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Islamic Ethical Perspectives on Human Genome Editing

Religious scholars take a generally favorable position toward human genome editing research, and Gulf countries have launched several scientific efforts on the topic.

The interest in exploring the interplay of genomics and Islamic ethics took an important turn at the beginning of the 1990s, when the international Human Genome Project was declared. Since then, both Muslim religious scholars and biomedical scientists have been examining the relevant ethical questions from an Islamic perspective in addition to providing recommendations for policy-making pertinent to biomedical and genetic research in the Muslim world.

In the secular bioethical discourse, which dominates the discipline of bioethics in the West, there is a distinct class of bioethicists who lead the discussions. However, the Islamic bioethical discourse is framed by the class of Muslim religious scholars (*ulama*) who are specialists in the Islamic religious sciences. The positions adopted by these scholars are usually premised on the two main Islamic scriptures, namely the Quran (the literal word of God) and the Sunna (sayings, deeds, and approvals attributed to the Prophet of Islam). Because of the complexity and multidimensional character of the ethical questions raised by the field of genomics, Muslim religious scholars, most of whom received no training in biomedical sciences or in languages other than Arabic, sought the help of biomedical scientists to understand the biomedical aspects of the questions at hand and to gain access to the 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 the mechanism of collective reasoning (*al-ijtihad al-jama'i*).

By the beginning of the 1980s, the collaboration between religious scholars and biomedical scientists started to be the norm in Islamic bioethics, and the mechanism of collective reasoning adopted an institutionalized form through three main transnational institutions based in the Muslim world. The Islamic Organization for Medical Sciences (IOMS), established in Kuwait in 1981 and assuming its current name in 1984, has been the most active of the three institutions. In 1983, the IOMS initiated the series "Islam and Contemporary Medical Issues," which addressed a long list of bioethical questions, including those related to genomics. The IOMS coordinates with two other institutions whose interest in bioethics is rather occasional: the Islamic Fiqh Academy (IFA), established in 1977, which is affiliated with the Muslim World League and based in Mecca, and the International Islamic Fiqh Academy (IIFA), established in 1981, based in Jeddah, Saudi Arabia, and affiliated with the Organization of Islamic Cooperation.

The two-decade period between 1993 and 2013 witnessed the peak of interest in examining genomics through the lens of the Islamic ethical tradition. In addition to individual opinions expressed in works written by religious scholars or biomedical scientists, a large number of symposiums and conferences, which adopted the mechanism of collective and interdisciplinary reasoning, also addressed the ethical questions raised by genomics. The positions adopted by both individual Muslim religious scholars and the authoritative institutions were overwhelmingly positive. Some voices considered joining the genomic revolution not just an ethical option but even a collective duty that Muslim countries should collaboratively achieve. Some specific ethical questions, such as those related to genetic and genomic testing, received considerable attention in these discussions. Other questions, such as those related to incidental findings and genome editing, received less attention. That is why my analysis here will be based on previous discussions with relevance to gene therapy in general, as well as to other related topics within the broad field of Islamic bioethics.

Genome editing

In order to properly understand the Islamic ethical discourse on genome editing in particular, a number of preliminary points on the field of genomics in general are necessary. The mainstream position adopted by the majority of Muslim religious scholars and biomedical scientists views the study of human genes and genomes as part of man's commendable endeavor, since immemorial time, to explore human nature and to know oneself in an increasingly better and deeper way. Within this overall positive framing, research in the field of genomics, including genome editing, will generally be categorized as an ethical practice.

However, two main precautionary principles are usually raised to qualify, sometimes even overrule, this general permissibility under certain circumstances. The first principle is respect for human dignity. Thus, whenever research would undermine the dignity of human subjects (e.g., exposing them to risky and unsafe experiments or conducting research without informed consent), it will be judged as unethical. Despite their agreement on this point, Muslim religious scholars, as we shall see below, had different views on what the concept of human dignity would mean in the context of genomics and genome editing because they understood human nature differently. The second principle stresses that all scientific research, including genomics, should comply with the religious rulings and the overall religio-ethical system of Islam, namely Sharia. When specific research ventures contravene any of the values anchored in Sharia, this research will be seen as unethical, even if it is safe and does not involve risks for one's physical structure. One of the recurrent issues that Muslim religious scholars underscore in this context is respecting the marriage institution as the only channel through which family can be established. Hence, no children can be procreated without having a valid marital relationship between the prospective biological parents.

