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The Problems of Human Embryos Genome Editing from the Position of Islam Denominations

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Abstract

Biomedical technology is one of the most relevant and rapidly developing branches of science. In response to the major problems of bioethics and bio-law, bioethical dilemmas emerge in society, which constrain the abuse of new technologies. Medical discoveries, on the one hand, can greatly facilitate the life of humankind, but, on the other hand, the problem of interference in human nature actualizes the most fundamental questions concerning its ontology, the boundaries of permissible transformations, the responsibility of a scientist and a specialist, applying the latest technologies, for remote and unpredictable consequences, due to the integrity and interconnectedness of various aspects of human nature. This paper presents the experience of generalizing the attitude of the main Islamic confessions and different approaches in the legislation of Islamic countries to the problem of editing the human embryo genome. Based on a review of scientific and religious literature, it is concluded that, although the Islamic world is increasingly using Western models of behavior, in matters of the permissibility of editing the human embryo genome from the point of view of Islamic bioethics, it is necessary to rely on the principles of Sharia and multidisciplinary knowledge.

Keywords: *biomedicine; bioethics; human; embryo; genetic manipulation; Islam*

I. Introduction

The development of medical biotechnology in developed countries sets a new vector for solving medical problems in the 21st century, but, at the same time, generates acute ethical problems for the scientific community and for humanity as a whole. Each social group sees and explains new technologies in its own way, giving rise to new bioethical questions.

It should be noted that the problem of ambivalence and bioethical dilemmas of scientific acts and results in relation to hereditary genetic modifications was raised by Zeljko Kaludjerovic in his paper entitled “Bioethics and Hereditary Genetic Modifications” (without any reference to the context of a specific religious tradition). The authors agree with the opinion of Zeljko Kaludjerovic that the issue of responsibility of the scientist is of crucial importance: will there be any scientific results that their application will lead towards progress and achievement of the highest human values, or will they generate catastrophic consequences?¹

Gene editing problems are controversial from a religious point of view. The aim of this work is to study and compare the attitude of the heterogeneous Muslim world to the problem of editing the genes of the human embryo. For the study, the following tasks were defined:

- Identify the key bioethical issues regarding editing the genome of human embryos formulated by Islamic scientists at this stage.
- Analyze the legal framework, and religious and ethical grounds for solving problems in Islamic bioethics.
- Determine the main stages of the institutionalization of research on editing the human genome in the Islamic world.
- Identify the main positions of Islamic researchers on key bioethical issues regarding editing the genome of human embryos.

This is a continuation of the study of the attitude of various faiths to bioethical problems caused by human embryos genome editing. The first stage of the study was to consider the attitude towards problems of human embryos genome editing from the position of Christian denominations.²

Islam is the second-largest religion after Christianity, and its principles regulate all spheres of social relations. Currently, the followers of Islam make up about 30% of the world’s population, and according

¹ Zeljko Kaludjerovic, “Bioethics and Hereditary Genetic Modifications,” *Conatus – Journal of Philosophy* 3, no. 1 (2019): 31-32. For an equally secular framework of responsibility with regard to bioethics, see Hans Jonas’ views as presented and discussed in Dejan Donev and Denko Skalovski, “Responsibility in the Time of Crisis,” *Conatus – Journal of Philosophy* 8, no. 1 (2023): 87-109.

² E. E. Gribkov and T. P. Minchenko, “The Problems of Human Embryos Genome Editing from the Position of Christian Denominations,” *CPT2020 Computing for Physics and Technology* (2020): 184-189. Also, see Crosby’s views as discussed in Evangelos D. Protopapadakis, *Creating Unique Copies: Human Reproductive Cloning, Uniqueness and Dignity* (Logos Verlag: Berlin, 2023), 77ff.

to forecasts, the number of Muslims by 2050 will not only increase significantly but will also reach numerical parity with the population professing Christianity.³

The assessment of modern biomedical technologies from the standpoint of the Muslim worldview differs on the one hand, because of the moral depth due to the spiritual experience of thousands of years in relation to the highest divine principle, and, on the other hand, because of the specific cultural development of countries where different currents of Islam developed.

Human germline gene editing (hGGE) poses many questions for the Muslim community. Ismail Lala highlights the most pressing ones: Is there sufficient evidence that hGGE is better than existing technologies? Is lack of consent an insurmountable obstacle? What is the moral status of the embryo? What impact will hGGE have on social inequality? Can the use of hGGE be banned to prevent its inevitable use in eugenic programming?⁴

Drawing on traditional sources of Islamic jurisprudence in his reasoning, the scientist concludes that, with the exception of very few cases, which should be individual and specific, hGGE does not correspond to the principles of Islam. However, there are other points of view.

