Committee: World Health Organization

Issue: Genomics and its global health implications

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Position: President, Deputy President, Deputy President

INTRODUCTION

Dear Delegates,

"Can technology be the answer to the crises that the world faces nowadays, like democratization, economic recession, wars, and pandemics?" is a question we all regularly hear these days. Genomics could potentially be the answer to that question. This branch of science that intersects with technology is highly promising since it offers a long-term possibility of offering prevention and management of multiple currently untreatable diseases.

However, genomics is a new and rapidly evolving field and as a result its future role and boundaries are unclear. Thus, solutions need to be identified and implemented in order to ensure its disadvantageous side is limited while its potential is fully explored.

This study guide will provide you with an insight on genomics, however it is essential that you do your own research regarding your country's policy.

Should you have any questions concerning the issue or the conference in general, please do not hesitate to contact us via email (dionysiamei@gmail.com, niki.drakopoulou@gmail.com, gbakalis17@gmail.com), Instagram (@_dionysia.mei_, @nikki_dra, @b1k1l1s) or Facebook (Dion Meimar, Nikki Drakopoulou).

Looking forward to meeting and working with you all!

Kind regards,

Dionysia Meimaroglou

George Bakalis

Nikki Drakopoulou

DEFINITION OF KEY TERMS

Genomics

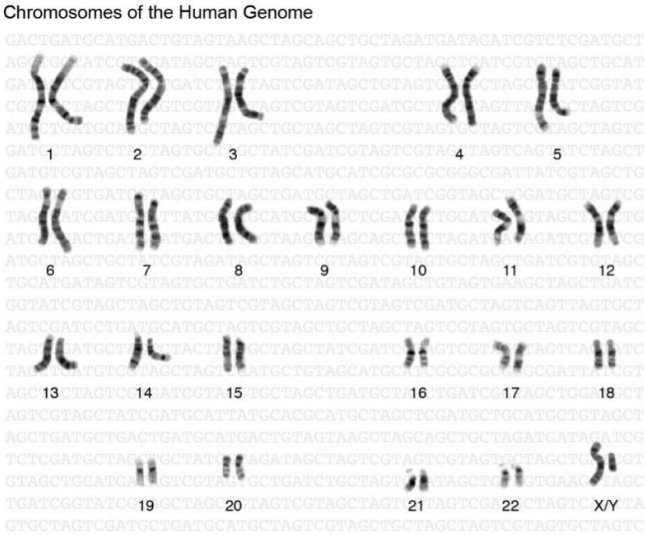
Genomics is the study of the total or part of the genetic or epigenetic sequence information of organisms and attempts to understand the structure and function of these sequences and of downstream biological products. [1]

Gene

The gene is the unit of hereditary information that occupies a fixed position (locus) on a chromosome. Genes achieve their effects by directing the synthesis of proteins. [2]

Genome

The genome is the complete set of genetic material of a human, animal, plant or other living thing. [3]



A karyotype of the human genome

Gene Therapy

Gene Therapy is a technique that attempts to cure or treat a disease through gene modification. This can work with several mechanisms; replacement of a disease-causing gene

[1] World Health Organisation. "Genomics." Genomics, 12 Nov. 2020, www.who.int/news-room/q-a-detail/genomics#.
[2] ---. "Genetically Modified Organism | Definition, Examples, & Facts." Encyclopedia Britannica, www.britannica.com/science/genetically-modified-organism. Accessed 19 July 2021.
[3] Cambridge. "Genome Definition." Cambridge Dictionary, Cambridge, 23 June 2021, www.dictionary.cambridge.org/dictionary/english/genome.

with a healthy copy of it, deactivation of the disease-causing gene or introduction of a modified gene to help treat the disease.

Genetics

Genetics is the study of how, in all living things, the characteristics and qualities of parents are given to their children by their genes. [4]

The difference between genetics and genomics is that while genetics analyzes a single gene's functioning and composition in order to study heredity, genomics focuses on all genes and the relationships between them so as to address their combined impact on the growth and development of an organism.

Germline Modification

Germline Modification or Germline Editing is a technique used to modify ova, sperm and embryos, with the prospect of improving gene therapy for people with genetic diseases, allowing the correction of faulty genes of embryos before they are implanted using in vitro fertilization (IVF) or even contributing to the "editing" of inherited traits, which could potentially lead to the creation of the so-called "designer babies". This use, however, has aroused great controversy due to its ethical complications.

Designer Baby

A Designer Baby is a baby whose genes have been chosen by its parents and doctors so that it has particular characteristics. [5]

In Vitro Fertilization

In Vitro Fertilization (IVF) is a series of procedures used to help with fertility or prevent genetic problems and assist with the conception of a child.

