



Religious Viewpoints: Protestant and Catholic

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Introduction

The demand for human organs for transplant consistently outpaces the need. In the United States (US) alone, there are currently around 100,000 persons waiting for a kidney transplant, with the median wait-time approaching 4 years [1]. Many of these patients—17 each day in the US—will die on the waiting list [1].

Because of this great need for additional organs for transplant, research into the use of non-human animals for transplantation has been conducted for decades. Xenograft heart valves, primarily from pigs have been used successfully since the 1960s [2], but the use of solid organ xenografts presents a more significant challenge. Recently, in 2021, there has been a flurry of activity in animal-to-human solid organ transplant, known as xenotransplantation (XTx). This activity has created excitement for continued advancement and researchers are quickly moving in the direction of formal human clinical trials [3–5]. Much has been written on the ethical issues that may present in XTx [6–8], as well as some commentary on theological issues and positions that exist [9–12]. This chapter seeks to provide a summary of the landscape of Christian—both Protestant and Catholic—viewpoints towards XTx, the dominant arguments made in support and opposition to the practice, and the growing body of empirical evidence. While XTx refers to any cross-species transplant, this chapter will largely focus on solid organ transplants. The chapter concludes with an appeal for additional empirical studies focused on specific areas in need of further exploration.

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Xenotransplantation and the Initial Role of Theologians

Various forms of XTx using different animals have been attempted since at least the seventeenth century with very little success [13]. In the modern era, a major landmark in XTx took place in 1984 with the case of Baby Fae. Stephanie Fae—better known as Baby Fae—was born prematurely in October 1984 with hypoplastic left heart syndrome (HLHS). HLHS is a rare congenital heart defect that, if left untreated, will typically be fatal within the first weeks of life. Treatment consists of either multi-step surgical procedures or heart transplant. Shortly after her birth, Dr. Leonard Bailey at Loma Linda University Medical Center in California judged that surgical treatment was very risky with approximately a 50% mortality. He is also recorded as rejecting the prospect of a heart allograft due to no documented successes. Bailey, who had performed hundreds of experimental animal transplants, suggested transplanting the heart of a young female baboon into the merely days old infant [14, 15]. The XTx was performed and while the baboon heart functioned well for 2 weeks, rejection soon occurred and Baby Fae died on day 20 after the surgery [16]. The case of Baby Fae was not so much a landmark for XTx in terms of helping science advance, but rather Baby Fae would place XTx squarely in the media and in the eyes of theologians.

Prior to Baby Fae there is only sparse mention of XTx in theological writings. However, Baby Fae would change this and oftentimes it was the viewpoints of clergy members who were quoted in media accounts. As one example, following Baby Fae a leading Vatican theologian—Rev. Gino Concetti—issued a report in *L'Osservatore Della Domenica* (a weekly publication of the Holy See) outlining six conditions under which transplanting a non-human animal organ into a human could be justified:

1. that the patient needed it
2. that no suitable human or artificial organ was available
3. that the surgical team was properly qualified
4. that the hospital had the right equipment
5. that the patient or guardians agreed, and
6. that a “broadly positive outcome” was foreseeable [17].

Concetti did not specify which condition had not been met in the case of Baby Fae, though it seems likely that the sixth condition loomed large in his viewpoint. Following Baby Fae, theological—particularly Christian—viewpoints on XTx began to be reported on at greater length.

Transplantation in Christian Thought

One way to think through the ethical issues of XTx would be to see it as an extension of allotransplantation. However, to see non-human-to-human transplant as *simply* an extension of human-to-human transplant is limited. XTx brings forth novel

ethical issues as well as presenting old debates in a new light. Nonetheless, beginning with a discussion of how allotransplantation has been viewed from a Christian viewpoint is a good starting point, as much has been written and deliberated on.

A principal viewpoint in the extant Christian literature on allotransplantation is positive and endorses transplant as an act of selfless love from one person (alive or deceased) to another, though nuances exist [18, 19]. Norman Geisler's view is emblematic of the general positivity, seeing transplant as in accordance with the biblical principle of love [20]. As Jesus emphasized, "Greater love has no one than this, that someone lay down his life for his friends" (John 15: 13). One of the most prolific Protestants to have written on issues of medical ethics, Paul Ramsey, stated emphatically that once it has been determined that a patient has died then "the corpse itself can certainly be used as a 'vital organ bank'" [21]. Similarly, Helmut Thielicke, referring to allotransplantation, stated, "I see no reason why [organ transplant] should involve any ethical or religious problems" [21].

