An Ethical Comparison between In-Vitro Fertilization and NaProTechnology

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Abstract

In vitro fertilization (IVF) is morally objectionable for a number of reasons: the destruction of human embryos, the danger to women and newborn infants, and the replacement of the marital act in procreation. Recent studies have shown a significant risk of maternal death and morbidity associated with ovarian hyper-stimulation syndrome and multiple pregnancies after IVF. Due to lack of uniform regulations for IVF clinics, there is under-reporting of the adverse effects. NaProTechnology is one ethical alternative to IVF for female infertility. One study has confirmed earlier findings that NaProTechnology results in a number of live births similar to that of assisted reproductive technology, without the danger to women and newborn infants. Adoption of born children is another ethical and praiseworthy alternative to IVF.

There are many treatments of infertility, ranging from those that have a minimal impact on the natural fertile cycles to those that use hormonal manipulation to enhance fertility to those that completely supplant the natural means of procreation, such as in vitro fertilization. The purpose of this paper is not to review exhaustively the various methods of treating infertility and their effectiveness. Rather, the purpose is to compare and contrast one method—NaProTechnology (NPT)—that

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makes use of a woman's natural fertile cycles, and in vitro fertilization (IVF), which is a form of assisted reproductive technology (ART) and which seeks to replace the natural means of procreation.¹

The Creighton Model/FertilityCare method (CrMS), a modification of the Billings Ovulation Method, has been used for three decades and has thousands of data points correlating hormones, anatomy, surgical outcomes, etc. with fertility charting. Over the years the Creighton Model gave rise to NaProTechnology. Because of the extensive collection of data and years of research with the Creighton Model, it is possible to draw valuable medical and ethical conclusions from NaProTechnology. There is still, however, need for ongoing research with regards to the efficacy of various components.²

A medical comparison between IVF and NaProTechnology is imperfect because their methods and measurements are different. The success or efficacy rate in IVF is often measured per cycle, while in NaProTechnology it is measured over one to two years (cohort studies).³ However, a consideration of the acts involved and their effects and consequences provides some grounds for comparison from an ethical point of view. In such a comparison what matters most is not the positive results achieved (live births) but the actual morality of the actions and the risk at which women and fetuses are placed.

The heartbreak of infertility puts couples in a vulnerable situation. Faced with the possibility of a life without children, the couple seeking advice is met with a confusing set of choices. Depending on the situation, the ethical choice is often not evident. In vitro fertilization is the most frequent type of assisted reproductive technology.⁴ In vitro fertilization produces the destruction of discarded embryos (equivalent to abortion), and in the case of multiple embryo transfer is often accompanied by selective reduction (also equivalent to abortion) of implanted embryos. The principle reason that this procedure, now widely practiced throughout the world, is evil is that it involves the destruction of human embryos. Because of the minute size of the human embryos discarded or the small dimensions of fetuses aborted in multiple pregnancies to reduce the risk of maternal death, these abortions draw less attention.⁵ Still, the willful destruction of a nascent human being as a means or an end in itself is always gravely wrong. It is an affront to the Creator and to the dignity of the human being, created in the maternal womb in His image and likeness, as the fruit of spousal love. In the first part of this article we will focus primarily on two other evils of IVF: the serious risk to the lives of women, and the manufacturing of human babies.

An Overview of IVF

After failing conventional medical and surgical treatments for infertility, infertile couples are offered IVF and other assisted reproductive technologies. In 2009, approximately 1 percent of children born in

the U.S. were born by means of assisted reproductive technology.⁶ Women treated with IVF often undergo repeated and expensive cycles attempting to conceive children. The cumulative live birth to women treated with IVF decreases with increasing age.⁷ In the United States 57,569 infants were born in 2006 through IVF.⁸ Success rates vary from as high as 46 percent in women under thirty-five years of age (a third of these women have twins or multiple infants) to as low as 8.4 percent in women between the ages of forty-two and forty-three.

Another ethical problem posed by IVF that is often neglected is the danger this procedure poses to the woman being treated. The health risks to the mother and fetus are significant, including death. In the Netherlands the overall mortality due to IVF has been shown to be higher than the overall maternal mortality rate. The increased mortality is due to multiple pregnancies and ovarian hyper-stimulation syndrome.⁹ In an editorial in the *British Journal of Medicine*, Dr. Susan Bewley noted that in the United Kingdom between 2003 and 2005, there were two deaths due to abortion, whereas there were seven deaths related to complications from IVF. The author suggests that the incidence of IVF-related death is probably significantly higher for two reasons. First, the number of cycles of IVF was a quarter of the number of abortions and yet there was a higher mortality following IVF. Secondly, the reporting of complications from IVF is not mandated by law and therefore leads to under-reporting.

