

Chapter 23

Technology and Wholeness: Oncofertility and Catholic Tradition

Paul Lauritzen

P. Lauritzen (B) Department of Religious Studies, John Carroll University, University Heights, OH, USA
e-mail: plauritzen@jcu.edu

T.K. Woodruff et al. (eds.), *Oncofertility*, Cancer Treatment and Research 156, 295
DOI 10.1007/978-1-4419-6518-9_23.

<http://www.springerlink.com/content/978-1-4419-6517-2#section=759973&page=1>

Introduction

The remarkable scientific work on fertility preservation that is documented in the early chapters of this volume will inevitably give rise to moral and religious questions about the use of technology to reproduce. In this regard, oncofertility is no different from other forms of assisted reproduction that have led to extensive debate among ethicists and moral theologians. In the case of many forms of reproductive technology, the ethical debate *followed* rather than *preceded* the widespread adoption of new techniques in a clinical context. It is thus both notable and commendable that the oncofertility research community seeks to explore the broad implications of oncofertility techniques before they are used widely among cancer patients.

The goal of this chapter is to examine oncofertility from the perspective of Catholic moral teaching on assisted reproduction. To facilitate this examination, the chapter focuses narrowly on one particular avenue of oncofertility research, namely ovarian tissue cryopreservation [1]. Although the Catholic church has not issued a specific directive about this technology, the general teaching on assisted reproduction is sufficiently clear that we can reasonably extrapolate from prior teaching to predict the likely response of the Vatican to this technology [2, 3]. At the same time, ovarian tissue transplantation may lead us to rethink Catholic teaching in interesting ways. In part one of this chapter, I review Catholic teaching on assisted reproduction with an eye to anticipating Catholic teaching on oncofertility. In part two, I address the question of whether new techniques in oncofertility might lead us to rethink Catholic teaching.

Part One

We begin by noting that ovarian tissue cryopreservation and transplantation can take a number of different forms. As diagram 1 indicates, ovarian tissue research

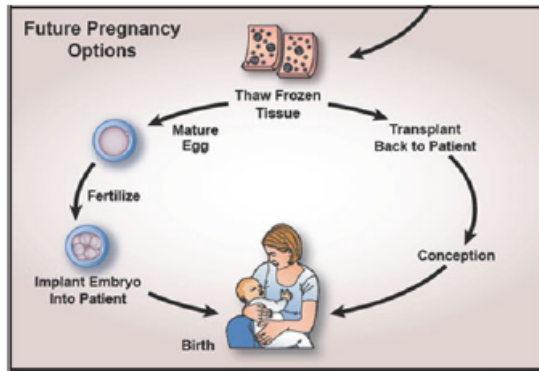


Diagram 1

follows two main paths. Assuming that ovarian tissue has been surgically removed and frozen prior to the onset of cancer treatment, a woman who has survived cancer and desires children can take either path. Either she can have her ovarian tissue thawed to seek in vitro maturation of follicles to produce mature eggs prior to an IVF attempt or she can pursue an autologous tissue transplantation of her thawed ovarian tissue back into her own body with the hope of restoring endocrine and ovarian function prior to “natural” conception. What will the Catholic church say about these two paths of ovarian tissue transplantation?

To answer this question, we must turn to two documents that have set out Catholic teaching on reproductive technology, *Donum Vitae* – issued in 1987 – and *Dignitas Personae* – issued in 2008. Released by the Congregation for the Doctrine of the Faith (CDF) shortly after the dawn of the modern era of assisted reproduction and when Pope Benedict, then Cardinal Ratzinger, was prefect of the CDF, the document is impressive. Unlike many other groups at the time, the congregation recognized the significance of the technology of in vitro fertilization, and *Donum Vitae* systematically examined the implications of a technology that allows scientists to manipulate gametes and embryos in the laboratory. Indeed, most of the major moral issues that have arisen in the wake of this technology were anticipated and addressed by the congregation in the *Instruction*. Freezing embryos, experimenting on them, selling gametes, and gestational “services,” turning procreation into a kind of manufacturing process – all were taken up in *Donum Vitae*.

