Bioethics of xenotransplantation: Three religious perspectives

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The recent explosion of biotechnology has raised many ethical and religious questions among faith communities. Many of these faith communities are attempting to balance modern technology and historical religion. Using xenotransplantation as a case study, the transplantation of genetically engineered animal organs into human beings, this article follows three major religious traditions through the discernment process of how to deal faithfully with this new technology. In addition, the role of the biotechnology industry and the pressures that researchers face are also explored in the context of investigating how to effectively integrate science and religion into future bioethical discussions.

Different religions, and different denominations within those religions, have different orientations to begin the bioethical discussion of the issues surrounding biotechnology. The starting place could be the scriptures specific to each religion, or it could be pure reason, or philosophical mandates, or a mixture of the three. Rarely, however, does this starting place determine the eventual answer of a religious group to a bioethical question. Groups that have widely varying theologies (or no unifying theology at all) often come to the same conclusion through different paths of logic. Rather than the specific theology determining the final bioethical decision, it stems largely from how a religious group defines life.

In hindsight, this orientation is logical, since most bioethical decisions involve determining moments at the beginning or end of life, and the definition life itself. Many of these decisions also involve identifying the role of human life in relation to other forms of life, nonhuman animals and plants. There is another layer of difficulty in bioethical decisions when the life of one requires the death of another (such as those involved in organ transplantation, or when pregnancy threatens the life of the mother). This is when the definition of life becomes critical. When does life begin? When does it end? How is it defined? How is it valued? Does quality of life matter, or is it simply life itself that is valued? Where does human life fit within the schema of all life? Does life exist after death? Is life special, or only an accidental force of nature?

As part of this exploration, I examined the bioethical decision-making process from a variety of different religious groups on the issue of xenotransplantation. In cases where a religious group had not yet developed an official position, information regarding their position on the beginning and ending of life, genetic engineering, animal rights, and other defining issues was gathered. Xenotransplantation involves the implantation of nonhuman animal organs (usually pig, due to immunological similarities, organ size, rapidity of the growth cycle, and the size of litters) into human beings, when human donor organs are unavailable. The issues surrounding this operation are complex. They range from the immediate situation of performing the surgery itself, to future considerations such as possible transfer of disease from one species to

The Boston Theological Institute
another, and the rights of the donor animals, raised in a sterile environment and genetically engineered to ensure a more successful transplant procedure.1

While I could continue at length regarding the specific issues surrounding xenotransplantation, the purpose of this paper is to examine the various pressures on the decision-makers of some major religious groups in the United States that draw them toward a specific bioethical conclusion. Since "transplantation reveals cultural values that we assign to our bodies and challenges assumptions concerning the body and personal identity," the topic of xenotransplantation could have a deep impact in the discussion venues of religious communities that perceive the self as sacred and human beings as separate from other animals.2

This preliminary study is limited to those groups that have a large population in the United States and use diverse methodologies for determining the bioethical decisions for their religious communities. Three of these religiously oriented bioethical discussions are summarized below: United Methodist, Conservative Jewish and Sunni Muslim.

In addition, I explore how biotechnology industry groups make bioethical decisions. It is important to understand the thought processes of those in the laboratory situations who create the technologies and procedures that must later be debated.

**Sunni Islam**

The Islamic tradition has an outstanding history with medicine. From the founding of the first formal medical schools to the great "Prince of Physicians," Avicenna (Abu Ali at-Husain ibn Abdullah ibn Sina) of the Middle Ages, the great Islamic kingdoms of the Middle East maintained the traditions of learning and medical education throughout the time when Europe was plunged into the Dark Ages. While their religious books prevented the Islamic doctors of this era from performing autopsies or examining too closely the naked form of female patients, the Islamic medical tradition took giant leaps in performing some of the first pharmacological and wound care studies.3

Modern Islam, like many modern religions, struggles in the tension between contemporary knowledge and ancient teachings. However, when the two come into conflict, usually the ancient teachings are given precedent over the contemporary knowledge. Islamic faith holds that the human being is the perfect creation of Allah.4 Human beings must be honored as human beings; to do otherwise is to insult God. Humans are set both apart from and above the other animals. Therefore, in reference to the xenotransplantation discussion, to utilize any part of an animal to save a human would decrease the resulting value of that human.5 Rather than being entirely human as God’s inviolate creation, the person would be partly human and partly nonhuman; part higher being and part lower organism. Doctors should allow the individual to die with dignity rather than perform a xenotransplantation that would confer the humiliation of living in some partial-human state. Not only would there be religious repercussions for the patient of a xenotransplantation operation, but any doctor performing that surgery would be destroying God’s creation and would be called by God to account for that destruction.

This position statement expands beyond the surgery itself, since prior to implementing this type of surgery, experimentation must be performed. This is forbidden.6 To violate a human being or human tissue through experimentation in xenotransplantation is prohibited since it would ultimately decrease the value of human life. The possibility of saving lives through xenotransplantation is not the primary consideration, since death comes to everyone as a member of God’s creation. Dying allows the individual to return to Allah; it is not a tragedy. Rather, it is a gift from Allah as a reward for a good life.7 To perform extreme measures that violate the human body, such as xenotransplantation, is to deny Allah’s gift and to make a demand for more of this life and a spurning of the next. Death is a part of life. While medical research
should enhance the life we are given, it should not run counter to the natural state of life and death.\(^6\)

**Conservative Judaism**

Judaism has a long history with medicine. The tradition’s earliest holy writings include many commandments that logically contributed to health and well-being in an otherwise uncertain time. Ritual hand-washing, rapid disposal of the dead, and sanitation rules all served to decrease the level of illness and disease in early Jewish society compared to other groups of that era.\(^7\) In conjunction with their historical position against mutilation of the dead, many Conservative Jewish families today still choose to circumvent autopsy and embalming the dead. This injunction against autopsy did hinder some aspects of historical Judaic medicine, since there was a resulting lack of understanding regarding the internal organs and systems of the body. However, Jewish medical practices remained far ahead of other cultures in the field of preventive medicine until the discovery of germ theory allowed the Western world to catch up with many of the practices the Jewish community had begun thousands of years earlier.

In Judaism, theology is completely intertwined in medicine. Only God is acknowledged as rof’e, or “healer.” While this larger concept may be unfamiliar, many non-Jews may recognize the name of the angel Raphael—Rof’e-El, or “the healing of God”—as a convenient reference point for this idea. Jewish doctors merely assist in God’s healing touch. Only God can create life, and only God has the right to take life away. In context, this means that if God provides the means to save a life, then that life must be saved, regardless of whether it breaks a religious commandment. In Jewish medicine, human life must be preserved at all costs. Therefore, when bioethical decisions must be made that would otherwise jeopardize a specific religious law, the decision is always made in favor of life.\(^8\)

Since the Torah obviously does not have any specific commandments regarding xenotransplantation, religious scholars look instead at stories where religious laws were broken under the greater commandment to preserve life. One such passage is the story of David who broke into a religious site and ate the bread that was reserved solely for the priests. God allowed this action, even though it had been previously forbidden in the religious laws, since the bread kept David and his companions from starving to death. Many Jewish scholars apply that story to the current biotechnology discussions, including that of xenotransplantation. In xenotransplantation, animal organs (usually from a pig) are implanted into a human recipient to save the life of a human being. Though kosher laws would prevent the taking of pig flesh into the body (the injunction against eating pork), these dietary laws would not take a higher precedence than saving a human life.\(^9\)

Since preserving human life takes precedence over all other considerations and supersedes all other religious laws, Jewish medical theology has a perspective different from that of Sunni Islam.\(^10\) Therefore, while there remains a great deal of discussion in the Jewish community surrounding various biotechnological advances, particularly in the areas of interfering with God’s creation and the bioethics of performing the research itself, there is also a relatively positive reception in those areas that could lead to saving lives.

**United Methodist Church**

Historically, Christianity has had a suspicious relationship with science and medicine. Stories of healing by faith can be found in the earliest Christian holy writings. By the
Middle Ages, a popular theology had developed around sickness and health. It was believed that God meted out illness as a form of punishment for sins. Only God should perform healing, though humans could precipitate this healing by making pilgrimages and seeking out holy relics. During the same era that Islam was making great strides in science and medicine, Christian Europe closed in on itself, often torturing or killing those who attempted to integrate new techniques or knowledge into medicine. In fact, during that era the Church threatened excommunication to any Christian that studied at an Islamic medical school. While doctors and surgeons (considered much less prestigious than doctors because they manipulated the body, while doctors dealt solely with pharmaceuticals) did practice during this period, training occurred through apprenticeship, and most of the medicine practiced was ineffective at best, and lethal at worst.

Over time, this attitude has undergone a significant alteration, particularly in the liberal Protestant denominations, such as the United Methodist Church (UMC). While remnants of religious suspicion of science can still be found among some Christian groups, many denominations are embracing, or at least considering, most modern medical techniques. Medical study is supported; autopsy, surgery, and medical treatment are no longer discouraged. However, with modern advances that could result in an alteration of the genome and with some forms of medical research, new caution has been raised as to the bioethics surrounding some of these medical procedures.

In order to identify and address these biotechnical issues that may have important ethical considerations, the United Methodist Church created the Genetic Science Task Force within the larger committee, Ministry of God’s Creation. The larger committee is designed to deal with general biological issues such as ecological stewardship. The Genetic Science Task Force’s original role within that group was to specifically discuss medical techniques dealing with genetic engineering, and research in those areas. Over time the role of the Task Force has expanded to include other areas of medical bioethics as well and committee members now include research biologists, medical doctors, and laboratory specialists in addition to theologians. This organization presents its research, deliberations, and conclusions to the larger church body. However since the United Methodist Church has a centralized structure, no sub-body of the church has the ability to speak for the church as a whole. Consequently, the Task Force is quick to point out that they do not speak for the United Methodist Church and their findings do not become church policy unless ratified by the Quadrennial All-Church Conference.¹³

The Task Force has not explored the specific area of xenotransplantation yet. However, their previous deliberations that have been ratified by the entire United Methodist Church include position statements on the topics of cloning and genetic engineering, which can be found in the Book of Discipline of the United Methodist Church in the section entitled “Social Principles: The social community: Genetic technology.” The Task Force has created resolutions against the patenting of life in any form. Therefore, claiming that specific plants, animals, bacteria, or even genetic sequences “belong” to any per-

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son or company is contrary both to the purpose of good science and to proper stewardship of God’s creation.\textsuperscript{14} The UMC has also released statements that, while they fully support the use of genetic engineering to eradicate genetic disease or disability, still decry the use of genetic engineering for cosmetic, or socio-economic purposes. Expanding on their genetic engineering position, they state that while they approve somatic genetic alterations (those that affect only the individuals who receive the treatment), they stand firmly against genetic alterations to the germ line (resulting in changes to the sperm or egg cells that could be passed down to the next generation). The United Methodist Church also spoke out against research into any therapies, such as those working with early stage genetic alterations, that knowingly waste human embryos.\textsuperscript{15} Interestingly, there is currently no language in their policies regarding the use of fetal tissue, since no agreement has yet been reached on the issue.\textsuperscript{16}

As one of the largest organized Protestant denominations in the United States, the UMC is often placed between some members’ desire unabashedly to encourage modern technology and its development and the more conservative counterparts that strongly advise caution surrounding the bioethical issues involved in these new technologies. In an attempt to ensure that all the voices be respectfully heard, the UMC does not speak on areas where consensus has not been reached. The Task Force acts only on full consensus. On those topics where consensus cannot be reached, the Task Force, and consequently the United Methodist Church, is intentionally silent.\textsuperscript{17} Therefore, since they have not yet explored the topic, the UMC maintains no official position, theologically or ethically on xenotransplantation or on any of the surrounding issues involved, though the church’s position on genetic engineering may provide preliminary insight into the Task Force’s bioethical deliberations. After the Quadrennial All-Church Conference in 2000, the Task Force renewed discussion on contemporary bioethical issues.

**Biotechnology laboratories**

For the scientists at the leading edge of this field and in the laboratories, there are multiple concerns, very few of them of a bioethical nature. There are strong economic pressures at work among small biotechnology companies.\textsuperscript{19} The companies require expensive equipment and materials that usually are financed by investors (either private or on the public stock markets). Start-up costs alone can easily reach the multi-millions of dollars. These investors expect a return for their financial input relatively quickly. Consequently, these companies feel the pressure to produce and patent their products as soon as possible, so that they can be placed on the market and the investors can begin to reap the benefits from acquiring a piece of the company. Biotechnology companies rise and fall almost on a daily basis; it is a difficult fight just to stay alive in a brutal market. Therefore, it is usually economic pressures, not bioethical ones, which determine the research agenda for a company.\textsuperscript{19}

Even if economic pressures are not severe, bioethical issues still do not take the top priority in industrial biotechnology. After economics pressures are eased, the thrill of pure research is the next enticement to take effect. Interviews with a variety of biotechnology scientists suggest that it is the love of exploration that initially drew them into the field.\textsuperscript{20,21,22,23} In fact, many of the younger scientists lament upward career movement that usually means less time in the lab and increased time with paper and administrative work. As one young woman mentioned, “If I do a good job doing what I love in the lab, they take me out of the lab and make me do work I hate. What incentive!”\textsuperscript{24}

In most cases the biotechnicians are the best equipped both to understand the sciences involved, as well as to speculate on potential harmful outcomes. Yet, due to their formal scientific training requirements, the researchers are possibly the most poorly equipped to understand or predict the bioethical issues surrounding those outcomes. In general, scien-
Scientific researchers do not have an educational background in ethics needed to formulate these issues for discussion, and they often consider instigating the discussions as one more form of administrative work that would pull them away from their labs. Therefore the discussions, when they occur, will occur less often with the young scientists, who are actually in the laboratories performing the work, and more often with the upper level administration, some of whom have not spent any serious laboratory “bench time” in over ten years.

The field, however, is beginning to understand the financial value of assessing the bioethical issues prior to moving toward a goal. The industry pays particular attention when the bioethical issues begin to impact their national or international economic interests. Consider the recent example of the need for biotechnology companies to research the bioethical issues before beginning a multi-million-dollar process of developing a new product line: the upheaval in the Monsanto Company when public backlash forced them to remove their new second-generation termination seed from the market. The Monsanto Company created seed that does not have a second-generation germination cycle; that is, seed gathered from the original crop is sterile. Thus, the farmer is forced to buy new seed every year from the company. Bioethicists consequently attacked Monsanto on two points. The first was Monsanto’s proposed “humanitarian effort”/tax write-off, the donation of tons of this type of seed to farmers in developing nations. Since small family farms depend on seeds held back from the previous year’s crop to replant the following year, this type of seed would lead to a famine after a single growing season. The second point of attack stemmed from biologists concerned about cross-pollination altering the genome of regular crops, making them sterile for the next planting season. Outrages over these possibilities forced Monsanto to back-step and remove their termination seed from the market. Monsanto lost billions of dollars in research and development, as well as a number of their customers, over the issue. However, it forced the biotechnology industry to take an interest in the bioethics of their research. In addition, it provided evidence that grass-roots bioethical movements can make a significant impact and alter the position of major international companies.

Science and religion working together

As evidenced by the three religious perspectives and contrasted with the values of the biotechnology industry, it is obvious that the area of religious bioethics is complex, and many questions need to be answered prior to proceeding with the use of xenotransplantation. Each of the religious groups has carefully considered its position on bioethical issues, and each has a history and tradition to support its current position. Yet, these positions are certainly very different. On the issue of xenotransplantation alone these three groups state positions of “absolutely yes,” “maybe,” and “absolutely no.” How can all of the voices in this country be heard and integrated into policy decisions, particularly when they are so disparate? And when decisions are made, what are the rights of the minority in that decision-making process? While medical capabilities continue to race ahead,
there are still issues to be solved prior to their implementation.

There is one major question that ethicists and theologians must be able to answer to ensure a future for ethically considerate scientists. How can ethics be integrated into a standard scientific course of study? And further, how can science literacy be integrated into theological and ethical courses of study? As one of the individuals who straddle these two worlds, I can certainly see the value in creating the "renaissance researcher," an individual who understands both what he or she is creating and the implications of creating it. Humankind has long ago left the "age of innocence," where they can idyllically believe that science and scientists are "pure," and that only those who implement the science must worry about messy bioethical issues. The creators, too, need to understand the implications of what they are creating. However, as the situation currently stands, my undergraduate science degree makes me rather unusual in theological discussions, and my theological training makes me very unique in most scientific settings. Further, my scientist friends look at me askance when I begin discussing the ethical issues surrounding the science involved in a project, and my theology friends are equally discomforted when I begin to talk about the realm of science.

It may be that neither field equips its students to function in the world of the other. Each person has specific aptitudes and interests. It is rather uncommon to find an individual that has both the time and inclination to become fluent in both the realms of science and ethics/theology/philosophy. Further, the professors from those fields would purport that there is not even sufficient time in the current degree programs to get through the necessary preparatory curriculum, much less attempting to add a class outside of the field into an already full schedule. Until curriculum committees of these departments are convinced of the value of cross-educating their students, it will remain a difficult fight to have these classes included in the curriculum.

This is not to say that all hope is lost, however, in attempting to create areas of communication between the two fields. A renewed (or completely new, in many instances) interest in bioethics caused the recent biotechnology conference, hosted by Biotechnology Industry Organization (BIO) in Boston, to draft a set of bioethical principles by which to direct the future of their research. Within the preamble to these principles, one can sense a major change in the attitude the biotechnology industry toward bioethics.

While biotechnology can greatly improve the quality of life, we recognize that this new technology should be approached with an appropriate mixture of enthusiasm, caution and humility. Biotechnology can provide useful tools for combating disease, hunger and environmental contamination, but it should not be viewed as a panacea or as miraculous. For example, life-saving medicines may have serious side effects. and, while our expanding knowledge of genetics can help create the next generation of medicines, it can also raise important ethical issues.

While this statement may be taken with at least a partial sense of irony, since a representative of the protesters outside the Biotechnology Conference was not allowed to speak inside the meeting hall, the statement at least represents a beginning to opening the discussion with ethicists, theologians and government officials. Additionally, the newly developed biotechnologies with worldwide implications have peaked theology's interest in science as well.

In addition to biotechnology beginning to open its doors, theologians are beginning to recognize the role that they must play in these decisions as well, and that this role must be a central one on the world stage, rather than simply commentary from the behind the curtains. The creation of programs such as the Science and Religion Certificate at the Boston Theological Institute and the doctoral program in Philosophy, Science, and Religion at Boston University shows that there is a movement afoot to train theologians and scientists to range widely across both fields and to be able to influence developments in both. While this, of course, is not the final solution, it certainly
is a strong beginning. By increasing theologians’ scientific literacy, there will be more opportunities for those theologians to take a meaningful role in future bioethical decisions made at the political, economic, and religious levels.

While the door may now be opened, ethicists should not forget the economic pressures that initially opened the discussions. Unfortunately, industry in a capitalist society can be fickle. Should the bioethical discussion ever become sufficiently costly in the industry’s cost-benefit analysis, the talks will probably close again. That places the bioethicists in a position of needing to continue the economic pressure on the biotechnology companies. The discussion is beginning, but a vision of what biotechnology can accomplish has only been glimpsed. It is imperative that those who live “dual lives” in the worlds of science and religion continue the discussions.

Concerned ethicists and scientists need to continue the pressure on biotechnology companies, but it cannot stop there. Opening and maintaining the discussion will require a cooperative effort across multiple areas of science and religion. However, in order for the fields to make headway in fruitful discussion, there will be a need for individuals who are fluent in the languages of both areas to act as mediators among the different groups at the table. The first step in creating those mediators begins with educating young scientists in the ethics of their field, and integrating science into a theological curriculum. Only then can discussions continue on equal footing with all parties coming to the table with the bioethical interests of the global community in mind.

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**Endnotes:**

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