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UNESCO

Forming Ethical Boundaries for Genetic Intervention

EFFLMUN'25

UNESCO(IBC)

STUDY GUIDE

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1. Letters from the Secretariat

Dear delegates,

A warm welcome to EFFLMUN'25. We are genuinely delighted that you have chosen to spend your time with us, and we aim to make this decision one you'll look back on with absolute satisfaction.

This conference has been crafted with careful thought and unwavering dedication. I feel incredibly fortunate to have a role in shaping this event and to work alongside such talented individuals. The process demanded commitment, yet every step was rewarding because we always believed in the value of what we were building.

EFFLMUN'25 represents so much determination, passion, patience, and countless moments of collaboration that cannot be summed up easily. Above all, it was created to leave you with lasting, meaningful memories.

With great enthusiasm, we come together once more to celebrate dialogue, leadership, and the spirit of democracy. We cannot wait to offer you an exceptional and inspiring experience.

Güneş Uzun

Secretary-General

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Dear Delegates,

We made the EFFLMUN'25 with you in our hearts. We are happy that you joined us. Much thought and energy went into creating this gathering — but most importantly, it started with one idea: talking deeply always links people in unique manners. You picked to stay these days by our side; thus for every bit of time spent getting ready, it is valuable.

EFFLMUN'25 is far greater than the timetable of committees and sessions. It is a space where ideas converge, perspectives widen, and acquaintances happen to strike up. We wish that you are able to muster up enough confidence to speak out your thoughts, interest to look around, and ease just having fun being here.

As this conference kicks off, we want you to feel welcomed and supported as well as encouraged to take hold of any opportunity that comes your way. We are eager to see your drive, your leadership, and the individual marks each of you will make.

Ahmet Furkan Elden

Director General

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2. Letters from the Academic Team

Dear Delegates,

It is our pleasure to welcome you to the conference. As the Academic Team, we have worked with great care to research, write and organise every topic you will see throughout this event. Our goal was to create material that is clear, reliable, informative, and inspires you to debate with confidence.

We believe MUN is at its best when delegates feel prepared, supported and their visions expanded. That's why we focused on building committees that not only tackle global issues but also spark curiosity and encourage deeper thinking. We hope our work helps you dive into your roles, challenge ideas, and enjoy the experience fully. If you have any questions before or during the conference, our team will be glad to assist you. We wish you meaningful discussions, bold diplomacy, and an unforgettable MUN experience.

The Academic Team

3. Letters from the Chairboard

Dear Delegates,

We are genuinely excited to welcome all of you to the UNESCO Committee at EFFLMUN'25. This committee will seek the answer to one of the most challenging questions of our time: How do we draw ethical boundaries for genetic intervention? As your chair and co-chair, it is a pleasure to guide you through this crucial debate that creates a space where science, ethics, and human rights intersect.

Within the boundaries of our UNESCO Committee, we will talk about curing diseases, preventing genetic disorders, and developing healthcare for all. However, breakthroughs in science bring forward concerns that UNESCO has been raising for years related to bioethics and human rights. In this regard, your voices matter as our generation will be the one making the choices that will shape the future of genetic advancements. Throughout the conference, we hope you will stand up for your ideas, be kind in developing collaboration, and be open to different perspectives. You don't have to know everything about genetics or ethical issues to shine in this committee; what matters is your willingness to participate in discussions, ask questions, and engage in finding solutions. We are sure you will bring curiosity, empathy, and courage to the ongoing debates. It may be your first MUN, but one thing you can be sure of in this committee is that you will never be alone. As your chair members, we will always be here to help you. Don't be afraid to ask for help from us anytime you need. Remember, we were in your shoes once upon a time and surely know how you feel.

We can't wait to see the spark of energy, leadership, and creativity we will generate together. Let's make this committee an unforgettable event for all of us with all your meaningful, inspiring, and enjoyable contributions. This will be a space for growth and transformation.