Lutheran bioethicist Gilbert Meilaender presents a more nuanced view of living organ donation, on the one hand, seeing humans as stewards—rather than owners—of our bodies, and that whilst donating a kidney is a bodily-gift, it remains morally complex [22]. For instance, donating a kidney requires exposing oneself to the intrinsic risks involved with undergoing general anesthesia, major surgery, and a life with just one kidney, none of which is insignificant. After all, as Meilaender notes, "[I]t is one thing to aim at my neighbor's good, knowing that in so doing I may be harmed; it is another to aim at my own harm in order to do good to my neighbor" [22] (p. 89). In contrast to the theological and moral themes of allotransplantation as a bodily *gift* to another, XTx requires using animals as a means to an end by using them to benefit humankind.

Xenotransplantation in Christian Thought

Perhaps the most thorough discourse on XTx from a Christian perspective has come from the Catholic Church's Pontifical Academy for Life. The Pontifical Academy for Life, a group of persons appointed by the Pontiff to promote the Church's consistent life ethic that frequently comments on scientific and bioethical matters, released a guidance document on scientific and ethical considerations for XTx in 2001 [23]. The Academy included anthropological and ethical aspects of XTx that should be considered, including: human intervention in the created order, the use of animals for the good of humankind, and how XTx may affect the identity of the graft recipient. Each of these aspects will be considered.

In the Catholic tradition, humankind is created in the image and likeness of God—the *imago Dei*. This is a basic tenet not only of Catholicism but of Christian doctrine in general. Humankind is both the centerpiece and the pinnacle of God's creation, per the Academy. Certain duties proceed from this. In Genesis 1: 26 and 28, God tells humans to exercise dominion over the things of the earth [24]. While there is significant debate on what the exercise of this dominion looks like, it has historically been understood to entail that the use of animals for food, clothing, and

work is morally licit, a view held by Augustine and Thomas Aquinas [25]. Dominion, of course, should not to be understood as permitting despotism, exploitation, and abuse, but rather care, responsibility, and stewardship [26]. However, what this looks like in praxis remains contested. More to this point, Pope John Paul II writes in his encyclical *Laborem Exercens*, “Man is the image of God partly through the mandate received from his Creator to subdue, to dominate, the earth. In carrying out this mandate, man, every human being, reflects the very action of the Creator of the universe” [23]. Hence, in Catholic doctrine and even Christian doctrine more broadly, human intervention in the created order is mandated in order to hold dominion over the rest of the created world, further affirming that this dominion is not to be reduced to lording over creation in a destructive manner. Rather, it points to guiding creation towards the good of humankind [23]. If animals can be used to glorify God and bring about his Kingdom through humans, then Catholic theology seems to allow for their use. Several Catholic pronouncements affirm these positions, including documents from the Second Vatican Council (1962–1965).

As seen above, generally the use of animals to support and promote humankind is permissible in Catholic theology, making the exception that encephalon and gonad transplantation cannot be considered morally licit [23]. The Pontifical Academy for Life examined not only this basic question but the more specific questions of: (1) whether animals can be used to improve humankind’s chances of survival or to improve their health, and (2) if it is acceptable to breach the barrier between humans and non-human animals. To answer the first question, the Academy re-emphasizes the role of humans over the created world and that the rest of the created order is meant to serve humanity:

[T]he sacrifice of animals can be justified only if required to achieve an important benefit for man, as is the case with xenotransplantation of organs or tissues to man, even when this involves experiments on animals and/or genetically modifying them [23].

Certain criteria should still be adhered to when using animals for these purposes, such as, among others, preventing unnecessary animal suffering. On the second question regarding whether it is acceptable to breach a barrier between humans and non-human animals by transplanting a xenograft into a human, the Academy notes that there is no doctrinal basis that would preclude XTx.

Catholic theology also approaches the topic of XTx from an anthropological position, that is, in relation to the identity of the xenograft recipient. Would XTx alter a person’s identity or what it means to be human? Would it change humanity on an ontological level or a psychological level? This is a primary question for the Church that must be answered in order to assess the moral legitimacy of XTx. For instance, Pope John Paul II, in a 2000 address to the International Congress of the Transplant Society, upheld the moral legitimacy of XTx if it held to the following conditions that, “the transplanted organ does not affect the psychological or genetic identity of the person who receives it” and “that there exists the proven biological possibility of carrying out such a transplant with success, without exposing the recipient to excessive risks” [23]. Empirical studies have tried to assess whether persons believe that XTx would affect the psychological identity of the transplanted

person [9]. The Catholic Church notes that in the early stages of XT_x then psychological experts should assess “probable repercussions that the recipient could undergo in their psyche.” [23].