A significant intensification of research on the interaction of genomics and Islamic ethics both by Muslim religious scholars and biomedical scientists has been observed since the early 1990s when the international project "Human Genome" was announced. The Muslim Gulf countries have a high incidence of genetic diseases, and the cost of treatment for these is largely covered by governments. To reduce these costs, significant funds are being used for research that can reduce genetic diseases.

At the same time, there is a significant difference between the scientific communities studying bioethical problems in the West and the Muslim world. If in the secular bioethical discourse, which dominates the bioethics of Western countries, discussions on bioethics are mainly conducted by specialists in the field of specific disciplines, then Islamic bioethical discourse is formed by a class of Muslim religious scholars (ulema) who are specialists in the field of Islamic religious sciences.

³ "The Future of World Religions: Population Growth Projections, 2010-2050: Why Muslims Are Rising Fastest and the Unaffiliated Are Shrinking as a Share of the World's Population," Pew Research Centre, last modified April 2, 2015, <https://www.pewforum.org/2015/04/02/religious-projections-2010-2050/>.

⁴ Ismail Lala, "Germ-Inating Solutions or Gene-Rating Problems: An Islamic Perspective on Human Germline Gene Editing," *Journal of Religion and Health* 59 (2020): 1855.

In this work, we primarily restrict ourselves to considering the Sunni tradition, in which four main religious and legal schools have been preserved at present – the Hanbali, Maliki, Hanafi and Shafii madhhabs. In addition to these, we will consider the religious and legal regulation of bioethical issues in the Shiite tradition of Iran, which one of the authors of this paper researched.

II. Common ethical and legal grounds for problem-solving in Islamic bioethics

The ethical principles followed by Sunni Islamic scholars are based on two main Islamic scriptures, namely the Quran and the Sunnah (sayings, deeds and endorsements attributed to Muhammad).

Due to the complexity and multidimensionality of bioethical issues, Muslim religious scholars (most of whom are not specialists in biomedical sciences and publish materials mainly in Arabic), seek the help of biomedical scientists to understand biomedical aspects of issues and gain access to literature published in non-Arabic languages, especially English. This interdisciplinary collaboration between Muslim religious scholars and biomedical scientists is known in the field of Islamic bioethics as a mechanism for collective thinking (al-ijtihad al-jamai).⁵

The uniqueness of the Islamic world lies both in the multitude of followers all over the world, and in the fact that there is a “universal” concept of Sharia, the code of commandments that form religious conscience and morality and determine all aspects of a Muslim’s life. When talking about medical ethics, it uses the term “*طب*” (Medical ethics). This concept is based on the verses (ayah) of the holy book of Muslims – the Quran.⁶ However, due to the specific features of this religion, reading and interpretation are not tied to a religious school, such as patristic and scholasticism in Christianity. Accordingly, in the absence of absolute authority in the interpretations of scripture, various interpretations arise, leading to a very different understanding of the essence of the human soul, embryo, and life.

The discussion about the possibility of editing human embryos is one of the most acute problems in the world, concerning both the

⁵ Mohammed Ghaly, “Islamic Ethics and Genomics: Mapping the Collective Deliberations of Muslim Religious Scholars and Biomedical Scientists,” in *Islamic Ethics and the Genome Question*, ed. Mohammed Ghaly, 47-79 (Leiden: Koninklijke Brill NV, 2019), 47-49; Aznan Hasan, “An Introduction to Collective Ijtihad (Ijtihad Jama’i): Concept and Applications,” *American Journal of Islam and Society* 20, no. 2 (2003): 26-49.

⁶ Quran, “Surah.”

essence of human life and the legal status of a person.⁷ The Islamic religious view plays an important role in solving this bioethical problem.

A feature of the religious and legal regulation of bioethical problems in the Islamic tradition as a whole is that the norms of international law in this area are implemented in close connection with the Shariah. To a greater extent, this concerns the realization of personal human rights in the field of health care.

From these positions, the main principle of the study of ethical problems associated with the use of technologies for editing the germline of a person is that it should be carried out taking into account the goals of Islamic law (*Maqasid al-Shari'a*) and basic legal principles (*Qawaid Fighiyyah*).

The goals of *Maqasid al-Shari'a* are about maintaining order, preventing harm, establishing equality among people, achieving benefits, and effectiveness of the law and compliance with that, and creating conditions for people to become influential, respected, and confident. From an Islamic perspective, the therapeutic use of germline editing technologies may be acceptable if safety and efficacy issues are addressed and the principles of *Maqasid al-Shari'a* are followed.⁸

One of the key issues for jurists and theologians of Islamic countries is the admissibility of genetic research on humans, as well as animals and plants. Since genetic research is a multifaceted issue that affects theological, legal, and moral standards, in order to get answers to questions on adapting innovations that are not regulated by the classical foundations of Islamic law, and to comply with the provisions of the Quran, they apply to well-known theological centers of Islamic jurisprudence.