Looking forward to meeting you all at the conference.

Warm regards

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4. Introduction

4.1 Introduction to the Committee

The Committee has been established by the Act of 1860 to carry out the functions of the committee of inquiry into bankruptcy and insolvency that was formerly performed by the office of the Auditor General.

4.1.1 UNESCO and the International Bioethics Committee (IBC) Role.

UNESCO ventures in the life sciences and biotechnology through its Bioethics Programme and the International Bioethics Committee (IBC). The IBC was formed in 1993 to tackle ethical, legal, and social issues that have arisen as a result of progress in the life sciences. Its mandate covers the encouragement of moral thinking and debate about scientific research and its uses, support of ethical capabilities by Member States, as well as developing normative tools based on respect to human dignity, human rights, and cultural diversity.

The IBC played a key role in the recognition of the Universal Declaration on the Human Genome and Human Rights in 1997, which refers to the human genome as the heritage of humanity, and requires that research and application of the genome should also be conducted with respect to human dignity and rights. Later normative efforts by UNESCO extended to the International Declaration on Human Genetic Data (2003) and the Universal Declaration on Bioethics and Human Rights (2005). Taken together, these tools demonstrate how UNESCO intends to offer soft-law guidelines that would allow the Member States to be able to formulate national bioethical policies.

The IBC and UNESCO are instrumental in defining the ethical limits in the current context of genetic interventions, be it in humans, animals, or plants, as it allows international agreement and responsible innovation. UNESCO has made more than just normative statements but also educational and capacity-building efforts, thus making sure that scientific advancement is accompanied by moralizing, societal consciousness, and equal participation.

4.2 Introduction to the Agenda

Genetic intervention technologies have been developed to assist in treating genetic disorders, and their overview will be presented here. In its general definition, genetic intervention can be described as the intentional manipulation of the genetic material of an organism by use of biotechnological tools with defined purposes of achieving certain goals. Some uses in humans are gene therapy, genome editing (such as CRISPR-Cas9) and germline modification. The field of interventions in animals and plants includes genetic engineering, the production of transgenic organisms, and the use of gene drives. Such technologies are changing the world in significant ways, which include the elimination of hereditary diseases, higher agricultural production, the development of climate-resistant crops and new medical treatments, however, they come with significant ethical, social and legal issues.

These possibilities have been accelerated by the appearance of genome-wide technologies, and the fact that the cost of sequencing has dropped by orders of magnitude. The Human Genome Project

(HGP) was the first roadmap to the mapping human genetic variation and has since given rise to large-scale genomics, genome editing and a period of genetic intervention.

In the setting of this item on the agenda, which is to determine ethical limits of the genetic intervention, representatives ought to look at the number of technological platforms (somatic versus germline gene editing, human versus non-human intervention, screening and selection, synthetic biology), the speed of scientific progress lag in pace with existing ethical standards. Contribution of UNESCO and the IBC to provide a normative and ethical scaffold takes the center stage, when scientific innovation provides the capacities to shape the genetic composition of individuals and generations to come radically.

5. Historical Background

5.1 The History of Genetic Sciences and Ethical Aspects

Genetics is the field that has radically changed during the last century, changing how it was known as the field of Mendelian inheritance through the era of molecular biology to genome sequencing, genome editing and synthetic biology. Along with the development of the ability to directly intervene with genetics, there also developed the awareness of ethical issues, such as eugenics, genetic discrimination and identity, access and the future-generational consequences. Scientists who address the HGP regularly mention the Ethical, Legal and Social Implications (ELSI) programme that was developed specifically because genetics offered not only medical discoveries, but also social issues in terms of how genetic information is used or abused.

The ethical aspect also broadened when genome technologies developed: the possibilities of modification of germline led to the appearance of questions of inheritance, consent of the future individuals, human enhancement, discrimination and justice. As an example, research observes that although the Universal Declaration on the Human Genome and Human Rights is altruistic in its intentions, critics complain that some definitions (eugenics) in the declaration are not clear, and they will sound like previous ideologically founded approaches to genetic enhancement.