According to the *Instruction*, there are two fundamental values that should govern moral reflection on assisted reproduction: (1) “the life of the human being called into existence and (2) the special nature of the transmission of human life in marriage” [2]. The first value, namely the right to life of the embryo from conception, effectively prohibits any form of assisted reproduction that fails to accord embryos complete moral respect as persons. In vitro fertilization, non-therapeutic embryo experimentation, freezing embryos, and gestating embryos in non-human hosts or paid human hosts all fail to honor the value of a human life called into existence through assisted reproduction. In short, this value served to shape judgments about what could be done with human embryos.

By contrast, the appeal to the value of the special nature of the transmission of human life in marriage functioned differently. Whereas respect for embryonic life primarily constrained technologies that involved creating or manipulating embryos in the laboratory, the commitment to keeping sex and procreation together within a marriage responded to reproductive medicine's new abilities to disembodify procreation by facilitating reproduction through the isolation and manipulation of sperm and egg in a laboratory. The opposition to procreation that was not the result of a loving act of sexual intercourse effectively functioned as a barrier to the tendency within reproductive medicine to reduce the creation of human life to the mere manipulation of gametes.

If these are the fundamental values that the Catholic church will use to assess ovarian tissue cryopreservation, what is Church teaching likely to be? The answer can be represented in relation to diagram 2. Here, we see that there is a divide between the two avenues of research pursued in relation to ovarian tissue preservation. The research represented by the left side of diagram 2, namely that designed to facilitate the in vitro fertilization of human eggs followed by embryo

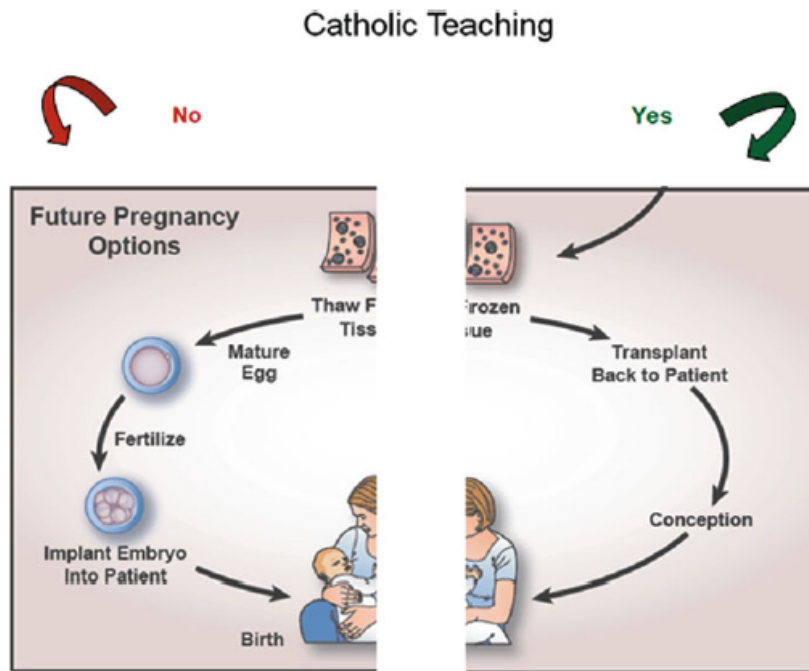


Diagram 2

transfer is almost certain to be rejected by the Vatican. Given the fundamental values set out in *Donum Vitae*, it is hard to see how the Vatican can do anything other than reject this line of research. Ovarian tissue preservation for the purpose of maturing and fertilizing human eggs in the laboratory violates both values. The life of the human being created in the laboratory is not respected by this technology and human procreation is separated from sexual intercourse and thereby disembodied.

By contrast, research directed toward the right side of diagram 2, specifically research that involves orthotopic ovarian tissue transplantation, appears to be unproblematic, if judged by the twin values of *Donum Vitae*. In relation to the two values of respecting the dignity of the human embryo as a person with rights and respecting the inseparable connection between sex and procreation, this technique appears untroubling, for neither of these values is necessarily threatened by this new technique. Orthotopic reimplantation of ovarian tissue does not involve creating embryos in the laboratory and if the transplant is successful procreation will follow from marital intercourse. Thus, orthotopic grafting of ovarian tissue should be acceptable given current Church teaching.