During IVF, mature eggs are collected (retrieved) from ovaries and fertilized by sperm in a lab. Then the fertilized egg (embryo) or eggs (embryos) are transferred to a uterus. One full cycle

[4] "Genetics." Cambridge Dictionary, Cambridge, 2021, www.dictionary.cambridge.org/dictionary/english/genetics.
[5] Cambridge Dictionary. "Designer Baby Definition." Cambridge Dictionary, 2021, www.dictionary.cambridge.org/dictionary/english/designer-baby.

of IVF takes about three weeks. Sometimes these steps are split into different parts and the process can take longer.[6]

Genetically Modified Organisms

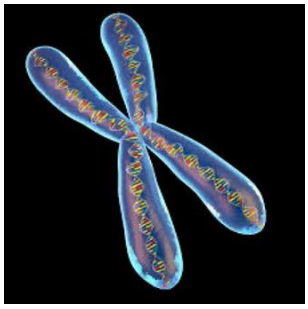
Genetically Modified Organisms (GMOs) or Genetically Engineered Organisms (GEOs) are organisms whose genome has been altered in the laboratory in order for them to acquire favored physiological characteristics or to produce desired biological products.

Cloning

Cloning is a collective of different procedures used to create genetically identical copies of a biological entity, the clones.

Chromosome

A structure consisted of DNA organized into genes and proteins located inside the nucleus of the cell. Each cell contains 23 chromosomes.[7]



A 3D model of a chromosome.

Karyotype

The term refers to a laboratory technique that produces an image of an individual's collection of chromosomes. The karyotype is used to look for abnormal numbers or structures of chromosomes.

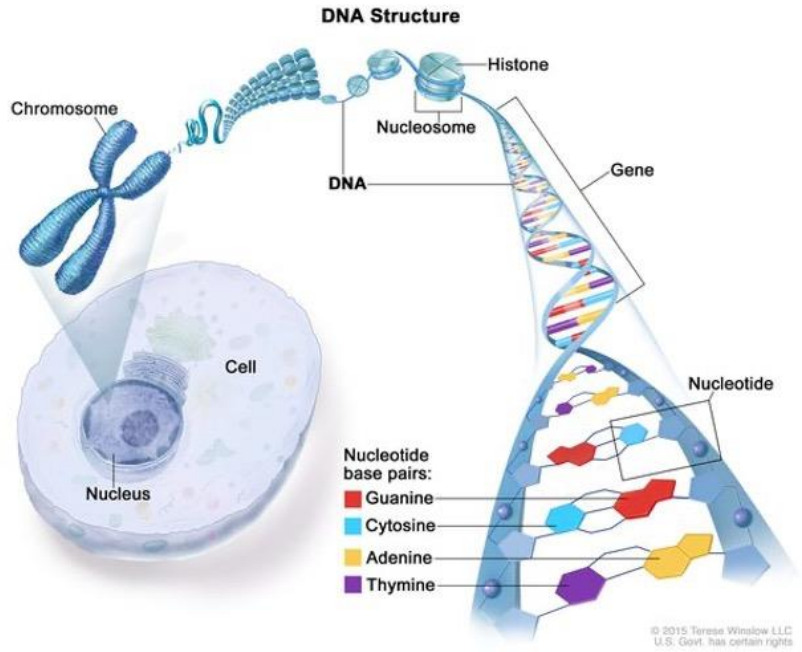
[6] "In Vitro Fertilization (IVF) - Mayo Clinic." Mayo Clinic, www.mayoclinic.org/tests-procedures/in-vitro-fertilization/about/pac-20384716. Accessed 23 June 2021.
[7] "NCI Dictionary of Genetics Terms." National Cancer Institute, www.cancer.gov/publications/dictionaries/genetics-dictionary/def/chromosome. Accessed 19 July 2021.

Nuclein

The nuclein is any of a group of proteins, containing phosphorus, that occur in the nuclei of living cells.[8]

Deoxyribonucleic Acid (DNA)

DNA is a double stranded, helical molecule composed of nucleotides, each of which contains a phosphate group, a sugar molecule (pentose) and a nitrogenous base (adenine, thymine, guanine and cytosine).[9] DNA contains all the genetic information responsible for the development and function of the organism, as well as heredity since it allows information to be passed down to the offspring. Most DNA is located inside the cell nucleus and a small amount can be found in the mitochondria and the chloroplasts (plants only).



