How far should human genetic modifications be allowed to go?

World Health Organization (WHO)

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INTRODUCTION TO THE COMMITTEE

The World Health Organization (WHO) is a specialized agency of the United Nations (UN) for public health created in 1948. It reports directly to the Economic and Social Council of the United Nations and its headquarters are located in Pregny-Chambrésy, in the canton of Geneva, in Switzerland.

FLAG OF THE WHO: World Health Organization website

The WHO, which has 194 Member States, has more than 150 offices in six Regions (New Delhi, Cairo, Manila, Washington, Brazzaville and Copenhagen). WHO staff members share a commitment to improving health for all, everywhere.

The WHO's two-year budget is funded by a combination of assessed and voluntary contributions.

Its main areas of activity are non-communicable diseases, communicable diseases, crisis preparedness, surveillance and response, lifelong health promotion, and health systems. It helps countries achieve their health goals. It supports its health policies because it coordinates the efforts of multiple sectors of government and multiple partners- bilateral or multilateral, foundations, civil society organizations, and the private sector. The governance of the WHO rests in the hands of the World Health Assembly, which is its supreme decision-making body.

A. HISTORY OF THE COMMITTEE

The first international sanitary conference took place in Paris, in 1851, bringing together 12 states which discussed an international sanitary convention signed in January 1852 to fight against plague, yellow fever, and cholera.

In 1907, the “International Office of Public Hygiene”(OIHP) was created in Rome and provided with a permanent secretariat as well as a “permanent committee”. This committee organized several conferences over the following years; The OIHP is at its creation composed of 12 nations, its official language is French and its headquarters are in Paris.

However, it was only in 1945, during the San Francisco conference, that the inclusion of health within the remit of the United Nations was discussed, with a rapid move toward the creation of a specialized organization in this field. In 1946, an international conference drew up the WHO Constitution, which was adopted in New York by the World Health Conference on 22 July 1946. It was signed by the representatives of 61 States and came into force on 7 April 1948.

B. WHO’S ROLE

WHO's priority in the area of health systems is moving towards universal health coverage. Unlike the institutions that preceded it, one of the main objectives of the WHO

when it was created was to raise the level of health of the world's population, and not just of its member countries, particularly the Western countries. This objective is to be found in its constitution. When it was set up, the WHO defined a number of lines of action, such as technical assistance for countries in need, the organization of international agreements, standards, and typologies in the field of health, support for medical research and training, and the cross-checking of statistical data on a global scale. These thematic areas of action must also address health priorities, in particular malaria, maternal and child health, tuberculosis, nutrition and STDs. The WHO coordinates international health action by promoting collaboration and partnerships with the various health actors.

INTRODUCTION TO THE SUBJECT

The cells' nuclei of a human being or other organism contain "**genes**" that control the chemical reactions in the cell and make it grow and function, and ultimately determine its growth and function in the organism. An organism inherits some genes from each parent and thus the parents pass on certain traits to their offspring.

The genes in a body's cells play a **key role in its health**. Indeed, a defective gene or genes can make you sick. Recognizing this, scientists have worked for decades on ways to modify genes or replace faulty genes with healthy ones to treat, cure, or prevent a disease or medical condition. This research is paying off, as advancements in science and technology today are changing the way we define disease, develop drugs, and prescribe treatments.

Gene therapy and genetic engineering are two closely related technologies that involve **altering the genetic material** of organisms. The distinction between the two is based on purpose:

- **Gene therapy** attempts to correct genetic abnormalities by introducing a non mutated, functional gene into the patient's genome, and thus prevent or cure genetic diseases. **Genetic engineering** aims to modify the genes to enhance the capabilities of the organism beyond what is normal. It is a process that uses laboratory-based technologies to alter the DNA makeup of an organism. It is very similar to genetic therapy: this may involve changing a single base pair (A-T or C-G), deleting a region of DNA or adding a new segment of DNA. For example, genetic engineering may involve adding a gene from one species to an organism from a different species to produce a desired trait. Used in research and industry, genetic engineering has been applied to the production of cancer therapies, brewing yeasts, genetically modified plants and livestock, and more.

Because gene therapy involves changing the genetic background, it raises important **ethical concerns**. Genetic therapies hold promise to treat many diseases, but they are still new approaches to treatment and may have risks. Even though recent advances have made genetic therapies much safer, there are still potential risks that could include certain types of cancer, allergic reactions, or damage to organs or tissues if an injection is involved. Because gene therapy involves so many risks, candidates for gene therapy need to be fully informed of these risks before providing informed consent to undergo the therapy. Ethical controversy

surrounds the possible use of these technologies in plants, animals, and humans, particularly genetic engineering. Some perceive it as dangerous such as the University of Maryland, which defines it as a 'threat to human society' while others see it as a very big advancement for public health, and for the future in general. For instance, some wonder whether it would be proper to tinker with human genes to make people able to outperform the greatest Olympic athletes or much smarter than Einstein. It must be possible, but shall we allow those modifications to go that far? How big can the risks become if we do allow them?

DEFINITIONS

3-parent IVF: The technique involves using the genetic material of three people - the father's sperm, the mother's oocyte, and the mitochondria of another woman's oocyte.(L'Australie adopte la « FIV à 3 parents » - Genethique)

AI: Artificial intelligence (AI) is the ability of machines to perform tasks that are typically associated with human intelligence, such as learning and problem-solving. (Artificial intelligence - Wikipedia)

ARN: Nucleic acid essential for transporting the genetic message and synthesizing proteins.