Indeed, the technique seems profoundly consonant with the view of human nature set out at the start of *Donum Vitae*. Quoting Pope John Paul II the document reads “Each human person, in his absolutely unique singularity, is constituted not only by his spirit, but by his body as well. Thus, in the body and through the body, one touches the person himself in his concrete reality. To respect the dignity of man consequently amounts to safeguarding this identity of the man ‘*corpore et anima unus*’, as the Second Vatican Council says (*Gaudium et Spes*, 14, par. 1).” I do not think it much of a stretch to say that the effort to help a cancer survivor to have children after the fertility-ending effects of cancer treatment is partly an attempt to stitch back together a spiritual and bodily unity that cancer may have sundered. Nor is it a stretch to say that ovarian tissue transplantation and the return to reproductive function that it may facilitate profoundly touches the body and thus the person whose sense of bodily integrity and spiritual wholeness was deeply threatened by cancer.

Given that orthotopic tissue transplants are experimental, they should not currently be offered to cancer patients as standard clinical practice. Indeed, given that freezing and thawing of ovarian tissue is itself still experimental, the option of storing ovarian tissue should only be offered to patients as part of an experimental protocol that has been approved by an ethics committee. But if freezing ovarian tissue is offered as part of a research effort, I see no moral reason why a Catholic patient should not enroll in such a study. Similarly, if a woman has stored ovarian tissue, there seems to be nothing intrinsically wrong with participating in a research study that involves placing this tissue back in her body in the hopes of conceiving a child naturally. We will want to be as sure as we can be that conceiving a child after storing ovarian tissue does not result in significant risk of harm to the resulting child. But conceiving a child in this fashion does not seem *per se* wrong, and Catholic tradition ought to embrace such a treatment when it is no longer experimental.

If we turn from *Donum Vitae* to the most recent *Instruction* issued by the Vatican, *Dignitas Personae*, these conclusions are confirmed. In the fall of 2008, the Congregation for the Doctrine of the Faith updated the teaching of *Donum Vitae*. The congregation reviewed its previous conclusions about reproductive technologies and addressed new technologies that have emerged during the 20 years since *Donum Vitae* was issued. The document effectively reaffirms the conclusions set out in *Donum Vitae*, but it is worth looking at this newer *Instruction* nevertheless. One notable feature of the *Instruction* is that it begins by highlighting the Vatican’s commitment to science and its hope that

Christians will continue to dedicate themselves to scientific inquiry. The Church, the document reads, “seeks to offer a word of support and encouragement for the perspective on culture which considers science an invaluable service to the integral good of the life and dignity of every human being” [3]. At the same time, the Congregation for the Doctrine of the Faith again insists “the ethical value of biomedical science is gauged in reference to both the unconditional respect owed to every human being at the moment of his or her existence and the defense of the specific character of the personal act which transmits life” [3]. Thus, the two fundamental values set out in *Donum Vitae* are reaffirmed here.

However, *Dignitas Personae* articulates a slightly different formulation of the values that infertility treatment must respect. “With regard to the treatment of infertility,” the CDF writes, “new medical techniques must respect three fundamental goods” [3]. These goods are (1) the right to life of a human being from conception to natural death; (2) the unity of marriage, which requires that spouses reproduce only with each other; and (3) the integrity of human sexuality, which requires that conception take place through sexual intercourse. Moreover, in giving examples of how infertility treatment may respect these goods, *Dignitas Personae*, provides further clarity about the likely position the Church will take on ovarian tissue transplantation. Infertility treatment is not to be rejected per se. For example, hormonal treatments for infertility and surgery for endometriosis are both perfectly acceptable. In the language of the *Instruction*, these techniques are “authentic” because “once the problem causing the infertility has been resolved, the married couple is able to engage in conjugal acts resulting in procreation, without the physician’s action directly interfering in that act itself” [3].

If this is the standard by which to evaluate infertility treatment, then clearly some of the current work in oncofertility will be acceptable in terms of Catholic teaching and some will not. Research on ovarian tissue cryopreservation for the purpose of maturing eggs in the laboratory prior to fertilization in vitro will be morally unacceptable in Catholic teaching. By contrast, ovarian tissue cryopreservation for the purpose of autologous transplantation should be acceptable.