In this evolutionary process of genetic science, the role of bioethics in UNESCO also evolved, initially the issue of the protection of the human genome per se, then the issue of data management, data sharing, informed consent, equity and the protection of human dignity against the accelerated biotechnological transformation.

5.2 The Human Genome Project and Its History

The Human Genome Project was a massive, international project of mapping and sequencing of the human genome that was initiated in 1990 and was mostly completed in 2003. Besides this scientific breakthrough, the HGP created a widespread policy, ethics and society legacy. First, it transformed our vision of human disease, genetic variation, and the area of personalised medicine. Second, it stimulated the development of specific ethical standards, in particular, the ELSI programme that explicitly touched on ethical, legal, and social implications.

Third, the promise of the HGP also caused historical warnings: genetic reductionism (the belief that genes are the determinants of fate), privacy and discrimination (the possibility of using genetic information to work or insure), and the potential abuse of genomics to be improved or eugenics. As an illustration, Vicedo (1992) contends that the controversy regarding the HGP should take into consideration conceptual problems like determinism and reductionism.

This leaves a legacy of the HGP which is that, even as the ability to edit, manipulate, and intervene on genes has grown, so has the expectation of ethical regulation, equity, popular discourse, and global regulation. To representatives who discuss the limits of ethics, the HGP presents not only a precedent of scientific scope but also a warning example of the way ethical structures necessarily develop in response to technological potential.

6. Genetic Intervention in Humans

6.1 Germline vs. Somatic Interventions

In some respects, the line between germline and somatic interventions is not well delineated, and it is quite plausible to assume that both are going to be applied in the long run. Germline interventions alter the cells of the reproductive system or embryos at an early developmental stage, and this alteration is passed on to the subsequent generations. These interventions raise ethical issues in the long term since they affect those who are not involved in the process of decision making. This analysis sheds some light on the fact that the germline edits can have wide social implications and impact the identity and responsibility in the future. Somatic interventions, on the other hand, also modify non-reproductive cells in living beings. These procedures cure the illness without having to change the genetic lineages, and are typically less considered morally difficult. Some researchers stress that somatic editing can be treated as a part of the current medical tradition, whereas germline editing presents some questions that remain open regarding both governance and the effect on society.

6.2 Therapeutic Applications vs. Enhancement Goals

Therapeutic genome editing is designed to fix mutations that cause severe medical diseases. These applications are aimed at the prevention of suffering and the repair of health and are very popular in the field of scientific ethics. Macpherson and other researchers find that therapeutic editing is in line with the established medical objectives. Enhancements aim to increase the number of non-medical features, including the appearance, mental ability, or athletic performance. These cast doubt on the issue of fairness, discrimination, and the social pressure to become genetically enhanced. In the literature, the line between medicine's necessary intervention and the choice aspect of modification is drawn, and it is observed that the improvement can contribute to increasing social inequality and changing the point of medicine.

6.3 Consent, Autonomy and Ethics of Genetic Selection

The genetic choice and editing of embryos make it difficult to work with the conventional concept of consent since the future person cannot provide consent to the alterations made in prenatal life. The researchers demonstrate that informed consent is not easily practiced in process that involve genetically unrepresented individuals. Ethical evaluations hence take into account the rights of the future person and the duty of decision-makers to maintain autonomy. Halpern and O'Hara suggest the models that focus on the protection of human rights and caution against the actions that can restrict

the possibilities of the future individual to create their life. These issues represent the problem of the difficult necessity to bind the authority of the parent with the ethical need to protect the autonomy of a person.