They are engaged in the interpretation and search for rational solutions, on the basis of which a key conclusion about the admissibility of the “introduction” of innovations and their degree of admissibility from the point of view of Islamic dogma and law, and their further implementation in practice is made. Such centers, for example, the International Academy of Islamic Fiqh (Jurisprudence) in Saudi Arabia, Al-Azhar University in Egypt, and others present fatwas – oral and written judgments of authoritative theologians and jurists, adopted on issues of modern life.

Let's note the different legal approaches to the problem of regulating genetic research considering the legislation of specific Islamic

⁷ For a Western, secular view on gene editing and enhancement, in general, see Julian Savulescu and Evangelos D. Protopapadakis, “‘Ethical Minefields’ and the Voice of Common Sense: A Discussion with Julian Savulescu,” *Conatus – Journal of Philosophy* 4, no. 1 (2019): 125-133.

⁸ Nimah Alsomali, and Gaiath Hussein, “CRISPR-Cas9 and He Jiankui's Case: an Islamic Bioethics Review Using *Maqasid al-Shari'a* and *Qawaid Fighiyyah*,” *Asian Bioethics Review* 13 (2021): 149-165.

states. Primarily, we note that there are no uniform standards for a unifying legislation in the field of genomics, carrying out genetic research, and editing the genome of human embryos in Islamic states. In addition to the Quran and Sunnah, guidelines in the formation of legislation in Islamic countries are the Islamic Code of Medical Ethics and Healthcare, the decisions, and recommendations of the Council of the Islamic Academy of Fiqh and other theological centers.

The legislation of the Arab Republic of Egypt does not contain a specialized act on the legal basis for carrying out genetic studies. However, work is currently underway on the law “On Bioethics.” The main executive body of Egypt in the field of conducting clinical research and issuing the basic rules in this area is the Ministry of Health and Population, which, together with the professional community of doctors, initiated the creation of the Egyptian National Committee on Bioethics in 1996. There are about 30 institutional committees in Egypt, which are part of a single network of ethics committees. In 2003, the Regulation “On professional ethics in the field of human medical research” was developed.⁹ In December 2020, the Egyptian Parliament published its first clinical research law. According to experts, the Law contains provisions that meet all the requirements of ethical research.¹⁰

Kuwait is one of the main Islamic states contributing to the development of the concept of a bioethical sphere with a combination of Islamic religious values on medical and interdisciplinary issues, including genetic editing. In 2015, the Genetic Research Law was passed in Kuwait. At the same time, this Law was sanctioned for refusing to provide a DNA sample. However, already in 2016, this act was challenged by lawyers and the Constitutional Court of Kuwait ruled that the law violates the constitutional guarantee of the personal freedom of citizens, respect for the principles of confidentiality and civil human rights.¹¹

Another leading custodian of Islamic values is the Kingdom of Saudi Arabia. In 1999, the Kingdom’s National Committee on Bio- and

⁹ Ramilya G. Novikova, “Islam and Genetics: Religious, Ethical and Legal Issues,” *RUDN Journal of Law* 23, no. 4 (2019): 571.

¹⁰ Amal Matar and Henry J. Silverman, “Ethical Analysis of Egypt’s Law Regulating Clinical Research,” *Journal of Empirical Research on Human Research Ethics* 17, no. 4 (2022): 494-503.

¹¹ Adam Taylor, “Kuwait Plans to Create a Huge DNA Database of Residents and Visitors. Scientists Are Appalled,” *The Washington Post*, September 14, 2016, <https://www.washingtonpost.com/news/worldviews/wp/2016/09/14/kuwait-plans-to-create-a-huge-dna-database-of-resident-and-visitors-scientists-are-appalled/>; Olaf Riess, “Presidential Address,” The European Society of Human Genetics (ESHG), last modified September, 2016, https://www.eshg.org/fileadmin/eshg/newsletter/ESHG-Newsletter_No29_2016.pdf; Olaf Riess, “Presidential Address,” The European Society of Human Genetics (ESHG), last modified May, 2017, https://www.eshg.org/fileadmin/eshg/newsletter/ESHG-Newsletter_No30_May_2017.pdf.

Medical Ethics was established by Royal Decree.¹² The main goal of the Committee is to develop ethical standards and monitor their observance in the field of biological and medical research, taking into account Islamic values and the achievements of world science. In 2010, the Royal decree “Law of Ethics of Research on Living Creatures and its Implementing Regulations” was issued. The Saudi system respects Islamic Sharia in addition to international research ethics guidelines. This decree is a guideline for countries where Islamic values are a priority.¹³ In 2013, the Saudi Arabia Human Genome Research Program was officially launched in Riyadh, which is one of the national development programs of the monarchy for the period up to 2030. Its implementation is carried out on the basis of the National Science and Technology Center of Saudi Arabia. The program uses modern methods of genome sequencing, bioinformatics, and validation.¹⁴