Beyond these overall points that govern the field of genomics in general, there is no one-size-fits-all moral judgment that views genome editing as a single block or indivisible whole. Judging genome editing from an Islamic ethical perspective can differ widely from one context to another, depending on a number of circumstances. Generally speaking, the ethical judgment is based on the

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answer to two broad questions: what type of cells will be edited, and what is the purpose of editing?

Contributors to the scientific and ethical debates on genome editing worldwide usually make a standard distinction between editing somatic and germline cells. This distinction also has important ramifications when genome editing is approached from an Islamic ethical perspective.

In the case of somatic cell editing, the edited cells will affect only the person who has these cells, and thus the scope of possible benefits or harms will be limited. After gaining the patient's consent, rigorously evaluating potential benefits and harms, and making sure that privacy will not be violated, this type of genome editing will not raise serious ethical concerns, especially when it is used for research or treatment purposes. Humans do not "own" their bodies in the Islamic perspective, because the real "Owner" is God, who created these bodies. However, God entrusted humans with the task of "managing" or taking care of their bodies. Thus, humans can still make decision about their bodies in the capacity of God's trustees, as long as they do not violate the instructions of the Owner by exposing their bodies to unnecessary or unjustified risks. Still, some religious scholars hold that new techniques whose efficacy and safety are still not widely recognized, including genome editing, should be employed in the clinical setting only in the case of necessity, when other therapies cannot do the job.

Germline genome editing, however, does raise some ethical concerns among Muslim religious scholars. The mainstream position among these scholars is that there is no principled opposition to editing germline cells, but the majority of them are inclined to adopt a temporary precautionary position, something close to a moratorium, when it comes to using this technology for treating humans. At least for the time being, these scholars argue, germline genome editing should be halted because of issues related to safety and efficacy. Unlike somatic cell editing, germline cell editing will affect not only the person who has the cells but also his or her offspring. In the eyes of these scholars, the wider scope of possible effects and their long-term nature necessitate adopting more cautious procedures. On the other hand, these scholars found no harm in using this technology for research purposes or for trials on animals.

Two possible concerns that usually occupy a central position in secular ethical discourse on germline genome editing hardly attracted the attention of Muslim religious scholars. One of these concerns is the impossibility of gaining the consent of future generations who will be affected by editing germline cells. It seems that Muslim scholars believe that this is a nonissue because the consent of the parents should suffice. These (prospective) parents will have the position of a guardian (*wali*), which empowers them to make decisions on behalf of their children. I believe that this line of argumentation may work for decisions on behalf of one's direct children on specific issues, as reflected in the works of early Muslim jurists, but the case of germline cell editing can sometimes be drastically different from an ethical perspective, given the possible long-term consequences that can affect a long line of future generations and not just one's direct children. The other ethical concern has to do with the moral status of the embryos that will be the subject of research on germline editing. It seems this was also not a serious concern for Muslim religious scholars. Using nonviable or surplus embryos from in vitro fertilization processes was approved by Muslim religious scholars, as detailed in their discussions on stem cell research and assisted reproductive technologies. The mainstream position among Muslim scholars is that before embryos are implanted in the uterus, they do not have the moral status of a human being. That is why the scholars find it unproblematic to use them for conducting research with the aim of producing beneficial knowledge.

Muslim religious scholars are concerned, however, about gene therapy in which a reproductive cell is transferred from one person to another. Because such cells carry one's unique genetic structure, the majority of these scholars prohibit their transfer, especially between nonmarried couples, because this technique will disturb the lines of lineage. They argue that procreating children in Islam should take place only between married couples who biologically contribute to the genetic makeup of their prospective children.

For what purpose?

Although the traditional research/treatment and treatment/enhancement dichotomies are sometimes contested, these different categories can considerably affect how genome editing is viewed through the lens of Islamic bioethics. It is clear, however, that the collective bioethical deliberations within the Islamic tradition have yet to pay due attention to borderline cases where these dichotomies will be of little help in making a nuanced and rigorous moral analysis.

