GOMUN 2022

# TOPIC 1:

# Establishing guidelines for human genetic modification

Committee: **Future LEGAL**

# Study Guide

Genome editing is a powerful tool for making precise additions, deletions and substitutions in the genome. Compared to earlier methods, altering the genome is now far more accurate, effective, adaptable, and affordable because of the development of new techniques. Similar to previous medical innovations, each of these applications has a unique mix of advantages, hazards, ethical considerations, and social ramifications that may call for new regulatory frameworks.

Raising important questions such as how to weigh potential advantages against the possibility of unintended negative effects, how to regulate the use of these technologies, and how to incorporate societal values into crucial clinical and policy considerations are just a few of the significant issues raised with regard to genome editing. Heritable genome editing used to be regarded as inappropriate for safety, ethical and societal grounds. There are still restrictions such as using genome editing only for medical reasons in 50 countries including the whole of Europe, North and South America.

However, the People's Republic of China, Japan and South Korea have legalized heritable genome editing and people can use this service as freely as plastic surgery for whatever purpose they would like.  The use of these tools to edit the human genome raises ethical concerns that have highlighted the need for strong oversight in this area. Questions concerning what makes us unique as humans and what separates species from one another are raised by the use of genome editing in both human and non-human animals.

Our DNA, which gives us unique abilities, is frequently seen as the basis of what it is to be human. Genome editing also has a significant impact on diversity. Through the use of new genome editing tools, it is now possible to increase or decrease genetic diversity depending on the application domain. Diversity in relation to people is generally regarded to include a wide range of factors, such as age, gender, beliefs, and worldviews. It also includes biological elements like genes. In addition to variation, measures of diversity also consider how frequent or uncommon a characteristic or feature is. Diversity has become widely recognized as a "positive" and a societal

objective that should be safeguarded and fostered. There are several concerns to be discussed in relation to human genome editing.

WHO established the Expert Advisory Committee on Developing Global Standards for Governance and Oversight of Human Genome Editing (hereinafter referred to as the Committee) in December 2018 to study the scientific, moral, social, and legal issues surrounding human genome editing (somatic, germline and heritable).

The reports published deliver recommendations on the governance and oversight of human genome editing in nine discrete areas, including human genome editing registries; international research and medical travel; illegal, unregistered, unethical or unsafe research; intellectual property; and education, engagement and empowerment. The recommendations focus on systems-level improvements needed to build capacity in all countries to ensure that human genome editing is used safely, effectively, and ethically.

**What's genetic modification?**

By transferring a fragment of DNA from one creature to another, genetic modification is a way to alter the traits of a plant, animal, microorganism or now humans. This is accomplished by carefully removing the desired genes from one organism's DNA and re-adding them to the DNA of the other. There are two very distinct applications for human genetic alteration (also known as "gene editing"). To cure a medical ailment, somatic genome editing modifies the genes in a patient's cells. These treatments are now considered as normal medical procedures.

Heritable genome editing, in contrast, would alter genes in sperm, eggs, or early embryos in an effort to regulate a child's features. Every cell of the resulting human and all succeeding generations are altered as a result. Benefits of human genome editing include faster and more accurate diagnosis, more targeted treatments and prevention of genetic disorders.

Somatic gene therapies, which involve modifying a patient's DNA to treat or cure a disease, have been successfully used to address HIV, sickle-cell disease and transthyretin amyloidosis. The technique also vastly improves treatment for a variety of cancers.

**Progress**

Genome editing methods have been known for a long time; in 1973, Escherichia coli was genetically altered to produce the first transgenic organism, which was swiftly followed by the creation of the first transgenic mammal, a mouse, a year later. However, the rapid advancement of gene editing technology into the widely used procedure that it is today was sparked by the release of the CRISPR/Cas9 system in 2012.

In 2018 it was announced to the world that the first genetically modified children have been born, known publicly under the pseudonyms Nana and Luna. As embryos their genomes were edited using CRISPR technology by scientist He Jiankui in an effort to prevent them contracting HIV from their fathers. He was denounced as highly unethical, was imprisoned in China in 2019 and was released in April 2022. This experiment changed the world and since then many scientists have tried to take genetic modification to next levels.

**Year 2050**

Enhancement like making current genes better than they already are – for example, to make the body absorb nutrients ten percent more efficiently. Genetic upgrades are about either replacing the genomes that are bad for the body and survival or taking advantage of animal DNA by replacing human DNA with it. Military now wants to use the technology for creating genetically enhanced combat units. Genetic soldiers would have special muscular or cerebral upgrades and enhancements to survive and fight better. Individuals in developed nations typically conceive their children using artificial insemination, whereas sex-based conception is viewed as both normal and risky. Similar to how not vaccinating your children is now perceived as something quite normal, but also as taking an unnecessary risk. In nations with no restrictions on human genome editing, parents can, for example, select the eye and hair colors for their children. China just invented a method that allows parents to increase their child's IQ, however this is still very early in the trial process.

**Useful links:**

https://www.who.int/publications/i/item/9789240030404

https://ec.europa.eu/info/sites/default/files/research_and_innovation/ege/ege_ethics_of_genome_editing-opinion_publication.pdf

https://www.europarl.europa.eu/RegData/etudes/STUD/2022/729506/EPRS_STU(2022)729506_EN.pdf

https://www.nature.com/articles/d41586-019-00673-1

https://www.smithsonianmag.com/innovation/how-to-prepare-for-future-gene-edited-babies-180972027/

https://www.geneticsandsociety.org/topics/human-genetic-modification

https://www.technologyreview.com/2022/04/04/1048829/he-jiankui-prison-free-crispr-babies/