In Qatar, in 2007, a “Policy for Conducting Procedures and Guidelines for Conducting Research” was approved. These rules marked the beginning of genetic research and their ethical and legal support. In 2013, the Qatar Genome Program was announced and is currently at the pilot stage. As part of the implementation of the Qatar Genome Program, the following units were created under the Ministry of Public Health of Qatar: Genetic Research Department, Clinical Department, PR Department.¹⁵

A different approach is taken in Tunisia. Although according to Art. 38 of the Constitution of Tunisia “health is a fundamental human right,”¹⁶ there is no legal regulation for genetic research. At the same time, since 1964, a program of free premarital genetic consultations has been operating in Tunisia; in 2001, the law “On Reproductive Medicine” was adopted, which states that it is permissible to carry out investigations on an embryo for exclusively medical purposes.¹⁷

In Bahrain, since 1992, the Bahrain Ministry of Health’s National Premarital Counseling Program has been extended to all health cen-

¹² NCBE Chairman, <https://ncbe.kacst.edu.sa>.

¹³ Ghiath Alahmad, “The Saudi Law of Ethics of Research on Living Creatures and its Implementing Regulations,” *Developing World Bioethics* 17, no. 2 (2017): 63-69.

¹⁴ “The Saudi Human Genome Program: Bringing Genetic Testing to Routine Clinical Care,” ThermoFisher Scientific, accessed February 7, 2024, <https://www.thermofisher.com/ru/ru/home/clinical/precision-medicine/precision-medicine-learning-center/precision-medicine-resource-library/precision-medicine-articles/saudi-human-genome-program.html>.

¹⁵ Qatar Genome Programme (QGP), <https://www.qatargenome.org.qa/ar>.

¹⁶ The Tunisian Constitution of 2014, https://www.constituteproject.org/constitution/Tunisia_2014.

¹⁷ “Loi n° 2001-93 du 7 août 2001 relative à la médecine de la reproduction,” *Journal Officiel de la République Tunisienne* 7 (2001): 2025-2027.

ters, and in 2004, a law mandating premarital screening and counseling for all persons wishing to marry was passed. The clinical base for the research was the genetic clinic at the Salmaniya Medical Center. In 2015, at the initiative of the Ministry of Health, work on the National Program “Bahrain Genome Project” open to all citizens over 21 years of age began.¹⁸

In the United Arab Emirates, the Dubai 10X Genome Program is operating.¹⁹ To implement the project, a Council of Experts on Genetics was formed, which cooperates with the Institute of Pathology and Genetics, the Center for Cord Blood Research in Dubai and a number of other governmental organizations. The main executive body in the field of genetic research in Dubai is the Department of Health, as well as the Scientific and Ethical Committee, which acts as the main center for compiling and reviewing biomedical research and has developed recommendations for centers and laboratories that do research in the field of genomics.

An important part of the Dubai 10X21 project is Dubai Genomics, which includes three main implementation phases. Phase I is aimed at creating the necessary infrastructure for genomic medicine and large-scale genome sequencing. Phase II aims to create new artificial intelligence capabilities to comprehensively analyze the genome and accurately predict the risks associated with genetic diseases. Phase III is about collaborating with pharmaceutical companies and scientists to develop the drugs of the future.²⁰

As for the regulation of bioethical issues in countries where Shiite Islam is practised, this area is most developed in Iran. In 1999, the Ministry of Health and Medical Education of Iran, together with the Department for the Study of the Humanities and Islamic Sciences in Medicine and Medical Ethics, developed a regulation on the “Code of Rules for the Protection of a Person as an Object of Medical Research.” The Ministry of Health and Medical Education of Iran has ordered all universities and biomedical research centers to establish institutional bioethics committees based on a single regulation. Currently, there are 85 research centers engaged in research in the field of biotechnology, molecular and cellular biology, and related fields, which develop proposals for carrying out genetic research in order to develop a unified guideline.²¹

¹⁸ Bahrain Genome Project, <https://www.moh.gov.bh/GenomeProject/Index>.

¹⁹ Dubai 10X, <https://www.dubai10x.ae/>.

²⁰ Dubai Genomics, <https://www.dha.gov.ae/en>.

²¹ Kambiz Banihashemi, “Iranian Human Genome Project: Overview of a Research Process among Iranian Ethnicities,” *Indian Journal of Human Genetics* 15, no. 3 (2009): 88-92.