Genome editing for research purposes will yield the most permissive stance among Muslim religious scholars. Such scientific activity will be seen as a praiseworthy response to the call of Islam to search for beneficial knowledge ('*ilm nafi*'), which God eventually makes accessible to those who work hard to get it. To defend this position, various Quranic verses are recalled, such as "Say, 'Travel throughout the earth and see how He has originated the creation'. Then God will bring the next life into being. Surely, God has power over everything" (Q. 29:20); "And in your own selves; do you then not behold?" (Q. 51:21); and "Our Lord is He Who gave to each thing

its due shape and nature, then guided it aright" (Q. 20:50).

When genome editing moves from research to clinical application, it will be judged through the framework of medical treatment (*tadawi*). In principle, medical treatment is permissible from an Islamic perspective. In this regard, religious scholars usually quote prophetic traditions such as "O servants of God! Seek treatment because God never sent down a disease without sending down its treatment." Because of the novelty of genome editing, Muslim religious scholars add extra precautionary measures, especially the two points of safeguarding human dignity and abiding by Sharia rulings. Thus, using genome editing for immature and risky clinical purposes or for treating infertile married couples by having genetic contribution from a third person is considered unethical.

Another possible purpose of genome editing is enhancing capacities and powers in humans who do not suffer from malfunction or deficiency. Using genome editing for enhancement is much more controversial than using it for research or treatment purposes. One can differentiate between two main positions among Muslim religious scholars. The advocates of the first position see no harm in enhancing human capacities such as height, strength, speed, or intelligence. It seems that they reached this conclusion because they conceive human nature as something evolving and improvable, rather than stable and fixed. It is eventually God, they explain, who gave humans access to this new knowledge. When humans put this God-gifted knowledge into practice in a responsible and ethical way, this should be seen as a good act in the eyes of Islam. The advocates of the second position, however, argue that God created humans in the best possible form. As stated in the Quran, "Surely, We created man in the best of molds" (Q. 95:4). Human intervention should thus be restricted to the realm of treating diseases and restoring a patient to a normal health condition. This is the position that was adopted by the three key Muslin transnational institutions: the IOMS, IFA, and IIFA. They view human nature as something stable, fixed, and already perfect. Genome editing for enhancement purposes would be a violation of the human duty, as dictated by the Creator, to safeguard the original perfection with which humans are created. According to some religious scholars, such an act will not qualify as scientific undertaking but would rather fall under the category of "tampering" (*'abath*) with God's creation.

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Active participation

The generally favorable attitude of Muslim religious scholars and biomedical scientists toward genetic research and therapy paved the way for the launch of large-scale genome projects in Qatar and Saudi Arabia in December 2013. Bahrain, Oman, Kuwait, and United Arab Emirates also began their own genome initiatives. The process of developing policies and guidelines on genomics is still in its infancy in these countries, with no concrete positions on how human genome editing should be regulated. With the advancement of the already existing and planned genomic projects in the Muslim world, I expect quite permissive and accommodating policies and guidelines, particularly for somatic cell research and treatment and for germline cell research.

There are also sociopolitical and cultural considerations that I see as quite supportive as well. Muslim countries in the Gulf region suffer from high rates of genetic diseases, and the cost of treating these conditions is covered primarily by the governments. These countries have a strong incentive to reduce the costs by funding research that can eliminate or alleviate the burden of genetic disease. Finally, a feeling of bitterness overwhelms people in the Muslim world when it comes to their contribution to scientific research today. The general public as well as the intellectual and political elite share an earnest desire to regain the past golden age of science in the Islamic civilization, and they see genomics as one of the promising fields that can help them achieve this target. I would advise scientists and scientific entrepreneurs to keep an eye on the Muslim world because there is a fertile soil there for human genome editing with great potential for successful collaboration.

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Recommended reading

Mohammed Ghaly, Eman Sadoun, Fowzan Alkuraya, Khalid Fakhro, Ma'n Zawati, Said Ismail, and Tawfeg Ben-Omran, *Genomics in the Gulf Region and Islamic Ethics: The Ethical Management of Incidental Findings* (Doha, Qatar: World Innovative Summit for Health, 2013).

Mohammed Ghaly, ed., *Islamic Ethics and the Genome Question* (Leiden, Netherlands: Brill, 2019).

Noor Munirah Isa, Nurul Atiqah Zulkifli, and Saadan Man, "Islamic Perspectives on CRISPR/Cas9-Mediated Human Germline Gene Editing: A Preliminary Discussion," *Science and Engineering Ethics* (2019).