6.4 Designer babies and the Controversy of Human Identity

The debates on designer-babies discuss the intentional change or formulation of characteristics in embryos. According to Collier, these practices can change the definition of human identity to advance the notion that traits can be designed to suit parental preference. The process of this is dangerous because it will push individuality into a set of available traits and possibly support social principles regarding what traits are deemed desirable. Ethical controversies consider these practices might transform parent-child relationships, and cause the commodification of human characteristics, and shift collective understandings of normal human diversity. Consequently, it creates issues of upholding dignity, diversity, and respect for intrinsic human identity.

6.5 Equity, accessibility, and Global justice

Genome editing technologies present the threat of increasing the differences between countries and people. The analyses of policies in Cambridge Prisms: Precision Medicine state that disparities in access to advanced genetic treatment would exacerbate preexisting social and economic inequalities. The international bodies, such as the World Health Organization (WHO), emphasize that the governing structures should incorporate the values of equity, non-discrimination, and universal global accountability. The lack and prohibitive prices along with the different regulatory capacities are a cause of concern regarding the future when only privileged groups can enjoy the benefits of genetic developments. Fair access is one of the main concerns of international discourse of responsible technological development.

7.Genetic Intervention in Animals

7.1 Animal Welfare and Ethical Research Standards

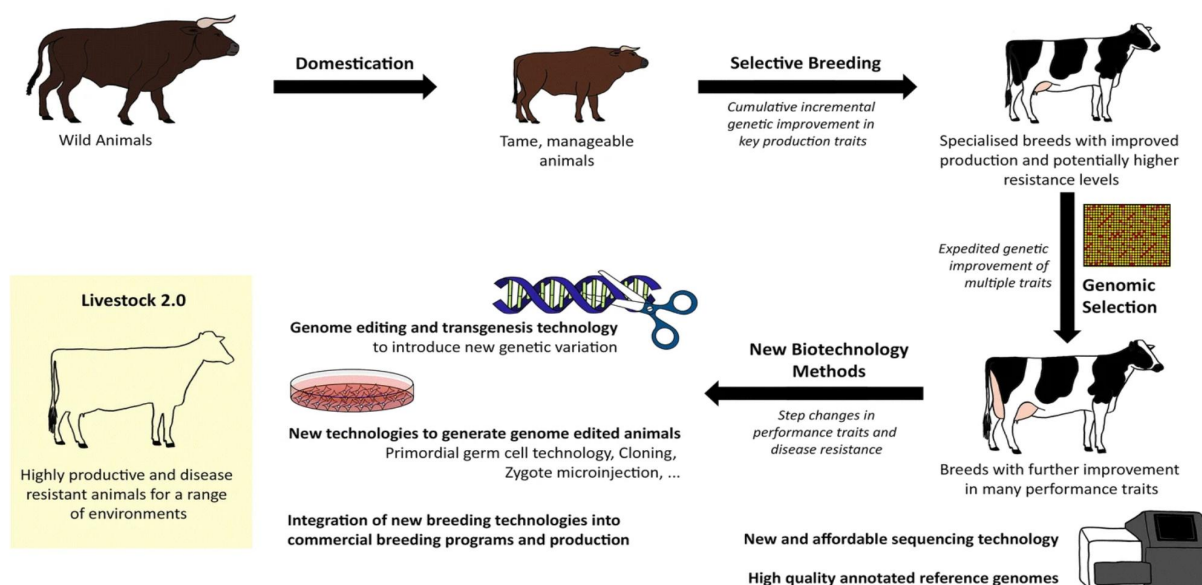
The controversy over the question of animal welfare, ethics and scientific responsibility has once again surfaced due to genetic engineering on animals across the world. Such new technologies as CRISPR-Cas9 have enabled genome editing that has enabled an element of precision to be added to the editing of animal DNA as never before in terms of research, farming as well as biomedicine. However, there is also a tendency of the ethical discussion being reduced to a point where technology competence has no moral justification. In ethical paradigms of research, the requirement of a regulation is not the only one, but also the value of animal welfare must exist. According to Dennis (2002), unpredictable welfare issues that genetically modified animals are normally faced with include development-related problems and behavioral stresses and long-term health disorders. According to the suggestion made by researchers, the application of animals in biotechnology must be ethically reasonable in line with the science, likely pain, and enhance the transparent monitoring systems. They also confirm the fact that the ethical reasoning process is a developing process in which the process must be originally based on the value of animal integrity and naturalness as two important concepts.