A large cohort study of IVF-treated women in Australia did not show an increase in maternal mortality related to IVF. This study reported maternal deaths by 100,000 women treated. There were 11.7 (95 percent CI 2.9–46.8) deaths per 100,000 women treated. This way of reporting the deaths seems to be flawed. Deaths should have been reported as deaths per 100,000 pregnancies, in which case the maternal mortality rate would have been higher. In the Netherlands the “six deaths were directly related to IVF (6/100,000), 17 deaths were directly related to the IVF pregnancy (42.5/100,000) and eight deaths were neither related to the IVF nor to the IVF-related pregnancy.”¹⁰ The authors of the Netherlands study as well as Dr. Bewley conclude that there is under-reporting of IVF-related mortality.¹¹

Dr. Bewley advocates the establishment of a mandatory registry for complications for IVF in the United Kingdom, full disclosure to women about possible complications of IVF, and the limitation of IVF to single embryo transfer to avoid the risk of multiple pregnancy related patient deaths.¹² She reported an IVF-related death associated with twins as early as 1991, and explains that limited funding for IVF cycles drives the practice of multiple embryo transfer. In the United Kingdom, where state funding is not provided or limited, there is reluctance to accept single-embryo transfer, whereas in Australia and Belgium, where there is ample state funding for IVF, a single-embryo transfer policy has been easier to implement.

In the United States, the United Kingdom, and other countries, the serious risk of multiple pregnancies is overlooked due to the cost of IVF cycles or the despair of women of increasing age who are willing to risk the danger of a multiple pregnancy with the hope of having a child. Were there no other ethical objections to IVF, the life and health of women and implanted embryos would strongly recommend that single-embryo transfer become the standard practice. Establishing a single-embryo policy would reduce the risk of maternal death and the practice of selective reduction in the case of the implantation of multiple embryos.

Another important cause of maternal death related to IVF derives from ovarian hyper-stimulation syndrome. As part of IVF women are given pituitary gonadotropins to stimulate the development and release of multiple follicles. This hyperstimulation of the ovaries is a non-physiological condition, which produces various side effects. In severe cases, it produces a syndrome characterized by massive ovarian enlargement, ascites, pleural effusion, kidney failure, electrolyte imbalance, and hypercoagulation. Like other complications with IVF, there is under-reporting of these risks, but it is estimated that as many as one fourth of women who undergo IVF develop ovarian hyper-stimulation syndrome. According to a Mayo Clinic website, between 1 and 2 percent of all women undergoing ovarian stimulation develop a severe and life-threatening form of this syndrome,¹³ but this figure varies according to others and suggests incomplete reporting. When patients present symptoms of ovarian hyper-stimulation syndrome, their doctors are often reluctant to stop ovarian stimulation for reasons similar to those reasons for doing multiple-embryo transfer. Lack of experience in dealing with ovarian hyper-stimulation syndrome increases the risk of death or life-threatening disease.

There are other serious risks to women undergoing ovarian stimulation with gonadotropins, risks such as ovarian torsion, which sometimes requires removal of the affected ovary; severe abdominal bleeding following rupture of the follicles; and abdominal infections, sometimes requiring surgical management. Some of these are illustrated in anecdotal manner in *Eggsploitation*, an excellent documentary on the unregulated practice of “egg harvesting” from U.S. college women. A review of three decades of IVF surprisingly calls this technique safe, even though it indicates that women who are impregnated with donor oocytes develop the following complications: pregnancy-induced hypertension (preeclampsia) (16 to 40 percent), cesarean section (40 to 76 percent), and gestational diabetes (20 percent).¹⁴ This data contrasts sharply with the following reports for the general population: pregnancy-induced hypertension, 3 to 7 percent¹⁵; cesarean section, 31.8 percent (in the U.S., 2007);¹⁶ and gestational diabetes, 1 to 3 percent.¹⁷

Exposing women to these serious medical risks, including death, without a proportionate reason and often without sufficient disclosure to the women treated constitutes unethical behavior on the part of physi-

cians and owners of IVF clinics. This practice is contrary to the time-honored formulation of the first obligation of a physician “Do no harm.” A woman’s desire to conceive a child must not obscure a physician’s pledge to safeguard his patient’s health and life.

Making Babies

In addition to the possibility of serious health complications and maternal death, the moral consequences of IVF are equally serious. A major one is the instrumentalization of babies, which come into being as the result of a manufacturing process in which they are considered parts and goods subject to quality control and abortion. In fact a large number of the human beings conceived in the process are aborted, some through selective reduction, and many by being discarded or used for research. In the early 1990s pre-implantation genetic diagnosis (PGD) of embryos was begun to identify gene mutations and chromosome abnormalities by amplifying short sequences of DNA through polymerase chain reaction (PCR), and more recently fluorescence *in situ* hybridization (FISH).¹⁸ With these procedures, human embryos that have defects are discarded.

