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ONCOFERTILITY AND THE BOUNDARIES OF MORAL REFLECTION

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Advances in medical technology provide regular opportunities to explore theological reflection and magisterial teaching at the border of science and conscience. This article reflects on one such advance involving fertility preservation for cancer patients. The authors argue that ovarian tissue transplantation (OTT) poses intriguing questions for Catholic teaching and theologians about reproductive technology.

THE *CHARTER FOR HEALTH CARE WORKERS*, issued by the Pontifical Council for Pastoral Assistance to Health Care Workers in 1995, noted the inescapable tension between science and technology on the one hand and wisdom and conscience on the other.[1] Quoting the Instruction *Donum vitae*, the *Charter* reads: "Science and technology 'cannot of themselves show the meaning of existence and of human progress. Being ordered to man, who initiates and develops them, they draw from the person and his

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[1] Pontifical Council for Pastoral Assistance to Health Care Workers, *Charter for Health Care Workers: To Health Care Workers* (Boston: Pauline, 1995) no. 45.

moral values the indication of their purpose and the awareness of their limits.'"[2] This is why, the *Charter* continues, "science and wisdom should go hand in hand. Science and technology are extremist, that is, they are constantly expanding their frontiers. Wisdom and conscience trace out for them the impassable limits of the human."[3]

We find this account of the relation between science and conscience deeply appealing, because, among other reasons, it acknowledges that science is appropriately committed to exploring new possibilities, and that wisdom and science are dialectically related. This article adopts the spirit of the *Charter* by examining one of the new frontiers in medical science in light of the wisdom of what the *Charter* calls the "bioethical magisterium."[4] At the same time, we believe that new medical technologies invite us to rethink our ethical approach both by confirming magisterial positions and theological insights as well as by exploring new ones. Our goal here is therefore twofold. First, we reflect on new ways of preserving fertility in cancer patients in light of the current bioethical magisterium. Second, we suggest how these techniques might lead us to review relevant magisterial teaching with new eyes.

The essay unfolds in three parts. In part one, we introduce oncofertility, a new medical field that brings cutting-edge techniques in assisted reproduction to the preservation of fertility for cancer patients who are likely to become infertile because of chemo- or radiation therapy. In part two, we reflect on these technologies in light of existing magisterial teaching on assisted reproduction. In particular, we examine the arguments set out in

[2] Ibid. The internal quotation is from the Congregation for the Doctrine of the Faith (CDF), *Donum vitae*, Instruction on Respect for Human Life in Its Origin and on the Dignity of Procreation: Replies to Certain Questions of the Day (February 22, 1987), Introduction, no. 2, http://www.vatican.va/roman_curia/congregations/cfaith/documents/rc_con_cfaith_doc_19870222_respect-for-human-life_en.html (this Web site and all others cited in this article were accessed on September 13, 2010).

[3] *Charter* no. 45. The *Charter* (n. 114) refers to Vatican II's *Gaudium et spes* by offering its own translation: "Our age, more than any of the past, needs such wisdom if all that man discovers is to be ennobled through human effort" (*Gaudium et spes* no. 15). For the Vatican's Web site translation, see Second Vatican Council, Pastoral Constitution on the Church in the World of Today *Gaudium et spes*" (December 7, 1965), http://www.vatican.va/archive/hist_councils/ii_vatican_council/documents/vat-ii_const_19651207_gaudium-et-spes_en.html.

[4] "With vigilant and careful attention, the magisterium of the Church has intervened [in bioethics], with reference to questions and disputes arising from the biomedical advances and from the changing cultural 'ethos.' This bioethical magisterium is for the health care worker, Catholic or otherwise, a source of principles and norms of conduct which enlighten his conscience and direct him—especially in the complexity of modern bio-technical possibilities—in his choices, always respecting life and its dignity" (*Charter* no. 6).

the instructions *Donum vitae* and *Dignitas personae* as they relate to the new technologies of oncofertility. Finally, in part three we explore the boundary territory of medicine and morals to which oncofertility takes us. Although our discussion engages Catholic moral thought more directly than other traditions of Christian or secular ethics, we hope in passing to identify lines of inquiry that would repay further study. In terms of our limited focus, we can say at least this much: while we can show that some applications of new oncofertility techniques cohere with existing magisterial teaching, not all of them do. We thus seek to engage the moral boundary issues posed by this new technology.