A final criterion that the Pontifical Academy advises to assess the moral legitimacy of XT_x is health risk. On this point, the Academy notes that the probability and extent of damage that could occur define the acceptability of such risk [23]. In addition, the Academy notes that it is an ethical requirement for researchers to proceed with utmost caution, but the document is silent on how to evaluate when an acceptable risk threshold is low enough to proceed.

There has been limited explicit theological engagement with XT_x from Protestants. Some of the earliest engagement came from the German speaking world, specifically the Evangelical Church (Protestant) in Germany in partnership with the German Bishops Conference (Catholic) who formed a working group in 1998 [27]. Together they recommended the importance of ethical dialogue and identified several ethical and legal challenges posed by XT_x, though with little in-depth theological analysis. These included consideration of (1) the moral status of non-human animals and humankind’s legal and moral responsibility towards them, (2) the risks posed by the possibility of xenozoonotic disease and how an individual patient can give informed consent for a potential global risk, and (3) the potential for negative psychosocial sequelae from receiving a xenograft.

Paris and colleagues reported on religious viewpoints presented at a symposium of the 2017 International Xenotransplantation Association [10]. In the section on Christian perspectives then three relational aspects of the Christian tradition applied to XT_x were considered. These three relational aspects include the need to treat the whole, the appropriate use of animals, and the potential impact that a given treatment would possibly have on the larger community. However, outside these few theological viewpoints, there is little literature from a Christian—specifically an explicitly Protestant perspective—on XT_x.

XT_x, therefore, finds itself in the midst of a contemporary theological and ethical debate. If the use of non-human animals for food is theologically permissible,¹ then it ought to be *prima facie* permissible to use non-human animals for XT_x. In fact, the case is even stronger for the latter given that the necessary sustenance for the body can be achieved without killing animals. However, some Christians may argue that eating animals is not permissible, or at least is not morally and theologically ideal given that God did not permit humankind to kill non-human animals in their prelapsarian state (Gen 2: 16). Only in humankind’s postlapsarian state does God first give qualified permission to eat non-human animals for food (Genesis 9: 3). Rather than addressing the case for and against the killing of non-human animals for consumption, there does not seem to be any scriptures or doctrine that implicitly or explicitly rule out the use of non-human animals for the benefit of humans; though, in light of the stewardship and responsibility to creation given to humankind, it

¹Animals are frequently killed for sacrifices and food throughout the Old Testament (Lev. 7: 12–18; 1 Chron. 29:21, 22; Deut. 12:15; Lev. 17:13; Lev. 4) and presumably entailed some degree of animal pain and suffering.

would be a mistake to conclude from this that it permits non-human animals to be instrumentalized and treated without any moral regard. Nevertheless, it does seem exegetically consistent to view XT_x as an extension of the acceptable uses of non-human animals that is already permitted in Scripture. This position is similarly internally consistent with the creation narrative and the dominion given to humankind by God, which seemingly gives them the right to put their interests above those of non-human animals.

Nevertheless, it is worth noting that this perspective is not without challenge. Vic McCracken points out that embracing XT_x could be understood as another example of human hubris, whereby humankind once again attempts to become like God [28]. After all, part of what is unique about the human condition is that despite our propensity to abuse creation and the mandate given to us by God, we are able to transcend our nature, for good or ill. What remains unclear is whether or not XT_x should be understood as constituting a violation of our responsibility towards creation or an acceptable expression of it.

This permissive approach does, however, leave many difficult ethical questions unresolved. For example, will XT_x be practiced in a way that reflects the Christian moral values that follow from being God's image bearers and having dominion over non-human animals? This is unclear, since non-human animals such as pigs—whom are social animals with significant cognitive and emotional capacity [29–31]—will be genetically engineered, bred, isolated, and kept in biosecure, pathogen-free environments where they will live in a manner that is atypical and perhaps deprived. Therefore, if XT_x is permissible from a Christian view we should be supportive of attempts to minimize the pain and suffering of any non-human animals involved. Moreover, a point that has been rarely, if ever, discussed is whether or not it is always necessary to kill a non-human animal to access their organs for XT_x. It is at least conceivable in some cases, that a single pig kidney could be removed whilst leaving one functioning kidney in the pig from which to continue to live in a separate and freer, but albeit secure, environment. There are obvious downsides to this approach, the most obvious being the economic and time costs associated with the number of additional surgeries required, and the provision of suitable postoperative care. Greatly increasing this pig population could, theoretically, have deleterious effects on an ecosystem where they are kept. However, something akin to this may help to make XT_x more acceptable to those with theological and ethical concerns with the permissibility of raising and harming non-human animals only for human benefit.