For comparison, in Iraq, where most of the population professes Shiism, genetic research is not regulated by any act. At the same time, by decision of the Ministry of Higher Education and Scientific Research of the Republic of Iraq, the Center for Genetics and Cancer Research was opened.²²

Today, in the Arab world the search for answers to the problems of biopolitics and the limitation of human rights to their corporeality and genomic privacy has been intensified. The very concept of “biolaw” reflects the legal aspects of life sciences, and contains legal regulations for the fields of ecology, ethology, genetics, genomics, biomedicine, neurophysiology, sociobiology, etc.²³

In the international legal system, the category of subjective human rights (recognition of biorights) and guarantees of their protection through the constitutional and legal reception of international standards of subjective rights of the individual have started to be separated.²⁴

Arab jurisprudence, when considering issues of bioethics, in the absence of a clear indication (nass) regarding the subject in question in the sacred texts, transfers the decision-making to the sphere of ijtihad (leaving it to the discretion of the fuqahas).

In all ethical systems, religious and non-religious, the relationship between ethics and law is a key issue requiring clear definition and doctrinal discussion. However, when it comes to the Arab political and legal tradition, such an additional factor as the Islamic legal regulation (fatwa), which is the basis of rulemaking in the region of traditional Islam, plays a special role. Islamic bioethics refers to the branch of Islamic law and Muslim ethics. Therefore, scientists and practitioners in the field of biomedicine and biological law directly refer to the main sources of Islamic law: the Quran and Sunnah.

For a clearer regulation and clarification of bioethical issues on Sharia in 1981, a Pan-Islamic Conference was convened in Kuwait, at which the “Islamic Code of Medical Ethics” was adopted. In accordance with its provisions,

²² Iraqi Center for Genetics and Cancer Research, <https://www.uomustansiriyah.edu.iq>.

²³ For an in-depth discussion on biopolitics and biolaw, see Roberto Andorno and George Boutlas, “Global Bioethics in the Post-Coronavirus Era: A Discussion with Roberto Andorno,” *Conatus – Journal of Philosophy* 7, no. 1 (2022): 185-200, especially pages 188ff.

²⁴ E. N. Trikoz, “Communicative Function of the Emerging Branch of Biological Law. Legal Communication between the State and Society: Domestic and Foreign Experience,” in *Legal Communication between State and Society: Domestic and Foreign Experience*, 106-110 (Voronezh, 2020 – in Russian).

the art of healing is a noble profession, knowledge of medicine, like all our knowledge, comes from God. The study of medicine reveals the divine destiny in its creation and its practice, whereby the divine blessing is transmitted to people and therefore it is an act of reverence and charity. His sun, the breath of His breeze, the coolness of His waters and the generosity of His providence extends to everyone – to good and evil, well-behaved and vicious, friends and enemies, so medical assistance should be provided to everyone in the name of compassion.²⁵

Today the Kingdom of Saudi Arabia, being the “cradle of Islam,” dictates the norms of lawmaking that apply to all countries of the Sunni Arab world.²⁶ At the same time, in accordance with the resolutions of Majma al-Fiqh al-Islami (International Islamic Academy of Fiqh; IIAF), the Kingdom of Saudi Arabia (KSA) recognizes the legalization of abortion, IVF, genetic testing, but only in special cases when this is an extreme measure to preserve women's health and all other ways of solving the problem have already been tried.²⁷

Thus, Islam is conservative regarding changes in the human genome – this can be regarded as interference with the creation of God. Moreover, these changes can lead to unpredictable changes for future generations. Muslim scientists establish their decisions referring to the five foundations of Islamic law, that is, “maqahid al sharia;” the purpose of the law. These are *dīn* (religion), *nafs* (life), *nasl* (progeny), *‘aql* (intellect) and *māl* (wealth).²⁸

This approach was reflected in UNESCO's 2005 Universal Declaration on Bioethics and Human Rights, Art. 16 on the protection of future generations where it was stated that “Due consideration should be given to the impact of the life sciences on future generations, including on their genetic characteristics,” and in 2015 UNESCO reaffirmed through its advisory group a temporary ban on any genetic modification of the germ line.²⁹

²⁵ Islamic Organization for Medical Sciences, *Islamic Code of Medical Ethics* (Kuwait: Islamic Organization for Medical Sciences, 1981).

²⁶ The “Information portal of the spiritual administration of muftis” can be found here: <https://al-marsd.com/384906.html>.

²⁷ Asghar Saberi, “Islam and Human Rights,” *Vestnik RUDN: International Relations* 3 (2008): 25-32, <https://journals.rudn.ru/international-relations/article/view/10441>.

²⁸ Qosay A. E. Al-Balas, Rana Dajani, and Wael K. Al-Delaimy, “The Ethics of Gene Editing from an Islamic Perspective: A Focus on the Recent Gene Editing of the Chinese Twins,” *Science and Engineering Ethics* 26 (2020): 1851-1860.

²⁹ Universal Declaration on Bioethics and Human Rights, <https://www.unesco.org/en/ethics-science-technology/bioethics-and-human-rights>.

The religious and legal tradition of Islam in Arab countries is the foundation in the search for answers to the questions posed by biomedicine and the emerging branch of biological law. It extends to decision-making in clinical and research practice.