A visual representation of genetic information organization

DNA Sequencing

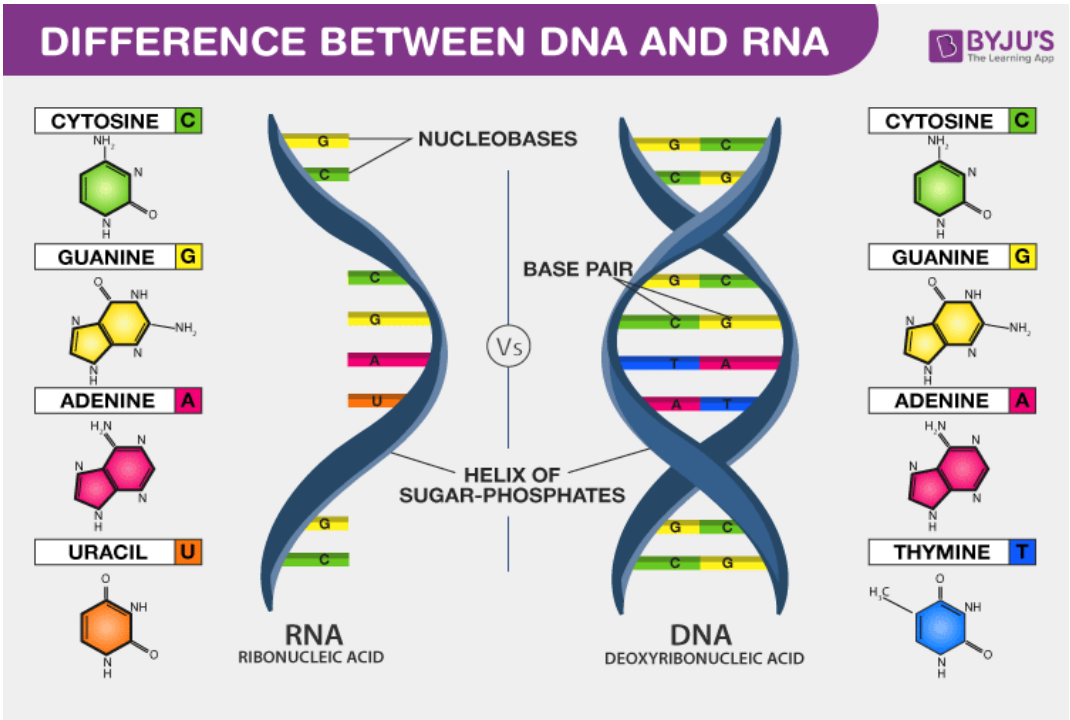
DNA sequencing is a laboratory technique used to determine the exact sequence of bases (A, C, G, and T) in a DNA molecule. The DNA base sequence carries the information a

[8] "Definition of Nuclein | Dictionary.Com." Www.Dictionary. Com, www.dictionary.com/browse/nuclein. Accessed 19 July 2021.
[9] "The Order of Nucleotides in a Gene is Revealed by DNA Sequencing." https://www.nature.com/scitable/topicpage/the-order-of-nucleotides-in-a-gene-6525806/

cell needs to assemble protein and RNA molecules. DNA sequence information is important to scientists investigating the functions of genes.[10]

Ribonucleic Acid (RNA)

Ribonucleic acid (RNA) is a molecule similar to DNA. Unlike DNA, RNA is single-stranded. An RNA strand has a backbone made of alternating sugar (ribose) and phosphate groups. Attached to each sugar is one of four bases--adenine (A), uracil (U), cytosine (C), or guanine (G). Different types of RNA exist in the cell: messenger RNA (mRNA), ribosomal RNA (rRNA), and transfer RNA (tRNA). More recently, some small RNAs have been found to be involved in regulating gene expression.[11] The primary role of RNA is to convert the information stored in DNA into proteins.



A comparison between DNA and RNA structure

Heredity

Heredity is the transmission of genetic characters from parents to offspring. It is dependent upon the segregation and recombination of genes during meiosis and fertilization and results in the genesis of a new individual similar to others of its kind but

[10] ---. "DNA Sequencing." National Human Genome Research Institute, www.genome.gov/genetics-glossary/DNA-Sequencing. Accessed 19 July 2021.
[11] ---. "Ribonucleic Acid (RNA)." Genome.Gov, www.genome.gov/genetics-glossary/RNA-Ribonucleic-Acid. Accessed 18 Aug. 2021.

exhibiting certain variations resulting from the particular mix of genes and their interactions with the environment.[12]

Meiosis

Meiosis, also called reduction division, is the division of a germ cell involving two fissions of the nucleus and giving rise to four gametes, or sex cells, each possessing half the number of chromosomes of the original cell.[13]

Fertilization

Fertilization is the process in sexual reproduction that involves the union of male (sperm) and female (ovum) gametes (each with a single, haploid set of chromosomes) to produce a diploid zygote or the fecundation or impregnation of animals and plants (e.g., by insemination and pollination, respectively).[14]