The irony in all this is that babies and children who are already alive are not given homes by those couples who could adopt them, while numerous babies are aborted. The same medical profession that condones abortion is the one that condones the production of babies with IVF, which inevitably leads to many abortions of one-week-old human embryos. Clearly abortion is by far the major reason why IVF is morally reprehensible.

The instruction *Dignitas personae* (2008) of the Congregation for the Doctrine of the Faith reaffirmed earlier teaching of the instruction *Donum vitae* (1987): “Thus the fruit of human generation, from the first moment of its existence, that is to say, from the moment the zygote has formed, demands the unconditional respect that is morally due to the human being in his bodily and spiritual totality. The human being is to be respected and treated as a person from the moment of conception; and therefore from that same moment his rights as a person must be recognized, among which in the first place is the inviolable right of every innocent human being to life.”¹⁹

There are, however, other reasons why IVF is wrong: babies are treated as objects created in a sort of assembly line with the involvement of many different workers and quality control.²⁰ The children born through IVF may have a greater incidence of complications at birth, and an increase in birth defects.²¹ These defects may be associated with the ovarian stimulation protocols or embryo culture environment.²² At present there is incomplete data on this, in part due to insufficient registries. Large-scale systematic studies are needed to clarify the link between genomic imprinting and defects in assisted reproductive technology. The risk for newborn babies is associated with the increased incidence of twin

and multiple pregnancies due to multiple embryo transfer in IVF. Some authors have found that an increase in the practice of single embryo transfer in Belgium resulted in a decrease in twin and multiple pregnancies.²³

There is a growing trend to choose babies according to specifications such as sex²⁴ or maternal IQ. This contrasts with procreation in which a baby is conceived as the mutual gift of husband and wife to each other. The child conceived is the fruit of their love; it is a new person that reflects the love of its parents, not an object. Even more, the child is God's gift to the spouses. If the child has an illness it is still accepted with love as a precious gift rather than discarded as a defective object.

Another reason why IVF is wrong is that, when there is gamete donation and parents do not have access to the history of the donor, the parents raising the child and the child himself may be deprived of information on his family background. Those who trace back their ancestors for a number of generations have a rewarding sense of their heritage and belonging to a family. But every person, even without studying his family tree, likes to know the origin of his immediate family. People like to know about places and activities that have ties to their family. Not everyone is affected by the absence of this information, but people can benefit from the knowledge of diseases which they are at a greater risk of suffering or transmitting. Some countries, such as Britain, Sweden, Norway, the Netherlands, and Switzerland have banned anonymity in sperm and egg donation, but this is not the case in the United States.²⁵ A study in the United States compared 485 adults between the ages of eighteen and forty-five years old who said their mother used a sperm donor to conceive. They were interviewed with a group of 562 young adults who were adopted as infants and 563 young adults who were raised by their biological parents.²⁶ Forty-five percent of those conceived through donor gametes agreed with the statement "The circumstances of my conception bother me." Almost half reported that they think about donor conception at least a few times a week or more often. Forty-five percent were bothered that money was exchanged for them to be conceived.

In vitro fertilization is wrong for another important reason directly related to the treatment of a child as a thing; that is, IVF substitutes for the marital act, the unique loving act of spouses in which God grants a soul to a new human being. Without intending to do away with the marital act, spouses or persons who undergo IVF are saying something quite drastic with their actions: the sexual and procreative act of self-giving of the spouses is no longer necessary. Fatherhood and motherhood, as in the case of ovum donation or surrogate motherhood, can be replaced by technology and sometimes completely excluded even after the birth of a child. Thus the parents are unintentionally redefining the proper expressions of human sexuality and spousal love. As a result of assisted reproductive technology more single women, older couples, and homosexual couples seek to be parents, and often the best interests of children and society are overlooked.²⁷

In *Donum vitae* (*Instruction on Respect for Human Life at its Origins*), the Congregation for the Doctrine of the Faith addressed the legitimate desire of couples to have children: “The desire for a child—or at the very least an openness to the transmission of life—is a necessary prerequisite from the moral point of view for responsible human procreation. But this good intention is not sufficient for making a positive moral evaluation of in vitro fertilization between spouses. The process of IVF and ET must be judged in itself and cannot borrow its definitive moral quality from the totality of conjugal life of which it becomes part nor from the conjugal acts which may precede or follow it.”