III. Institutionalization

By the early 1980s, human genome editing research was institutionalized through three major transnational institutions based in the Muslim world. The most active and influential is the Islamic Organization of Medical Sciences (IOMS), established in Kuwait in 1981. In 1983, the IOMS launched the *Islam and Modern Medical Problems* series, which addressed a long list of bioethical issues, including those related to genomics. Genomics issues highlighted by IOMS are featured in the “Ongoing Discussions” section of various IOMS symposiums and conferences.

Let us single out the conferences where the most significant discussions took place among a wide range of participants: the 1993 Conference on the “Ethical implications of modern research in the field of genetics,” the 1998 Symposium with the same name, which developed the basic rules and guidelines under “Genetics, genetic engineering, the human genome and Genetic Therapy: An Islamic Perspective,” which are still the most influential in the regulation of genetic research; as well as the Conference “Gene Engineering Between Shariah and Law” of 2002.³⁰

In addition to the IOMS, which systematically conducts biomedical research, two other organizations periodically address the problems of bioethics: the Islamic Fiqh Academy (IFA), created in 1977, a member of the World Muslim League and based in Mecca, and the International Islamic Fiqh Academy (IIFA), founded in 1981, based in Jeddah, affiliated with the Organization of Islamic Cooperation.

Since the 1990s, there has been a significant increase in interest in the study of genomics in the Islamic ethical tradition. In addition to the large number of publications both by religious scholars and biomedical scientists, a large number of symposia and conferences have been held at which the mechanism of collective and interdisciplinary thinking has been adopted, and the ethical issues raised by genomics have been con-

³⁰ H. Al Hosani and A. E. Czeizel, “Unique Demographic Situation in the United Arab Emirates,” *American Journal of Medical Genetics* 61, no. 1 (1996): 1; Ghazi O. Tadmouri, “Biomedical science journals in the Arab world,” *Saudi Medical Journal* 25, no. 10 (2004): 1331-1336; A. S. Daar, and A. B. al Khitamy, “Bioethics for Clinicians: 21. Islamic Bioethics,” *Canadian Medical Association Journal* 164, no. 1 (2001): 60-63.

sidered. The positions taken both by individual Muslim religious scholars and established institutions were overwhelmingly positive. Joining the genomic revolution was seen by some as not just an ethical option, but even a collective duty that Muslim countries must jointly fulfill.³¹ The generally favorable attitude of Muslim religious and biomedical scientists towards genetic research and therapy paved the way for the launch of large-scale genomic projects in Qatar and Saudi Arabia in the end of 2013.

Bahrain, Oman, Kuwait, and the United Arab Emirates have also launched their own genomic initiatives. The process of developing genomics policies and guidelines in these countries is still in its infancy, and there are no specific provisions on how the editing of the human genome should be regulated. With the development of existing and planned biotechnology projects in the Muslim world, proceeding from the logic of the development of research in the field of bioethics, we can assume that the policies and guidelines will be sufficiently liberal and consistent, especially regarding research and treatment of somatic cells, as well as germ cell research.

IV. Main positions in relation to human embryos genome editing

Most Muslim religious scholars and biomedical scientists view the study of human genes and genomes as part of a commendable human endeavour from time immemorial to explore human nature and to know oneself better and deeper. As part of this genomics research, including genome editing, ethical practice is imperative.

The main regulators to curb abuse in the field of genome editing are two basic precautionary principles. The first principle is respect for human dignity. Accordingly, research is considered unethical when it could undermine people's dignity (for example, by exposing them to risks and unsafe experiments or to the conduct of research without informed consent).

The second principle emphasizes that all scientific research, including genomics, must comply with religious regulations and the general religious and ethical system of Islam, namely the Sharia. Research will be considered unethical even if it is safe and does not pose a risk to the physical structure of a person in the event of a conflict with Sharia values. One of the most important issues that Muslim religious scholars emphasize in this context is respect for the institution of marriage as this is the only channel through which a family can be established.

³¹ Ghaly, "Islamic Ethics and Genomics," 47-49.

Therefore, no children can be reproduced without a valid marital relationship between the intended biological parents.

Generally speaking, ethical judgment is based on answering two general questions: what type of cells will be edited and what is the purpose of the editing?³² As Hacker put it at the International Summit on Human Gene Editing: “The goal of society is to promote a better life for all and to ensure that everyone can live with dignity and freedom.” “Could this be achieved by germline gene editing? My point of view is no.”³³

The negative answer was based not only on the risks associated with the use of new technologies, but on the ethical implications of editing human germ lines. According to Hacker, researchers and future parents are obliged to respect the morally significant status of the human embryo, its freedom and autonomy. But she did not believe that this commitment was being fulfilled, because “editing the genes of the germ line [...] makes the embryo morally neutral or downgrades its status to property or commodity.”³⁴

Researchers looking at the ethical issues of genome editing around the world usually distinguish between somatic and germ cell editing. Somatic mutations occur in a single body cell and cannot be inherited. Germline mutations occur in gametes and can be passed onto offspring (every cell in the entire organism will be affected). Islamic ethics also support this distinction.