Of course, despite the bright future of genome editing in the context of disease modelling and food security, it implies a new understanding of moral responsibility towards the living things. The research question that will guide the policy makers is whether science will achieve any form of development that will be morally right regarding animal welfare.

7.2 Genetic Engineering in Medicine and Productivity

Genetic engineering of animals is equally becoming quite acceptable in an attempt to enhance medicine and production in agriculture. It has also resulted in the creation of disease resistant herd and this has made livestock to be high yielding as genes can be introduced or silenced. Researchers have explained such a trend by the fact that the genetic innovation is currently shifting towards Livestock 2.0 in which genetic innovation not only raises the yield of the animal but also enhances their resistance to the pathogen. It is directly related to the food security and sustainable agriculture in the regions in particular to the complications related to the outbreak of the zoonotic diseases or resource insufficiency. Animals such as pigs have also been very useful in the medical field when it comes to researching on the human disease. The use of genetically engineered pigs is also a premise of biomedical research and organ transplantation since, according to Hryhorowicz et al, these pigs share physiological similarities with human beings. These animals either give out proteins which can be utilized by human beings or they may be utilized in the xenotransplantation. But, with that being said in the medical enterprise, the more ethical questions are raised on such animal-human boundaries and dehumanization of life in the name of the human. The problem to the global community is how to devise equitable solutions that will propagate the concept of innovation but at the same time equitable and non-exploitative to the population in the name of scientific findings.

7.3 Cross-Species Gene Transfer and Bioethical Problems



Not all these ethical issues can be handled lightly because of the peculiarities of the object of the experiment. The cross-species gene transfer is, probably, the most controversial of the animal genetic interventions. It is the xenotransplantation tradition and the chimeric works which are turned to get rid of the deficit of the organs and create the new biological models. Researchers further opine that engineered pigs will reduce the immunological rejection among human recipients that can be instituted as a remedy in the global front that can be adopted to combat the crisis in transplantation. However, these advances are blurring the ethical boundary between the species, and some of the greatest questions of man of where its dominion over the earth must start and at what point life shall end are being brought up. Closely connected with the concept of genetic disenchantment, Rodger Ourset narrates the case of animals (which were donated), which undergo genetic modifications in order to experience less pain or distress. Even though this strategy is said to be the cause of the suffering, there is an immense contradiction on the aspect of morality on such treatment strategy: then how are human beings expected to change their own, their ability to feel in order to be able to excuse their treatment of animals? Opponents are terrified that the legalization of interspecies modification would be the weapon of undermining the freedom and moral right of non-humans

8. Genetic Intervention in Plants

8.1 GMOs and World Food Supply

The technique of genetic engineering in the agricultural industry is usually advanced as one of the solution to food insecurity, containment of climatic changes, and improved productivity in the agricultural industry. Some of these proponents think that genetically modified organisms (GMOs) will result in drought resistance hence allowing the developing world to stabilize food crop production. The example of genetically modified agricultural crops such as maize, pest resistant and soybean, herb resistance has shown to increase the yield in certain countries. However, this narrative does not identify structural causes which have led to food insecurity in a broader context by including land inequity, substandard farming infrastructure and political unrests. Despite all the theoretical possibilities of GMO in production growth, the GMOs will not solve the existing economic and social institutions, which restrict access to food. The other problems are connected with the ecological risks: the biodiversity may be lost, the genetic pollution of unmodified and modified species, and the appearance of resistance to the pests. At the political level, the member countries of UNESCO are urged to balance between scientific growth and decency and prosperity of the community. In the International Biosecurity Conference (IBC) it is stated that food security is not a technological issue only but also a moral requirement, where local agricultural practices, cultural liberty and ecological regulation must be considered in the long term.