Infection

The invasion and growth of germs in the body. The germs may be bacteria, viruses, yeast, fungi, or other microorganisms. Infections can begin anywhere in the body and may spread all through it. An infection can cause fever and other health problems, depending on where it occurs in the body. When the body's immune system is strong, it can often fight the germs and cure an infection. Some cancer treatments can weaken the immune system, which may lead to infection.[15]

Table of Abbreviations

Abbreviation	Meaning
WHO	World Health Organization
UNESCO	United Nations Educational, Scientific and Cultural Organization

[12] "Heredity." Www.Dictionary.Com, www.dictionary.com/browse/heredity. Accessed 18 Aug. 2021.
[13] "Meiosis | Definition, Process, & Diagram." Encyclopedia Britannica, 5 Aug. 2021, www.britannica.com/science/meiosis-cytology.
[14] "Fertilization." Biology Articles, Tutorials & Dictionary Online, 2021, www.biologyonline.com/dictionary/fertilization.
[15] "NCI Dictionary of Cancer Terms." National Cancer Institute, www.cancer.gov/publications/dictionaries/cancer-terms/def/infection. Accessed 18 Aug. 2021.

MEDC	More Economically Developed Country
LEDC	Less Economically Developed Country
DNA	Deoxyribonucleic Acid
RNA	Ribonucleic Acid
IVF	In Vitro Fertilization
GMO	Genetically Modified Organism
GEO	Genetically Engineered Organism
NHGRI	National Human Genome Research Institute
RCMG	Research Centre for Medical Genetics
DOE	Department Of Energy
CDC	Centers for Disease Control
OGDP	Office of Genomics and Disease Prevention
JCB	Journal of Biological Chemistry
HGB	Human Genome Project
HapMap	Haplotype Map
Abbreviation	**Meaning**
MEDC	More Economically Developed Country
LEDC	Less Economically Developed Country

BACKGROUND INFORMATION

Ever since the first sequencing of DNA in 1977, genomics and the study of complete genomes has brought about a revolution in all aspects of combatting disease, from diagnosis to prevention and thankfully to treatment. However, the global monopoly on genomics technologies is held mostly by MEDCs, causing the prices of related drugs and patents to be higher and further increasing the health gap between MEDCs and LEDCs.

Historical background

The history of genomics begins in 1977. At this point, knowledge of DNA had evolved tremendously in the over six decades since its discovery. Many attempts had been made to sequence a full genome, but it is then when Frederick Sanger developed a breakthrough method, which involved producing all possible incremental length sequences and labelling the ultimate nucleotide. This method, although improved and refined as the years went on, would become the most common method used because of its ease of use and accuracy. Over the years, second and third generation methods would appear, such as pyrosequencing, which utilizes detection of pyrophosphate release, and minion devices, portable, real-time sequencing that monitor changes to electrical currents during the passing of DNA and RNA through a protein nanopore. These methods all ultimately serve the same goal, to sequence and document the genetic information of organisms, in hopes to better understand life and combat disease. Notable efforts of this include:

- The Human Genome project, which lasted from 1990 until 2003 and successfully achieved the sequencing of all 3 billion letters in the human genome.
- The International Mouse Genome Sequencing Consortium, which achieved the first full genome sequencing of a mammal in 2002.

