

**The Genetic Material
The Genome
Fiqh Issues¹**

Author: Dr. Mohammed Raafat Osman,
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The Author:

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Book Chapters:

In addition to a lengthy introduction reviewing the pioneers of genetic research and provided a scientific background on cells, chromosomes, genes, and genome, the book covers the following chapters:

1. Stem Cell Research
2. Cloning of plants, animals and human
3. Surrogate mother and renting of uterus
4. Genetic identification
5. Gene therapy
6. Selection of the fetus sex
7. Genetic testing
8. Genes and behavior
9. Transplantation of gonads and sex organs

Summary:

The book summarizes the aims, benefits and potential applications of the human genome project and related public fears. It highlights opinions of Islamic scholars on stem cell research and cloning of organs (e.g. heart, liver and kidney), legality of research that aims to prolong the human lifespan or modify human behavior through gene therapy, the issue of infertility treatment, selection of the sex of the baby, genetic or morphologic feature modification through genetic intervention, organ transplantation, and the issue of surrogacy, in addition to the establishment of banks for sperms and ova and their use in order to have children after death. The author bases his opinion on the five Islamic principles of Fiqh, and makes recommendations based on the balance of harm and benefits (potential versus definite) to the individual and the society.

In this review, we thoroughly discuss the different chapters of the book and summarize the recommendations from different conferences and seminars, referenced in the book, made by Islamic organizations about the topics.

Chapter 1: Experiments on Human Stem Cells

In this chapter, the embryonic stem cells, which are obtained from fertilization of an ovum with a sperm, are discussed. Some scholars believe that experimentation on stem cells is against human dignity because obtaining the fertilized zygote is considered an abortion, whilst others consider such experiments to help treat serious diseases.

The author discusses the different opinions of Islamic Fiqh scholars on abortion. For some scholars, abortion is permissible during the first 120 days regardless of the reason, for others it is only permissible during the first 120 days if there is a strong reason for the benefit of the mother. Other scholars only allow it during the first 40 days, if there is a good reason, and utterly prohibited after 40 days. The author supports the latter opinion and adds that prohibition is stronger with the advance of in-utero life after 40 days even with appropriate reason. As stem cell research benefits humanity, and can be obtained prior to day 40, the author finds this to be permissible and does not contradict human dignity. On the other hand, there is no objection to conducting research on animals and plants for the benefit of man.

The author also discusses the different ways of assisted fertilization; relevant to our project is the use of extra embryos obtained from in-vitro fertilization. He referenced a UK legislation that determines that 1) an embryo developed in-vitro can be used for stem cell research prior to day 14, which is the day for development of the primitive nervous system from the ectoderm, and that 2) the embryo should not be implanted into a human uterus.

The author raises a number of legitimate conditions regarding the use of embryos in research and treatment, namely:

- The purpose is scientific research.
- To be performed before the 14th day of the age of the fetus, and in special cases may be extended until the 18th day.
- Never implant human embryo used for research back into the womb of a woman or animal.
- It is forbidden to transfer the nucleus of one embryo to another.

The author raises a hypothetical situation where a married couple has a diseased child who can be treated by stem cells from an embryo. In this scenario, the author finds this to be permissible to do elective abortion. Using embryos for stem cells from spontaneous or therapeutic abortion is not prohibited, providing consent is taken from parents. However, the author suggests that more research in this area among Islamic scholars is required. The author suggests extreme caution for developing chimera, animal human, human/human, for research and therapeutic purposes.

We believe that most future research in stem cells, which is obtained from children and adults, and not from embryos, will be based on the induced pluripotent cells obtained from adult tissues.

