  - b.) Should cosmetic genetic modification be introduced and if so, what would be the

possible implications?

## **Resources for Delegates**

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[History of Genetic Engineering and the Rise of Genome Editing Tools](#)

[Scientists Argue the US Ban on Human Gene Editing Will Leave It Behind Genetic](#)

[Modification of Preimplantation Embryos: Toward Adequate Human Research Policies](#)

[Potential impact of human mitochondrial replacement on global policy regarding germline gene modification](#)

[Genetic Engineering Will Change Everything Forever – CRISPR](#)

[Biotechnology Research Viewed With Caution Globally, but Most Support Gene Editing for Babies To Treat Disease](#)

[Stem Cell Research: At the Crossroads of Religion and Politics](#)

[The Future of Gene Editing](#)

## **Delegations**

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1. **Argentina** - Argentina has not explicitly expressed its opinion on the genetic modification of embryos but is leading in genetic modification for Agriculture. The nation leads in the innovation, regulation, and use of the genetic modification of biotechnology in agriculture. Policies related to genetic modification for agriculture, as well as the lack of regulation of human genetic modification, could indicate the viewpoint of the delegation.

[Regulatory Aspects of Gene Editing in Argentina](#)

[Argentina: Animals - Global Gene Editing Regulation Tracker](#).

2. **Australia** - The Australian government does not regulate the use of gene-editing techniques in human cell lines that do not introduce new genetic material. The delegation believes that genetic modification without a template does not pose a risk to the environment or human health. There are still regulations in place that prevent cloning, the creation of hybrid embryos, and that prohibit a person from altering the genome of a human embryo if the alteration is heritable by descendants.

[Australian Gene-Editing Rules Adopt 'Middle Ground'](#)

[Gene-Edited Babies: What Does the Law Allow in Australia?](#)



3. **Brazil** - This delegation does not allow genetic modification of embryos. Genetic engineering is completely banned on the embryonic level. However, Brazil does allow genetic research on adult cells. Brazil has taken a legal approach to the subject and determined that genetic modification of embryos will be accompanied by criminal sanctions.

[Brazil: Germline / Embryonic](#)

[Rewriting the human genome, rewriting human rights law? Human rights, human dignity, and human germline modification in the CRISPR era](#)

4. **Canada** - Canada prohibits the genetic modification of reproductive cells and early embryos for research or clinical purposes. These technologies are primarily opposed from a health perspective, and scientists in Quebec are diving into the ethics of genetic modification in order to support future decisions about the practice within their country. Officials believe that these technologies should only be used in life or death situations, but there is uncertainty about using gene editing to give children immunity to diseases. Canada is firmly against genetic modification for cosmetic purposes.

[How should Canadian policy react to CRISPR babies?](#)

[Designer babies? Canadians say modifying genes in embryos acceptable only in certain](#)

[circumstances](#)

5. **China** - The Chinese scientist He Jiankui was the first person to perform genetic modification on twin embryos. He received immense amounts of criticism for pursuing germline editing in a sanctioned and unsafe manner. Since this scandal, China has tightened its rules on the genetic modification of embryos. There are extreme penalties and punishments in place for anyone who attempts to pursue the use of these technologies. Though these activities have been deemed illegal, this conflict goes to show that science in China is relatively unregulated, as demonstrated by the fact that Jiankui was able to conduct his experiments unhindered.

[China to tighten rules on gene editing in humans](#)

[Genetic engineering and human-animal hybrids: how China is leading a global split in controversial research](#)

6. **Colombia** - This delegation prohibits the use of human germline genome editing in most cases, but there is an exception to this prohibition. Genetic modification technologies may be used in Colombia if they are “aimed at relieving suffering or improving the health of the person and humanity.” While genetic modification is thus permitted for treatment and research to alleviate suffering, if these technologies are used for other purposes, such as cosmetics and immunity, perpetrators can face up to 5 years in prison.