Even in cases when destruction of embryos is put aside and IVF is homologous, that is, completed with gametes from both spouses, IVF is still wrong because of what it does to the marital act and the way it treats a new human being. *Donum vitae* continues: “Homologous IVF and ET is brought about outside the bodies of the couple through actions of third parties whose competence and technical activity determine the success of the procedure. Such fertilization entrusts the life and identity of the embryo into the power of doctors and biologists and establishes the domination of technology over the origin and destiny of the human person. Such a relationship of domination is in itself contrary to the dignity and equality that must be common to parents and children.” Physicians should respect the marital bond between spouses, the dignity of the marital act, and the dignity of each human embryo by treating infertility rather than by “making babies.”

Treatment of Infertility with NaProTehonology

Diagnosis and therapy of pathologies which cause infertility or subfertility,²⁸ such as polycystic ovary syndrome and endometriosis, have yielded modest success and are the object of ongoing research. Polycystic ovary syndrome, which is prevalent in as many as 5 to 10 percent of women of reproductive age, is associated with an arrest of follicle growth and anovulatory subfertility.²⁹ Diet modification and weight loss have been found to improve the likelihood of ovulation and pregnancy in women with polycystic ovary syndrome.³⁰ Many patients are not capable of lifestyle modification or weight loss and require drug therapy. Metformin, a second-generation biguanide which reduces insulin resistance, is a standard therapy³¹ and does not exclude lifestyle modification.

Letrozole, an inhibitor of estrogen synthesis, seems to be as effective as clomiphene citrate, an estrogen receptor modulator, for inducing ovulation and achieving pregnancy in women with polycystic ovary syndrome. Gonadotropins and laparoscopic ovarian drilling are second-line interventions when clomiphene alone or clomiphene and metformin together fail to induce ovulation. In vitro fertilization is a third line of intervention, except for some pathologies such as severe endometriosis and tubal damage, in which cases IVF is used sooner.³²

Endometriosis affects as many as 10 percent of women of reproductive age. Many trials of medical therapy, surgical therapy, or combined therapy have been done to treat pain, infertility and other symptoms. Surgical treatment for early-stage endometriosis has produced only a “mild effect” in improving fertility.³³

Over the last few decades Dr. Thomas Hilgers has developed NaProTechnology, an integrated diagnostic and multi-level therapeutic approach to infertility, which excludes IVF. NaProTechnology is a systematic approach to infertility. There are other morally legitimate approaches to infertility besides NaProTechnology, which do not reduce the embryo to an object or exclude the marital act in procreation. NaProTechnology incorporates many conventional treatments for infertility such as ovulation induction or surgery for endometriosis, but NaProTechnology also encompasses NFP fertility-focused intercourse.

In NaProTechnology, patient diagnosis includes a detailed patient observation of events during the menstrual cycle and ovulation. Abnormalities of the reproductive cycle are identified and corrected when it is possible.³⁴ Some of the commonly identified abnormalities associated with female infertility are “decreased production of estrogenic cervical mucus, intermenstrual bleeding or spotting, short or variable luteal phases, and suboptimal levels of the ovarian hormones estrogen and progesterone.”³⁵

Patients, aware of their fertility cycle, work with their physicians to optimize the physiologic conditions for conception. “Common interventions include induction or stimulation of ovulation; medications to enhance cervical mucus production, including vitamin B6, guaifenesin, or one of several antibiotics; and hormonal supplementation in the luteal phase.”³⁶ Doses of medications are adjusted according to the response of biomarkers and mid-luteal serum estrogen and progesterone levels. The timing of intercourse according to ovulation biomarkers such as vulvar mucus has been shown to improve chances of conception.³⁷ During pregnancy patients are often given supplementation of progesterone based on periodic measurements of progesterone levels. Hilgers and others have found that this supplementation reduces pre-term delivery.³⁸

NaProTechnology thus permits accurate diagnosis and treatment of various hormonal imbalances, allowing infertile women to conceive and bear children. With hormonal treatments, and at times surgery, infertile couples are able to achieve pregnancy results comparable to the average for IVF clinics. Similar good results were obtained with NaProTechnology in Ireland by Dr. J. B. Stanford and two family physicians trained in NaProTechnology.³⁹ They studied 1239 infertile couples, of which 1072 had been trying to conceive for at least a year. The average female age was 35.8 years, and the mean duration of attempting to conceive was 5.6 years. The overall live birth rate was 25.5, with higher rates in younger couples.⁴⁰ The most common treatments were

Clomiphene, support of luteal hormone production with human chorionic gonadotropin or progesterone, and medications to enhance the production of cervical mucus. Although specialized surgical treatment can be part of NaProTechnology, it was not included in this study. Fifty-four women (5 percent) conceived without medication, using only the Creighton Model/FertilityCare method to optimize the timing of intercourse. There were thirteen twin births (4.6 percent) and no higher order births. No women in the study developed ovarian hyper-stimulation syndrome.

The results achieved in Stanford's study were comparable with those obtained through assisted reproductive technology, even though in comparison with cohorts treated with assisted reproductive technology the average age of the group studied was older (35.8 years), the time since the last pregnancy was longer (5.6 years), and 33 percent of the women enrolled had previously failed assisted reproductive technology.⁴¹ In other words, with a more similar cohort the expected results for NaProTechnology would be better than for assisted reproductive technology. The number of twins in the Irish study was much lower than in studies with assisted reproductive technology. In the United States, for example, the rate of twin births for assisted reproductive technology was 34 percent in 2003. Thus the maternal and fetal risks, such as preterm delivery and low birth weight associated with twin or multiple pregnancy, are higher in women treated with assisted reproductive technology.⁴²

From the ethical point of view, NaProTechnology seems a good approach to female infertility because it does not expose women or children to unnecessary risks, and it respects their dignity and the nature of marital intercourse. This medical approach also respects the patient because it is oriented towards treating specific disorders rather than sidestepping the physiological problem and attempting to implant human embryos in a woman's uterus. There are, however, ethical considerations that should be asked, such as the following: Should primary-care physicians use Human Chorionic Gonadotropin to induce the ovulation of previously stimulated ovaries or should this be left to reproductive endocrinologists and gynecologists with more experience and capability of monitoring the patient? Is hormonal treatment morally acceptable as treatment for polycystic ovary syndrome, endometriosis, and other causes of infertility? These questions, important as they are, fall out of the scope of this article.

Another consideration concerns the degree of effort involved in learning to chart with the Creighton Model/FertilityCare method. Learning the method requires time and effort, but as with other fertility awareness-based methods, motivated couples can incorporate this method into their everyday lives relatively easily.⁴³

Gamete intra-fallopian transfer (GIFT) is another technique of assisted reproduction in which, after obtaining an ovum by laparoscopy

or transvaginal ultrasound aspiration, the gametes are introduced into the woman's reproductive tract with a catheter in which the sperm and ovum are separated by a bubble so that the union occurs within the woman. Although the moral evaluation of this method continues to be debated by moral theologians, the practice decreased in popularity among fertility specialists during the decade of the 1990s,⁴⁴ and in 2005 accounted for less than 0.05 percent of assisted reproduction in the U.S.⁴⁵

Adoption

In adoption the biological mother treats a child with the respect inherent to a human being. Although the child is given up for adoption, the birth mother recognizes that the life of the child is precious. Unable to care for the child, she gives the child to parents who accept the gift of the new child. Parents who adopt give themselves generously to the new child. They give the child their family name and raise him or her as their own. Sometimes spouses adopt a child who is ill and has special needs or has suffered neglect in his home. Not everyone is capable of adopting, especially adopting disadvantaged children, but adoption highlights the reality that human beings are to be treated with respect and love as human persons, never as objects.

There are generous spouses, who after trying morally acceptable fertility treatments, sometimes turn to IVF. These spouses wish to have offspring with whom to share their lives. Despite these very good intentions they unconsciously see childbearing as a right rather than a gift. They go to all lengths to have a child, forgetting that in the process they are obtaining a child in a way that is not in keeping with the child's innate human dignity.

Many infertile couples are not familiar with ethical medical treatments for infertility. They are also unfamiliar with adoption or consider it to be a last resort. Legal scholar Elizabeth Bartholet describes the social conditioning that makes women think of themselves in terms of fertility, and of parenting in terms of biological parenthood.⁴⁶ This author explains that our "society glorifies procreation and childbirth while it stigmatizes infertility and adoption."⁴⁷ In reality, neither motherhood nor fatherhood is limited to biological parenthood. Infertile couples can form a family through adoption of children. In doing so, a married couple is able to transmit love to the child or children they adopt. In turn, adopted children are a gift that they receive, enabling them to become parents. Thus adoption is an act of love in which a child is considered a gift, not the result of a series of medical and laboratory procedures.

Adoption also serves an important social need: the care and education of children. In 2008 approximately 40 percent of the 4,247,694 children born in the United States were born out of wedlock.⁴⁸ Often they are not conceived in stable families, but their mothers rightly choose to carry them during pregnancy and give birth to them. Many of

these babies are in urgent need of the love and care of generous families. In 2007, there were 133,737 domestic adoptions reported in the United States.⁴⁹

Adoption of children can be a good solution for some infertile couples. Single pregnant women who go to crisis pregnancy centers should be told that giving their child in adoption can be a responsible parenting decision. Sadly, although women's health centers offer women various options, the options (except in pro-life centers) often amount to single parenting and abortion. At the same time, infertile women should be told about adoption as a part of informed consent before accepting treatment for infertility.⁵⁰

Infertile couples often face emotional hardship in finding a child to adopt, in legal obstacles, and in prohibitive costs.⁵¹ The National Council for Adoption provides excellent resources for these couples.⁵² Local pregnancy centers and national organizations like the Nurturing Network can also provide necessary resources for single mothers and infertile couples.⁵³ Respect-life organizations, churches, medical associations, and others should collaborate with adoption advocacy groups, such as the National Council for Adoption, to make adoption an easier and safer option for couples. This could have a big impact in the lives of countless children and reduce the practice of IVF.

Adoption is a beautiful way of building a family, even if it was not initially contemplated. Adoption is a very generous act of fatherhood and motherhood in which the new parents embrace the responsibility of raising and loving one or more children with the inherent life-long sacrifices this entails. In addition, when adopting parents accept the sacrifice of not being able to procreate their own biological offspring, adoption becomes an expression of their mutual love. In many ways adoption is a more demanding fatherhood and motherhood. Spouses often fear adopting a child who may have a propensity to an illness unknown to the family or who has suffered deprivations during pregnancy or his early years. Examination, however, of a large United States database on adopted children indicates that as teenagers they scored better than their counterparts in various social indicators such as school performance, social competency, optimism, and volunteerism. They were less depressed and involved in delinquency than the children of single parents.⁵⁴

It is true that married women who are infertile often face strong social and family pressures to be treated at IVF clinics. We must, therefore, show understanding to people who face these pressures and also realize that not all infertile couples are ready to adopt. However, all are morally obliged to resist the social pressures and personal desires to obtain a child through IVF.

In sum, the desire to have a healthy child, with the least possible deprivations or unknown risk factors, may lead couples or single women

to undergo IVF, which presents grave ethical problems. In addition to the destruction of human embryos, a commonly ignored problem is the serious health risk that IVF poses to women, including the risk of death from ovarian hyperstimulation syndrome and the risks associated with multiple pregnancy. The need for obligatory registry of patients and careful explanation of health risks is paramount to a just and ethical practice of medicine. Another grave moral evil of IVF is the treatment of the human embryo as an object subjected to quality control, manipulation, and destruction. Physicians and the public should be educated about these medical dangers and moral evils.

At the same time, physicians and spouses should be informed about the treatment of female infertility with NaProTechnology. This approach fully respects women without exposing them to unnecessary dangers, and a few studies indicate that it provides them with a pregnancy rate comparable to women treated with IVF. Furthermore, much needs to be done to educate health-care professionals and families about adoption and to facilitate the adoption of children by families.

Notes

¹ In the United States the use of assisted reproductive technology has doubled in frequency in the past decade. See Centers for Disease Control (CDC), *2009 Assisted Reproductive Technology Success Rates: National Summary and Fertility Clinics Report*, http://www.cdc.gov/art/ART2009/PDF/ART_2009_Full.pdf. Assisted reproductive technology, as defined by the CDC, refers to “all clinical treatments and laboratory procedures which include the handling of human oocytes and sperm or embryos with the intent of establishing a pregnancy,” such as in vitro fertilization, intracytoplasmic sperm injection and gamete intrafallopian transfer. This does not include ovarian stimulation with clomiphene, surgical treatment for endometriosis, and other conventional medical treatments. See CDC, *Implementation of the Fertility Clinic Success Rate and Certification Act of 1992*, <http://wwwn.cdc.gov/dls/pdf/art/fro6n098n.pdf>.

² There is debate among proponents of different types of natural family planning with regard to the efficacy of the different methods. The object of this article is not to present objections to specific components of NaProTechnology, such as fertility-focused intercourse.

³ The different methods used to calculate pregnancy and live births after IVF make it difficult to compare results. There is often an overestimation of cumulative pregnancy rates based on the assumption that women who stop IVF before the occurrence of a pregnancy have the same probability of becoming pregnant as those who continue. A.M. Stolwijk et al., “A More Realistic Approach to the Cumulative Pregnancy Rate after In-Vitro Fertilization,” *Human Reproduction* 11 (1996): 660–663, <http://www.ncbi.nlm.nih.gov/pubmed/8671287>.

⁴ In 2001, “The majority of ART procedures used IVF with or without ICSI. Less than 2% of ART procedures used GIFT or ZIFT,” Centers for Disease Control

(CDC), *Assisted Reproductive Technology Surveillance—United States, 2001*, <http://www.cdc.gov/mmwr/preview/mmwrhtml/ss5301a1.htm>.

⁵ Selective reduction, that is, abortion of implanted embryos, reduces the risk of multiple pregnancy and premature births with its associated morbidity. This improves the statistics for IVF at the cost of the lives of many small human embryos.

⁶ CDC, *2009 Assisted Reproductive Technology Success Rates*.

⁷ B.A. Malizia, M.R. Hacker, and A.S. Penzias, "Cumulative Live-Birth Rates after In Vitro Fertilization," *New England Journal of Medicine* 360 (2009): 236–243.