In the case of editing somatic cells, the edited cells will only affect the person who has these cells, and thus the scope of possible benefits or harms will be limited. Once patients’ consent is obtained, potential benefits and harms are carefully evaluated, and confidentiality is not compromised, this type of genome editing will not pose major ethical concerns, especially when used for research or therapeutic purposes. From an Islamic point of view, people do not “own” their bodies, because the real “Master” is God who created these bodies. However, God commissioned people to “manage” or take care of their bodies. Thus, humans can still make decisions about their bodies as God’s confidants, provided they do not violate the Owner’s instructions by exposing their bodies to unnecessary or unjustified risks.

However, some religious scholars believe that new methods, the effectiveness and safety of which are still not widely accepted, including

³² Lala, 1855-1869.

³³ Steven Olson, ed., *International Summit on Human Gene Editing: A Global Discussion* (Washington, DC: National Academies Press, 2016), <https://www.ncbi.nlm.nih.gov/books/NBK343651/>.

³⁴ *Ibid.*, 3.

genome editing, should be used in the clinical setting only when necessary, when other treatments cannot work.³⁵ With regard to editing the genome of the embryo, it causes more ethical problems among Muslim religious scholars. The main point of these scientists is that there is no principled opposition to germline cell editing, but most of them tend to adopt a temporary precautionary stance, something close to a moratorium, when it comes to using this technology to treat people.

Germline genome editing should be discontinued due to safety and efficiency concerns. Unlike somatic cell editing, germ cell editing will affect not only the person who has these cells, but also his or her offspring. According to Muslim scientists, the wider range of possible effects and their long-term nature require more careful procedures. However, it is allowed to use this technology for research purposes or for testing on animals.

Other possible issues that are central to the Western secular ethical debate on germline genome editing are not issues for Muslim religious scholars. The first of these problems is the inability to obtain the consent of future generations when editing the embryo's genome. Muslim scholars believe that parental consent should be sufficient. The second problem is the moral status of the edited embryos that will be the subject of research. The main position of Muslim scientists is based on the fact that before the implantation of embryos into the uterus, they do not have the moral status of a person. This is why scientists see no problem in using pre-implanted embryos to conduct research to gain useful knowledge.

At the same time, the concern of Muslim religious scholars is gene therapy, when a reproductive cell is transferred from one person to another. Because these cells carry a unique genetic structure, most Islamic scholars prohibit their transfer, especially between unmarried couples, because this method violates lineages.³⁶ According to the ethics of Islam, the conception of children should only occur between married couples who biologically contribute to the genetic makeup of their future children.³⁷

With regard to the purposes of genome editing, there are different attitudes towards editing for the purpose of research and editing for

³⁵ Mohammed Ghaly, ed., *Islamic Ethics and the Genome Question: Volume 1* (Leiden: Koninklijke Brill NV, 2019), 340.

³⁶ International Society for Stem Cell Research, "The ISSCR Statement on Human Germline Modification," EurekAlert, last modified March, 20, 2015, <https://www.eurekalert.org/news-releases/610552>.

³⁷ Lala, 1855-1869.

the purpose of treatment. Most Muslim religious scholars favor genome editing for research purposes. Such scientific endeavors will be seen as a worthy response to Islam's call to seek useful knowledge that Allah ultimately makes available to those who work hard to obtain it. This is reinforced by references to verses in the Quran such as "Say: Travel the earth and see how He created creation. Then God will create the next life. Undoubtedly, God has authority over everything"³⁸ or "Our Lord is the One who gave everything its proper form and nature, and then directed it correctly."³⁹

With regard to genome editing in clinical applications, it will be assessed in terms of the principles of medical treatment (*tadavi*). In principle, treatment is permitted from an Islamic point of view. Islamic religious scholars rely on prophetic traditions, that for example suggest: "O servants of God! Seek a cure, because God never sent a disease without giving it a cure."⁴⁰ At the same time, in order to exclude abuse, additional precautions are added, especially two points: protection of human dignity and observance of Sharia law. For example, it is considered unethical to use genome editing for risky clinical purposes or to treat infertile couples with genetic contributions from a third party.

Regarding another goal of genome editing – improving the abilities of genetically healthy people who do not suffer from failures or shortcomings among Muslim religious scholars, two main positions can be distinguished. The followers of the first position approve of genetic editing to increase such human abilities as height, strength, speed or intelligence, since they perceive a person as something developing and improving, and not as stable and fixed. They argue that it was Allah who gave people access to this new knowledge. When people put this God-given knowledge into practice responsibly and ethically, it should be seen as a good thing in the eyes of Islam. Proponents of the second position, considering man to be created perfect, argue that God created people in the best possible form and there is no need to change his nature. As the Quran says: "Of course, We created man according to the best model."⁴¹

³⁸ Quran, 29: 20.