Chapter 2: Cloning Human, Animals and Plants

The cloning of animals and possibly of humans has become possible with advanced technology. The author comprehensively discusses cloning of animals reported by different researchers and rumors of cloning human individuals. He provides an extensive discussion for the religious ruling regarding the five possible ways for cloning humans by manipulating a somatic cell taken from the human body, then de-differentiating it into a pleuri-potent cell that can mimic the fertilized egg to produce an individual who is genetically identical to the source of the nucleus:

1. A nucleus of a somatic cell from one woman is placed in the “uterus” of another is religiously forbidden.
2. A nucleus of a somatic cell from one woman is placed in her own “uterus” is also religiously forbidden.
3. A nucleus of a somatic cell from a man is placed in the “uterus” of a woman who is not his wife is religiously forbidden.
4. A nucleus of a somatic cell from a man is placed in the “uterus” of a woman who is his wife needs more research by contemporary jurists.
5. An ovum is fertilized by a sperm and the cells are divided into multiple twins is religiously forbidden because it will lead to serious social problems and damage as a result of the presence of individuals who are fully similar in shape.

In our opinion, the second method produces a genetically identical fetus to the mother; this is not different from the fourth method, which produces a genetically identical fetus to the father. Thus, the ruling should not be different between 2nd and 4th methods.

The author recognizes that cloning of a dead person is still science fiction; however, from jurisprudence view, he says it is forbidden because reproduction is done only through marital relationship between a man and a woman. In contrast, cloning of plants and animals for the benefit of human is welcome, as there are no legitimate texts or general rules against this.

Chapter 3: Surrogate Mother or Renting Wombs

The author considers the womb as one of the organs that cannot be donated, rented or used by a different individual. Therefore, surrogacy is not permissible as it is forbidden to use a woman’s womb without marital relationship, as this may lead to mixing of lineages even if this was voluntary between co-wives.

The issue of donating mitochondrial genetic materials was not discussed in this book. For example, there are mitochondrial disorder that causes severe disability, which can be treated by mitochondrial donation. In fact, a child was recently born from IVF where the genetic materials were obtained from 3 individuals: sperm from the father, nucleus from the mother, and mitochondrial DNA from a healthy donor (example:

<https://www.newscientist.com/article/2107219-exclusive-worlds-first-baby-born-with-new-3-parent-technique/>). This is a new advancement that needs analysis whether it is Islamically permissible or not.

Chapter 4: Use of DNA Information for Individual Identification:

The use of DNA fingerprinting as a tool for proving paternity is permissible in situations of conflict of paternity and can be superior to testimonies. However, genetic testing should not be performed to confirm paternity in a stable family. The author advised against DNA profiling prior to marriage to avoid disclosing confidentiality of stable relations.

Chapter 5: Gene Therapy

The biotechnological revolution of the 20th century made it possible to achieve diagnosis and treatment of genetic disorders and inherited diseases. The book discusses the different types of gene therapy (somatic and germ line) and the methods used (gene replacement, gene correction and gene addition).

Treatment of diseases using gene therapy should follow the following general principles:

1. Treatment of disease is legitimately requested by the patient.
2. Do no harm.
3. Everything that leads to benefit of individual or community is permissible unless it interferes with legitimate text or rule.

Regulations to be considered in experimentation on gene therapy:

1. It is not permissible to experiment gene therapy on humans before testing it on animals and showing benefits.
2. Gene therapy can be attempted in humans only if the side effects in animals are less than the symptoms of the disease.
3. It is not permissible to expose animals to painful experiments not intended for the benefit of man.
4. Everyone is entitled to dignity and respect regardless of his/her genetic background.
5. It is not permissible to experiment, diagnose or treat anyone without a careful assessment of potential risks and benefits, and should adhere to Islamic legitimate rules.
6. Respect the desire of the patient regarding outcomes and consequences of test results.
7. All genetic diagnoses that are saved or prepared for research purposes should be dealt with full confidentiality except for general medical benefits.
8. It is prohibited to donate, trade ova or sperms or establishing banks to save them for infertility treatment of other individuals.
9. Donation of gametocytes is permissible strictly to research institutes certified by the government, for producing embryos, to be used by certified doctors for therapeutic research purposes, where the embryo age should not exceed 14 days.
10. It is not permissible to use intrauterine human embryos, children or adults in any research that can be lethal or harmful.
11. It is not permissible to implant in-vitro fertilized or genetically modified embryos inside women wombs to produce children for the purpose of conducting research on them.

