CONCEPTION & MISCONCEPTIONS:

A Christian Conversation on Reproduction, Infertility, & Reproductive Technologies

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Description

Studies vary concerning the percentage of couples experiencing infertility, but our own experience and the communal narrative in which we live attests to widespread struggle for couples attempting to conceive children. The agony of infertility is complicated by the medical and social choices advanced reproductive technologies have created. Amidst the litany of voices and opinions, what does the Bible say about reproduction, infertility, and reproductive technology? How can we labor as Christians to ensure our ethics are shaped by a Biblical worldview and not merely by pragmatic concerns?

The goal of this course is to facilitate a conversation that is often gestured at, but rarely entered into. My hope is that whether or not you personally struggle with infertility – you will be introduced to a theologically formed ethic placed in dialogue with personal narratives. The goal is that our time together would inform personal decisions, deepen communal dialogue, and give us a lab for practicing applied theology.

Class Goals

(1) The material for this conversation was born out of a local church. As a church, Redeemer Fellowship exists to *"cultivate communities of transformed disciples who live for the glory of God and the good of the city."* As we labor to serve Kansas City – contributing to the welfare of our city in a way that brings glory to the name of Jesus – we must be able to engage winsomely in complex ethical conversations.

I'm working from the assumption that our mission is congruent with your mission as a student in Porterbook and a citizen in Omaha.

Loving, strategic, missional conversaionts require a well-formed worldview; the ability to navigate between facts, feelings, and faith; the ability to disagree humbly without rancor or hostility; and a loving presence that genuinely desires interpersonal communion and the good of another person.

(2) I want to see people throughout the Church think *Christianly* about every facet of their lives. I do not mean that I want people to make overly spiritualized, uninformed, vacuous decisions. In fact, to think *Christianly* is to do the exact opposite! Anselm's motto was "faith seeking understanding." For Anselm, this meant "an active love of God seeking a deeper knowledge of God." To this end, I long to see people in Omaha and beyond who are motivated by a deep love for God seeking a deeper personal knowledge of Him as well as an applied understanding of what it looks like to live in His world. The many and varied personal decisions we face specifically when it comes to infertility and reproductive technology demand depth of prayer, reflection, and informed, loving conversation within the context of community.

(3) As we labor to live *Christianly*, I want us to be able to walk faithfully with others in the midst of pain and suffering. As this pertains to the pain of infertility and the litany of ethical decisions that available reproductive technologies require, I'm praying that God will use this class to cultivate a new depth of empathy in all of us – together with a posture of humble inquiry – as we journey as a church family.

In short, my goals for this class are that God would: grow us as disciples of Jesus, grow us as a loving

community, and grow us as a community of servant missionaries.

BIG ROCKS FOR THIS CLASS

(1) Framing the Conversation

(2) A Biblical Theology of Reproduction, Infertility, & Reproductive Technology

(3) Introduction to Assisted Reproductive Technology (A.R.T.)

(4) Introduction to Christian Ethics

(5) Applied Theology & Ethics: Moving from "Can we ____?" to "How should we _____?"

RECOMMENDED READING*

Appling, Matt. *Plus or Minus: Keeping Your Life, Faith, and Love Together Through Infertility*. Chicago, IL. Moody Publishing, 2015.

Best, Megan. *Fearfully and Wonderfully Made: Ethics and the Beginning of Human Life*. Sydney: Matthias Media, 2012

Glahn, Sandra, and William Cutrer. *The Infertility Companion: Hope and Help for Couples Facing Infertility*. Grand Rapids, MI: Zondervan, 2004.

Glahn, Sandra, and William Cutrer. *When Empty Arms Become a Heavy Burden: Encouragement for Couples Facing Infertility*. Grand Rapids, MI: Kregel Publications, 1996.

Hill, Michael. *The How and Why of Love: An Introduction to Evangelical Ethics*. Kingsford, Australia: Matthias Media, 2002.

Kilner, John Frederic, Gary P. Stewart, William R. Cutrer, Timothy J. Demy, Donal P. O'Mathuna, Paige C. Cunningham, and Linda K. Bevington. *Basic Questions on Sexuality and Reproductive Technology: When is it Right to Intervene?* Grand Rapids, MI: Kregel Publications, 1998.

Mundy, Liza. *Everything Conceivable: How Assisted Reproduction Is Changing Men, Women, and the World*. New York: Alfred A. Knopf, 2007.

**NOTE: I have included in your course materials an extensive (though not exhaustive) Bibliography. There is a lot of great material if you're interested in pursuing this more fully. What I have included here is what I believe to be the best, the most cogent, and the most concise. Additionally, with the exception of Liza Mundy's book, the recommended readings are constructed upon and advance a worldview I would generally adhere to.*

The Embryo and Personhood

Is an embryo a person? Does an embryo have a right to life? How does our understanding of embryos influence our involvement in ART?