Despite the more recent positive advancements, it is worth cautioning that the scientific realization of XT_x is not necessarily inevitable. It may well be the case that the necessary efficacy of non-human animal organs is not achievable and that alternatives arise in its place. One alternative might be the use of induced pluripotent stem cells and the 3D printing of organs, which would have the benefit of preventing immunogenicity [32], and would not require killing non-human animals. However, *if* XT_x can one day produce outcomes similar to a human organ this may have practical implications for other areas of transplantation ethics. For instance, will cadaveric organ donation be necessary if all the required organs can be accessed

through XTx, and what will the implications be for—hard and soft—presumed consent models of organ donation? Both practices have contributed to the misunderstanding that the human body is a mere collection of organs that can be used by whoever requires them, and arguably compromises a Christian anthropology of the body.

Empirical Data

In 2008, the World Health Organization (WHO) hosted a global consultation on the regulatory requirements for XTx clinical trials in Changsha, Hunan, China. Within the principles that were produced, the WHO stated that before any clinical trial is conducted there should be not only scientific assessment, but also include “ethical assessment and should involve the public.” Researchers have interpreted this statement to signal that broad samples of the public should be consulted on ethical matters involved in XTx. Ethical assessment may be particularly important within the local communities in which XTx clinical trials are planned.

To date, there have been qualitative and quantitative studies conducted that have, to varying degrees, assessed theological viewpoints toward XTx. In addition, at least one symposium has been held with theologians [10]. Assessing theological viewpoints toward a particular issue, such as XTx, is complex. Religious viewpoints are oftentimes primary to the identity of a person. Adherents of the same religion or, as is the case in Protestant Christianity, even the same denomination, may espouse differing viewpoints on a topic. While the Catholic Church has the Pope as its ecclesiastical head, as well as the Magisterium as the official teaching body, Protestantism and other faith groups, with their various denominations, do not have a true cognate of this. Nonetheless, while theological arguments can certainly be made, as presented in the previous section, empirical studies can also aid in showing how persons who self-identify as Christians think through the issues at stake in XTx. Nonetheless, detailed theological viewpoints on XTx are limited.

Theological opinion on XTx can be found for centuries, as highlighted in the previous section. Studying the attitudes of persons toward XTx that do not specifically assess the role of religion on viewpoints have been studied since at least the 1990s [33]. Empirical studies on the viewpoints of persons toward XTx who identify as a member of a particular religious tradition are difficult to locate in the extant literature prior to around the turn of the twenty-first century [34, 35]. Ward makes brief mention of a questionnaire study sent to dialysis patients in Great Britain and stated that many of those who were unwilling to accept a xenograft objected either because of animal ethics concerns or for religious reasons, which were not detailed [36]. Schlitt and colleagues in Germany used a questionnaire to survey viewpoints of patients who either had received a transplant ($n = 722$) or were on the waiting list for various organ grafts at the time ($n = 327$) [34]. In the study, researchers did not find that a patient’s self-identified religion (Protestant: 53%; Catholic: 26%)

influenced their viewpoints on accepting a xenograft, stating that concerns about the use of animal organs based upon religion were “very rare.”

Hagelin and colleagues published a study in 2001 that assessed associations between religious beliefs and attitudes toward XT_x in students from Kenya, Sweden, and the United States [35]. In their study, non-religious students approved of XT_x at higher rates than religious students. In the religious students’ cohort, Protestants were more likely to accept XT_x than Catholics. However, this can vary from country to country. A study exploring the views of undergraduate and graduate theology students ($n = 123$) in South Korea found that despite having very positive views of human transplantation, the participants were found to have a neutral attitude towards XT_x, with religious belief shown to be negatively correlated with a less favorable view towards XT_x [37]. The researchers caution against deriving any causal relationship between religious belief and attitudes towards XT_x, as the participants demonstrated a lack of understanding of transplant-related issues. It is also noteworthy that how favorably or unfavorably someone may view XT_x is dependent on how much information they are given. For example, in a study ($n = 327$) from Canada, support for the use of pigs for XT_x dropped by ~20% when participants were told that the pigs would need to undergo genetic engineering [38].

In 2006, Jeong et al., published a Delphi survey of respondents in South Korea regarding viewpoints on the societal impacts and implications of XT_x [39]. The survey comprised many groups of persons, including a broad Christian faith group perspective that included ministers, priests, and monks. The core reservation identified toward XT_x amongst this group was that XT_x is a challenge to God. This perspective was not fully explained, though it was apparent that it was a negative outlook on the research.