³⁹ Ibid., 20: 50.

⁴⁰ The Hadith of the Prophet Muhammad.

⁴¹ Quran, 95: 4. According to this second outlook, as Balogun claims, "[...] Islam will explain the social ills currently experienced in the world as a result of the deviation of members of their communities from the standards laid down by God." Babalola Joseph Balogun, "How not to Understand Community: A Critical Engagement with R. Bellah," *Conatus – Journal of Philosophy* 8, no. 1 (2023): 63.

In general, according to the researchers of the three main Muslim transnational institutions: IOMS, IFA and IIFA – human nature is something fixed and already perfect, genome editing should be limited to the field of treating diseases and restoring the patient's normal health. The improvement of the genome for the purpose of improvement would be a violation of the human duty to preserve the original perfection with which people were created, this is ordained by Allah. Accordingly, this will not be a scientific study, but “falsification,” a violation of the Creator's intention.

V. Conclusions

Thus, the key problems of human embryos genome editing in the Islamic world are related to determining the moral status of the embryo, the adequacy of the use of editing methods, and the limits of applicability and admissibility of this editing. Also relevant are the problems of social and spiritual consequences of genetic experiments, not all of which can currently be foreseen.

Currently, in matters of genomics and genetic research in the legislation of Islamic countries there are different approaches in the discussions of religious scholars, doctors, and lawyers. Taking into account the religious orientation of states, considerable attention in these countries is paid to the ethical regulators of Islam in relation to bioengineering (humans, animals, plants, i.e. all living things), on the basis of which legal norms are formed.

In some countries of the Arab East, comprehensive laws in the field of genetics have already been put into force or are under development. In some states, attention is paid to genomics in the legal acts of executive authorities, and in some other, local acts of leading medical centers have been developed. Also, a number of eastern countries stand out, in the legislation of which some aspects of the legal regulation of genetic research act as legislative novelties in the field of health care. In the most economically prosperous Middle Eastern states, issues of genetics are one of the priority tasks of the state. In particular, national strategic development programs are already in place, taking into account the use of modern methods of genome sequencing, bioinformatics and validation methods. Almost all countries in the Middle East region have ratified international instruments in the field of genetic research and on issues related to the conduct of such. In addition, Islamic states, within the framework of a unified religious approach to the events taking place in the field of achievements in science and technology, have developed an independent concept of regulating bioengi-

neering, taking into account the attitudes of the fundamental sources of Islamic law.⁴²

Since the 1980s, in several Islamic countries, the process of institutionalization of research on editing the human genome has begun, largely due to the activities of three large transnational organizations – IOMS, IFA and IIFA.

In the 1990s, institutionalization reached a new level – as a result of a significant intensification of research on ethical issues raised by genomics, while as a result of discussions at conferences and symposiums, a mechanism for collective and interdisciplinary thinking is adopted regarding key bioethical issues. In many ways, these processes were influenced by the international project “Human Genome” – a global scientific project, the main goal of which was to create the first sequence of the human genome.⁴³ And finally, since 2013, large-scale genomic projects have been launched in Islamic countries, starting with Qatar and Saudi Arabia.

In general, the modern Islamic world is increasingly introducing western models of behaviour into its traditional way of life through the legitimate recognition of certain aspects of bioethics and bioengineering that were previously strictly prohibited, regardless of the circumstances and according to Islamic traditionalism.

From an Islamic point of view, methods for editing a person’s germ line are not prohibited as it can be applied to protect human life and health. However, it’s not just the technology, but how it can be used. A common problem is the lack of scientific justification and evidence supporting the safety and effectiveness of technologies.⁴⁴ To make moral decisions regarding the use of technology for editing the human germline, based on Islamic law, the following basic principles can be distinguished:

- Decisions from an Islamic point of view are based on the use of Maqasid al-Shari’a and Qawaid Fighiyyah which are perceived as sources of ethical guidance for evaluating new technologies from the point of view of Islamic bioethics.
- The use of new biotechnology in the Muslim world requires multi-

⁴² Novikova, 565.

⁴³ Subcommittee on Human Genome, *Report on the Human Genome Initiative for the Office of Health and Environmental Research* (Washington, DC: the Health and Environmental Research Advisory Committee (HERAC), 1978), https://web.ornl.gov/sci/techresources/Human_Genome/project/herac2.shtml.

⁴⁴ Alsomali, and Hussein, 149-165.

disciplinary expertise, including geneticists, Sharia law specialists, bioethics specialists and sociologists. They will need to work together to draw appropriate ethical, religious, and legal conclusions.

- New technologies may be allowed for therapeutic applications, including germline editing, as needed, after safety and efficacy concerns have been resolved.

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