

Cross-Cultural Biotechnology

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Islamic Perspectives on Biotechnology

Bushra Mirza

Biotechnology is unquestionably one of today's most vital and profoundly far-reaching fields. It has nearly endless applications and the potential to affect every aspect of our lives in positive ways. Biotechnological research is moving at a pace that knows no parallels in the history of biology. Yet, for most of us, modern biotechnology such as genetic engineering is new, formidably complex, and unfamiliar. This may explain somewhat why some of us find it worrisome and view it as dangerous, unethical and hence unacceptable. But one can also counter that it would be unethical not to use this powerful modern technology that bears the promise of alleviating all kinds of human suffering caused by hunger and numerous diseases. Therefore, research must proceed cautiously, potential risks need to be carefully assessed, and ethical debate must be encouraged. This ethical discussion and dialogue are all the more necessary for two reasons: The ultimate challenge in any religion or spiritual group is to be able to apply its teachings to the world in which its believers live. And issues related to biotechnology are undeniably relevant to peoples of all faiths and religions.

ISLAMIC LAWS AND GENERAL PRINCIPLES

Islam is the world's second largest religion. A conservative estimate would indicate that one-sixth to one-fifth of the world's population is Muslim. The term "Islam" means "peace and submission/surrender," and the religion of Islam stands for "a commitment to surrender one's will to the Will of God (Allah) and thus to be at peace with the Creator and with all that has been created by Him." Hence, within the Muslim world all ethical issues are examined

in the light of Islamic law, known as Shariah. And the primary source of Shariah is found in the Holy Quran, which is a holy book revealed by God to the holy prophet Muhammad. The Quran gives a complete code of life, a code that incorporates economic, social, legal, and ethical principles. This code of life is further expressed in the sunnah and hadith, the traditions and sayings of the prophet Muhammad. Hadith and sunnah actually represent what prophet Muhammad said or did during his daily life that helps in explaining practical aspects of the Holy Quran. This in turn is followed by the opinions of Islamic scholars. These scholars provide their opinions with the use of analogies, that is, they rule on events that are not mentioned by the Quran and sunnah by comparing these events to similar incidents that have already been ruled upon. In this way, Islamic scholars and institutes of Islamic learning take a well-defined specific issue, examine it in detail, and decide certain questions by issuing a religious decree known as a *fatwa*.

It is very important to emphasize that in Islam there is no central institution resembling the pope or the Vatican. Therefore, juridical-ethical opinions in matters of Islamic law, or Shariah, sometimes tend to evidence a plurality of opinions, each of these based upon independent research and interpretations by legal scholars in the community.

All of this means that, when it comes to new issues like biotechnology, Muslim scholars discuss and debate specific questions on the basis of fundamental principles and guidelines. Here are some guiding principles relevant to biotechnology:

- Necessities overrule prohibition.
- Choice of the lesser of the two evils if both cannot be avoided.
- Acceptability of a deed depends upon the intention behind it.
- All things are lawful unless specifically prohibited. Similarly all things are juridically clean except those specified not to be.

Necessities overrule prohibition. To understand this rule let us take the example of food. Muslims use two key, critical terms to describe food: *halal* and *haram*. *Halal* means "permitted" or "lawful." There are no restrictions regarding consuming or using *halal* food. *Haram* means "forbidden" or "unlawful." There are prohibitions as to the consumption and use of *haram* food. Other terms used by Muslims are *makrooh* and *masbboob*. *Makrooh* means "religiously discouraged" or disliked. *Masbboob* means "suspected."

Eating pig is forbidden, haram. However, treating diabetic patients with insulin that is obtained from a pig source is permissible because of necessity, given that no alternative is available. Similarly alcohol is also forbidden, or haram. But until alcohol-free medicines can be prepared, there is no prohibition against using medicines containing alcohol.

Choice of the lesser of the two evils if both cannot be avoided. Violating the human body, whether living or dead, also violates the teachings of Islam. Therefore, one might claim that organ transplantation is not permissible because that requires incising the body of a living donor or of a cadaver and obtaining the organ to be donated. Nevertheless, the saving of life is a necessity that carries more weight than preserving the integrity of the body of donor or cadaver. Hence, organ donation and transplantation are sanctioned since the injury to the body of the donor or cadaver is a lesser evil compared to letting a patient die.

Acceptability of a deed depends upon the intention behind it. Islamic teachings place a great deal of emphasis upon *neeayat*, meaning "intention." Muslims believe that any reward for deeds rests upon the intentions behind the deed. Therefore, whether an action is sometimes permissible or not depends primarily upon the intention behind the deed. For example, according to Islamic teachings, euthanasia is absolutely unacceptable and unlawful. A patient should receive whatever medical care is possible, and this includes material and emotional support from family and friends. Human life per se is to be valued unconditionally, irrespective of circumstances. The idea of a "life not worth living" does not exist in Islam. This means that the taking of life *in order to* end life is not acceptable. Yet suppose that a person dies because he or she is given a lethal dose of a painkiller, and this dose is administered *in order to* alleviate the person's suffering, not to take that person's life. In this case, Islamic teachings would view this as acceptable.