In 2010, Jenkins and colleagues published a questionnaire survey of how different faith and cultural groups view the use of allogeneic and xenogeneic mesh for soft tissue repair [40]. Representatives from major faith groups were contacted and researchers concluded that many major Christian faith groups leave the decision of whether to accept a xenogeneic mesh product up to the individual.

Lastly, in 2019, Hurst and colleagues held a series of focus groups with various members of the community surrounding The University of Alabama at Birmingham, the site of a recent bilateral kidney XT_x in a deceased person and where XT_x clinical trials are being considered [3, 9, 41]. One focus group was comprised of 10 clergypersons—8 Protestant, 1 Catholic, and 1 Muslim. The Catholic participant—a deacon in the Church—stated his viewpoints aligned with the document produced by the Pontifical Academy for Life. A recurring concern amongst several of the Protestant clergypersons centered around the idea of hypocrisy and its connection to animal ethics. While none of the participants articulated a viewpoint that would eschew the use of animals for purposes such as food or clothing, there was concern for a species of pig merely bred for their organs. As was highlighted above, the topic of animal ethics and the proper stewardship of creation, including what dominion of creation entails, has occupied a central place in Judeo-Christian theology, and it is evident that XT_x re-frames this old discussion.

Community Risk of Xenozoonosis Vs. Individual Benefit

A primary ethical concern with XT_x has been the risk of xenozoonotic infection. Pigs naturally are hosts to certain viruses that could plausibly be transmitted to a human xenograft recipient. While this risk is now considered to be very low due to specifically breeding pigs in biosecure, pathogen-free environments, as well as “knocking out” certain viruses from the pig genome, some risk remains. In early 2022, the University of Maryland Medical Center transplanted a pig kidney into a living adult male who was not considered a candidate for a human heart due to medical non-compliance. He lived for about 2 months before dying. Following his death, it was revealed that he had acquired a cytomegalovirus—a communicable virus—which is thought to have come from the pig heart [42]. At the time of this writing, an official autopsy report is still pending, but it exhibits the individual risk.

When thinking about the issue of potential xenozoonosis spread throughout the community due to an infected xenograft through a Christian lens, there are certain Christian principles that may help guide this analysis. Christians are called to love their neighbor. When a lawyer asks Jesus what the greatest commandment is, Jesus responds:

You shall love the Lord your God with all your heart and with all your soul and with all your mind. This is the great and first commandment. And a second is like it: You shall love your neighbor as yourself. On these two commandments depend all the Law and the Prophets. (Matthew 22: 37–40, ESV).

Pointing to this commandment to love one’s neighbor as oneself has been used as justification for allotransplantation. That is, a Christian may show their love for another by providing for them in their need for an organ. However, in the context of XT_x an opposing conclusion could be drawn. In the face of real risk of the potential for xenozoonotic spread, it could be argued that the loving action would be not to perform any action/undergo any therapy that could lead to risk for another, especially an unknown level of risk that the “neighbor” did not consent to. However, daily we undertake activities that place those around us at some risk—risk that was not consented to. We drive our cars and are accepting risk. If we have passengers—children, especially—we are accepting a risk for them, as they cannot consent to that risk. We place other drivers and pedestrians at risk. We bring up the aspect of “risk” because Christians are called to love their neighbors, as previously mentioned. Accepting a non-human organ carries the risk of becoming infected with a pig virus and then possibly exposing others (our neighbor) to that risk—a risk they did not consent to accept. The constant risk of spreading an infectious disease to loved ones (at least until the scientific community can be certain their source pigs are indeed pathogen-free) is a glaring issue and one that Christians may not want to assume currently due to the recent COVID-19 pandemic.

Ways Forward

As has been stated, very little has been written from the perspective of assessing XTx in light of Christian theology. The literature could benefit from additional resources that are accessible to parish clergy and to Christians globally. While XTx being a clinical option is still likely years in the future, it would be prudent for Christian theologians and moral philosophers to begin addressing these issues from their own denominational outlook to provide a helpful perspective and structure to think through the issues involved. It may be premature for clergy to be having conversations with their parishioners on XTx, yet beginning to think through how they might counsel persons on these issues in light of their religious commitments seems sensible.

From an empirical standpoint, we know from some data that while acceptance of XTx is generally high, there are some hesitations among persons with religious beliefs. Some Christian clergypersons have stated that they may feel “hypocritical” by supporting XTx [9]. These viewpoints merit further exploration. Furthermore, not much is known about Christian viewpoints toward XTx aside from the bifurcation of Catholicism and Protestantism. Minority Protestant denominations, as well as Orthodox viewpoints, may be especially underrepresented in the data that exists, which will need to be accounted for in future studies.

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