8.2 The Corporate Control, Farmer Rights and Biopiracy

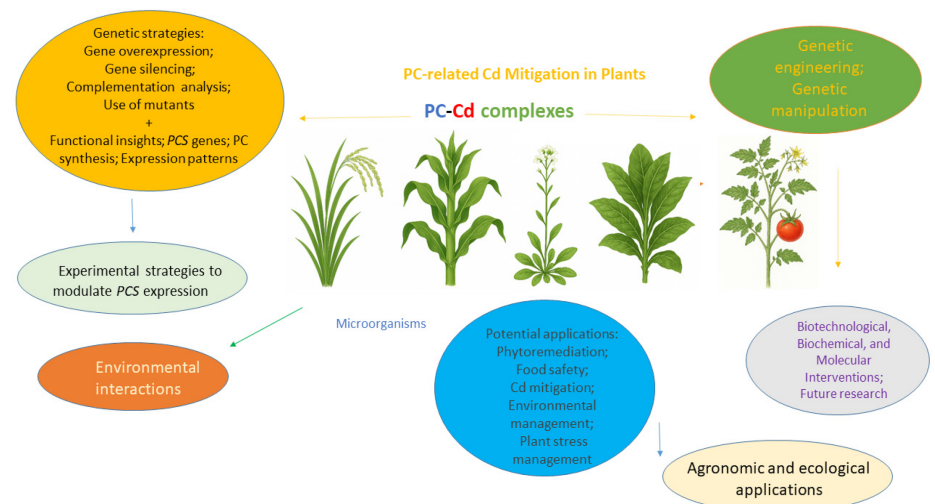
The increasing number of multinational companies operating in the seed, patent, and agritech sectors poses a disputable element of genetic manipulation of plants. The large biotechnology firms are taking over the market whose seeds are patented in the market as genetic modified (GM) and therefore farmers are unable to save their harvest or reproduce their stock of the crop. It implies that the farmers are now being subjected on a mass scale to purchase fresh types of seeds on a contractual basis with each growing season, a fact that entices them into dependency. Biopiracy has the problem of ethical issues, which means unauthorized use of native genetic resources. In other instances, firms have

patented the genetic information through the customary crops acquired without compensating or acknowledging the community in which these crops started. All these actions challenge the equal sharing of advantages and discrimination against the rights of indigenous people in the international system. According to the IBC, a regulatory regime must not only discriminate access to technology but also not monopolize and embrace ethical governance. The open patent system, prior informed consent, and sharing the benefits of such measures are among some of the protection measures that can guarantee freedom of farmers, as per the international standards.

8.3 Practices of Labelling and Consumer Autonomy

The controversies of food labeling are symptomatic of broader issues that people have concerning their trust of scientific institutions. The problem of consumer autonomy is the one that is a central issue of the discussion of GM crops; the majority of the populations would like to get to know about the presence of GM modified components in the foodstuffs that they purchase. Labeling would allow a wise decision in

cultural/dietary beliefs. However, some jurisdictions have established very stringent labeling requirements of GM foods whereas the others have viewed these as identical to any other conventional crop hence no special labeling requirement is enforced. The absence of transparency can lead to the development of misinformation, politicization of scientific discoveries and the emergence of consumer resistance to products which can be deemed safe. Consequently, the ethical policy making should extend beyond the paradigms of risk-assessment and adopt the strategies that are socially dependent and culturally relatable to the different communities which would be acceptable. UNESCO IBC initiative encourages practices leading to plurality of food cultures worldwide and individual decisions to be made by people. The most useful labeling systems should be based on clarity, accuracy and fair accessibility amongst the socioeconomic segments.