## [Human Germline and Heritable Genome Editing: The Global Policy Landscape](#)

### [International Research Oversight and Regulations](#)

7. **France** - While France supports gene therapy, the nation opposes genetic modification used in vitro on embryos. France is mostly concerned with the ethics of these technologies, saying that it's unnatural. They also emphasize the unpredictable effects that genetic modification could have on evolution. Furthermore, France feels that the world isn't ready to have access and utilize these technologies, for they have not been proved to be reliable and safe.

### [Hateful politics infiltrate human genome editing debate in France](#)

### [World 'not yet ready' for embryo gene-editing, say experts](#)

8. **Germany** - In 2019, the German Council met to discuss the genetic modification of human embryos. The council agreed on getting involved in the discussion after seeing the potential it has in reversing hereditary diseases. However, they believe it is best to hold off until there are more regulations set in place. Additionally, Germany is hesitant due to its history surrounding inhumane eugenic practices during World War II.

### [German ethics council expresses openness to eventual embryo editing](#)

### [European Union: Germline / Embryonic - Global Gene Editing Regulation](#)

## [Tracker](#)

9. **New Zealand** - Genome editing is currently banned in New Zealand by the guidelines set in place by the Health Research Council of New Zealand. The country believes there is not enough sufficient research presenting possible drawbacks of genetically modifying the human genome. Scientists, however, are still weighing the potential risks genetically-modified embryos can have against the possibility of making great scientific discoveries.

[New Zealand: Germline / Embryonic - Global Gene Editing Regulation Tracker](#)

[Indigenous Perspectives and Gene Editing in Aotearoa New Zealand](#)

10. **India** - Currently, the National Guidelines for Stem Cell Research have banned human germline editing and reproductive cloning in India. However, India lacks proper laws to enforce this ban. The Indian Council of Medical Research is debating implementing a law that would effectively ban germline editing in India.

[India: Germline / Embryonic - Global Gene Editing Regulation Tracker](#) [India's laws](#)

[need to keep up with the rapidly evolving science of gene editing](#)

11. **Iran** - With the rise of new genetic modifications and biotechnology, Iran has been quick to place restrictions on these new practices. While Iran has the infrastructure to make

large advances in genetic modification, they have been very hesitant. Being an Islamic Nation, Iran wants to ensure that these practices align with their Sharia Law.

[Current Situation of Bioethics in Genetic Research in Iran - The Experiences and Challenges of Science and Ethics - NCBI Bookshelf](#)

[Iran Joins World States with Gene Manipulation Technology](#)

12. **Ireland** - Scientists in Ireland have recently made breakthroughs with the help of a new modern technology known as CRISPR. However, this has upset many people as the legislation in Ireland has yet to set regulations regarding the ethics of this research. Scientists have almost unregulated ability to tamper with the human embryo and will continue to do so until the Irish government discusses the issue.

[Lack of legislation could allow gene-editing go unchecked](#)

[Regulation of stem cell research in Ireland | Eurostemcell](#)

13. **Israel** - Germline gene editing with the purpose of creating humans is strictly prohibited in Israel. However, the Israeli Minister of Health is open to allowing germline gene editing experiments with the observation of an advisory committee. Recently, after news of the Chinese scientist raising genetically modified embryos to term, Israeli scientists have agreed to join a global moratorium regarding the modification of human embryos.

[Israel: Germline / Embryonic - Global Gene Editing Regulation Tracker Israel aiming](#)

[to enable unprecedented human DNA edits, to help cure illnesses](#)

14. **Italy** - The Italian agricultural minister is interested in genome editing and believes GMOs are a thing of the past. She believes genome editing can open an array of doors that scientists can not simply turn down. Currently, gene editing for clinical purposes is banned. However, it is unclear what this means for gene editing research. Regulations and guidelines are stated in the EU Charter of Fundamental Rights.