ONCOFERTILITY'S NEW TECHNIQUES

Although many new biotechnological advances call for reflection on the relation between science and conscience, here we attend to emerging work in oncofertility.[5] This new field of scientific research and practice has not yet been explored by theological ethics.[6] Prepubescent children and young adults, male and female, of all races, independent of their social, cultural, and religious status, could benefit from oncofertility. But oncofertility presents questions about human flourishing that need to be addressed carefully as it moves from the laboratory to the clinic.[7]

Before exploring some of these questions, we need to put oncofertility into context. Consider, for example, the situation of cancer treatment generally in the United States. The National Cancer Institute "estimates that approximately 11.1 million Americans with a history of cancer were alive in January 2005."[8] Among cancer survivors, 4% were between 20 and 39 years

[5] "The goal of oncofertility is to meet an emerging urgent unmet need for young cancer patients: balancing life-preserving treatments with fertility-preserving options" (Teresa K. Woodruff, "The Emergence of a New Discipline: Oncofertility," in *Oncofertility: Fertility Preservation for Cancer Survivors*, ed. Teresa K. Woodruff and Karrie Ann Snyder [New York: Springer, 2007] 3–11, at 10). See also the Oncofertility Consortium website at http://oncofertility.northwestern.edu/; and the websites Fertile Hope and Livestrong, two foundations that support patients: http://www.fertilehope.org/ and http://www.livestrong.org/default.aspx.

[6] Some articles focus on ethical issues solely from a medical point of view; see, e.g., Leilah E. Backhus and Laurie Zoloth, "Today's Research, Tomorrow Cures: The Ethical Implications of Oncofertility," in *Oncofertility* 163–80.

[7] We would expect research protocols to be established to test extensively the various techniques in oncofertility. We are aware that, as in the case of assisted reproductive technologies, this testing might be difficult due to the pressure by scientists, hospitals, clinics, and patients to begin using oncofertility.

[8] American Cancer Society, *Cancer Facts and Figures 2009* (Atlanta, Ga.: American Cancer Society, 2009) 1.

of age.[9] Furthermore, "the number of people with a personal history of cancer living in the US has continued to rise, and is expected to double by the year 2030 to more than 20 million."[10] In particular, "an estimated 10,730 new cases are expected to occur among children aged 0 to 14 years in 2009."[11] In the coming years, the improvements in cancer therapy will increase the number of young survivors. "Currently, more than 80% of children and adolescents with cancer survive 5 or more years after diagnosis."[12]

This success, however, comes at a price: for many young cancer patients, the treatments that save their lives also destroy their fertility. According to the American Society for Reproductive Medicine, in 2005 the only nonexperimental treatments for preserving fertility in cancer patients involved freezing and banking sperm or embryos.[13] New possibilities are on the horizon; we focus on one that involves a technique for retrieving and storing ovarian tissue.[14] Here a concrete example may be helpful. Suppose a woman diagnosed with breast cancer must begin treatment immediately but hopes to have children in the future and is aware that her treatment may leave her infertile. Undergoing hormone stimulation with the intent of freezing mature eggs is not an option since it will delay the start of her treatment and may cause her cancer to spread.

In a case like this, ovarian tissue retrieval offers a new option for preserving fertility. This experimental procedure begins with laparoscopic

[9] See: M. J. Horner et al., eds., *SEER Cancer Statistics Review, 1975–2006* (Bethesda, Md.: National Cancer Institute, 2009); available at http://seer.cancer.gov/csr/1975_2006/. The results are based on November 2008 SEER data submission, posted to the SEER Web site in 2009.

[10] American Cancer Society, *Cancer Facts and Figures 2009* 38. In 2009 "more than 1.4 million cancer patients" were diagnosed. Ibid. 60.

[11] Ibid. 11. [12] Ibid. 36.

[13] See The Ethics Committee of the American Society for Reproductive Medicine, "Fertility Preservation and Reproduction in Cancer Patients," *Fertility and Sterility* 83 (2005) 1622–28, at 1622.