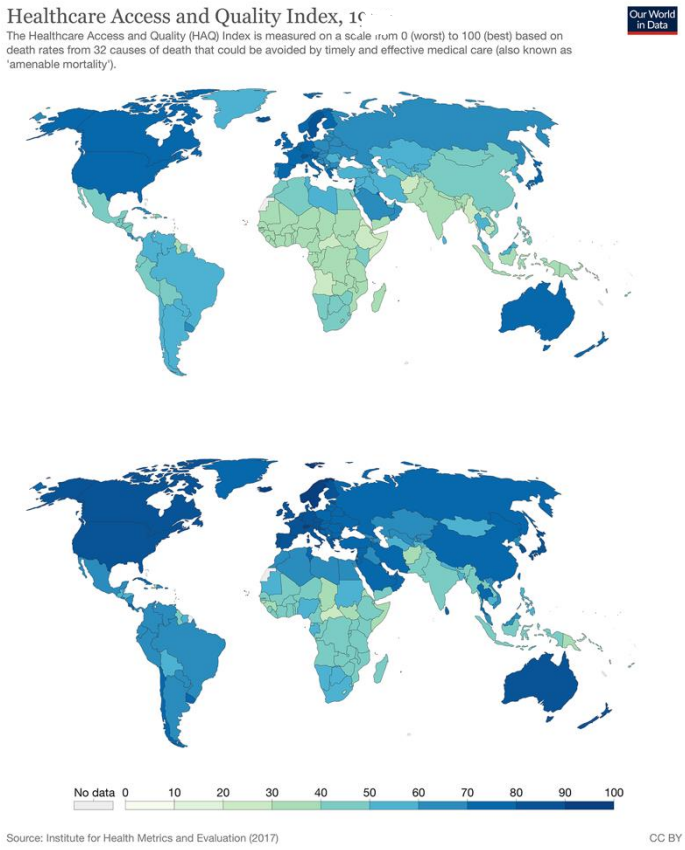
Effect in global health innovations

Even as soon as 6 years after its discovery, the field of genomics has opened the door to incredible innovations in all different kinds of disease prevention. Particularly, the United States National Institute of Health stated that: “In recent years the genomes of nearly 50 microbial pathogens have been sequenced, and ongoing efforts to sequence the genomes of mosquito vectors (e.g., *Anopheles gambiae,* the malaria vector, and *Aedes aegypti*, the main vector for dengue fever) promise benefits in the shorter term for the control of communicable

diseases."[16]. Additionally, it is predicted that in the future, advancements in genomics will give us the tools to manage diseases that, throughout history, have been considered unmanageable, such as cancer and diabetes, or even mental disorders such as psychosis and dementia.

Effect in the healthcare gap

The above-mentioned progress in medicine has the potential to be a substantial step closer to closing the healthcare gap, by combatting diseases common in LEDCs (i.e., malaria). However, most of the funding, research and innovation was made and, as a subsequence, is owned by MEDCs. A study conducted by the WHO found that in 2000, the total funding to United States-based genomics research was close to double that of Japan, who received the second most funding. Additionally, the same study notes that over 80% of the DNA patents in genomics in the period 1980 through 1993 were held by US companies. On the other hand, healthcare in LEDCs has only shown minor health improvements since the discovery of genomics, whereas the healthcare in MEDCs has shown staggering innovation. [17]



Ethics and Implications

As with any major healthcare discovery, we must never ignore the bioethics and social implications it might have. On one hand, as far as genomics are concerned, the biggest question in the present is the misuse of genetic information, intellectual property regarding DNA and the cataloguing of populations. On the other hand, the long-term effects include the engineering of a genetic caste system, which would divide people based on their "genetic

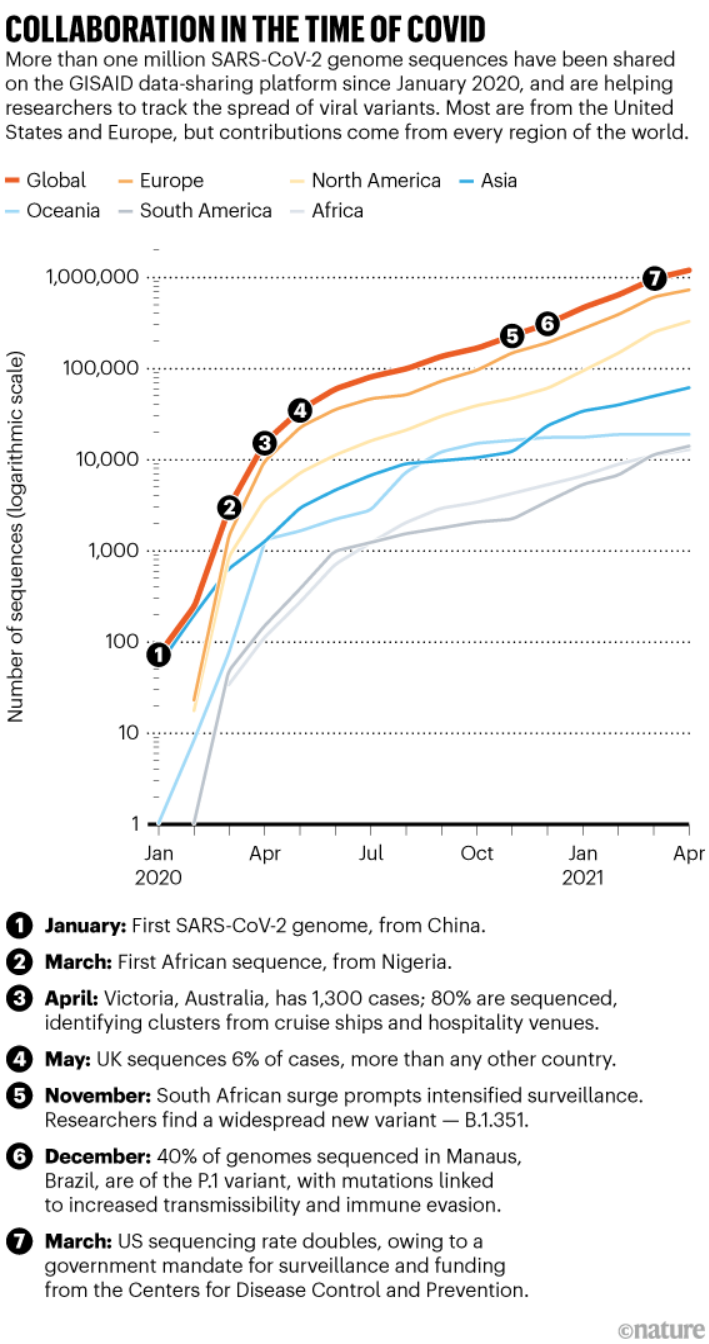
[16] Pang, T. (2002, July). *The impact of genomics on global health*. American journal of public health. Retrieved September 18, 2021, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1447192