In addition to the above regulations, the author recommends the following for the Muslim societies:

1. Islamic countries should be involved in the field of genetic engineering by building research institutions that comply with Islamic law.
2. Muslim scientists should publish their books that simplify genetics and genetic engineering to increase public awareness.
3. Muslim countries should introduce genetic engineering in different levels of education, with excessive attention in university and postgraduate studies.
4. Muslim countries should raise awareness about gene therapy benefits and the rules and regulation governing it.

Chapter 6: Selection of the Fetus Sex

The author states that there is no clear evidence that forbids this. He argues that beneficial choices are permissible if they do not contradict with legitimate text or rule, and some families may want a baby girl/boy for some good reason. It is also permissible to pray for God asking for a boy/girl. The author further explains the opposing arguments: this act contradicts the will of Allah, and that it may lead to increased abortion of female fetuses, causing an imbalance in the ratio between males and females. He concludes that it is permissible as an individual act during the period of fertilization, and in some occasions this can be helpful to avoid sex-related diseases that run in families by determining the sex that will be protected.

Chapter 7: Genetic Testing

The author investigates genetic screening for marriage, job application, health insurance coverage, and screening of pregnant women for genetic diseases in the fetus. The author recommends that screening before marriage should be non-compulsory. He suggests that disclosing results of premarital screening to partners is not considered dishonesty or breaking confidentiality. He also thinks that employers have the right to screen job applicants, and health insurance companies have the right to screen their clients before providing insurance service. From our point of view, the last two screenings may have consequences on people at risk, leading to employment or insurance discrimination. The author assumes that screening of pregnant women is permissible and can be compulsory to prevent certain inherited lethal or disabling diseases. We strongly consider that the last point can be expanded to screen fetuses in-utero for diseases that can be based on the parent's gene.

Chapter 8: Genes and Behavior

After discussing the effect of genetics and environment on human behavior, the author concludes that, even if proven, in the future, there are specific genes relating to certain crimes, this does not discard responsibility from the gene carrier, bearing all responsibilities.

Chapter 9: Transplantation of Gonads and Sex Organs

The author explains, in details, the different views of scholars regarding organ transplantation in general, including definition of death and whether it is permissible to take somebody’s organs for the benefit of others. He, then, specifically discusses transplantation of sex organs (testicles, ovaries, and internal/external sex organs). He concludes that it is permissible to transplant an organ from a dead person to save a life, or eliminate harm from the recipient, conditionally, such as consent from the person “being on a donor list” and their family. He comments that the concept of “brain death” is controversial, as in some rare cases, where patients are reported to recover after being labeled “brain dead”. The author discusses possible benefits for transplantation of gonads and genitalia such as fertility, pleasure and cosmetics. Transplantation of testicle and ovary is prohibited as this may lead to mixing of lineages. Transplantation of uterus is not permissible due to the absence of marital relationship. Transplantation of fallopian tubes, however, is permissible provided that the donor does not need them or might regret donating. It is not permissible to transplant the external genitalia (both penis and vagina), and it is not permissible to sell human organs.

Attachments:

The book makes references to a number of conferences and seminars held by different Islamic organizations, which are highly relevant to the topics of the book. We summarize the most relevant of these references that relate to the book chapters:

Chapter 1: Stem Cell Research:

The author references and details the recommendations of the Islamic organization for medical science published at an international seminar on "Dilemma of Stem Cells: Research, Future and Ethical Challenges" in Cairo, Egypt, in cooperation with the WHO regional office in Cairo; UNESCO; ISESCO; and the Islamic Fiqh Academy in Jeddah. The seminar took place between 3rd-5th November 2007. As these recommendations highly relevant to our topic, we have listed them below:

Specific Recommendations:

First: There is no legal objection to conducting research on stem cells to produce human tissues for therapeutic purposes. However, these cells must be obtained from sources permitted by Islamic law.

Second: Fertilized eggs surplus from IVF possess no privileged status and enjoy no sanctity before their implantation. There is no objection to any method of disposing of them, hence using them for the purposes of treatment and scientific research better than wasting them.

Third: It is forbidden to implant a fertilized egg in the uterus of a woman other than its owner.

Fourth: It is prohibited to perform an intentional abortion so as to use the fetal parts for transplantations.