CRISPR: (short for "clustered regularly interspaced short palindromic repeats") is a technology that researchers use to selectively modify the DNA of living organisms. CRISPR has been adapted for use in the laboratory from natural genome-editing systems found in bacteria. (CRISPR)

Chromosome: Element of a living cell, with a characteristic shape and constant number (23 pairs in humans), located in the nucleus of the cell.

Clone: Cloning in biotechnology refers to processes used to create copies of DNA fragments (molecular cloning), cells (cell cloning), or organisms. (https://www.biologyonline.com/dictionary/cloning)

DNA: a self-replicating material that is present in nearly all living organisms as the main constituent of chromosomes. It is the carrier of genetic information.

Gene: A defined unit located on a chromosome, through which a hereditary trait is transmitted.

Genetic modification: Genetic modification is a technique to change the characteristics of a plant, animal, or microorganism by transferring a piece of DNA from one organism to a different organism. This is done through targeted removal of the desired genes from the DNA of one organism and adding them to the other organism

Genome: The entire set of DNA present in a cell or organism. It consists of 23 chromosomes and contains all the information needed for an individual to develop and function.(National Human Genome Research Institute)

GMO:genetically modified organism: a plant or animal whose genes have been scientifically changed (https://dictionary.cambridge.org/fr/dictionnaire/anglais/gmo)

LICs, MICs, HICs: Low-income country (with a GNI per capita of US$1,045 or less), Middle-income country (with a GNI per capita of US$1,086 to $13,205)and high-income country (with a GNI per capita of US$13,845 or more)

HDI: Human development index is a summary measure of average achievement in key dimensions of human development: a long and healthy life, being knowledgeable and having a decent standard of living. The HDI is the geometric mean of normalized indices for each of the three dimensions.

TIMELINE

Date	Event
1865	Mendel's studies - birth of genetics
1952	Marvin Minsky built the first neural network machine, the SNARC (Spatial Numerical Association of Response Codes)
1953	The discovery of the Double Helix structure of the DNA by James Watson, Francis Crick and Rosalind Franklin which gave rise to the modern study of biology and genetics.
1956	John McCarthy defines the term "artificial intelligence" as the science and engineering of building intelligent machines
1960s	The birth of recombinant DNA technology
1973	Herbert Boyer and Stanley Cohen made the first genetically modified organism a bacteria resistant to the antibiotic kanamycin.
1980	The European Organization for Nuclear Research (better known as CERN) launched ENQUIRE (written by Tim Berners-Lee), a hypertext program that allowed scientists at the particle physics lab to keep track of people, software, and projects using hypertext (hyperlinks).
1982	First genetically engineered human drug - Synthetic Insulin by Arthur Riggs
1983	The first genetically modified plant (GMP) was a tobacco resistant to antibiotics in 1983. In 1996, the first genetically altered crop, a delayed-ripening tomato was commercially released. In the year 2003, the estimated global area of GM crops for was 67.7 million hectares.
1996	Ian Wilmut and Keith Campbell created Dolly, the first cloned sheep.

1990-2003	The Human Genome Project in United States, United Kingdom, France, Germany, Japan and China
2009	Discovery of CRISPR (a genetic pair of scissors) by Jennifer Doudna, Emmanuelle Charpentier and Feng Zhang
2015	First human gene editing in China
2018	Creation of genetically modified babies (first by He Jiankui: the twins Lulu and Nana)

HISTORY OF THE TOPIC

There is a rich history of gene editing which, when outlined in order, shows an industry determined to aid humanity through the study of genetics. From conceptualizing the double helix to CRISPR edits, this industry has demonstrated a commitment to game-changing discoveries, all while adhering to a careful set of ethics and regulations.

Genome editing technologies enable scientists to make changes to DNA, leading to changes in physical traits, like eye color, and disease risk. Scientists use different technologies to do this. These technologies act like scissors, cutting the DNA at a specific spot. Then scientists can remove, add, or replace the DNA where it was cut.

In January 1952 Marvin Minsky, a graduate student at Harvard University Psychological Laboratories implemented the SNARC (Stochastic Neural Analog Reinforcement Calculator). The SNARC was possibly the first artificial self-learning machine. This technology was immediately followed by the discovery of the Double Helix structure of the DNA by James Watson, Francis Crick and Rosalind Franklin which gave rise to the modern study of biology and genetics.

In the early 1960s, gene therapy first progressed with the development of recombinant DNA technology and was further developed using various genetic engineering tools, such as viral vectors. This technology laid the foundation for genetic engineering. More than 1900 clinical trials have been conducted with gene therapeutic approaches since the early 1990s. Genetic modification was first used on humans in 1982 with the synthetic insulin. Insulin was used for many years to treat diabetes and saved millions of lives, but it wasn't perfect, as it caused allergic reactions in many patients. The first genetically engineered, synthetic "human" insulin was produced in 1978 using E. coli bacteria to produce the insulin. Eli Lilly went on in 1982 to sell the first commercially available biosynthetic human insulin under the brand name Humulin.

In 1990, the Human Genome Project started. It was an international research effort that aimed to map and sequence the entire human genome. It was completed in 2003 and provided a comprehensive understanding of human genetics.

A revolutionary gene-editing technology called CRISPR invented in 2009, has made it easier than ever to edit DNA. This technology allows for precise and targeted modification of

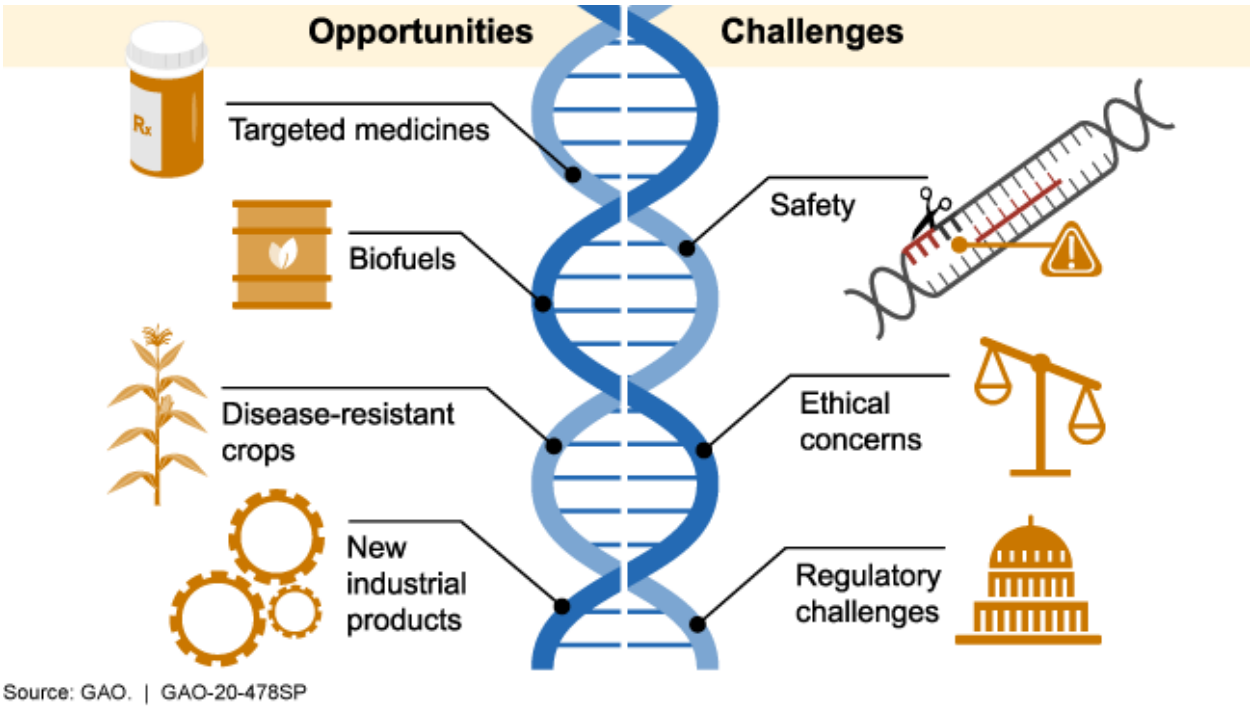
genes and has opened up new possibilities in genetic engineering. It even allowed the CRISPR inventors, Emmanuelle Charpentier and Jennifer Doudna, to receive the Nobel Prize in Chemistry in 2020. CRISPR is simpler, faster, cheaper, and more accurate than older genome editing methods. Many scientists who perform genome editing now use CRISPR, still, this discovery and its use remain highly controversial

Indeed, in 2015, Chinese scientists reported the first successful use of CRISPR to edit the DNA of a human embryo. This experiment raised significant ethical concerns and sparked a global debate on the ethics of human genetic modification. Later on, Chinese scientist He Jiankui announced in 2018 that he had used CRISPR to edit the genes of twin girls to make them resistant to HIV (Human Immunodeficiency Virus). This announcement was met with widespread condemnation and raised ethical and safety concerns.

It is important to note that the field of human genetic modification is continually evolving. The ethical and regulatory landscape surrounding genetic modification is also a subject of ongoing discussion and debate in the scientific and bioethical communities.For instance, the EU Charter of Fundamental Rights, Article 3, prohibits “eugenic practices, in particular those aiming at the selection of persons.” Ratified by 29 of the 47 European states, Oviedo (the 1997 Convention on Human Rights and Biomedicine - Oviedo Convention - of the Council of Europe) requires that any therapy modifying the human genome “may only be undertaken for preventive, diagnostic or therapeutic purposes and only if its aim is not to introduce any modification in the genome of any descendants.”

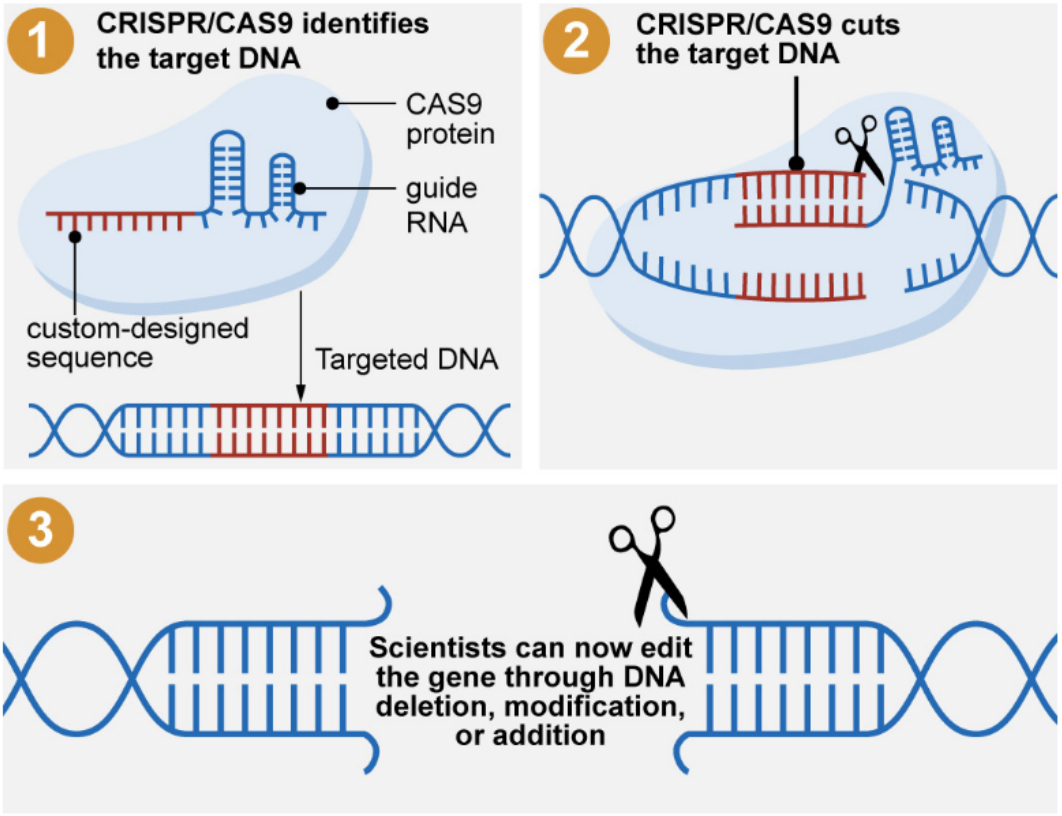
DISCUSSION OF THE TOPIC

Human genetic modification, also known as genetic engineering or gene editing, involves the deliberate alteration of an individual's genetic material. This revolutionary field has witnessed significant advancements in recent years, particularly with the advent of CRISPR technology, offering the potential to eradicate genetic diseases and enhance human traits. However, these remarkable scientific achievements are accompanied by complex ethical and societal questions.



The field of genetics has evolved a lot, especially when DNA's structure was discovered by James Watson, Francis Crick and Rosalind Franklin in 1953 and became an important moment that paved the way for genetic research.

More recently, the CRISPR system became a revolutionary technology. It allows for precise and targeted changes to the human genome. CRISPR is based on a natural defense mechanism found in bacteria. It involves a guide RNA that directs the protein to specific DNA sequences, where it can cut and modify the DNA. Genetic modification using CRISPR has shown promise in treating a wide range of genetic diseases. For example, researchers have used this technology to correct mutations responsible for sickle cell anemia.



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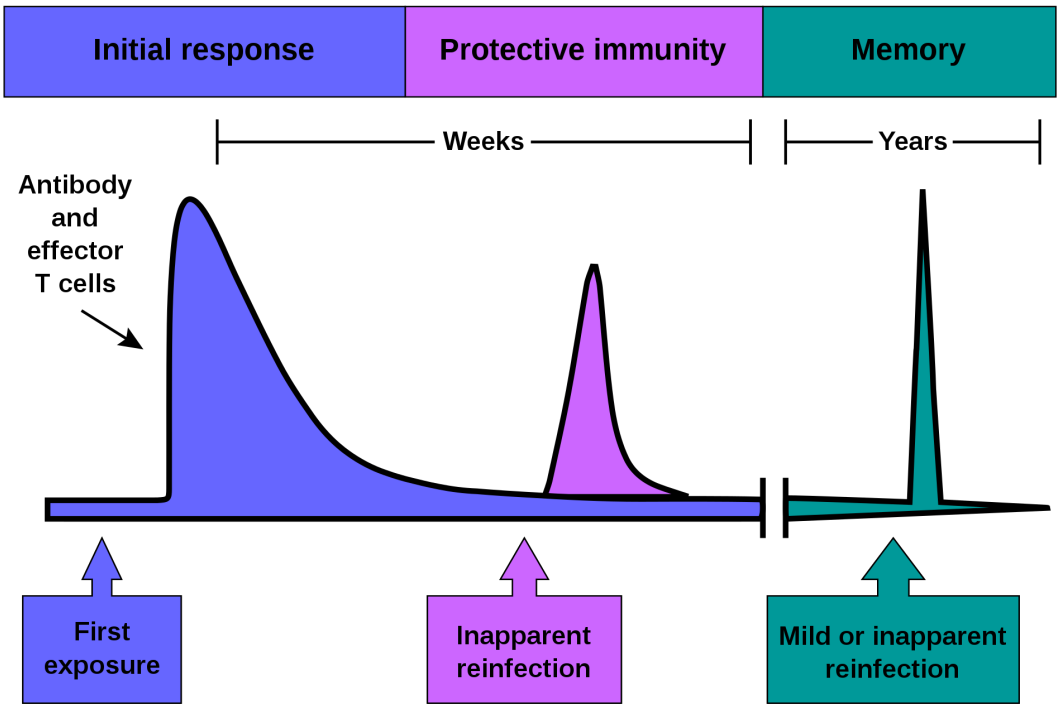


Scientists are developing gene therapies - treatments involving genome editing - to prevent and treat diseases in humans. Genome editing tools have the potential to help treat diseases with a genomic basis, like cystic fibrosis and diabetes. There are two different categories of gene therapies:

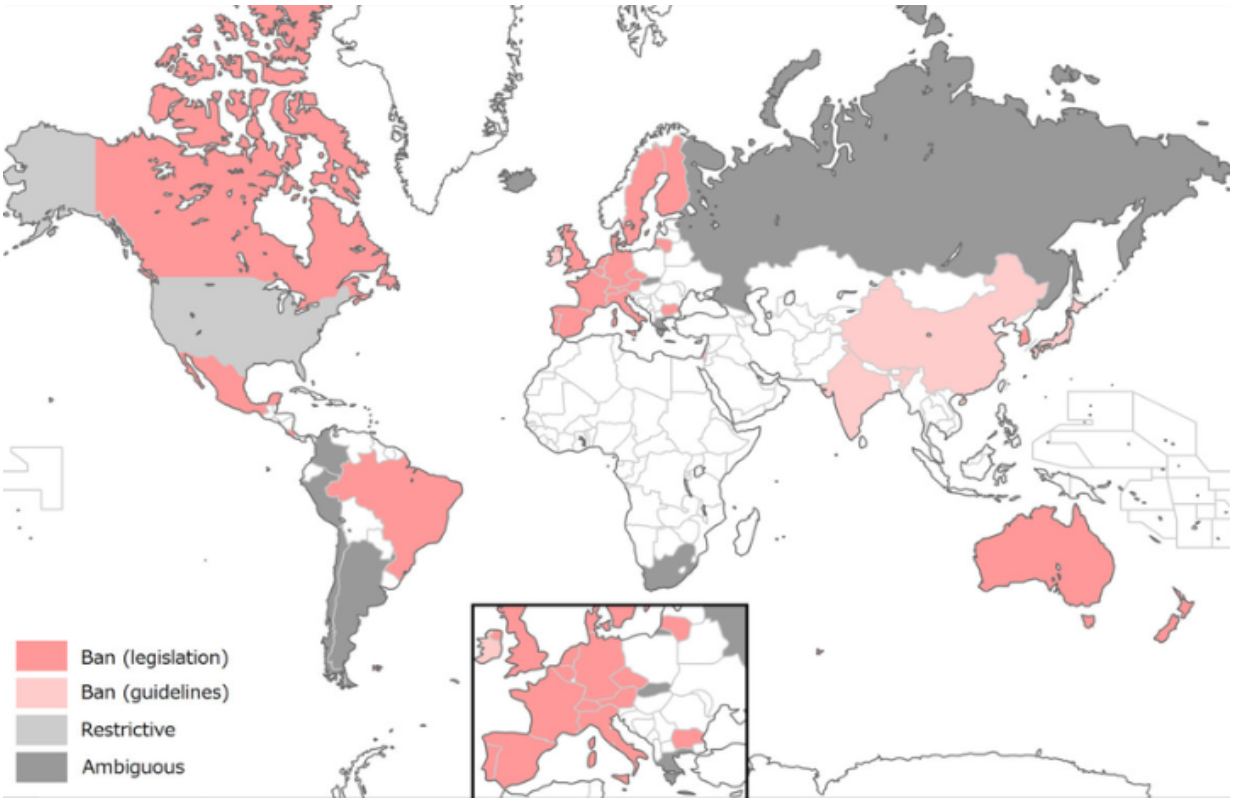
- Germline therapies change DNA in reproductive cells (like sperm and eggs). Changes to the DNA of reproductive cells are passed down from generation to generation.
- Somatic therapies, on the other hand, target non-reproductive cells, and changes made in these cells affect only the person who receives the gene therapy.

The concept of "designer babies" (in germline therapies) raises ethical questions about selecting specific traits for future generations. This practice could lead to the creation of genetically enhanced individuals, potentially exacerbating societal inequalities. Genetic modifications may have unintended consequences, including off-target effects or the introduction of new mutations. Ensuring the safety of these interventions is paramount.

Equitable access to genetic modification technologies is also a pressing ethical concern. Striking a balance between affordability and responsible development is crucial. International organizations such as UNESCO and the World Health Organization (WHO) are working to establish global standards for genetic editing. These efforts aim to foster ethical consensus and collaboration.

Many countries have regulations and guidelines in place to govern genetic modification in humans. These regulations may vary widely, reflecting different ethical, legal, and cultural perspectives. They have implemented or proposed legislation to regulate genetic editing research and applications. These regulations seek to balance scientific progress with ethical responsibility. For example, Sweden and Canada have banned gene editing trials on human embryo but other countries, such as Russia, have adopted a neutral position Genetic modification has the potential to revolutionize healthcare by offering personalized treatments and preventive strategies. This individualized approach can lead to more effective and less invasive medical interventions.

Genetic modification challenges traditional societal norms about human nature, identity, and the sanctity of life. Fostering societal dialogues and developing ethical frameworks that accommodate these changes is essential.



Beyond CRISPR, emerging technologies like base editing and prime editing offer even greater precision and fewer off-target effects. These advancements promise to expand the range of treatable genetic conditions. As genetic modification continues to advance, the development of robust ethical frameworks becomes increasingly imperative. Considerations for responsible research, transparency, and informed consent will shape the ethical landscape. There also are private companies that are using CRISPR technologies to heal healthcare conditions like Intellia Therapeutics which is an American biotechnology company. But many scientific leaders are asking: “When the benefits are believed to outweigh the risks, and dangers can be avoided, should science

consider moving forward with germline genome editing to improve human health? If the answer is yes, how can researchers do so responsibly?" (Harvard researchers share views on future, ethics of gene editing)

Human genetic modification is a rapidly evolving field with the potential to revolutionize medicine and impact society profoundly. However, the ethical and societal implications are complex and require careful consideration. Striking a balance between scientific progress and ethical responsibility will be essential in determining the path forward for this transformative field.

In more and more countries, AI is used to develop healthcare start-ups and also teleconsultaion platforms. Indeed, it can help people living in less developed countries to easily have access to healthcare. However this might be a threat to real doctors that could possibly be replaced by AI.

WHAT SHOULD RESOLUTIONS BE ABOUT?

- What are the potential risks that modifying human genetics generates and what long-term diseases can it bring to the patient?
- How can it improve human life and health by treating, curing or even preventing a disease or medical condition?
- Should countries share their scientific discoveries and studies to help the poorest countries develop their healthcare ? (preventing these countries from potential risks should of course be a priority.) Should the international community consider helping the MICs and LICs finance research to improve their healthcare and their life expectancy ?
- Many countries have implemented or proposed legislation to regulate genetic editing research and applications. That's why it is necessary to help them by sharing our knowledge and our research.
- Should a worldwide law be suggested to supervise human genetic modification that could impose limits on gene editing and not let it go too far ?

  It is a subject not to be taken lightly and impose serious and thoughtful laws. By creating a worldwide law, human genetic modification could become less risky as it will have more control and safety, but it will also provide patients from the whole world a chance to treat a medical condition or disease that was incurable for years.

BLOC POSITIONS

Afghanistan:

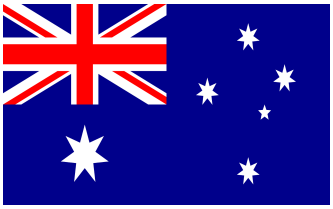
In Afghanistan, the prevalence of cousin marriages is estimated at 46.2%, and such marriages have become the main reason for the creation of genetically disabled children.

International research groups working on the genetic characterization of hereditary diseases are focusing on these large consanguineous families with genetic disorders. Hereditary diseases could be one of the fundamental causes of the high mortality rate in Afghanistan. Here AI genetic modification could be very useful to solve these genetic problems

Type of government: Unitary totalitarian provisional theocratic Islamic emirate (not recognized by the UN)

HDI: 0.478

Major diseases: cancer, congenital heart defect, hepatitis A&C



Australia:

AAAIH, or the Australian Alliance for Artificial Intelligence in Healthcare, is an alliance that brings together more than 100 national and international partners, government, consumers, clinics, industry organizations, and leading agencies. By working together, they are supporting and accelerating the adoption of AI-enabled healthcare in Australia. Alliance members operate in strategic areas including safety, quality, ethics, and workforce. They are working on helping AI to get adopted by healthcare. however, they focus on developing safe and ethical care for the patients

In March 2022, Australian senators passed a bill to authorize the controversial procedure of "3-parent IVF", also known as "mitochondrial donation". The bill was passed unamended by 37 votes to 17, after a passionate debate and a vote of conscience. It is nicknamed "Maeve's Law", after a little girl suffering from mitochondrial disease. Every year in Australia, around fifty babies are born with a serious form of mitochondrial disease.

Type of government: representative democracy and constitutional monarchy

HDI: 0.951

Major diseases: arthritis, asthma, cancer, cardiovascular disease, chronic obstructive pulmonary disease

Chad:

Since Chad is one of the least developed countries on the planet (187th on 189 on the HDI), AI could improve diagnostics and reduce health costs. Thanks to this, more people could afford healthcare while it would save on the State expenditure for it in both long and short term, especially as the country's health situation is severe (highest rate of infant mortality in the world).

Type of government: presidential republic

HDI: 0.394

Major diseases: lower respiratory infections, malaria, HIV/AIDS

Democratic Republic of Congo (DRC):

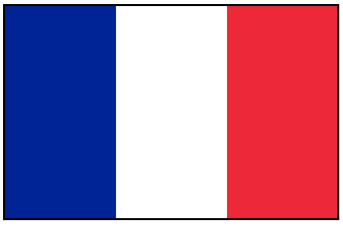
The DRC's health situation is difficult. The country is facing numerous endemic diseases and, despite remarkable progress over the last years (only two people died of the Yellow fever in 2021 according to the World Bank), many challenges remain. The country

has the second highest rate of infant mortality, and frequently faces severe disease outbreaks (in 2019, the Ebola outbreak caused 1,000 casualties), as well as massive problems of stunted growth and of risks of hunger crisis (2020: 15.6 million people at risk in case of hunger crisis). Hence, new technologies strengthening the genome or protecting it better could be a new solution bringing new perspectives. In the DRC, some of the legal texts about Genetically Modified Organisms (GMOs) prove to be ineffective; others are anachronistic in relation to the provisions of the international legal instruments to which the DRC is a Party. DRC is bound by the Cartagena Protocol on Biosafety, which is an international agreement on biosafety and a supplement to the Convention of the United Nations on biological diversity. But, there is still no specific law or regulation in force concerning biosafety, the lack of adequate legislation to regulate the import and monitor the introduction of GMOs and synthetic biology products. DRC proposes the revision or strengthening of the legislative and regulatory on Biodiversity, in particular, updating the National Biosafety Framework and Biosafety Bill.

Type of government: unitary semi-presidential republic

HDI: 0.479

Major diseases: river blindness, cholera, malnutrition, malaria, HIV/AIDS, pneumococcal disease, yellow fever, Ebola



France:

France, like 29 other countries, has ratified the Oviedo International Convention, which prohibits any transmissible modification of the human genome.

Under Article 13 of the Oviedo Convention, "an intervention seeking to modify the human genome may only be undertaken for preventive, diagnostic or therapeutic purposes and only if its aim is not to introduce a modification in the genome of the descendants".

France to become the world leader in the use of ia to diagnose and treat diseases thanks to OWKIN (biology company)

In France, there are systems such as the Telethon, it is a very long emission aiming at raising funds to finance research on rare diseases. In the early 2000's, Alain Fischerand his team succeeded in treating "bubble babies" suffering from a serious genetic disease affecting their immune system, by administering a gene-drug. This is called genomic therapies and it is now used to heal diseases as parkinson or heart diseases it is a flourishing system in France

Type of government: semi-presidential government

HDI: 0.903

Major diseases: cancer and cardiovascular diseases

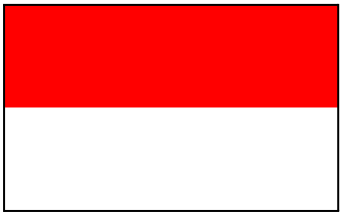
Gabon:

Gabon could help by improving patient care. Gabon could, for example, develop personalized treatments or teleconsultation platforms powered by AI to allow people from remote regions to access healthcare easily and rapidly. It also could help improve cost management.

Type of government: presidential republic

HDI: 0.706

Major diseases: dengue, yellow fever, ebola…



Indonesia:

AI was a key element during the COVID crisis, by helping with developing treatments, with thermic testing and facial recognition. In 2020, there were 74 healthcare start-ups with AI, like Haodoc which was a teleconsultation platform.

The Bajau people in Indonesia have undergone a genetic modification that enables them to remain underwater for up to 13 minutes. During an 8-hour working day, these indigenous people spend 60% of their time in the water. They descend to depths of up to 70 m, equipped only with weights and a wooden mask. This genetic mutation has given them a larger spleen, enabling them to store many more red blood cells and therefore oxygen.

Type of government: presidential representative democratic republic

HDI: 0.705

Major diseases: malaria, typhus, chikungunya, dengue fever

Kazakhstan:

There are several advantages to integrating AI into the Kazakhstan healthcare system. The first is greater efficiency. An automated system allows healthcare professionals to analyze patient data more quickly in order to deliver better healthcare faster. This can reduce stress for doctors who may already be overworked.

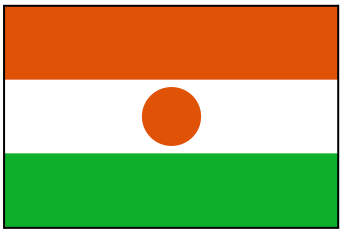
Overall, PneumoNet is an AI-based healthcare device called PneumoNet to enable early diagnosis of the most infectious lung diseases. is enabling Kazakhstan to effectively diagnose 17 of the most contagious lung diseases using AI techniques. These include pneumonia, tuberculosis, cancer, and COVID-19. The Kazakh Research Institute of Oncology and Radiology (KRIOR) and Forus Data have joined forces to develop and implement this technology.

Since lung diseases are the third cause of death in Kazakhstan, this country has much to win by continuing to develop such devices.

Type of government: presidential system

HDI: 0.811

Major diseases: hepatitis A&B, meningitis



Niger:

Situated in the heart of the Sahel, Niger has a relatively undiversified economy, dependent on agriculture for 40% of its GDP. More than 10 million people live in extreme poverty, which will reach 41.8% in 2021. Niger is facing an influx of refugees fleeing conflicts in Nigeria and Mali. On 31 August 2022, the United

Nations Refugee Agency (UNHCR) counted 294,467 refugees and almost 350,000 displaced persons on its territory.

Type of government: semi-presidential republic

HDI: 0.4

Major diseases: yellow fever, malaria

Russia:

The Republic of Sakha, which is the biggest Russian republic, located in far east Russia, is launching a pilot project named ONKOPOISKAKHA.RF. It would be about using AI in preventive medicine for oncopathologies thanks to a site presenting the screening stages.A Russian scientist wants to use the CRISPR method to modify human embryos. He wants to immunize unborn children against HIV. He claims that his method is more effective than the one used in China last year. Denis Rebrikov, a Russian biologist, intends to modify human embryos, following on from the experiment conducted by He Jiankui. If he obtains the necessary authorizations. He wants to use the controversial "genetic scissors" technique.

Type of government: federal democratic state

HDI: 0.829

Major diseases: diabetes, hypertension, tuberculosis

Singapore:

As one of the wealthiest countries on earth, Singapore benefits from an universal healthcare system. The life expectancy is 82.7 years old and the infant mortality rate is very low (2.7‰, the lowest in the world). The population is aging (20% over 65 years by 2030). The country is benefitting from one of the best healthcare systems in the world with, as of 2019, Singapore had a total of 14,297 doctors in its healthcare system, giving a doctor-to-population ratio of 1:399. The country disposes of numerous hospitals, including many specialized facilities; however, Singapore still faces issues due to a rampant medical beds shortages. The country is also a pioneer in telemedicine and was among the first to develop electronic medical records for its patients. In Singapore, genome editing techniques may be applied in research but not for therapeutic (or clinical) purposes.

Type of government: Unitary dominant-party parliamentary republic

HDI: 0.939

Major diseases: malnourishment, dengue, myopia

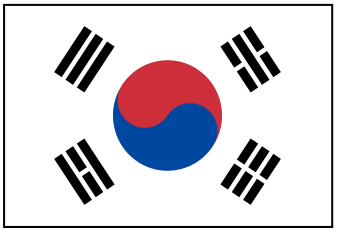
South Africa:

South Africa already has guidelines in place, such as the Policy Action Network regarding the use of AI and data in healthcare. There are also key policies embedded in the National Digital Health Strategy, which seeks to use digital health technologies to augment rather than replace existing systems.

Type of government: constitutional democracy

HDI: 0.713

Major diseases: malaria



South Korea:

The South Korean AI market should go from 0.1 billion euros in 2022 to 2.11 billion euros in 2030

The Ministries of Health and Food and Medicines are seeking to include and accelerate the approval of AI/big data-based devices and digital wearable technologies as innovative medical devices.

South Korea's capital has become the world's first capital of human cloning for therapeutic purposes

Trained as a veterinary surgeon, Professor Woo Suk-hwang gained international recognition in early 2004 when he announced that he had created human embryos by cloning. He then used an embryo to obtain stem cell lines capable of differentiating into human embryos.

Type of government: constitutional republic

HDI: 0.925

Major diseases: cancer, liver diseases, Alzheimer disease, hypertensive diseases

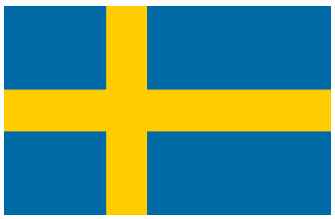
Sudan:

In Sudan, there are many contagious diseases but inadequate health infrastructure and limited access to health services in remote areas. AI could help with automatized diagnostics and telemedicine. A powered AI chatbot could be very useful in understanding Sudanese Arabic to give more precise pieces of information and better advice.

Type of government: federal provisional government

HDI: 0.508

Major diseases: cholera, viral hepatitis, yellow fever, haemorrhagic fever



Sweden:

The Halland region is developing federated learning capabilities in collaboration with Halmstad University. As part of a test project under the Federated Learning initiative coordinated by the Swedish National Centre for Applied Artificial Intelligence (AI Sweden), they have developed federated mortality prediction, designing an algorithm that predicts the survival rate of emergency care patients up to 30 days after their visit to the emergency care unit. This enables them to better monitor patients and avoid unnecessary illnesses while saving the hospital money.

Scientist Fredrik Lanner, from the Karolinska Institute in Stockholm, Sweden, hopes to find new treatments for infertility and miscarriage using the innovative CRISPR-cas9 gene-editing

technology. He will deactivate these genes in embryos in order to observe what roles they play in their early development.

This makes the researcher the first scientist to carry out this type of research on human embryos. This type of experiment has long been considered taboo, not least for safety and ethical reasons. For example, many fear that unsuccessful genetic modifications could lead to babies contracting new hereditary diseases. However, Lanner explains that this type of research is fundamental to trying to avoid such situations. While his primary aim is to find a way of treating infertility and preventing miscarriages, the researcher also hopes to learn more about the development of genes at this early stage, which he hopes could subsequently help to cure certain diseases.

Type of government: constitutional monarchy

HDI: 0.947

Major diseases: ischaemic heart disease and stroke

Syria:

AI could help Syria with AI-powered tools to treat medical images like radio tools powered by AI to process medical images such as X-rays, CT scans, and MRIs with great precision to detect useful details and give better diagnostics. Syrian start-ups could also develop virtual assistants and a 24/24h chatbox to answer medical questions to help people from remote regions

Type of government: unitary dominant-party semi-presidential republic

HDI: 0.577

Major diseases: cardiovascular diseases, cancer, diabetes

Türkiye:

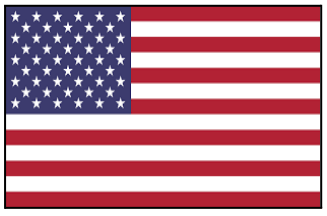
One of the main roles of AI in Türkiye's healthcare sector is to help healthcare professionals make accurate diagnoses. AI algorithms can analyze large amounts of patient data, including medical records, lab results, and imaging scans, to identify patterns and detect potential diseases, this could lead to faster and more accurate diagnoses.AI can also play a crucial role in personalized medicine. By analyzing an individual's genetic information, lifestyle factors, and medical history, AI algorithms can provide tailored treatment plans and preventative measures.

There is nevertheless an ethical and juridical challenge: To what extent should Türkiye allow AI to control human life? Fertility clinics in Türkiye have removed offers of germline genome modification from their websites.

Type of government: presidential representative democracy and constitutional republic

HDI: 0.838

Major diseases: malaria, cardiovascular diseases



United States of America:

While last month a commission voted to lift the ban on the genetic modification of embryos intended for pregnancy and birth, the US

Congress has finally decided to maintain it. Fear of impending scientific progress on the one hand, and awareness of the ethical problems of "designer" babies on the other, the Congressional Committee reversed itself: the ban on genetically modifying babies, which came into force in 2016, shortly after the discovery of Crispr technology, has been maintained.

After a survey made in 2022, 60 % of Americans would be uncomfortable if healthcare involved AI in their own medical care

Type of government: constitutional federal republic

HDI: 0.921

Major diseases: heart disease, cancer, stroke, chronic lower respiratory diseases

Yemen:

Yemen has long been one of the poorest countries in the Middle East and North Africa (MENA) and is now one of the world's worst humanitarian crises. The fighting raging since early 2015 has devastated its economy, leading to severe food insecurity, and destroying critical infrastructure. The UN estimated that 24.1 million people in 2023 were at risk of hunger and disease, and roughly 14 million were in acute need of assistance.

Around 18 million Yemenis are without safe water and sanitation. A staggering 16.2 million people require urgent emergency assistance because of food insecurity and even malnutrition. As a result, Yemen has been grappling with recurring outbreaks of preventable diseases such as cholera, diphtheria, measles, and dengue fever.

Type of government: republic

HDI: 0.455

Major diseases: measles, diphteria, dengue, cholera and polio

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