[17] Our World in Data, Healthcare Access and quality index, https://ourworldindata.org/health-inequality

superiority" is especially concerning, as it would create grounds for exploitation and discrimination.

COVID-19, the first pandemic in the post-genomic era

As is with every virus, the first step in combatting the global COVID-19 pandemic is sequencing the genome of SARS-CoV-2 as to understand its origin, study the epidemiology of the disease and move towards treatment. The urgency and worldwide spread of this virus has resulted in extraordinary collaboration during sequencing efforts, as more than one million sequences have been shared from 172 countries. These efforts are among the core reasons why tests and vaccines were developed in historic speeds. [18]



[18] One Million Coronavirus Sequences: Popular Genome Site Hits Mega Milestone Amy Maxmen - https://www.nature.com/articles/d41586-021-01069-w

MAJOR COUNTRIES AND ORGANISATIONS INVOLVED

Country	Initiative	Objective
Australia	Australian Genomics Health Futures Mission	Develop national standards and protocols to enhance data gathering and analysis; promote the value of genomics to the broader community; and encourage government partnerships with philanthropists and businesses
China	100,000 Genome Project	Study how Chinese population transform from health to disease, environmental impacts, and the interactions between environmental factors and genes, and its influence on people's health
Estonia	Personalized Medicine Programme	Develop genotypes that will enable personalized reports for use in everyday medical practice through the national e-health portal
France	France Génomique 2025	Integrate genomic medicine into routine patient care and establish a genomic medicine industry to fuel economic growth. By 2020, France aims to have increased its annual sequencing capacity to 235,000 genomes, of which 175,000 are to come from cancer patients, and the remaining 60,000 from rare disease patients
Japan	Initiative on Rare and Undiagnosed Diseases	Develop innovative drug candidates by targeting novel, single pathological mutations, apply new NGS-based genome analyses to cases that remain unsolved, and facilitate international data sharing
Saudi Arabia	Saudi Human Genome Program	Study more than 5,000 inherited diseases using more than 10,000 samples from Saudi patients with inherited diseases that resulted in identification of more than 2,000 variants underlying the diseases
Turkey	Turkish Genome Project	Sequence the genomes of 100,000 Turkish nationals and increase that number to 1 million genomes by 2023
United Arab Emirates	United Arab Emirates—Dubai Genomics	Sequence all of its 3 million residents. Dubai Genomics is one of numerous projects within the Dubai Future Foundation's "Dubai 10X Initiative," launched to catapult the UAE 10 years ahead of the rest of the world
United Kingdom	100,000 Genome Project	Incorporate genome sequencing in routine healthcare through the Genomic Medicine Service (GMS). Sequenced 71,095 whole genomes
United States	All of Us Research Program	Glean health and wellness data from 1 million or more Americans

NHGRI - US

The National Human Genome Research Institute (NHGRI) was founded in 1989 to lead the International Human Genome Project as the National Center for Human Genome Research. The National Institutes of Health (NIH), the US's medical research body, houses NHGRI.

Wellcome Centre for Human Genetics - UK

The Wellcome Centre for Human Genetics, based at the University of Oxford's Nuffield Department of Medicine in the Medical Sciences Division, is a human genetics research center supported by the Wellcome Trust and others.

Research Centre for Medical Genetics - Russia

The Research Centre for Medical Genetics is a non-profit federal academic research institute that is a leader in the field of medical genetics in Russia. Researchers and physician-scientists collaborate to turn scientific breakthroughs into revolutionary diagnostic and therapeutic treatments for patients.

RCMG was founded in collaboration with the Russian Federation's Ministry of Science and Higher Education.

Burkina Faso - Cameroon - Ghana - Kenya - Malawi - Mali - Nigeria - Papua New Guinea - Tanzania -The Gambia - Vietnam

The Consortium Project 1 relates to resistance to severe malaria in areas where people are repeatedly exposed to the Malaria parasite (plasmodium), in order to better understand why some people, die of infection and others survive.