Fifth: If the fetus shows signs of life, medical treatment should be sought to sustain and preserve its life rather than using it for organ transplantation. If the fetus shows no potential for continued life, benefit is not to be derived from it until after its death.

Sixth: It is imperative to be cautious in the use of fetal stem cells in light of the possibility of their rejection by the body of the recipient. This seminar commends researchers to pursue research in this regard to overcome this serious problem.

Seventh: No coercion or enticements should be used to obtain fertilized eggs.

Eighth: There is no legal objection to benefiting from the blood of the placenta or the umbilical cord; however, consent must be obtained and donors should be protected against DNA identification. The seminar also recommends the establishment of placental blood banks.

Ninth: It is not allowed to use primordial tissues of aborted fetuses for sperm or egg production. With the exception of using these eggs and sperms in research to unveil the reasons of male and female infertility or any other relevant problems, this should be stated clearly in the research protocol. Research Ethics Control committee should enforce these regulations.

Tenth: The seminar highlights the need for extensive studies on the ethics of the use of chimeras. This should be done in light of the expansion witnessed in the field of preparations of vaccines, insulin and animal cardiac valves. There is no reason that chimeras should not be used – in this phase – in conducting research in place of human fetuses for the present time;

Eleventh: There is no objection to obtaining stem cells from adult donors on the condition that they provide informed consent and that their identity is protected against DNA analysis.

Twelfth: It is permissible to plant adult stem cells in the tissue of the same person's organs to produce sperms or eggs for treatment of infertility.

Thirteenth: It is completely non-permissible for organ implantation processes to be subject to commercial purposes. No financial inducements should be offered by any agency whether the researcher or the firm in charge to entice a husband or wife to obtain an abortion.

Fourteenth: Donors should be protected against DNA identification processes that can be performed on the donated stem cells or offspring produced from these human fetal stem cells.

Fifteenth: Stem cells are only to be used in medical fields. They are not to be used for the purposes of plastic surgery that is contrary to divine law, and which alters and tampers with Allah's creation. Also, science is not to be used for evil, corrupt or subversive ends.

Sixteenth: *Enlightened and Informed Voluntary Consent:* The seminar recommends development of informed voluntary consent form of the Islamic Organization of Medical Sciences (IOMS), which should notify the couple of the destination of their fertilized eggs, answering all of their questions, clearly indicating that these gametes will not be implanted in any other woman and will not be used for a commercial purposes.

Seventeenth: *Patenting Stem Cells:* Methods of separating and producing specific therapeutic stem cell lines can be patented. The seminar highly recommends making these techniques and products accessible to developing countries at affordable prices. It should be noted that stem cells themselves as well as all their types can not be patented. This is identical to the way that none of the phases of human growth can be patented – including the fetal stages. In the same manner, fetuses cannot be patented if they are to be used for industrial or commercial purposes; for they are Allah's creations;

Eighteenth: *Policy, Equity, Priority and Ethics:* The seminar recommends the following:

- a) Calling on all countries to observe and respect the ethical values of each country in light of its customs, traditions, culture and religion, taking place in the fields of global biomedical technical progress and what underlies that progress, and under the guidance of the Global Islamic Covenant of Medical and Health Ethics issued by the IOMS.
- b) Researchers should heed ethical standards and international guidelines in biomedical fields, especially in the field of stem cells. This is to preserve man's dignity, freedom and the sanctity of their life.
- c) The seminar urges planners of health policies and healthcare systems in developing countries to consider the huge expenses and the complex technicalities of biomedicine in general and to assess expenses and benefits before providing these techniques; this should not run counter to equity of distribution and priorities.
- d) The seminar urges the developing countries to prepare the necessary personnel to benefit from them when financial circumstances become available.