[European Union: Germline / Embryonic - Global Gene Editing Regulation](#)

[Tracker](#)

[Italian minister: Unlike gene editing, GMOs belong to the past](#)

15. **Japan** - Japan has been fairly neutral on the topic of gene modification. They have always regulated the practice but have never had specific laws implemented. Recently, they proposed setting specific guidelines for the experimentation of genetic modification on human embryos. If these restrictions are administered, it would restrict the use of gene modifying technology on human embryos.

[Japan set to allow gene editing in human embryos](#)

[Japan: Germline / Embryonic](#)

16. **Mexico** - In Mexico, there are no explicit laws prohibiting the genetic modification of embryos. However, since 1997, there have been laws implemented that prohibit the fertilization of eggs for experimentation. This leaves a gray area for the opportunity for genetic modification. The technology can be used to be experimented with but not for reproductive purposes. Going against these laws can result in up to 6 years in prison.

[Mexico: Germline / Embryonic](#)

[ASU partners with Mexico](#)

17. **Norway** - Norway allows research on genetically modified embryos but only for certain purposes such as the development of methods for assisted reproduction and pre-implantation genetic diagnosis. The embryos used for research and gene-editing are not allowed to be implanted in a female uterus for pregnancy. Norway also prohibits genetic modifications that are inherited in humans.

[Research on gene-edited embryos allowed](#)

[The Norwegian Biotechnology Advisory Board recommends allowing human germline editing for basic research.](#)

18. **Panama** - In Panama, genetic modification of embryos is allowed for the sole purpose of avoiding serious illnesses. Their laws state that the use of technology like CRISPR is prohibited with this exception. Although it has been allowed, it has not been used on humans. The closest this country has come to this is experimenting with CRISPR on bananas.

[Human Germline and Heritable Genome Editing: The Global Policy Landscape](#)

[Regulation for Reproduction and Gene manipulation in Panama](#)

19. **Pakistan** - Pakistan was at the forefront of the implementation of genetically-modified crops in the 1960s. Now, there is a large capacity for the growth of the genetic editing sector in the nation. Pakistan is also constitutionally Muslim, and the vast majority of citizens practice Islam. This has led to some conflict regarding the religious implications of the technology.

[Gene Therapy and Genetic Engineering](#)

[The Race for Genome Editing: Future and Political Prospects.](#)

20. **Philippines** - The Philippines funds the Philippine Genome Center, dedicated to multidisciplinary research regarding the Human Genome, including the exploration of



genetic editing technologies. The Philippines has implemented regulation on genetic modification for use in agriculture, which may be reflective of the nation's view on the use of the same or similar technologies in human genetic editing.

[Philippine Genome Center](#)

[Philippines on the Right Path With Genome Editing Regulations](#)

21. **Russia** - Russia has a law that prohibits human genetic engineering. However, these laws are unclear on the modification of human embryos. This has left open doors for experimentation with this technology. In 2019, it was announced that a Russian scientist, Denis Rebrikov, would begin to experiment with altering DNA on human embryos.

[Russian biologist plans more CRISPR-edited babies](#)

[Russia: Germline / Embryonic](#)

22. **Saudi Arabia** - Saudi Arabia currently has restrictions in place on genetic modification of embryos. Historically, Saudi Arabia has followed Islamic bioethical guidelines, which focus on the moral implications of these practices. But in recent years, Saudi Arabia has begun to express interest in biotechnology and genetic engineering. As a part of their Vision 2030 project, Saudi Arabia plans to invest in biotech and become a global leader in the field in the next few decades.

## [Saudi Arabia's NEOM is Breeding a New City Built Around Genetic Engineering](#)

### [National Biotechnology Strategy -](#)

23. **Singapore** - In Singapore, gene modification is allowed for research purposes only. It is prohibited for any clinical reasons. This means that the technology is not allowed for the “improvement” of humans, but to aid in the prevention of diseases like HIV. The nation also has tight ethical regulations to support this research. This research should be used to improve the techniques and the technology used. However, these requirements are expected to change in the future.