9. Global and Ethical Considerations

9.1. International Regulations and Law Mechanisms

The international regulation of synthetic biology is based on the legal frameworks that have been established and which have the Convention on Biological Diversity (CBD) and Cartagena Protocol on Biosafety. Researchers draw a conclusion that harmonization of the national laws with such international standards is the only way of controlling biosafety and transnational threats. Their reasoning is that structural requirements of such agreements that bring such vital coherence is in turn back in the rapid rate of technological change, which creates weaknesses in the systemic level of

regulatory gaps. Based on this opinion, scientists develop the problems of dual-use technologies management and emphasize that it is a normal fact that it is a problem to distinguish between the applications that are good and those that imply security or ethical issues. Such studies have demonstrated that the world community must collaborate, be sensitive in the governing set ups, and revise the guidelines to promote responsible governance in synthetic biology.

9.2 Environmental and Long-term risks

Synthetic biology is vulnerable to the unanticipated ecological effects that may not be attained until the long-term time constraints. Some of the interventions that, according to Redford, Coppolillo and Seddon (2016), may radically transform the natural ecosystem to be hard to predict or reverse, are gene drives, engineered organisms, and ecological engineering. Rabitz believes that the broad spectrum of the environmental control system would have to be proposed which will be able to decide on long-term risks such as indirect contact with the generated organisms and natural population that is going to be left (Rabitz, 2025). The two articles underline the need to be careful with risk assessment and precaution in their prescriptions whereby potential cascading effects of the well-meaning intervention can be threatening to the biodiversity and ecological health other than the multi-generational livelihoods of the beneficiaries due to the natural complexity of ecological systems.

9.3 Cultural, Religious and Social Perspective

The invention of synthetic biology is on the fringe of the cultural, religious, and societal divisions. Maavei (2022) assumes an anthropological approach and proposes that the view of synthetic biology as unnatural has the potential to affect the effectiveness and justification of regulatory policies. The perceptions also change depending on the societal experience and culture and philosophical ideas of the role of humanity in the nature. One can also find a moral and ethical dilemma about synthetic biology in which some researchers talk about huge responsibilities in creating life or just controlling the most essential biological processes and the view of the questions concerning doubts about human responsibility and the limit of morality. Taken altogether, these studies suggest that the ethical governance cannot be practiced on the basis of the strictly scientific components, but, rather, it should be exercised under the pressure of the intricateness of values, beliefs and expectations prevailing in societies everywhere around the world.

9.4. Striking the right balance between scientific Innovation and morality

Synthetic biology is a new science that requires a balance between the innovativeness and ethical value. Stillgoe, Owen, and Macnaghton (2013) stated that responsible innovation is indicated with the assumption of predicting and managing the social consequences of the scientific finding, but the framework fails to define the direction of technological growth. The other dimension, which they focus on as the important matchmaking innovation and social values, is the foresight, social participation, and institutional reflexivity. Equally, according to Thematic Systematic Reviews (2023), the ethical supervision also needs to be adjusted depending on the technological ability to detect and reduce the occurred risks in the early stages. This is a balance, which is especially difficult to attain in

such instances where the degree of uncertainty is quite elevated, the hazard of dual-use is present, and a mechanism of interrelationship is established, yet, it is necessary to achieve a pathway so that scientific development would yield more benefits to the humanity and no harm to the human population.

10. Bloc Positions overview

10.1 Scientific Powerhouses vs. Ethically Restrictive Nations

Scholarly accounts heavily stress an emerging rift between those countries that place scientific potential and innovation at the altar and those that place ethical abstinence and danger-aversion in the regulation of heritable (germline) genome editing.

- Innovation-oriented states.