⁸ CDC, *2009 Assisted Reproductive Technology Success Rates*.

⁹ D.D. Braat et al., "Maternal Death Related to IVF in the Netherlands 1984–2008," *Human Reproduction* 25 (2010): 1782–1786.; Susan Bewley, Lin Foo, and Peter Braude, "Adverse Outcomes from IVF," *British Medical Journal* 342 (2011): d436; Suleena Kansal Kalra and Kurt T. Barnhar, "In Vitro Fertilization and Adverse Childhood Outcomes: What We Know, Where We Are Going, and How We Will Get There. A Glimpse into What Lies Behind and Beckons Ahead," *Fertility and Sterility* 95 (2011): 1887–1889.

¹⁰ D.D. Braat et al., "Maternal Death Related to IVF in the Netherlands 1984–2008."

¹¹ Ibid.

¹² Susan Bewley, Philippa Moth, and Yacoub Khalaf, "A Complicated IVF Twin Pregnancy," *Human Reproduction* 25 (2010): 1082–1084.

¹³ Mayo Clinic staff, "Ovarian Hyperstimulation Syndrome : Complications" (2011), <http://www.mayoclinic.com/health/ovarian-hyperstimulation-syndrome-ohss/DS01097/DSECTION=complications>.

¹⁴ Jeff Wang and Mark V. Sauer, "In Vitro Fertilization (IVF): A Review of Three Decades of Clinical Innovation and Technological Advancement," *Therapeutics and Clinical Risk Management* 2 (2006): 355–364.

¹⁵ *Merck Manual*, s.v. "Preeclampsia and Eclampsia" (2010), http://www.ubmed.com/merckmanual/ub/view/Merck-Manual/553519/all/Preeclampsia_and_Eclampsia?q=eclampsia.

¹⁶ Brady E. Hamilton, Joyce A. Martin, and Stephanie J. Ventura, "Births: Preliminary Data for 2007," *National Vital Statistics Report* 57.12 (March 18, 2009), http://www.cdc.gov/nchs/data/nvsr/nvsr57/nvsr57_12.pdf.

¹⁷ *Merck Manual*, s.v. "Diabetes Mellitus in Pregnancy (Gestational Diabetes)" (2011) http://www.ubmed.com/merckmanual/ub/view/Merck-Manual/553933/all/Diabetes_Mellitus_in_Pregnancy_Gestational_Diabetes?q=gestational%20diabetes.

¹⁸ Wang and Sauer, "In Vitro Fertilization (IVF)," 360.

¹⁹ Congregation for the Doctrine of the Faith, *Dignitas personae* (2008), http://www.vatican.va/roman_curia/congregations/cfaith/documents/rc_con_cfaith_doc_20081208_dignitas-personae_en.html.

²⁰ The fact that the process of in vitro fertilization very frequently involves the deliberate destruction of embryos was already noted in the instruction *Donum*

vitae. There were some who maintained that this was due to techniques which were still somewhat imperfect. Subsequent experience has shown, however, that all techniques of in vitro fertilization proceed as if the human embryo were simply a mass of cells to be used, selected, and discarded. Congregation for the Doctrine of the Faith, *Dignitas personae*, n. 14.

²¹ Wang and Sauer, "In Vitro Fertilization (IVF)," 362.

²² *Ibid.*, 360.

²³ D. De Neubourg and J. Gerris, "Single Embryo Transfer—State of the Art," *Reproductive Biomedicine Online* 7 (2003): 615–622.

²⁴ R.R. Sharp et al., "Moral Attitudes and Beliefs among Couples Pursuing PGD for Sex Selection," *Reproductive Biomedicine Online* 7 (2010): 838–847.

²⁵ Elizabeth Marquardt, Glenn D. Norval, and Karen Clark, "My Daddy's Name Is Donor: A New Study of Young Adults Conceived through Sperm Donation," 12, http://www.familyscholars.org/assets/Donor_FINAL.pdf.

²⁶ *Ibid.*, 7.

²⁷ Elizabeth Bartholet, "Beyond Biology: The Politics of Adoption & Reproduction," *Duke Journal of Gender Law & Policy* 2 (1995): 7.

²⁸ Subfertility is defined as a failure to conceive after one year of unprotected regular sexual intercourse, whereas infertility or absolute infertility means no chance of conception. Taylor Alison, "Extent of the Problem," *British Medical Journal* 327 (2003): 434–436. For this article we use the words infertility and subfertility indistinguishably.

²⁹ M.O. Goodarzi et al., "Polycystic Ovary Syndrome: Etiology, Pathogenesis and Diagnosis," *Nature Reviews Endocrinology* 7 (2011): 219–220.

³⁰ A. Badawy and A. Elnashar, "Treatment Options for Polycystic Ovary Syndrome," *International Journal of Women's Health* 3 (2011): 25–35.

³¹ John E. Nestler, "Metformin for the Treatment of the Polycystic Ovary Syndrome," *New England Journal of Medicine* 358 (2008): 47–54.

³² Goodarzi et al., "Polycystic Ovary Syndrome," 226.

³³ Gouri B. Diwadkar and Tommaso Falcone, "Surgical Management of Pain and Infertility, Secondary to Endometriosis," *Seminars in Reproductive Medicine* 29 (2011): 124–129.

³⁴ J.B. Stanford, T.A. Parnell, and P.C. Boyle, "Outcomes from Treatment of Infertility with Natural Procreative Technology in an Irish General Practice," *Journal of the American Board of Family Medicine* 21 (2008): 375–384. Within the next few months Elizabeth Tham, Karen Schliep, and Joseph Stanford will publish another study: "Outcomes of NaProTechnology (NPT) in the Treatment of Infertility and Recurrent Miscarriage in a Canadian Family Practice," *Canadian Family Physician*, in press. In a personal communication I was told that although the series is smaller than the previous one, the results are similar: namely, the rate of cumulative live births was similar as was the rate of twins; no patient had ovarian hyperstimulation syndrome.

³⁵ T.W. Hilgers, "NaPro Technology in Infertility: Evaluation and Treatment," in *The Medical and Surgical Practice of NaProTechnology*, ed. T.W. Hilgers (Omaha, NE: Pope Paul VI Institute Press, 2004): 509–540.

³⁶ Stanford, Parnell, and Boyle, "Outcomes from Treatment of Infertility," 375–384.

³⁷ J.B. Stanford, K.R. Smith, and D.B. Dunson, "Vulvar Mucus Observations and the Probability of Pregnancy," *Obstetrics and Gynecology* 101 (2003): 1285–1293. There is debate and lack of consensus on the effectiveness of fertility-focused intercourse and frequent intercourse, but this falls out of the scope of this article.

³⁸ T.W. Hilgers, "Using Progesterone Support during Pregnancy," in Hilgers, *The Medical and Surgical Practice of NaProTechnology*, 725–746; P.J. Meis et al., "Prevention of Recurrent Preterm Delivery by 17 Alpha-Hydroxyprogesterone Caproate," *New England Journal of Medicine* 348 (2003): 2379–2385.

³⁹ The study protocol was reviewed and approved by the Linacre Centre for Health Care Ethics in London, and the Institutional Review Board for Human Subjects at the University of Utah.

⁴⁰ Stanford, Parnell, and Boyle, "Outcomes from Treatment of Infertility," 375–384.

⁴¹ The authors made their comparisons with patients treated with various types of assisted reproductive technology as one group. They do not distinguish for IVF only.

⁴² CDC, *2009 Assisted Reproductive Technology Success Rates*.

⁴³ Stephen R. Spallone and George R. Bergus, "Fertility Awareness-Based Methods: Another Option for Family Planning," *Journal of the American Board of Family Medicine* 22 (2009): 147–157.

⁴⁴ Wang and Sauer, "In Vitro Fertilization (IVF)," 358.

⁴⁵ *Ibid.*, 359.

⁴⁶ Elizabeth Bartholet, "In Vitro Fertilization: The Construction of Fertility and Parenting," in *Issues in Reproductive Technology I*, ed. Helen B. Holmes (New York: New York University Press, 1992), 255.

⁴⁷ Bartholet, "Beyond Biology," 9.

⁴⁸ See National Center for Health Statistics, "Unmarried Childbearing" (2011), <http://www.cdc.gov/nchs/fastats/unmarry.htm>.

⁴⁹ National Council for Adoption, *Adoption Factbook V* (Alexandria, VA: National Council for Adoption, 2011).

⁵⁰ Donald Clark, letter to the editor regarding "The Infertile Couple," *New England Journal of Medicine* 330 (1994): 1154–1155.

⁵¹ Elizabeth Bartholet argues for the need for reform in adoption laws and policy that will overcome prejudice to interracial adoption and international adoptions. Bartholet, "Beyond Biology," 11–14.

⁵² See National Council for Adoption, <http://www.adoptioncouncil.org>.

⁵³ See the Nurturing Network, <http://www.nurturingnetwork.org>.

⁵⁴ Patrick F. Fagan, "Adoption Works Well: A Synthesis of the Literature," *Research Synthesis* (Family Research Council) (November 2010), 4, <http://www.insideronline.org/summary.cfm?id=13993>; Peter L. Benson, Anu R. Sharma, and Eugene C. Roehlkepartain, *Growing Up Adopted—A Portrait of Adolescents and Their Families* (Minneapolis, MN: Search Institute, 1994).