Nineteenth: *Animal Fetal Stem Cells and Xenotransplantation:* The seminar recommends the following:

- a) Caution should be heeded concerning the use of animal fetal stem cells in xenotransplantation. This involves many perils by confusing human and animal genes; a confusion that might be reflected in human behavior. It should be noted that the use of treated lifeless tissues or organs like a pig's cardiac valves, insulin and heparin (blood liquefying substance) does not come under the topic of xenotransplantation.
- b) Caution should be taken ‘against the possibility’ of ‘man’ contracting some known or undiscovered animal diseases. This could result in the wide spread of disease within the human community at a global level.
- c) The necessity of obtaining informed and voluntary consent of the patient after providing him with a full explanation of the hazards and benefits to which he may be subjected. Both the physician and the patient should advise relatives and visitors not to be close to the patient during therapy, until the medical ‘authority’ in charge permits it. This is for fear of the hazard of infection. The medical ‘personnel’ in charge should be strict in this regard.
- d) Xenotransplantation should not be permitted unless under effective national organizational mechanisms of regulation and monitoring, supervised by national health institutions. Xenotransplantation should only be permitted with an effective technical system to minimize hazards and improve safety and futility.

Twentieth: the seminar confirms the fourth paragraph of the WHO statement issued between 18th-20th April 2005 in Geneva stipulating the following: “There are some practices of xenotransplantation that raise concern. Sperms are injected with the presumption that they will, for instance, “renew energy” or “fare as therapy”. However, these procedures have not yet proved effective for various sets of diseases and illnesses. In these non-regulated practices,

many animal cells are used with indifference as to their quality, safety and usefulness. These kinds of practices represent unacceptable general health hazards that result in infection and should not be allowed.

General Recommendations:

- 1- IOMS and WHO to collaborate for studying the legal aspects of stem cell therapy to facilitate the mission of legislative bodies in Muslim countries.
- 2- Muslim countries to form national committees to supervise the conduct of research and therapy in the field of stem cells, complying fully with the Islamic ethical rules. These would be concerned with both national and international standards as well as with detailed monitoring of research by researchers or supervisors of therapy.
- 3- IOMS and WHO to issue a code for research and therapy entitled “The Islamic Code of Good Clinical Practice (GCP) for the Use of Human Stem Cells”.
- 4- IOMS and WHO to lay out a protocol similar to "good manufacturing practice (GMP)" to provide suitable accommodation for animals for use in stem cell research.
- 5- Muslim countries to establish an "Islamic Waqf" for funding scientific research.
- 6- Muslim countries to establish a communication network aiming at integration, cooperation and information exchange between their research centers.

Chapter 4: The Use of DNA for Identification

The author recommends the decisions of the 16th Session of Islamic Fiqh Assembly in Mecca, Saudi Arabia, 5th-10th January 2002, which addressed the use of DNA results in solving conflicts of paternity:

1. There is no objection to rely on DNA in criminal investigation to prove innocence from offenses for which no specific punishment in Islamic jurisdiction.
2. The use of DNA in lineages must be given the utmost caution and secrecy, and it should not be superior to legal texts and rules.
3. It is not permissible to use DNA fingerprinting to deny paternity and should not be superior to the Islamic ruling known as “al-li’aaan”.
4. It is not permissible to use DNA to confirm a legally confirmed lineage, and competent authorities should prevent this to protect and safeguard people’s honor and genealogy.
5. DNA identification can be used in the following situations:
 - a. Cases of conflict on unknown parentage of various types.
 - b. In suspected cases of babies born in hospitals, childcare centers and the like, as well as suspicion on IVF babies.
 - c. Cases of lost children and mixing, due to accidents, disasters or wars, whose parents could not be found, the presence of dead bodies that could not be identified, verifying the identities of missing people or prisoners of war.
6. It is not permissible to sell or donate human genome of any ethnic group, individual or people for any purpose.
7. The council recommends the following:

- a. The government should forbid conducting private genetic fingerprint, which should only be done at the request of the judiciary in the laboratories of the competent authorities, and prevent the private sector from practicing this examination because of possible major consequences.
 - b. Composition of a special committee for genetic fingerprint in every state, involving forensic specialists, doctors, and administrators, to be responsible for overseeing the results of the DNA and adopting its results.
 - c. To set precise mechanism to prevent plagiarism and fraud specimen pollution and everything related to human errors in DNA labs, so that the results are identical to reality, and ensure laboratory accuracy.
8. The author comments about the difference in scholars’ opinion regarding the strength of the Hadith that states: “avoid punishment with doubt”, arguing against not relying on DNA to prove paternity or to depend on it in certain situations where it can provide strong evidence like DNA from semen on cloths of rape victims.