[14] We focus primarily on techniques for preserving fertility in female cancer patients, but with the exception of sperm cryopreservation, the most common technique used, much of our discussion also pertains to men facing cancer treatments. For example, testicular tissue cryopreservation may be the only option available for preserving fertility in prepubertal boys undergoing cancer treatment. See Mark Schrader et al., "'Onco-tese': Testicular Sperm Extraction in Azoospermic Cancer Patients before Chemotherapy—New Guidelines?," *Urology* 61 (2003) 421–25; Robert E. Branningan, "Fertility Preservation in Adult Male Cancer Patients," in *Oncofertility* 28–46, esp. 39–46; Mieke Geens et al., "Autologous Spermatogonial Stem Cell Transplantation in Man: Current Obstacles for a Future Clinical Application," *Human Reproduction Update* 14 (2008) 121–29; Igor Crha et al., "Survival and Infertility Treatment in Male Cancer Patients after Sperm Banking," *Fertility and Sterility* 91 (2009) 2344–48.

surgery to remove ovarian tissue before the start of cancer treatment. The ovarian tissue, which contains follicles with immature oocytes, is then frozen and banked for future use. Later our hypothetical patient, now cancer-free, can thaw the frozen tissue, and try to conceive. At that point the challenge is to develop immature follicles, which cannot be fertilized, into mature eggs that can be. Currently, there are two primary ways of proceeding. A woman can have her ovarian tissue thawed either to seek *in vitro* maturation of follicles to produce mature eggs prior to an *in vitro* fertilization 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 function and egg maturation prior to conception.[15]

ONCOFERTILITY AND CURRENT MAGISTERIAL TEACHING

Drawing upon Christian tradition for a full analysis of the ethical issues raised by oncofertility would require us to examine new fertility-preserving techniques in light of Scripture, reason, experience, and tradition. We cannot here undertake such a complete analysis, but we can provide a preliminary review by examining two relevant magisterial documents from the Catholic tradition. Given the teaching set out in *Donum vitae* (1987) and in *Dignitas personae* (2008), insofar as the teaching concerns procreation, oncofertility must be assessed in relation to two values: "the life of the human being called into existence and the special nature of the transmission of human life in marriage."[16] The first value, namely, the respect due to the embryo from conception, effectively prohibits any form of assisted reproduction that fails to accord embryos complete moral respect. *In vitro* fertilization, nontherapeutic embryo experimentation, freezing embryos, and gestating embryos in nonhuman hosts or paid human hosts all fail to honor the value of a human life called into existence through assisted reproduction. In short, this first value shapes judgments about what could or could not be done with human embryos.

By contrast, the appeal to the value of the special nature of the transmission of human life in marriage functions differently. Whereas respect for embryonic life primarily constrains technologies that involve creating or manipulating embryos in the laboratory, the commitment to keeping sex and procreation together within a marriage responds to reproductive medicine's new abilities to disembody procreation by facilitating reproduction

[15] For a discussion of the science of human follicle maturation *in vitro,* see Min Xu et al., "In Vitro Grown Human Ovarian Follicles from Cancer Patients Support Oocyte Growth," *Human Reproduction* 24 (2009) 2531–40. For a general review of the clinical options, see Jacqueline Jeruss and Teresa Woodruff, "Preservation of Fertility in Patients with Cancer," *New England Journal of Medicine* 360 (2009) 902–11.

[16] *Donum vitae*, Introduction, no. 4.

through the isolation and manipulation of sperm and egg in a laboratory. Opposition to procreation that is not the result of a loving act of sexual intercourse effectively functions as a barrier to the tendency within reproductive medicine to reduce the creation of human life to the mere manipulation of gametes.

Given these fundamental values, it appears that the Congregation for the Doctrine of the Faith (CDF) would reject ovarian tissue preservation for the purpose of maturing and fertilizing human eggs in the laboratory. The life of the human being conceived in the laboratory is arguably not respected by this technology because human procreation is separated from sexual intercourse and thereby disembodied.

Research directed toward autologous ovarian tissue transplantation (OTT), however, 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 and respecting the inseparable connection between sex and procreation, this new technique appears untroubling, for neither value is necessarily threatened by it. Autologous 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, grafting of autologous ovarian tissue should be in accord with current magisterial teaching.