Beijing Genomics Institute - China

BGI is a Chinese genome sequencing firm based in Shenzen, Guangdong. It was founded in 1999 as a genetics research center as part of the Human Genome Project

Department Of Energy (DOE) – USA federal agency

The DOE Human Genome Program supports research projects at universities, the DOE Joint Genome Institute, DOE-owned national laboratories, and other research organizations.

Centers for Disease Control (CDC) – USA Federal agency

The Office of Genomics and Disease Prevention incorporates human genetics research, policies, and programs with public health research, policies, and initiatives. The OGDP engages in national policy-making panels, funds extramural population-based research projects, and educates and trains health professionals about genetics' role in illness prevention.

TIMELINE OF EVENTS

Date	Description of Event
1871	First paper mentioning nuclein, now known as DNA, is published.
1904	Proposal of Chromosome Theory, which explains the inheritance of genes based on the behavior of chromosomes during meiosis and states that specific genes are found within specific areas of chromosomes.

1910	Discovery of the five nucleotide bases.
1950	Discovery of nucleotide base pairings.
1952	The Hershey-Chase experiments show that genetic information is carried in DNA.
1953	Discovery of the double helix structure.
1977	First full genome, that of bacteriophage phiX174, which takes control of bacteria and forces them to make copies of itself, is sequenced.
1990	Launch of the Human Genome Project.
1992	Development of method for testing embryos for genetic diseases in the womb by testing and counting for the presence of a healthy number of chromosomes.
1995	First bacteria genome, that of Hemophilus influenzae, the bacteria responsible for Hemophilus influenzae disease, is sequenced.
1996	Dolly the Sheep, the first cloned animal, is born.
1999	The Human Genome Project sequences Chromosome 22.
2000	The full genome of the fruit fly is sequenced.
2002	Mice become the first mammals to have their full genome sequenced. The malaria parasite is also sequenced.
2003	The Human Genome Project is complete two years ahead of schedule and concluded that the human gene count is 20,000 to 25,000.
2005	Chimpanzee genomes are sequenced.
2007	New sequencing technologies are introduced, marginally increasing the sequencing output.
2008	Launch of the 1,000 Genomes Project, which aimed to document human genetic variation.
2009	Lung Cancer and Malignant Melanoma genomes are published.
2010	Sequencing and publishing of the Neanderthal genome.

2013	The United States Supreme Court illegalizes the patenting of naturally occurring DNA.
2018	Launch of the 100K Genomes Project, a UK project with the aim to sequence 100,000 genomes from patients with rare diseases.
2020	Sequencing of SARS-CoV-2, the virus responsible for the COVID-19 disease, marking the beginning of the efforts for developing treatment.

UN INVOLVEMENT: RELEVANT RESOLUTIONS, TREATIES AND EVENTS

➢ Universal Declaration on the Human Genome and Human Rights

On 15 November 1993, the General Conference of UNESCO at its 27th session, by its Resolution 27 C/5.15, asked the Director General to prepare an international instrument for the protection of the human genome.

Then, on 14 November 1995, the General Conference of UNESCO requested that the Director General prepare a primal draft declaration, as well as assemble a committee of governmental experts to finalize the declaration, by its Resolution 28 C/2.2.

After multiple drafts following the instructions given by the Legal Commission formed by the International Bioethics Committee (IBC), the General Conference of UNESCO at its 29th session adopted the Declaration on the Human Genome and Human Rights[19], unanimously and by acclamation, on 11 November 1997. They also laid out methods for the follow-up of the Implementation of the Declaration, by the Resolution 29 C/I7, also called 'Implementation of the Universal Declaration on the Human Genome and Human Rights'.

The United Nations General Assembly endorsed the Declaration at its 53rd session on 9 December 1998 by its Resolution AIRES/53/152.

UNESCO is currently assessing the declaration's impact in accordance with the Guidelines for the Implementation of the Declaration (1999).

[19] http://portal.unesco.org/en/ev.php-URL_ID=13177&URL_DO=DO_TOPIC&URL_SECTION=201.html

➢ The Millennium Project

As part of the Millennium project which aimed to formulate specific action plans in order to achieve the Millennium Development Goals and reverse extreme poverty, hunger and diseases that affect millions of people. the UN also established several task forces including the Science, Technology and Innovation Task Force for which JCB (Journal of Biological Chemistry) was asked to become the genomics working group.

➢ WHO's action plan

In 2019 the Director-General of WHO established a new advisory committee on developing global standards for governance and oversight of human genome editing.

The WHO and Food and Agriculture Organization of the UN has a greatly important role in educating about the risks and benefits of genetic technologies and developing internationally agreed norms and standards for their safe and ethical use.

PREVIOUS ATTEMPTS TO SOLVE THE ISSUE

➢ The Human Genome Project (HGP)

The Human Genome Project (HGP) was an international attempt for research in order to determine the DNA sequence of the entire human gene carried out by a team of researchers from all over the world from October 1990 to April 2003.