Chapter 5: Gene Therapy

The Islamic Fiqh Assembly during its 15th session held in Mecca, Saudi Arabia, 31st October–4th November 1998:

1. Confirmation of the Resolution No. 100/2/D/10 adopted on the issue of cloning by the Islamic Fiqh Assembly of the Organization of the Islamic Conference (OIC) during its 10th session held in Jeddah between 28th June–3rd July 1997.
2. Genetic engineering may be used to prevent or treat a disease, or to minimize its harm, providing that it does not cause more harm in the process.
3. It is not permissible to use genetic engineering for any mischievous or hostile purposes or for anything prohibited in Islamic Shari’ah.
4. It is not allowed to use genetic engineering in tampering with the personality of humans and their responsibility, or in interfering with the structure of genes on the pretext of improving the human race.
5. It is not permitted to conduct any research, treatment or diagnosis of an individual’s genes unless there is a need only after prior assessments of potential risks and benefits from such activities, and after having the consent of the concerned person, in addition to fully preserving the secrecy of results, keeping into consideration the rulings of Islamic Shari’ah regarding the respect and dignity of humans.
6. Genetic engineering may be used in fields of agriculture and animal breeding, providing that the necessary precautions are taken to prevent any harm – even on long-term basis – to man, animal and environment.
7. The Council calls upon the companies and firms that produce food, medical and other products using genetic engineering to state the ingredients of these products, so that people use them with full knowledge and caution about matters that are harmful or prohibited.

8. The Council calls upon medical scientists, as well as laboratory owners, to be fearful of Allah the Almighty and avoid any harm to individuals, society and the environment.

Chapter 7: Genetic Counseling and Genetic Diagnosis

Islamic perspective on genetics, genetic engineering, the human genes, and genetic treatment held in Kuwait, 1988, by the Islamic Organization of Medical Sciences (IOMS). The recommendations are:

Genetic Counseling:

- a) Genetic counseling service should be made widely available to families or prospective couples and should be run by qualified staff. The public should be educated.
- b) Genetic counseling must not be made compulsory, nor should it lead to any compulsory measures.
- c) Results of genetic counseling must be treated with the strictest confidentiality.
- d) Information on genetic counseling must be made widely available in medical and health institutions and schools, as well as through mass media and mosques.
- e) Since statistical evidence shows that inter-marriage between close relatives, although Islamically permissible, is usually associated with higher risks of physical defects, the public must be informed so that people can make an educated choice, especially families with a history of genetic diseases.

Genetic Diagnosis: Governments of Muslim countries and health authorities should:

- a) Promote public awareness of genetic diseases and seek to prevent their spread.
- b) Encourage people to take genetic tests before marriage by educating the public through mass media, public meetings and mosques.
- c) Increase the number of human genetics units to provide genetic counseling and widen the range of health services to pregnant women to include diagnosis and treatment of genetic diseases aiming at improving the health of childbearing.
- d) People must not be forced to undergo genetic screening.

The author also references the recommendations of the European Council for Fatwa and Research held on February 2005 about pre-marital screening:

1. Medical examination before marriage has benefits of identification of infectious or other diseases that may affect marriage and children, thus having the option to refrain from marriage. Genetic screening has both cons and caveats if results are concealed, and the consequent psychological effect as well as on the future of marriages.
2. There is no religious objection on medical examination, especially genetic screening, taking confidentiality into account.

3. There is no religious objection on requesting genetic screening prior to marriage.
4. There is no objection on agreement to conduct the medical examination (non-genetic) before marriage to commit to the ethics of Islam in confidentiality and avoiding harm.
5. Medical teams should not conceal any infectious disease, if any of the partners were affected or died because of it; offending party shall bear all consequences from penalties and compensation according to the provisions of legal laws.
6. Both partners have the right to divorce if one was found to have infectious disease or disease affecting the purpose of marriage.