If we turn from *Donum vitae* to the more recent instruction, *Dignitas personae*, we find these conclusions confirmed. In fall 2008, the CDF, updating the teaching of *Donum vitae*, reviewed its previous conclusions about reproductive technologies and addressed new ones that had emerged during the previous 20 years. The document reaffirms the conclusions of *Donum vitae,* but its updating goes beyond *Donum vitae* and so requires our attention.

Although *Dignitas personae* is in continuity with *Donum vitae*, it 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": (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 demands that conception take place through sexual intercourse.[17] Moreover, in giving examples of how infertility treatment may respect these goods, *Dignitas personae* provides further clarity about the likely position the magisterium will take on OTT. Infertility treatment is not to be rejected *per se*. For example, hormonal treatments for infertility and surgery for endometriosis are both perfectly

[17] CDF, Instruction *Dignitas personae* on Certain Bioethical Questions (September 8, 2008) no. 12, http://www.vatican.va/roman_curia/congregations/cfaith/documents/rc_con_cfaith_doc_20081208_dignitas-personae_en.html.

acceptable. In the language of the Instruction, these treatments 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."[18]

If this is the standard by which to evaluate infertility treatment, then, as our analysis of *Donum vitae* suggests, some of the current work in oncofertility will be acceptable in terms of Catholic teaching, and some will not. Like *Donum vitae, Dignitas personae* appears to rule out ovarian tissue cryopreservation for the purpose of maturing eggs in the laboratory prior to fertilization *in vitro*, while allowing ovarian tissue cryopreservation for autologous transplantation.

REFLECTIONS AT THE BOUNDARY OF SCIENCE AND CONSCIENCE

Although this analysis is fine as far as it goes, we believe it does not go far enough. Here we take a suggestion from the *Charter for Health Care Workers*: "The term and concept of health embraces all that pertains to prevention, diagnosis, treatment and rehabilitation for greater equilibrium and the physical, psychic and spiritual well-being of the person."[19] It is important to keep these words in mind when assessing the moral significance of oncofertility, because cancer threatens not only the body but also the person; it affects how she perceives herself.[20] Cancer patients often report feeling alienated from their bodies, as if their own bodies have betrayed them.[21] Something deadly grows within and, even when removed, may return. One may come not to trust one's body and to feel that one's path in life has been inexorably altered. When cancer treatment destroys fertility, the sense of alienation from one's body may be heightened.

For this reason, when thinking about the moral significance of oncofertility it is important to acknowledge that techniques that preserve fertility may help a patient to experience anew a sense of bodily integrity. Oncofertility is not only about restoring ovulatory function or even about having children; it is also about recovering a sense of the normal and everyday. Fertility is not the only or even a necessary element for

[18] Ibid. no. 13.

[19] *Charter for Health Care Workers* no. 9.

[20] See Marie-Jo Thiel, ed., *Entre malheur et espoir: Annoncer la maladie, le handicap, la mort* (Strasbourg: University of Strasbourg, 2006); Joseph Bernardin, *The Gift of Peace: Personal Reflections* (Chicago: Loyola, 1997); and James F. Keenan, "Impasse and Solidarity in Theological Ethics," *Catholic Theological Society of America Proceedings* 64 (2009) 1–14.

[21] See Laura Palmer et al., "Themes Arising in Group Therapy for Adolescents with Cancer and Their Parents," *International Journal of Rehabilitation and Health* 5 (2000) 43–54; Miles Little et al., "Survivorship and Discourses of Identity," *Psycho-Oncology* 11 (2002) 170–78; Karen Kaiser, "The Meaning of the Survivor Identity for Women with Breast Cancer," *Social Science and Medicine* 67 (2008) 79–87.

experiencing a renewed sense of wholeness, but the ability to have children may contribute to a life-long process of healing. The healthy tissue taken out, preserved, and made ready for reimplantation anticipates and carries with it not only the hopes and the desires of restored health after the ordeal of treatment, but also the possibility of experiencing the beauty of procreation as a gift expressing the couple's love. The preserved tissue witnesses to who the person was and hopes to be again. While the patient gradually discovers who she is becoming after the cancer diagnosis and therapy, the strength needed to endure treatments and to maintain hope for a full recovery and a lasting remission may be nurtured in her by the promise of future fecundity. The preserved tissue thus becomes a concrete symbol of goodness and flourishing that awaits recovery and beckons toward the future.[22]

The prospect of future fertility may help a patient preserve her humanity through the ordeal of sickness, and the recovery of her reproductive function may restore a sense of bodily confidence that affirms the perception that one's body has returned to normal. Although for a time one's body was announcing concretely the possibility of death, it is now associated once again with life and a promising future.

This is why the prospect of autologous OTT is so hopeful. It appears deeply consonant with the holistic vision of Catholic health care set out in the *Charter for Health Care Workers* and in many other places.[23] To be sure, there are a number of moral issues to consider before ovarian tissue removal, cryopreservation, and transplantation should be pursued, but autologous tissue transplantation is not intrinsically problematic. It may, nevertheless, approach a boundary where curing troubles conscience, and we need to think and work dialectically at this boundary.

To appreciate the fact that we are at an uncharted border point, consider the work of Sherman Silber and his colleagues reported in the *New England Journal of Medicine* a few years ago.[24] It involved identical twins,

[22] Many feminist scholars have properly insisted that preserving and restoring fertility will not be important for all women. We are not suggesting that all women will feel that their identities are threatened if they do not experience motherhood. We agree with Lisa Sowle Cahill that infertility should not be "construed as a deficiency from the womanly norm of motherhood" (*Theological Bioethics: Participation, Justice, Change* [Washington: Georgetown University, 2005] 204). See also Elisabeth Brinkmann, "Embracing the Deficient Body: Alternative Responses to Infertility" (Ann Arbor, Mich.: UMI Dissertation Services, 2001). A similar critical stance concerning fertility and identity can be articulated in the case of men.

[23] See, e.g., U.S. Conference of Catholic Bishops, *Ethical and Religious Directives for Catholic Health Care Services*, 5th ed. (Washington: USCCB, 2010), introductions to parts 1 and 2.

[24] Sherman J. Silber et al., "Ovarian Transplantation between Monozygotic Twins Discordant for Premature Ovarian Failure," *New England Journal of Medicine* 353 (2005) 58–63.

one of whom suffered from ovarian failure at age 14 with a consequent early menopause. When the twins were in their mid-20s, the sister who remained fertile donated her left ovary to her twin for surgical transplantation of ovarian cortical tissue. After a few months, the recipient twin began to ovulate again and then conceived a child with her husband through sexual intercourse.[25]

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 truly 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 her fertile twin sister. The case is complicated by the fact that the twins are genetically identical (i.e., they developed from a single zygote). 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 OTT between identical twins? In this case, should an ovarian tissue transplant be treated more like, say, a kidney transplant than like egg donation? After all, like organ transplants, OTT restores a complex biological system to normal function.

The comparison to organ donation opens a fruitful line of inquiry here. Catholic teaching endorses organ transplantation, except in two cases. The *Charter for Health Care Workers* articulates the exceptions this way: "Ethically, not all organs can be donated. The brain and the gonads may not be transplanted because they ensure the personal and procreative identity respectively. These are organs which embody the characteristic uniqueness of the person, which medicine is bound to protect."[26] Yet, if we ask at this point why an exception is made for transplanting gonads, we confront an interesting anomaly in Catholic teaching. Recall that the criterion for an "authentic" reproductive intervention set out in *Dignitas personae* is that "the married couple is able to engage in conjugal acts resulting in procreation, without the physician's action directly interfering in that act itself."[27] Yet, that is precisely the result of the OTT in this case; the recipient twin begins to ovulate again, and she is able to conceive a child with her husband through sexual intercourse. And the fact that the donor and the recipient essentially share a genome makes it questionable whether, in this case, OTT is a form of egg donation.

[25] She was diagnosed pregnant 176 days after her transplantation. See ibid. 60.
[26] *Charter for Health Care Workers* no. 88.
[27] *Dignitas personae* no. 13.

Or consider a second case reported in the journal *Human Reproduction* that involves an OTT between nonidentical sisters.[28] In 1990, the infertile sister had undergone aggressive chemotherapy and radiotherapy prior to a bone marrow transplantation to treat ß-thalassemia major. These treatments cured the disease but left the patient with premature ovarian failure. Sixteen years after the bone marrow transplant, the sister who donated bone marrow also donated ovarian tissue, which was successfully transplanted to the infertile sister.[29] The fascinating aspect of this case is that, because of the earlier bone marrow transplant, the sisters were completely HLA compatible.[30] In technical terms, there was "complete chimerism"[31] between the two sisters, so no immunosuppressants were needed.[32]

This case helps us see that we may need to define heterologous procreation more carefully and hence think about Catholic opposition to it. As it has been articulated up till now, the teaching on reproductive technology has been framed by focusing on procreation that results in the birth of a child who is not the genetic offspring of one of the spouses in a marriage, and that was conceived either artificially or gestated by someone who is not one's spouse. Nonautologous OTT followed by natural conception demonstrates that this is no longer the case. 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 nondualistic view of the body and a natural law understanding of the necessary integration of marriage, sex, and procreation? Or, alternatively, is it rooted in a theological understanding of marriage and procreation that makes genetic connection essential?

The answer to these questions is not immediately clear. At almost every point at which *Donum vitae* and *Dignitas personae* discuss heterologous procreation, these two distinct approaches are collapsed into each another, often in the same sentence. Yet, if we examine these different strands of

[28] Jacques Donnez et al., "Allograft of Ovarian Cortex between Two Genetically Non-identical Sisters: Case Report," *Human Reproduction* 22 (2007) 2653–59.

[29] The procedures were performed at the Université Catholique de Louvain (Belgium). They were approved by the University's ethical committee that, since 1995, allowed such research protocols, including reimplantation of ovarian tissue. See ibid. 2654.

[30] HLA (= Human Lymphocyte Antigen) defines the major antigen compatibility complex, genetically determined, that is involved in cell self-identification and histocompatibility.

[31] Donnez et al., "Allograft of Ovarian Cortex" 2654.

[32] "Restoration of the ovarian function was achieved after six months. Oocyte retrieval and embryo development were demonstrated" (ibid. 2653). "The origin of steroid secretion was indeed the transplanted tissue. It is extremely unlikely that restoration of ovarian function in this woman . . . was due to residual follicles in the atrophic native ovary, from which the majority of the cortex was removed" (ibid. 2658).

argument separately in relation to nonautologous OTT, 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 the *Charter for Health Care Workers* emphasizing health as a concept that involves the whole person, body and spirit. *Donum vitae* makes a similar point. 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."[33]

Given this very traditional understanding of health as involving the whole person and given the Catholic commitment to use science to promote health, OTTs should receive serious consideration. They should, because the effort to help a cancer survivor have children after the fertility-ending effects of cancer treatment is partly an attempt to restore a spiritual and bodily unity that cancer may have undermined. To be sure, by restoring reproductive function, OTT profoundly touches the body and thus the person whose sense of bodily integrity and spiritual wholeness was deeply threatened, but this touch is healing and may in fact preserve a sense of procreative identity, a point we will return to shortly.

This account of human embodiment dovetails with natural law teaching on the necessity of maintaining the integrated dynamic of marriage, sex, and procreation. This teaching is the basis of the magisterium's insistence that procreation must result from sexual intercourse within a married relationship. Sexual intercourse manifests the couple's love, respect, affection, and intimacy by highlighting its unitive and procreative meanings; to separate these dimensions of sexuality is to violate the natural order.[34] With regard to responsible parenthood, this reasoning leads to a ban on artificial contraception.[35] With regard to infertility, this reasoning leads to a ban on interventions that bypass the couple's sexual intercourse.[36]

[33] *Donum vitae*, Introduction, no. 3. The quotation is from John Paul II, "Discourse to the members of the 35th General Assembly of the World Medical Association" (October 29, 1983), *Acta Apostolicae Sedis* 76 (1984) 389–95, at 393. The pope is quoting *Gaudium et spes* no. 14.

[34] See *Donum vitae*, Introduction, no. 3; II, nos. 5–6, 8; III. See also Paul VI, *Humanae vitae* (July 25, 1968) no. 11, http://www.vatican.va/holy_father/paul_vi/encyclicals/documents/hf_p-vi_enc_25071968_humanae-vitae_it.html; and *Dignitas personae* nos. 5–6.

[35] See *Donum vitae*, II, no. 4, and *Humanae vitae* nos. 14, 17.

[36] See *Donum vitae*, II, nos. 2–6, and *Dignitas personae* no. 12.

We have seen, however, that even nonautologous OTT does not appear to contradict this reasoning. Assuming that the OTT 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, OTT arguably restores a sense of bodily and spiritual integrity to a woman whose sense of wholeness may have been shattered by cancer.

The fact that it does not appear possible to root opposition to heterologous procreation in a nondualistic account of human embodiment or a natural law conception of the relation of marriage, sex, and procreation suggests that it is somehow rooted in concerns about procreative identity understood in terms of genetic connection. To understand how this argument about procreative identity might proceed, we need to look more carefully at the passage in *Donum vitae* that explicitly rejects heterologous procreation:

> 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.[37]

Our review of the grounds for opposition to heterologous procreation suggests that only two of the claims articulated in this passage extend to nonautologous OTT: (1) "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." And (2) "it brings about and manifests a rupture between genetic parenthood, gestational parenthood and responsibility for upbringing." The question is whether there are good reasons for accepting (1) and (2) independently of concerns about embodiment and the unitive and procreative dimensions of embodied sexual love. Moral theologians have not typically asked this question before. Yet the question is pressing because the temptation will be to answer it by relying on a kind of genetic essentialism that Catholic tradition would repudiate in other contexts.[38]

[37] *Donum vitae*, II, no. 2.

[38] For example, in opposing eugenics, Catholic tradition has generally repudiated genetic reductionism. Pope Benedict XVI, in his Address to the Members of

If we return to the claim that gonadal tissue should not be transplanted because such a transplant undermines procreative identity, we need to ask whether this identity should be understood in terms of genetic connection. Consider traditional language in which couples might conceptualize reproduction. They often speak of wanting a child of one's own, a child who is flesh of their flesh. Once again, however, nonautologous OTT forces us to ask why a child conceived naturally and carried to birth is not flesh of a couple's flesh made one.

Here it might be useful to expand our discussion to consider other sources of Christian ethics. For example, Allen Verhey's analysis of assisted reproductive technology in light of Christian Scripture seems particularly suggestive.[39] Drawing on the Genesis creation story, Verhey notes that the story "cautions against the dualism that drives a wedge between body and soul and against any reductionism that reduces persons to their sexual or reproductive capacities."[40] We would add that Genesis might appropriately be read to caution against reducing a person to his or her genome. Verhey argues that in condemning the rupture between genetic and social parenthood the Vatican overreaches its legitimate concern that lovemaking and babymaking "be joined to the covenant fidelity of marriage and family."[41] Concern about the covenant fidelity of marriage and family does not, Verhey insists, require either that lovemaking and babymaking always be joined, nor that genetic parenthood and the parental vocation to nurture a child ever be sundered. Verhey does not put the point in quite these terms, but he effectively argues that parental identity should not be defined genetically, because to do so disparages adoption. Might not the same concerns be raised about defining procreative identity genetically?

We acknowledge that there is an intuitive appeal to defining procreative identity in terms of genetic relation. As philosophers Tim Bayne and Avery Kolers have written, many people see parenthood as grounded "in the natural derivation of one person's genetic constitution from the genetic constitution of others."[42] Yet, it is important to distinguish biological

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the Pontifical Academy for Life on the Occasion of the 15th General Assembly (February 21, 2009), http://www.vatican.va/holy_father/benedict_xvi/speeches/2009/february/documents/hf_ben-xvi_spe_20090221_accademia-vita_en.html, declares that we must "avoid the risk of a widespread genetic reductionism which tends to identify the person exclusively in terms of genetic information and interactions with the environment" and that every human being "is far more than a unique combination of genetic information that is transmitted by his or her parents."

[39] Allen Verhey, *Reading the Bible in the Strange World of Medicine* (Grand Rapids, Mich.: Eerdmans, 2003).

[40] Ibid. 255–56.

[41] Ibid. 290.

[42] Avery Kolers and Tim Bayne, "'Are You My Mommy?' On the Genetic Basis of Parenthood," *Journal of Applied Philosophy* 18 (2001) 273–85, at 273. See also Bayne and Kolers, "Toward a Pluralist Account of Parenthood," *Bioethics* 17

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 procreative identity.

Consider the issue of biological versus genetic connection. The case of OTTs between nonidentical siblings shows how complex the relation between biological and genetic connection can be, even biologically. If we consider the genetic relation between the nonidentical sisters described above, we would expect that immunosuppressive therapy would be necessary after the OTT. Yet, because the sisters share a biological connection mediated through an earlier bone marrow transplant, their genetic relation is less significant than their biological relation, at least in terms of their immune systems.

We are inclined to believe that the way forward here is to focus less on genetic connection (or even biological relation) and more on the significance of embodiment.[43] Consider again Verhey's caution about disparaging adoption: "In adoption the couple become a father and mother not '*through*' each other but *with* each other."[44] *Donum vitae* claims that the unity of marriage requires that spouses become father and mother only "through" each other, but Verhey wonders why becoming a mother and father through sexual intercourse is more important to the unity of the marriage or to family life than becoming a mother and father "with" each through adoption. The commitment to nurture children within the family will be manifest and embodied whether a couple enters the vocation of parenthood "with" or "through" each other. Focusing on the concrete, complicated, and densely embodied reality of cancer treatment, laparoscopic surgery, intercourse, gestation, and childbirth, as well as on the fairly relentless demands on a person—body and spirit—of raising a child may

(2003) 221–42; Bayne and Kolers, "Parenthood and Procreation," *Stanford Encyclopedia of Philosophy*, Summer 2006 ed. Edward N. Zalta, http://plato.stanford.edu/archives/sum2006/entries/parenthood/.

[43] M. Cathleen Kaveny reflects on embodiment by distinguishing between "bodily distinctness" and "bodily relatedness"; she affirms that "we experience ourselves both as distinct individuals whose boundaries are marked by the borders of our own physicality and as members of families and communities whose mental, emotional *and* physical boundaries are far more porous, far less certain" ("The Case of Conjoined Twins: Embodiment, Individuality, and Dependence," *Theological Studies* 62 [2001] 753–86, at 786). For a series of theological perspectives and practical applications on embodiment, see Lisa Sowle Cahill and Margaret A. Farley, eds., *Embodiment, Morality, and Medicine* (Dordrecht: Kluwer, 1995); Elisabeth Moltmann-Wendel, *I Am My Body: A Theology of Embodiment* (New York: Continuum, 1995); and Sue Campbell et al., eds., *Embodiment and Agency* (University Park: Pennsylvania State University, 2009).

[44] Verhey, *Reading the Bible* 291.

lead us to question the wisdom of defining either procreative or parental identity in genetic terms.

We already noted the attention that John Paul II rightly placed on the body in thinking about a person's "unique singularity."[45] To be sure, the uniqueness of one's body is mediated by one's genes, but we are not our genes. It is indeed in the body and through the body that one touches the person in her concrete reality; it is not in one's genes and through one's genes that we touch one another in our concrete particularity. Acknowledging that one's unique singularity does not reside in one's genome leads us, then, to have some doubts about the wisdom of defining procreative identity genetically.

We examined earlier the claims made in *Donum vitae:* first, that heterologous procreation violates the rights of a child by depriving her of her filial relationship, and second, that genetic and social parenthood should not be intentionally separated if one is committed to responsible parenthood. We also asked whether these claims can be sustained when procreation is the result of an embodied act of sexual intercourse between a married couple that has undergone nonautologous OTT. If we accept a nonreductionistic account of the person as a unified totality of body and spirit, it is not entirely clear on what grounds these two claims will be sustained. If they are not sustained, the door to nonautologous OTT appears to open, at least slightly. Whether this is a door whose threshold we should cross is one of the difficult questions faced at the boundary of moral decision-making.[46]

[45] See n. 33 above.

[46] The authors wish to express their gratitude to the anonymous reviewers whose suggestions for revisions significantly improved this essay.