These questions are both important and thoroughly contested. Secular and Christian scholars alike have proposed numerous theories about when the right to life begins, based upon various biological, psychological, and philosophical considerations.[1] Although we recognize that a one-page handout necessarily simplifies the complexities of this conversation, we affirm the view that human life and personhood begin at conception, based on scientific and Scriptural evidence.

Scientifically, human life begins as soon as the process of fertilization begins.[2] As the sperm and egg unite, a single-celled zygote is created, and embryologists confirm this is a "new, genetically distinct human organism."[3] The embryo has all of the genetic material necessary for development in the first cell, and thus an embryo is self-directing from the time of conception.[4] Although this human organism does change – from an embryo to fetus, then from infant to adult, it is still a human at every point.[5]

Scripture also affirms the view that humanity begins at conception. Most notably, the incarnation suggests that Christ's human life on earth began in the womb. Robert W. Evans summarizes this view by saying that the life of Jesus "must have begun in his embryonic biological state [because] this is the time at which he was conceived (rather than being created as a fully functioning person) and that such was necessary in order for him to take on true humanity."[6] In Matthew 1:20, the angel announces to Joseph, "do not fear to take Mary as your wife, for *that which is conceived in her* is from the Holy Spirit." These words indicate that the incarnated life of Jesus began at the very moment of conception.[7]

The Psalms also offer many Biblical bases for considering human life in its earliest stages. David emphasizes his relationship with God from the womb, such as in Psalm 22 ("from my mother's womb you have been my God"), Psalm 51 ("in sin did my mother conceive me"), and Psalm 139 ("you knitted me together in my mother's womb").

Finally, the Bible calls us to see all humanity as created in the image of God (Genesis 1:26-27). Evans expounds upon this truth as it applies to our relationship with embryos: "Where human biological life has begun (regardless of its limitations of stage of development), there is God's image. Although each life is differentiated in many ways from the initial moment of conception, even human embryos possess the very nature, value, and dignity of being *imago Dei*."[8]

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[1] While we cannot summarize all of these positions here, they include such theories as self-consciousness, potential self-consciousness, viability, sentience, potential sentience, and similarity. For a thorough discussion of various available theories, see Robert W. Evans (who assesses each theory from a Christian perspective) and DeGrazia (who examines them through a secular lens).

[2] Best notes that very little debate exists about whether an embryo is human life; most conversation involves determining *when* an embryo or fetus should be protected. Other debates center on whether a baby possesses rights individually from the mother.

[3] O'Rahilly and Muller, quoted in Colson and Cameron, 127.

[4] Best, 15.

[5] Colson and Cameron, 126.

[6] R. Evans, 73.

[7] Best, 48.

[8] R. Evans, 76.

Thus, we affirm that embryos are human life created by God, and our decisions involving them should seek to protect them by valuing their creation in the image of God.

A Brief History of Assisted Reproductive Technology (ART)

Although reproductive technologies have existed in some form since ancient times, the science behind modern assisted reproductive technologies (ARTs) did not begin developing until the 18th and 19th centuries, with enormous growth occurring in the late 20th century.

Most early ART experiments involved artificial insemination (AI). The first medical AI was reported in 1790 by John Hunter,[9] and the first live birth from such a procedure was recorded by Dr. James Marion Sims in 1866.[10] One story from 1884 recounts how a doctor in Philadelphia used semen from the "best-looking member" of his medical class to impregnate the wife of an infertile merchant. The doctor revealed the secret to the husband only after a healthy baby was born, and the wife was never informed.[11]

The turn of the 20th century brought several critical advancements in reproductive technology; most importantly, hormones were identified in 1905.[12] Estrogen was extracted for the first time in 1923, and as companies found more efficient ways to produce it synthetically, hormone treatments became possible.[13] However, reproductive treatment was still used sparsely, and it was not until 1950 that the American Society for the Study of Sterility (now the American Society for Reproductive Medicine) began advocating for more widespread societal acceptance of AI and sperm donation.[14]

In the meantime, doctors were pioneering the technology behind in vitro ("in glass") fertilization (IVF). John Rock, a notable pioneer in gynecology, announced in 1944 that he had fertilized four eggs in vitro, but without transferring the embryo into a woman's uterus.[15] Although the entire IVF technique had not yet been perfected, excitement about future possibilities grew, and more fertility clinics opened their doors for hormonal therapy. The 1960s brought huge advances related to reproductive hormones, including the availability of the birth control pill and the development of ovarian-stimulation drugs that would later become Clomid and Pergonal.[16]

In 1978, Louise Brown was born in England as the first IVF baby. Her birth was the result of work by Robert Edwards and Patrick Steptoe, who reportedly conducted gynecological experiments on at least 80 women during the 1970s while working to develop IVF technology.[17] The United States' first IVF baby was born in 1981, and by 1983, around 150 babies had been born via IVF.[18]

[9] Deech and Smajdor, 15.
[10] Best, 329.
[11] Almeling, 25-26.
[12] Spar, 19.
[13] Ibid., 21.
[14] Almeling, 27.
[15] Spar, 21; