

# Islamic teachings of bioethics in relation to the practice of medical genetics

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Islam has approximately 1.5 billion followers worldwide, the majority of which live in the Islamic states, and an appreciable number live in non-Islamic states.<sup>1,2</sup> In both environments, the Muslims maintain a “Code of Life”, in which they adhere to the instructions of Islam and respect its guidance in their daily living. Islam provides a “Code of Conduct” drawn from Al-Sharea’h, also known as the Islamic law.<sup>3-8</sup> Within this framework, Islamic law covers both medicine and medical practices. These include all the aspects of professionalism required to appropriately serve the individual, the family, and the community.<sup>3</sup> To respond to various implications from the information learned from the human genome and associated studies, a number of conferences, symposia, and workshops were held during the last 15 years in a number of Islamic countries, to discuss the new issues arising from the recent scientific developments and its applications in genetics. Among these, an international conference on Islamic medicine was held to discuss ethics of medicine in light of Islamic views, and a seminar on Genetics, Genetic Engineering, the Human Genes, and Genetic Treatment - An Islamic Perspective.<sup>9</sup> The World Health Organization (WHO) organized 2 relevant meetings. The first one was to discuss the “Ethical aspects of scientific application in Genetics”,<sup>10</sup> followed by another meeting to discuss the “Ethical issues in application to genetics in developing countries”,<sup>11</sup> which included a large number of Islamic countries. A complimentary workshop, “The 1st Regional Workshop on Ethical Issues in Genetic Counseling” was held, thereafter.<sup>12</sup> The last 3 events benefited from the previously held conferences, and from the “Fiqh” Council Fatwas of Relevance. Also of relevances was the United Nations Educational, Scientific and Cultural Organization (UNESCO) general guidelines on bioethics and human rights.<sup>13</sup> This paper presents and discusses the salient points of

ethics in genetics in the Islamic set-up, referring to these landmarks and building on their outcome.

*The outcome of genetic investigations and ethical considerations.* Science has a universal feature, and is seen as a global identity that has no boundaries. Likewise, the laboratory investigations and studies have gained particular leverage from the human genome project (HGP) and were advanced by collaborative efforts between scientists from various countries. However, due to the high cost of HGP research, the developing countries were practically excluded from this effort, and new information in genomics were made, and are owned, to a large extent by the developed world. This is illustrated by the fact that 80% of investment in genomics in the year 2000, were made in the United States (US), and 80% of the DNA patents in genomics in the years 1980 - 1993 were held by US companies.<sup>14</sup> These conditions made the contribution of scientists, and adoption of the outcome of HGP to health improvement in developing countries, a major challenge. Yet the basic ethical aspects remain universal, though with specific unique features that are relevant to the concerned community, its societal beliefs, and tradition.

*Medicine, medical ethics and Islam Jurisprudence Frameworks.* In general, medical ethics combines a set of societal values and beliefs that are relevant to medicine, in its endeavor to diagnose illnesses, prevent and control diseases, and care for patients. In medical practice, the health care teams obtain personal history and family history, and use varieties of approaches and methods, invasive and non-invasive, to reach a diagnosis of the disease(s) and provide care for the patients, accordingly. However, the health care teams are also required to conduct research, and acquire further knowledge and technology to help improve medical management.

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The balance between the medical services and research to enrich knowledge, therefore, is necessary, but has to meet a battery of ethical elements,<sup>6,14-18</sup> including autonomy, beneficence, non-maleficence, justice, confidentiality, and medical professionalism. In Islam, the Book of Muslims (The Qura'an), the instructions and practice of the Prophet, ([Peace Be Upon Him], Hadeeth and Sunnah), the Consensus (Al-Igmaa) of the learned Al-Ulama, and the Analogy (Al-Qiyas) on the newly encountered matters of life, are the sources of religious practice, and govern all the features of life through Al-Sharea'h, the Islamic law.<sup>19-24</sup> Where appropriate, consideration is also given to the public interest (Al-Maslaha) and local customary precedent (Al-urf).<sup>21</sup>

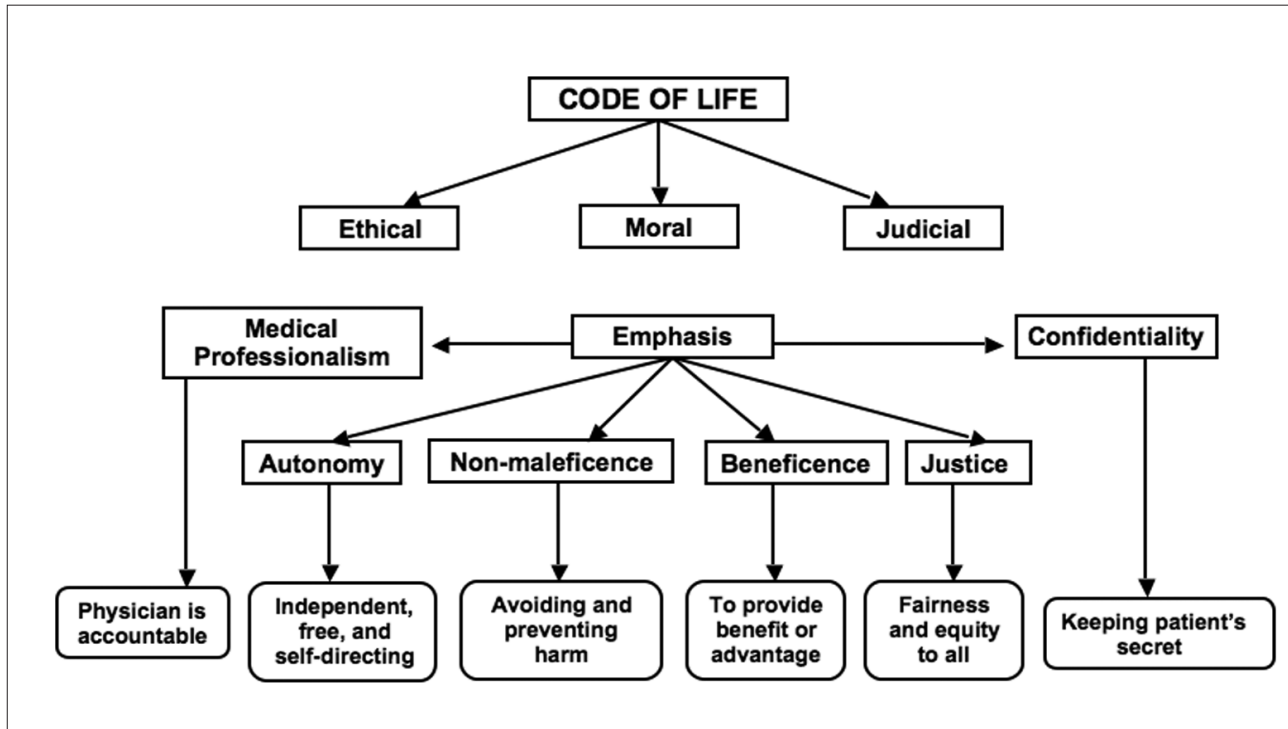
*Framework of beliefs and societal values in Islam.*

In Islam, "Magasid Al-Sharea'h", represents all aspects related to the respect for human beings and human life, as indicated by preservation of the following 5 necessities: 1. Maintenance of religion (A-ddeen), including the 5 Pillars of Islam;<sup>25</sup> 2. Maintenance of self (Al-nafs), including human dignity,<sup>26</sup> prohibition of abortion and the right of a fetus to survive,<sup>27</sup> prohibition of killings,<sup>28</sup> and suicides;<sup>29</sup> 3. Maintenance of brain-intellect (Al-aql), including encouragement of education,<sup>30</sup> freedom of intellect, and research;<sup>31</sup> 4. Preservation of progeny (Al-nasl), including encouragement of marriage<sup>32</sup> and prohibition of adultery;<sup>33</sup> 5. Preservation of wealth and honor (A-tharwah, wa Al-erdh), including freedom of commerce<sup>34</sup> and offering of alms (A-Zakat) to the needy.<sup>35</sup> Cultural awareness and contextual knowledge of societal values and religious beliefs, are the necessary prerequisites for the health care team, particularly in culturally sensitive communities, as in the Islamic communities. An appreciation of these values must be reflected in all aspects of life and during individual and family interactions. In Islamic countries, as well as among Islamic communities in non-Islamic countries, Islam continues to influence the societal values and customs of an estimated one-fifth of the inhabitants of the globe.<sup>19,20</sup> In addition, there is a variety of customs and traditions that, over the years, became an integral part of the Islamic community practices, and any instruction contrary to them may not be accepted, and may be readily rejected.

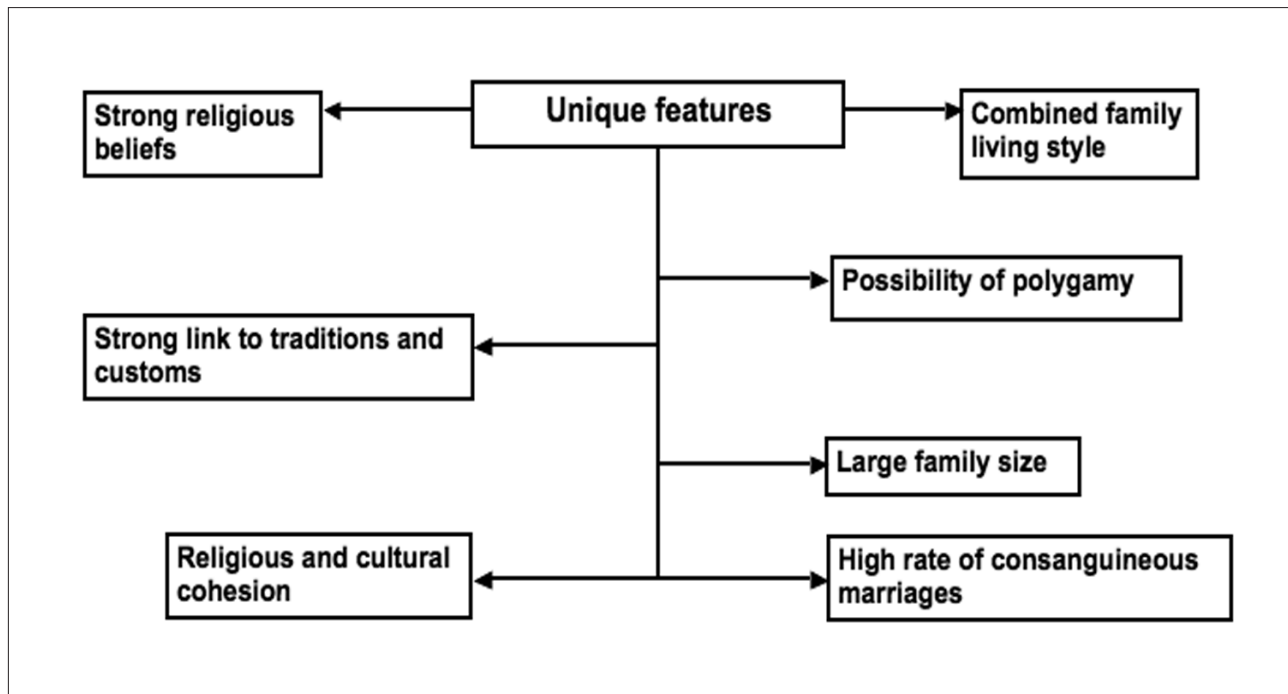
*Genetic screening and counseling as a means of prevention of genetics diseases.* Genetic disorders can give rise to chronic disorders that currently have no, or limited definite cure. Preventive measures, particularly at an earlier stage, have proven to be of practical value. The main pillars of prevention are genetic screening and counseling. Genetic screening or testing can be carried out at different stages, as follows:<sup>36-38</sup> a) age of puberty, preventive genetic screening of the individual in the

community, b) pre-marital screening, c) school age, d) post-natal screening, e) screening during pregnancy, and f) pre-implantation genetic screening (before implementation, and after in vitro fertilization [IVF]). Genetic counseling is a complementary approach to the screening procedure. As a service, it is offered to a member of high-risk groups, such as carriers of recessive genetic disease, or those with an affected family member.<sup>37,39</sup> As a profession, genetic counseling demands certain ethical features that are required by the very nature of the function of the counselor. Being considerate and compassionate should complement professionalism and color the communication with the counslee. From the ethical point of view, the process itself is of significant importance. The counseling process should be nondirective, where the decision-making should lie in the hands of the person concerned, but be based on full understanding of the genetic situation, and the *pros* and *cons* of the outcome of the probable condition. Within the general ethical framework, the principles and components of genetic screening and counseling that are generally acceptable in western countries<sup>39</sup> are also applicable to the Muslim community,<sup>40-47</sup> although Muslims, in general, will often want to consult with family members and religious scholars particularly in aspects of religious and social relevance. This is because of the unique features of both the Arabic and Islamic communities and teachings, particularly those related to reproductive issues (**Figures 1 - 3**).

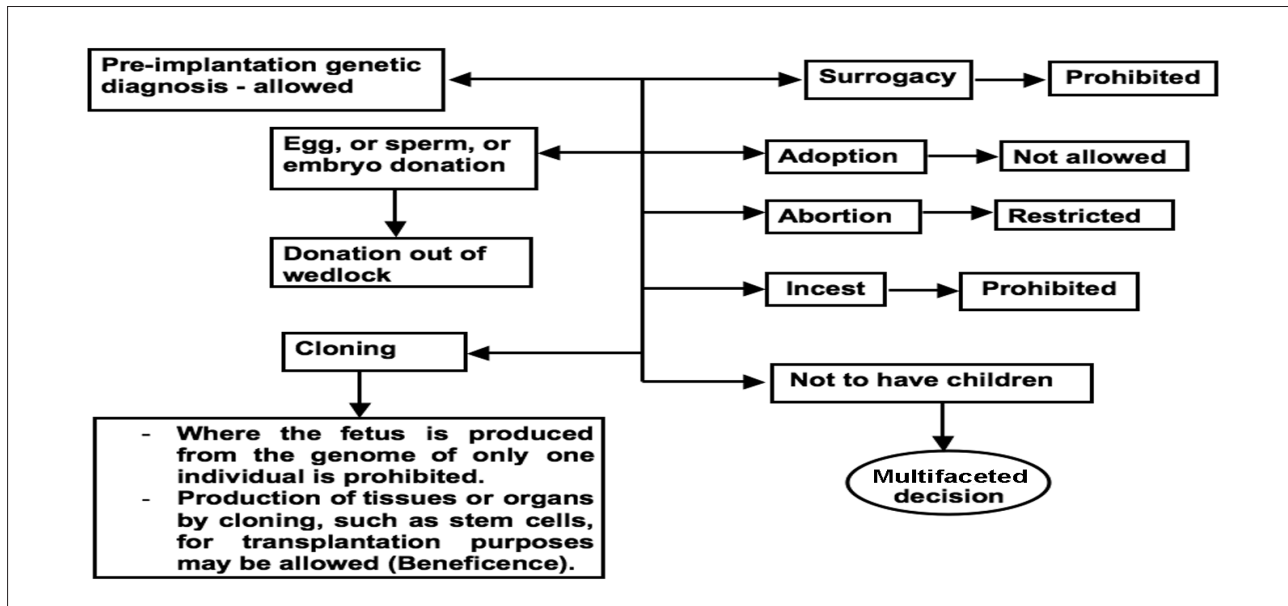
*The Islamic Sharea'hs' views toward human genetic research outcome and use.* Complemented by research into molecular pathology of various diseases, the molecular biology effort gave its fruits earlier than anticipated. On April 14, 2003, the 99% complete sequencing of the human genome was unveiled. Throughout the work, the far-reaching implications of the gained molecular information were appreciated at an increasing rate. As the research work progresses, genes and the interplay of genetic and environmental factors that determine the phenotype features of large number of chronic diseases have been uncovered. The molecular pathology reported for variety of genetic diseases and the application of HGP associated technologies lead to the unveiling of a battery of ethical dilemmas in various communities.<sup>38</sup> However, the potential usefulness of molecular and cellular technologies paved the way for advanced means of prevention and therapeutic intervention, that takes into consideration the ethical principles.<sup>49-56</sup> In Islamic communities, genomics research and the application of its outcome into medical practice is regulated within the context of culture and religious framework. The Islamic jurisprudence councils in various Islamic countries paralleled the scientific and technological advancements, and studied their usefulness to the welfare of humankind.



**Figure 1** - Salient features of Islamic teachings.



**Figure 2** - Unique features of the Arabic and Islamic communities.



**Figure 3** - Islamic teachings in relation to reproductive issues.

The Islamic Jurisprudence (Figh) Council of the Islamic World League of the Organization of Islamic Countries in Makkah Al-Mukaramah, and the High Council of Al-Ulama of Saudi Arabia, discuss and pass guidelines and Fatwas, an authoritative ruling, on subjects of general concern to Islamic communities, as the need arises. The decision-making process, the Fatwas and the guidelines, are based on information provided by professionals and experts in the relevant field under discussion. Over the past 2 decades, the Islamic Jurisprudence (Figh) council has dealt with issues such as organ transplantation, assisted conception, various uses of technology, stem cell research, and screening for genetic disorders.<sup>3,23,57-60</sup>

*Guidelines on the use of genetic information and technologies in Muslim communities.* On implications, and the use of the emerging genetic information and bio-engineering technologies in Muslim communities, the Islamic Jurisprudence Council of the Islamic World League of the Organization of Islamic Countries, in its 15th session gave the following guidance on the use of the genetic information and research technology:<sup>57</sup> 1. Use genetic engineering for disease prevention, treatment, or amelioration of the condition that do not cause further damage; 2. Forbid the use of engineering in evil and criminal use, or what is forbidden religiously; 3. Forbid using genetic engineering and its tool to change human personality and responsibility, or interfering with genes to improve the human race; 4. Forbid any research or therapy of human genes except in extreme need, after critical evaluation of its benefits and dangers, and after an official consent of the concerned, respecting the

extreme confidentiality of the information, and human rights and dignity as dictated by the Islamic Sharea'h; 5. Allow the use of bioengineering in the field of agriculture and animals, on the condition that precautions are taken not to inflict harm (even in the long term) on humans, animals, or vegetation; 6. Call on biotechnology companies, and food and medical factories to reveal the structure of these bioengineered products so they can be dealt with and used with caution in light of potential harm, or if any are forbidden religiously; 7. Recommends that all doctors, factory, and laboratory owners to fear Allah, and to watch out for Allah to avoid inflicting harm to humans, society or the environment.

*DNA fingerprinting and its use from the Islamic point of view.* On DNA fingerprinting, the Islamic Jurisprudence Council of Islamic World league of the Organization of Islamic Countries, in its 16th session, issued the following guidance:<sup>58</sup> 1. It is religiously allowed to use DNA fingerprinting in forensic interrogations to prove crime, which has no definite penalty in Islamic law (Sharea'h), ("Avoid punishment if there is any doubt, as doubt should always be used for the sake of the accused"), this will lead to justice and to safety of the community, as the criminal will be punished and the innocent will be freed from guilt, which is one of the most important goals of the Sharea'h. 2. DNA fingerprinting may be used in lineage (genealogy) only with great caution and confidentiality, as the Sharea'h rules take precedence over DNA fingerprinting. 3. It is forbidden to use DNA fingerprinting in paternity (lineage) disputes, which should not precede the oath of condemnation

(the sworn allegation of adultery committed by one's spouse). 4. It is forbidden to use DNA fingerprinting to confirm or refute legally proven lineage; the state should forbid this and inflict punishment, in order to protect people's honor and to preserve their lineage. 5. It is allowed to use DNA fingerprinting in proving lineage on the following conditions: a) in case of a dispute of unknown lineage, as mentioned by the Islamic scholars because the evidence is either absent or equivocal, and to overcome (inundate) the vagueness (suspicion); b) in case of a dispute over babies in hospitals and nurseries or test tube babies; c) in case of children lost because of war, accidents or natural disasters, where their family could not be found; and d) to identify babies or prisoners of war; 6. The human genome of an individual, nation, or race should not be sold for any reason; neither should it be given because of the harm it can cause. The counsel recommends that: i) The state to forbid DNA fingerprinting testing except on judge's orders and performed in the state laboratories; the private sector should be forbidden from doing such tests because of the great danger and harm. ii) Each state should have a committee on DNA fingerprinting tests, which should include legal scholars, physicians and administrators to supervise and approve the result of such tests. iii) There should be a precise mechanism to prevent deceit, cheating, contamination or human error in such laboratories, so the results are compatible with reality. The accuracy of these laboratories needs to be confirmed. iv) The number of genes used for a test should be sufficient, in the opinion of specialists, to overcome any doubts on the accuracy of the results.

***Islamic directions regarding abortion.*** The fatwa number 4 of the Islamic Jurisprudence Council of the World Islamic League of the Organization of Islamic countries at its 12th session,<sup>59</sup> allows for the option of abortion under certain specific conditions. The Fatwas determined that the abortion might take place only if a committee of specialized, competent physicians has decided the fetus is grossly malformed, and that its life would be a misfortune for both the family and itself. The malformation must be untreatable, unmanageable and very serious, and the abortion may only be carried out prior to the 120th day of conception (computed from the date of fertilization, not the last menstrual cycle). Beyond 120 days, or "after the spirit has blown in the fetus,"<sup>59</sup> abortion will only be allowed if there is a danger for the mother.

***Cloning and stem cell research.*** The Islamic Jurisprudence Council of Islamic World League of the Organization of Islamic Countries, in its 10th session,<sup>60</sup> explored all the research papers and recommendations of the 9th Medical and Fiqh Seminar held by the

Islamic Medical Organization during 14-17 June 1987, and agreed on the Decree no. 2/100D 10,<sup>60</sup> which states that: 1. Human cloning is forbidden in these 2 (or any other) methods that lead to human reproduction. 2. If the first legal rule is overstepped, the consequences should follow the legal rulings. 3. It is forbidden in all cases to introduce a third party into marriage, be it an egg donor, a surrogate womb, a sperm donor, or a cloned cell. 4. It is permissible to use genetic engineering and cloning in the fields of germs, microorganisms, plants, and animals following legitimate rules, which lead to benefits and prevent harm. 5. All Muslim countries are called upon to formulate the necessary legislation to prevent foreign research institutes, organizations, and experts from directly or indirectly using Muslim countries for experimentations on human cloning or promoting it. 6. The Islamic Organization for Medical Sciences and other similar bodies are called upon to monitor all scientific developments in the field of cloning, define its terminology, and organize seminars and meetings, as required to determine and articulate the Islamic rulings and principles pertaining thereto. 7. Specialized committees should be set up to look into the ethics of biological research and adopt protocols for study and research in Muslim countries. 8. Biological and bioengineering research institutions (other than cloning research) should be supported and established, according to the Islamic rulings, so that the Muslim world will not be dependent on others in this field.

The communication media are called upon to deal with recent scientific advances from an Islamic perspective in a faithful way and avoid employing their services against Islam, aiming to educate the public to be confident before any decision. According to God, saying, ("When there comes to them some matter touching [public] safety or fear, they divulge it. If they had only referred it to the Messenger, or to those charged with authority among them, the proper investigations would have tested it from them [direct]. Were it not for the Grace and Mercy of Allah unto you, all but a few of you would have fallen into the clutches of Satan" [The Holy Qura'an, Sorat Al Nesae, Ayat 83]). After listening to the research papers, and the opinion of the Council members and the experts with relevant knowledge, the Council made the following decree, *First*: It is permissible to obtain stem cells, to be grown and used for therapy or for permissible scientific research, if its course is legitimate, such as 1. Adults, if they give permission, without inflicting harm on them. 2. Children, provided that their guardians allow it, for a legal benefit and without inflicting harm on the children. 3. The placenta or umbilical cord, with the permission from the parents. 4. A fetus is spontaneously aborted or when aborted for a therapeutic reason permitted

by Sharea'h, with parents' permission. (Be reminded of decree No. 7 of the council in its 12th session on abortion).<sup>59</sup> 5. Left over zygotes remaining from *in vitro* fertilization, if donated by the parents, when it is ascertained that they will not be used in an illegal pregnancy. *Second*: It is forbidden to use stem cells, if their source is illegal, such as: 1. Intentionally aborted fetuses (that is, abortion without a legal medical reason). 2. Intentional fertilization between a donated ovum and sperm. 3. Therapeutic human cloning.

Muslims incorporate their religious teachings in all aspect of their daily lives, believing that their actions are very much accountable.<sup>61</sup> In these respects, Islam shares many foundational values with the other "Abraham religions" such as Judaism and Christianity.<sup>62</sup> Of relevance, the fact that Islam like other religions, has diverse sects and, therefore, diversity of views in bioethical matters does exist. This diversity derives from various schools of jurisprudence, views of the sects within Islam, differences in cultural background and different levels of religious observance. However, there is little that is controversial in the Islamic bioethics, which mainly in regards to pre-natal diagnosis and abortion of the malformed or genetically disadvantaged. Further instructions on ethics in Islamic Teachings can be viewed at a number of websites.<sup>9,63-68</sup> Islamic teachings on bioethics in medical practice, particularly those related to genetic services are outlined in this article. However, these accounts are not meant to be exclusive, there may be different opinions based on other sources, or fatwas, or related to other Islamic sects. Islam has a sizeable position as a religion in Asia and Africa, with variable sizes of minorities all over the world. Customs and traditions color their daily livings, and the Al-Ulama may give fatwas that takes into account the community set up.

The Arabian Peninsula is the cradle of Arabs and Islam, with the 2 Holy Mosques in Makkah Al-Mukarramah and Al-Madinah Al-Munawarah in Saudi Arabia. Makkah Al-Mukarramah houses The Islamic Jurisprudence (Figh) Council of Islamic World League of the Organization of Islamic Countries, with members representing the Islamic States. In this article, this source of guidance, in addition to relevant verses of The Qura'an and The Hadeeths are followed. Islamic teachings offer guidance to the individual, families, and the community in prevention and control of genetic diseases, and the use of genetic research outcome to the benefit of the human beings (Figures 1 - 3). Islamic teachings, in medical genetics and practices can be summarized as follows: 1. Islamic teachings emphasize the importance of educating the people and raising their awareness of the pattern of inheritance, its implications, and the available means of prevention and care.

2. On the prevention side, pre-marital screening seems to be the preferable means of choice and appropriate counseling that takes into account the religious beliefs and prevailing tradition can be effective. 3. The pre-natal diagnosis, and option of fetus abortion, for serious devastating diseases (prior to 120 days from conception), or when endangering the mothers health are acceptable. 4. Similarly, neo-natal testing, avoiding teratogens and provision of folate and iodine in the diet are encouraged. 5. Human cloning is totally prohibited. 6. On the care field, stem cell potential use for therapeutic purposes and gene therapy are welcomed. 7. Fingerprinting use in forensics and lineage is acceptable subject to specific guidelines. 8. An appropriate level of cultural awareness and informed consent are necessary prerequisites for the delivery of genetic counseling and care.

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