Part Two

While it is worthwhile to reflect on oncofertility in light of Catholic teaching on reproductive technology, is it also useful to review Catholic teaching in light of oncofertility? If I am right that the Vatican should embrace ovarian tissue transplants, it will be because Catholic teaching on assisted reproduction is primarily concerned with respecting embryonic life and with avoiding the reduction of procreation to the manipulation of gametes, as if human procreation is a manufacturing process. As we have seen, Catholic opposition to certain forms of assisted reproduction is not rooted in an anti-technological mindset, but rather in a concern that technology not dominates an area of human life that should be rooted in love and a commitment to the welfare of children. This is at least partly why the CDF insists that procreation should come from a loving act of sexual intercourse.

If the technique of orthotopic ovarian tissue transplantation lives up to its promise, it will allow women facing fertility threatening cancer treatment to store ovarian tissue in the hope of having a family down the road through means that would not violate the two fundamental values set out in *Donum Vitae*. Yet it is also important to note that ovarian tissue transplantation can be done in a number of different ways and that the technique itself may lead us to rethink how we have approached fertility treatment in the past. To see this, consider the work of Sherman Silber and his colleagues reported in the *New England Journal of Medicine* a few years ago [4]. It involved identical twins, one of whom suffered from ovarian failure at age 14. When the twins were in their mid-twenties, the sister who remained fertile donated ovarian cortical tissue to her twin for surgical transplantation. After several months, the infertile twin began to ovulate again and went on to conceive a child “naturally” with her husband.

This case points to a conundrum posed by modern biotechnology: new technology frequently confounds our traditional categories of thought. For example, in this instance we might ask whether the child conceived is the offspring of the infertile twin. The infertile twin has produced a mature egg *in vivo*, conceived an embryo through intercourse with her husband, and sustained a pregnancy that resulted in the birth of a child who, in the traditional language, was begotten not made. Nevertheless, the tissue containing the immature eggs came from another woman, namely her sister. The case is complicated by the fact that the twins are identical. Thus, it might not even be possible to determine whether the child was the genetic offspring of the fertile twin. Catholic teaching on assisted reproduction has insisted that genetic and social parenthood not be separated. But what does genetic parenthood mean in the context of an ovarian tissue transplant between identical twins? Should an ovarian tissue transplant be treated more like, say, a kidney transplant than like egg donation? After all, like organ transplants ovarian tissue transplantation restores a complex biological system to normal function.

If we return to the passage from *Dignitas Personae* quoted above, it is not clear why the Catholic church would condemn ovarian tissue transplants between identical twins. Recall that the criterion for an “authentic” reproductive intervention is that “the married couple is able to engage in conjugal acts resulting in procreation, without the physician’s action directly interfering in the act itself.” Yet, that is precisely the result of the ovarian tissue transplantation in this case; the recipient twin begins to ovulate again and she is able to conceive a child with her husband through sexual intercourse.

The fact that the ovarian tissue comes from the identical twin may divert our attention from the reality that genetic and social parenthood are separated by this procedure, but we need to address that reality to explore fully how this technology may lead us to reassess the foundations of Catholic teaching on reproductive technology. Because the donor and the recipient essentially share a genome, it may not be clear that an ovarian tissue transplant is a form of egg donation. Suppose we vary the case. Instead of an ovarian tissue transplant from one sister to her identical twin, let us imagine a case in which ovarian tissue is transplanted from a living, non-related donor to a woman suffering from ovarian failure. Let us further imagine that the transplant is successful; the recipient begins ovulating and conceives a child through sexual intercourse with her

husband. The child will be the genetic offspring of the donor and the recipient's husband, even though the child was conceived through an act of sexual intercourse between husband and wife, which involved no direct intervention by a physician.

This case poses a significant challenge to Catholic thought. If we review this case in terms of the two fundamental values set out in *Donum Vitae*, non-autologous ovarian tissue transplant appears to be morally acceptable. Such a procedure does not involve manipulation or destruction of human embryos, and the child that results from this procedure is conceived through a loving act of sexual intercourse of a married couple. Even the third value set out in *Dignitas Personae*, namely "the right within marriage to become a father or mother only together with the other spouse," is not obviously violated with this procedure.

Yet, Catholic teaching clearly rejects the so-called heterologous procreation. Here is how *Donum Vitae* defines heterologous procreation:

By the term *heterologous artificial fertilization or procreation*, the *Instruction* means techniques used to obtain a human conception artificially by the use of gametes coming from at least one donor other than the spouses who are joined in marriage. Such techniques can be of two types

- a) *Heterologous IVF and ET*: the technique used to obtain a human conception through the meeting in vitro of gametes taken from at least one donor other than the two spouses joined in marriage.
- b) *Heterologous artificial insemination*: the technique used to obtain a human conception through the transfer into the genital tracts of the woman of the sperm previously collected from a donor other than the husband [2].

We can now state the problem more directly. The Catholic church has framed its teaching on reproductive technology as if procreation that results in the birth of a child who is not the genetic offspring of one of the spouses in a marriage was conceived either by artificial method or by sexual intercourse with someone who is not one's spouse. Non-autologous tissue transplantation followed by natural conception demonstrates that this framework is mistaken and must be revised. In effect, this new technology forces the question: What precisely is the foundation of Catholic opposition to "heterologous" procreation? Is this opposition rooted in the tradition's non-dualistic view of the body and a natural law understanding of the necessary integration of sex, marriage, and procreation or is it rooted in a theological understanding of marriage that requires maintaining the connection between genetic and social parenthood?

The most responsible response to this question is that the answer is just not clear. At almost every point at which *Donum Vitae* and *Dignitas Personae* discuss heterologous procreation these two distinct approaches are collapsed into one another, often in the same sentence. Yet, if we examine these different strands of argument separately in relation to non-autologous ovarian tissue transplantation, we may reach different conclusions.

Consider, first, the approach rooted in a theological understanding of human embodiment and a natural law approach to human sexuality. We have already noted a passage from *Donum Vitae* that succinctly captures Catholic teaching that the human person is a union

of body and spirit. Man cannot be reduced to his body; neither can he be treated as pure spirit. And this is part of the problem with artificial procreation: it treats procreation as if it is merely a kind of mechanical production, as if humans are not a unified whole. In disembodied procreation, reproductive technology makes the mistake of reducing the body to instrumental status.

This account of human embodiment dovetails with natural law teaching on the necessity of maintaining the integrated structure of sex, marriage, and procreation. This teaching is the basis of the Church's insistence that procreation must result from sexual intercourse. Sex is designed to be both unitive and procreative; to separate these dimensions of sexuality is to violate the natural order. With regard to preventing conception, this reasoning leads to a prohibition on the use of artificial contraception. With regard to infertility, this reasoning leads to a prohibition on interventions that bypass sexual intercourse.

We have seen, however, that even non-autologous ovarian tissue transplantation does not appear to violate these norms. Assuming that the transplant restores endocrine and ovarian function, conception will be the result of a loving bodily act of sexual intercourse between husband and wife. Procreation is not disembodied through this technique; on the contrary, ovarian tissue transplantation arguably restores a sense of bodily and spiritual integrity to a woman whose sense of wholeness may have been shattered by cancer.

What if we evaluate non-autologous ovarian tissue transplantation in terms of Church teaching on the vocation of marriage? Here the answer is less clear. Once again, we must turn to a passage in *Donum Vitae* for guidance. The passage is long, but worth quoting in full.

Recourse to the gametes of a third person, in order to have sperm or ovum available, constitutes a violation of the reciprocal commitment of the spouses and a grave lack in regard to that essential property of marriage which is its unity. Heterologous artificial fertilization violates the rights of the child; it deprives him of his filial relationship with his parental origins and can hinder the maturing of his personal identity. Furthermore, it offends the common vocation of the spouses who are called to fatherhood and motherhood: it objectively deprives conjugal fruitfulness of its unity and integrity; it brings about and manifests a rupture between genetic parenthood, gestational parenthood and responsibility for upbringing. Such damage to the personal relationships within the family has repercussions on civil society: what threatens the unity and stability of the family is a source of dissension, disorder and injustice in the whole of social life [2].

Given this passage, it seems likely that the Vatican will reject non-autologous ovarian tissue transplantation. Before we draw that conclusion, however, it is important to review this passage in light of our previous concerns about the failure to distinguish two distinct lines of argument about heterologous procreation. Let us review this passage a bit more closely to see exactly what claims are being made.

We can distinguish at least four claims here.

(1) *Recourse to the gametes of a third person, in order to have sperm or ovum available, constitutes a violation of the reciprocal commitment of the spouses and a grave lack in regard to that essential property of marriage which is its unity.* In the absence of a procedure like non-autologous ovarian transplantation, this statement would appear to be relatively straightforward because using the gametes of a third person meant that the conception did not result from a loving act of sexual intercourse between spouses. Yet, given the possibility of ovarian tissue transplants, we must now ask whether the language of having “sperm and ovum available” is not really a concern about procreating without sexual intercourse. Similarly, the concern about “unity” may represent a rejection of the possibility of an infertile spouse having sexual intercourse with a donor.

(2) *Heterologous artificial fertilization violates the rights of the child; it deprives him of his filial relationship with his parental origins and can hinder the maturing of his personal identity.* This section of the passage suggests something new. The opposition to heterologous procreation is not here based on issues of disembodiment. Rather, the concern appears to be tied to genetic connection between parents and children. Although the formulation of the argument has a utilitarian cast, the basis for the argument is genetic connection. We will return to this below.

(3) *Furthermore, it offends the common vocation of the spouses who are called to fatherhood and motherhood: it objectively deprives conjugal fruitfulness of its unity and integrity.* Once again, the claim appears to be rooted in a natural law concerns about the structure of human sexuality, a structure that, as we have seen, ovarian tissue transplantation does not violate.

(4) *It brings about and manifests a rupture between genetic parenthood, gestational parenthood, and responsibility for upbringing.* Like claim (2), the issue here is explicitly genetic connection. This is something new and different from the other claims embedded in *Donum Vitae*.

I believe the positions articulated in items (2) and (4) suggest that Catholic teaching will be opposed to non-autologous ovarian tissue transplantation. The question is whether there are good reasons for accepting (2) and (4) independent of concerns about embodiment and the unitive and procreative dimension of embodied sexual love. This is a question we have not asked before. It is a pressing question because the temptation will be to answer it by relying on a kind of genetic essentialism that Catholic tradition would repudiate in other contexts.

William Werpehowski has argued that accepting the importance of a genetic connection between a married couple and their children need not rest on genetic essentialism [5]. He cites Leon Kass’s argument that one can want one’s “own” children without giving genetic connection a moral valuation that it does not deserve. According to Kass, when couples say they want a child of their own, they often use traditional expressions like “my seed,” “flesh of my flesh,” and “sprung from my loins,” and these expressions actually express the desire “to embody, out of the conjugal union of their separate bodies, a child who is flesh of their separate flesh made one.” In addition, says Kass, in seeking conjugal fruitfulness, a couple seeks “a new branch of their joined family tree.”

Once again, however, non-autologous ovarian tissue transplantation forces us to ask, why a child conceived naturally and carried in the womb of a woman who gives birth to the child is not a child who is flesh of a couple's flesh made one. I believe that a child so conceived is flesh of the couple's flesh, and so appealing to this idea to reject non-autologous ovarian transplants is not plausible. The idea of establishing a "new branch of their joined family tree" is more promising, but to evaluate this line of argument requires exploring conceptions of parenthood and the significance of genetic relation to parenthood, outside of the framework of natural law that emphasizes conjugal fruitfulness in family life.

The philosophical literature on parenthood is a useful resource here, but that literature suggests that a genetic conception of parenthood has serious problems [6–11]. Consider, for example, the work of Tim Bayne and Avery Kolers. In a series of articles on the topic, they have argued for a "pluralist" conception of parenthood and against a genetic definition of parenthood [6–8]. Bayne and Kolers acknowledge that a genetic conception of parenthood is intuitively plausible, for many people see parenthood as rounded "in the natural derivation of one person's genetic constitution from the genetic constitution of others" [6, p. 273]. Nevertheless, two points should be established right away.

First, it is important to emphasize that a genetic conception of parenthood rests on the derivation of genetic relations and not genetic connection itself. Obviously, a person has a closer genetic connection to his or her identical twin than to a genetic offspring, but this does not make the person a parent to his or her sibling. Second, it is important to distinguish biological connection and genetic connection. These are not the same, but treating them as if they are may contribute to the initial plausibility of a genetic view of parenthood.

To see the significance of this second point, it may be useful to explore why we equate biological and genetic connection. The answer, I believe, is that we have become so enthralled by genetic technology that it has become the lens through which we see all biological phenomena. Barbara Katz Rothman has captured this well when she writes: "The solidity of the body is breaking down as we imagine activity at the cellular level. The wholeness of the self is fragmenting as we think about lists of instructions, the pages and pages of ATCGs that make up each of us" [12, p. 40].

Even if we do not insist on recognizing the wholeness or solidity of the body, there is no denying its materiality, and focusing on material contribution makes a difference. Suppose, for example, that motherhood is defined less in terms of genetic contribution and more in terms of material contribution. Seen from this perspective, a woman who conceives a child after a non-autologous ovarian tissue transplant is unquestionably the mother of the child, for while the child's genetic material is not derived from hers, the genetic material is a negligible part of the child's material constitution [12, p. 276]. By contrast, her material contribution to the child's constitution is enormous.

Conclusion

The Catechism of the Catholic church defines the nature of the family this way: “The conjugal community is established upon the consent of the spouses. Marriage and the family are ordered to the good of the spouses and to the procreation and education of children” [13, Section 2201]. Because marriage and the family are central in Catholic teaching and because marriage is ordered to procreation, the Catholic church strongly endorses scientific efforts to treat infertility. At the same time, Catholic teaching is concerned to safeguard respect for human life, including early embryonic life, and it insists on the special nature of transmitting human life through sexual intercourse.

Given these tenets of Catholic teaching, the Vatican will be open to the work being done in the emerging field of oncofertility. At the same time, certain techniques of oncofertility will be unacceptable. In vitro maturation of eggs followed by fertilization in vitro will not be acceptable. By contrast, autologous ovarian tissue transplant is likely to be accepted by the Church. Given the teaching set out in *Donum Vitae and Dignitas Personae*, it also seems unlikely that the Vatican will accept non-autologous ovarian tissue transplantation. Yet, as I have tried to show in this chapter, non-autologous transplants pose an interesting question for Catholic teaching.

Acknowledgments This research was supported by the oncofertility consortium NIH 8UL1DE019587, 5RL1HD058296.

References

1. Woodruff TK, Snyder KA, Eds. Oncofertility: fertility preservation for cancer patients. New York: Springer; 2007.
2. Congregation for the Doctrine of the Faith. *Donum Vitae*. Available at: http://www.vatican.va/roman_curia/congregations/cfaith/documents/rc_con_cfaith_doc_19870222_respect-for-human-life_en.html. Accessed August 12, 2009.
3. Congregation for the Doctrine of the Faith. *Dignitas Personae*. Available at: http://www.vatican.va/roman_curia/congregations/cfaith/documents/rc_con_cfaith_doc_20081208_dignitas-personae_en.html Accessed August 12, 2009.
4. Silber SJ, Lenahan KM, et al. Ovarian transplantation between monozygotic twins discordant for premature ovarian failure. *N Engl J Med*. 2005; 353:58–63.
5. Werpehowski W. The vocation of parenthood. *J Relig Ethics*. 1997; 25(1):177–82.
6. Kolers A, Bayne T. “Are you my mommy?” on the genetic basis of parenthood. *J Appl Philos*. 2001; 18(3):273–85.
7. Bayne T, Kolers A. Toward a pluralist account of parenthood. *Bioethics*. 2003; 17(3):221–42. 306 P. Lauritzen
8. Bayne T, Kolers A. Parenthood and Procreation. *The Stanford Encyclopedia of Philosophy* (Summer 2006 edition) Available at: <http://plato.stanford.edu/archives/sum2006/entries/parenthood/>. Accessed August 12, 2009.
9. Austin MW. The failure of biological accounts of parenthood. *J Value Inq*. 2004; 38:499–510.
10. Fuscaldo G. Genetic ties: are they morally binding. *Bioethics*. 2006; 20(2):64–76.
11. Sparrow R. Cloning, parenthood, and genetic relatedness. *Bioethics*. 2006; 20(6):308–18.
12. Rothman BK. *Genetic maps and human imaginations*. New York: W.W. Norton; 1998.
13. Catechism of the Catholic Church. Available at: http://www.vatican.va/archive/catechism/ccc_toc.htm. Accessed, August 12, 2009.