All things are lawful unless specifically prohibited. Similarly all things are juridically clean except those specified not to be. Islamic teachings clearly designate foods or actions that are forbidden. However, we need to be very careful in how we interpret and understand this. The prohibition of a food or drink does not necessarily mean that it is juridically unclean. For instance, even though drinking and handling alcohol is forbidden because it is an intoxicant, there is no problem with using perfumes or cologne in which alcohol is used as a solvent for fragrance and aroma, or in using creams that also contain alcohol.

Now that we've looked at some of the basic rules and principles of Islamic laws, let us proceed further and discuss issues in specific areas in biotechnology: genetically modified food, assisted reproductive technology, prenatal testing, germ cell research, gene therapy, and cloning.

GENETICALLY MODIFIED FOOD

Biotechnology has abundant applications for the food industry. In general, outside of a few reservations about products that need to be reviewed on a case-by-case basis, Muslims accept biotechnology ingredients and enzyme

cultures. However, the Muslim community is also aware that it is sometimes rather difficult to make halal determinations (that is, to claim that food is permissible) of food ingredients, food products, and modified species of animals and plants produced through biotechnology. It is thus important that information should be made available to Muslims concerning the theories, concepts, and practices in food biotechnology and genetic engineering so that they can more properly evaluate their halal nature (permissibility) or otherwise.

Muslims were initially concerned that genetically modified (GM) food might contain genes from animals, whereas Muslims have no problem in using GM food crops that have so far been approved and developed with genes from plants. The U.S. Islamic Jurisprudence Council (IJC) has declared all current GM foods on the market to be halal and therefore fit for consumption by Muslims. It is important to mention here that according to Islamic law, transformation, that is, the process by which an object changes into another, totally different object with different properties, can also turn what is deemed to be unclean into a clean object. Therefore a substance may be extracted from a prohibited source. Yet by going through this transformation, via chemical or other changes that modify its nature, the end product is considered permissible by the Shariah, or Islamic law. For example, soap that is produced by treating and transforming pig fat or fat obtained from a dead animal (by themselves unclean and prohibited sources) becomes a clean compound through the process of transformation. Therefore it is permitted to use this soap. Similarly, Muslims have no objection to the use of bioengineered chymosin (rennin) in the production of cheese. Furthermore, Muslim leaders have ruled that simple gene additions that lead to one or a few new components in a species are acceptable. However, they have not yet resolved whether or not a gene that is derived from swine (a prohibited animal) constitutes an exception to this acceptance. Neither has it been determined about the status of more significant changes in the genetic makeup of species.

ASSISTED REPRODUCTIVE TECHNOLOGY

Assisted reproductive technologies (ARTs) make up one of the fastest growing areas in medicine. While this technology has certainly improved the chances for an infertile couple to conceive a child, it has evoked strong opposition from religious groups as well as human rights activists who object on legal and moral grounds. Islam is not opposed to treating infertility, and infertile couples seeking treatment for their infertility are not viewed as violating Islamic law. In fact, seeking treatment for infertility is encouraged since it aims for the good of procreation. However, though the aim is good, the means to achieve it that involves ARTs elicits debate.

Note the steps involved in a cycle of treatment such as in vitro fertilization (IVF). First, there is drug stimulation of the ovaries in order to produce multiple follicles. This is done in order to collect oocytes. The oocytes are then inseminated with sperm and left to fertilize. The embryos are then cultured for a period of two to three days, after which they are selected based on morphology and cell counts before being transferred back to the mother's uterus. Where infertility is due to the husband's condition of being either azoospermic (no sperm) or some other male factor, an alternative would be to inseminate the oocytes with the sperm from a donor. If infertility is due to the woman, embryos are implanted into the womb of a surrogate mother.

From an Islamic perspective, IVF is permissible only under certain conditions. The woman's oocyte may only be fertilized with her husband's sperm and only if they are still married. There must not be a third party such as an anonymous donor or a surrogate mother. Islamic teachings absolutely prohibit insemination of the woman's egg with the sperm of a man who is not her husband. Islamic scholars have addressed this issue of using sperm donors and have declared it comparable to adultery. They therefore regard it as a grievous crime and a great sin. Similarly surrogacy is entirely illegitimate. As the Holy Quran states, "None can be their mother except those who gave birth." And surrogacy creates confusion about who is the mother of the child as well as involves a woman who is not married to the father of the child. However, since polygamy is permissible, some jurists do permit in vitro fertilization between the husband's sperm and an egg from a legally married wife that is then implanted into the legally married second wife. Although this involves taking eggs from one woman and implanting it in the uterus of the other woman, both of these women are still within the same marriage contract with the man whose sperm is used for fertilization.