This effort resulted in a completed sequence that includes about 99% of the regions of the human genome that contain genes with a 99.99% accuracy. Additionally, they sequenced the genes of model organisms as well as advanced innovative technology to study the whole genome.

➢ European Union

In 2018, 14 European Union countries (Bulgaria, Czech Republic, Cyprus, Estonia, Finland, Italy, Lithuania, Luxembourg, Malta, Portugal, Slovenia, Spain, Sweden, UK) signed a Declaration on ensuring cross-border availability of genomics information. The goal was to improve understanding and prevention of diseases by allowing more personized approaches to many diseases, especially

cancer and brain related illnesses. Croatia and Greece are also committed to signing the declaration.

- **International HapMap Project**

The outcome of this project was a haplotype map, the "HapMap", which is a tool that allows researchers to explore genes and genetic variations that affect health and diseases. HapMap genome scan approaches have enabled finding genes that have an impact on diseases much more efficiently. What is more, it has strengthened the research on the genetic factors that contribute to variations in response to environmental factors, drugs and vaccines as well as susceptibility to infection.

- **The National Arab Genome Project in United Arab Emirates**

The HapMap and 1000 genome projects have resulted in the creation of a catalog that lists human genetic variations, with the goal of achieving a better understanding of human diversity. However, it also revealed that genome data on the Arab population are overwhelmingly underrepresented, which disadvantages Arabs in healthcare. As a matter of fact, in 2016, Popejoy and Fullerton reported (as part of the 1000 Arab Genome Project) that only 0.08% of the public information is of Arab origin.

The International Arab Project in United Arab Emirates will focus on indigenous groups in the gulf region by sampling Emirati citizens. This way, reference sequences will be formed, so as to establish databases for customized molecular diagnostic assays and personalize medicine to the patients of Arab descent.

POSSIBLE SOLUTIONS

Genomics' Future

Genomics is a new rapidly evolving branch of science and consequently its future role is unclear. Therefore, solutions should be focused on preparing society for its complexity, by means such as events and publications informing citizens about it. What is more, it is crucial

that this field's prospects are explored to the fullest without nonetheless neglecting well-tried and more conventional approaches.

Equity

Equity is another issue related to genomics. While the global burden of diseases and health issues in general are predominantly carried-out by low- to middle-income countries, progress in this field is principally observed in high-income countries. Hence, it is substantial that genomics' benefits are equally distributed amongst all nations, in ways such the establishment of research centers specialized in genomics in every Member State, funding for genomic research in LEDCs or scientists specialized in genomics working in LEDCs and training locals.

Health Insurance

With genomics identifying pre-existing conditions, patients could be derived from health insurance just because of their medical history. Hence, regulations should be established so as to compose the use of personal data deriving from genomic research and to limit the sectors that have access to them so as to ensure patients privacy.

Agriculture

Small farmers could potentially be disadvantaged because of their lack of access to genetically modified seeds. In order to prevent that, solutions should be focused on more equal distribution or funding to those farmers so as to ensure accessibility.

Weaponizing

Such technology can possibly be weaponized in order to harm targeted population groups. The avoidance of such unfortunate events requires the commitment of all countries as well as some form conference or agreement that ensures this will not happen.

Moral, ethical and legal implications

With such a new and innovative technology, it is only natural that its moral, legal and ethical boundaries are unclear. This is clearly illustrated by the production of the so-called "designer babies". There is a concern about this, not only regarding its safety but also its ethical side. More specifically, the use of germline editing for genetic enhancement rather for just the treatment of genetic diseases is questionable. Hence, it is important that such boundaries are clarified in resolutions.

Funding and accessibility

Another issue related to genomic research is its accessibility. Gene therapies are not affordable for many people that need them. On top of that, genomics is not a profitable market and as consequence it is not a focus of large pharmaceutical companies, which only makes the financial situation worse. Therefore, funding this field and ensuring its accessibility is a substantial part of a resolution on genomics. Indicative solutions include creating motives to invest in this field and emphasizing its benefits.

Environmental hazards

Last but not least, it is imperative that solutions are put in place so as to hinder the harm of specific species and consequently the ecosystem as a whole due to genomic research. Thus, a part of the resolution could be focused on limiting the environmental impact of genomics by devoting part of research to its environmental impact and acting in accordance with its findings.

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BGI Genomics - high quality and affordable sequencing services https://www.bgi.com/global/

Research Centre for Medical Genetics

https://med-gen.ru/en/

Wellcome Centre for Human Genetics

https://www.well.ox.ac.uk/about-us

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https://www.cdc.gov/hi-disease/index.html

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