### [The Regulation of Human Germline Genome Modification in Singapore](#)

#### [Bioethics committee seeks views on emerging genetic modification technology to prevent disorders](#)

24. **South Africa** - South African law states that all genetic editing, with the exception of disease research, is banned. Human experimentation and clinical treatment via CRISPR-Cas9 genetic embryo doctoring are also banned due to a set of ethical guidelines based on the nation’s constitution. While restrictions are tight within South Africa, the state continues to support supervised, morally acceptable research on the genetic editing of embryos.

[Human germline editing: Legal-ethical guidelines for South Africa](#)

[South Africa: Human Gene Editing - Who Decides the Rules?](#)

25. **South Korea** - South Korea has the “BioAct.” This act regulates the use of genetic modification on embryos in South Korea. It does not specify genetic editing because it assumes that it is being used for research purposes only. South Korea permits some experimentation but has regulations to make sure that this experimentation stays ethical. South Korea has used the technology CRISPR to target a specific gene to prevent hypertrophic cardiomyopathy.

[Korean scientists contribute to first gene repair of human embryos](#)

[Gene-Editing: Interpretation of Current Law and Legal Policy](#)

26. **Sweden** - Sweden allows the use of germline editing in human embryos for research purposes but has implemented sanctions forbidding such experimentation and usage within clinical bounds. The ethical nature of germline editing remains widely contested in Sweden. Its government has yet to take decisive action towards or against germline usage in either a clinical or research context.

[The Regulation of Human Germline Genome Modification in Sweden](#)

[The Right To Science And Human Germline Editing. Sweden, Its External Commitments And The Ambiguous National Responses Under The Genetic Integrity Act](#)

27. **Switzerland** - Switzerland's laws strictly forbid the genetic germline modification of reproductive cells or embryos under any circumstances, including those with the purpose of research. While the Swiss government has expressed minimal support for the basic research of germline editing, it remains highly unlikely that it will pass legislation allowing the use of such practices. Switzerland has stated that it implemented these restrictions to protect the welfare of humans and their environment.

[The Regulation of Human Germline Genome Modification in Switzerland  
Federal Act on Non-Human Gene Technology](#)

28. **Ukraine** - While Ukraine has not specifically stated its legal stance on germline editing, several Ukrainian scientists are pursuing it. Fertility doctors in Ukraine have applied a form of germline editing known as MRT (Mitochondrial Replacement Therapy) to successfully birth several human children. Additionally, Ukrainian companies have begun advertising the modification of embryos, supposedly resulting in various desirable phenotypic effects. Ukraine continues to have little to no restriction on germline editing.

[Ukraine: Germline / Embryonic](#)

## [Gene-Edited Enhancements For Sale In Ukraine?](#)

29. **United Kingdom** - The UK prohibits the use of genetically modified embryos within the practice of in vitro fertilization processes, but allows the modification of embryos outside of these practices. Currently, scientists in London have gained the license to edit human genes within such embryos, and have successfully eliminated several genes within them. The UK ultimately aims to encourage scientists and researchers to enter the field of germline editing to advance the efficacy of infertility treatment, all while supervised under national law.

## [UK Parliamentary Office Publishes Brief on Human Germline Genome Editing UK Scientists Gain Licence to Edit Genes In Human Embryos](#)

30. **United States** - In the United States, the genetic editing of embryos is not banned. However, genetic doctoring of all kinds is required to adhere to FDA (Food and Drug Administration) and NIH (National Institutes of Health) guidelines. Due to ethical controversies, the US government is not funding any research towards genetic doctoring,

as stated by the NIH. In 2018, the NIH decided to begin funding research towards genetic modification, with the exception of germline editing specifically. The US has not stated that it will be legalizing the genetic modification of reproductive cells in the near future.

[US Congress Moves to Block Human-Embryo Editing](#)

[Statement on NIH Funding of Research Using Gene-Editing Technologies In Human Embryos](#)

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