According to many scholars, gene-editing technologies, including CRISPR-Cas9, are becoming more and more accessible, technically efficient, and relatively inexpensive, which is why they are appealing to innovate therapeutically. These states tend to support risk-based regulation as opposed to complete prohibitions: regulatory frameworks based on institutional regulation, clinical-trial controls, and adaptive risk control as opposed to absolute prohibitions. A policy-analysis article proposes that good governance should strike a balance between innovation and ethical protection, and states that such mechanisms of good governance consist of soft governance (e.g., networks of ethical scrutiny, stakeholder involvement) and official governance.

- Precautionary, ethically restrictive states.

In the literature, the focus on the long-term risks, such as the safety of future generations, social justice, and future generational consent, is quite popular. Arguing that governance ought to be experimentalist, that is, it must be multi-tiered to allow deliberation and popular involvement and review on a periodic basis, another group of analysts insists there is no longer any need to make a one-off legislative judgment. Inclusive, global forms of governance are also demanded: not the legal limits, but moral principles, civil participation, and international consultations to curb the rogue actors. Specifically, there are ethical arguments along the lines of a global socio-bioethics that is based on the concept of dignity, slow science, and extensive consensus-building at the level of society.

- Regulatory and legal forces.

Autonomous principles of good governance, usually identified as beneficence, justice, and respect of autonomy, are often cited by analysts of governance as inherent to every governance system. National The literature suggests strongly that regulation needs to be iterative and responsive: international structures should be able to adapt alongside changes in technology, and should provide ways of constant public participation. Moreover, intellectual property and patent governance is pointed out as one of the factors of equitable access in some legal-ethical analyses. As an example, one of the analyses states that the patent holders, international bodies (such as WHO), and industry should work together to ensure that monopolization can be prevented and licensing can be encouraged to promote fairness.

10.2 Developing Countries and Access to Genetic Technology

A different group of the academic debate is that of developing and low-middle income nations, which focus on the matters of equal accessibility, capacity development, and inclusive governance.

Fairness in the access to genome therapies. A number of researchers claim that unless significant changes to policies are implemented, genome remedies would become a privilege of the rich nations. An example is a perspective article that points to the possible severely restrictive access in lower-income countries due to high prices, ineffective infrastructure, and potentially lax regulations. The same work also refers to a human-rights approach (e.g., right to health, right to science) to give governments and global institutions responsibilities: to multiply production capacity, to improve regulatory frameworks, and to expend more on public health.

- Moral and administrative ability.

In low and middle-income nations, there might not be experience or resources to support ethics review systems and regulatory bodies. The review commissioned by WHO reveals that it is necessary to strengthen national ethics committees and enhance the training of regulators, such as the support of informed consent and protection of data.

Further, a scoping review about genetic-resource governance reveals that the lack of harmonized legalization in many middle- and low-income countries remains in the form of a lack of integrated genetic-data archiving.

These loopholes bring about crucial questions concerning the ethical and social justice aspects of ownership, utilization, and beneficence of the genetic data.

- International management and involvement.

According to the scholars, global governance requires developing countries to be substantially engaged, not merely as a passive stakeholder, but as a stakeholder that is substantially engaged. An overview of governance projects implies that the so-called soft law (ethical norms, social consultation) can be especially effective in that case when formal regulation is still under rise.

Meanwhile, analysts also promote capacity-building activities aimed at local researchers, policymakers, and ethicists to enable them to participate in and influence governance mechanisms. This implies not only technical education, but also attempts to increase science and ethics literacy.

11. Questions to Ponder

- How can UNESCO help establish universal ethical guidelines for genetic intervention while respecting cultural and national differences?
- Where should the line be drawn between using genetic technologies for medical treatment and for human enhancement?
- What information and safeguards should be taken while performing genetic research in order to protect individual rights?
- How can access to genetic technologies be made fair and equal between developed and developing countries?
- What ethical considerations should guide genetic intervention in animals and plants used for food and research?
- How can the international community prevent the misuse of genetic technology for harmful or discriminatory purposes?
- How can the current generation ensure that genetic interventions do not harm future generations or the environment?

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