GENETIC SCREENING AND SELECTION OF THE EMBRYO

Genetic screening enables us to identify carriers of genetic disorders. It can be used to detect genetic disorders of the fetuses, through prenatal testing, or of the adults. The information obtained through this procedure can be used for genetic counseling or to protect the lives of the mother and the fetus. Genetic counselors have occasionally recommended the abortion of severely afflicted fetuses. In a more advanced technique called preimplantation genetic diagnosis (PGD), genetic screening of an embryo is done during assisted reproduction before its implantation into the uterus of a woman. PGD involves sampling one of the blastomeres that is present in the cleaving two- to three-day-old embryo and screening its genetic structure. The purpose is to screen for genetic defects that may be present in the

embryo. Any embryo that does not carry genes for genetic diseases is then implanted into the uterus.

From an Islamic point of view, the genetic screening of populations at risk in order to detect genetic abnormalities and for the purposes of genetic counseling and curing birth defects is acceptable. Similarly, prenatal diagnosis in order to protect the mother's life or health is also permissible. Islamic teachings do not permit the selection of an embryo on the basis of genetic structure through PGD. Furthermore, Islamic teachings forbid aborting a fetus for reasons of genetic abnormality. Muslims must accept all the decisions and gifts of God (Allah), and they must not determine who deserves to live for however long based upon their own desires. Spiritual maturity in Islam requires prohibiting any claims of superiority of one person over the other. All persons are equal. In the Holy Quran, the only valid claim to nobility rests upon being God-fearing. Therefore, deliberately selecting an embryo interferes with the work of the Creator. Selecting for gender is also strictly prohibited. As the Holy Quran states, "He [Allah] creates what He wills, He bestows females upon whom He wills, and He bestows males upon whom He wills. For He is all knowledgeable and all powerful."

FATE OF THE SPARE EMBRYOS

A procedure like IVF often results in the availability of numerous spare oocytes and embryos that are not transferred to the uterus of the mother. From the Islamic perspective, the fate of these remaining embryos is a debatable issue. Patients sometimes consent to discard the spare embryos or to freeze them (cryopreservation). Freezing embryos has its advantages. For one, if a woman decides to undergo IVF again, she does not have to repeat the drug stimulation cycle and can thus avoid having to experience any side effects from the stimulant drugs. Cryopreservation techniques can store embryos up to a few years, so that if the mother later decides to have a child, these embryos can be thawed and implanted in her uterus. Muslim scholars consider this process legitimate so long as the woman from whom the oocytes were obtained is still within the marriage contract with the husband whose sperm was used to fertilize her own oocytes.

Spare embryos can also be donated to a childless couple. Islamic teachings consider this illegitimate because it involves a third party to which the husband was not legally married and thus violates Islamic laws. Surrogate motherhood also produces its fair share of social and psychological complications.

Spare embryos can be donated for research purposes. Embryo research can further improve our knowledge about assisted reproduction, the diagnosis and prevention of genetic disease, and the development of better ther-

apies for birth defects. In the light of these benefits, Muslim scholars have differing opinions on this issue. Some Muslim scholars believe that since a human being is God's creation, once that human being comes to life, it should not be destroyed or manipulated. Other scholars allow embryo research for therapeutic purposes as long as there is the prior consent of the couple undergoing infertility treatment. At the same time, these scholars add that the embryos that have been researched upon must not be transferred back to the uterus of the mother or to another woman.

This controversy stems from the following question: If an embryo formed after artificial fertilization is not yet in the womb of its mother within a few days, should it be considered a human being, with all the rights of a human being? According to the Shariah, we should make a distinction between actual life and potential life. Indeed an embryo is valuable. It has the potential to grow into a human being, but it is not yet a human being. Destroying such an embryo is not called abortion. In the Quran as well as in hadith, different stages of fetal development have been described, and the stage for "ensoulment" is indicated at 120 days. Muslim jurists have made a clear distinction between the early stages of pregnancy (the first forty days) and its later stages. For instance, it is mentioned that if someone attacks a pregnant woman and aborts her baby in the early stages of her pregnancy, that person's punishment will be less than that of a person who commits this act during full pregnancy. And if he kills that child after its birth then he is liable to be punished for homicide. So there is nothing wrong in doing research especially if this research has a potential to cure diseases.

However, it is important to keep in mind that Muslims have strong reservations against the misuse of embryos. Embryo research surely has the potential for misuse. For instance, with respect to donors of cells, we should anticipate various possible misuses and establish safeguards against them. Possible misuses might include physicians requiring infertility patients to go through extra cycles of ovulation purely for the purpose of obtaining more embryos. Or they may themselves pay women to produce embryos. Or they may cultivate embryos without the consent of the donor. And in setting up safeguards, authorities should also clarify the difference between, on the one hand, the use of spare embryos from in vitro fertilization procedures that would be destroyed regardless and, on the other hand, the deliberate production of embryos for stem cell research.

Each year thousands of embryos are wasted in fertility clinics worldwide. Such embryos should not be wasted; they should be used for research. If embryonic stem cell research has potential to relieve human disease and suffering, then not only is it permitted but it is *obligatory* to pursue this research. However, this research must only involve those embryos that were created for the purpose of in vitro fertilization and that would otherwise be destroyed.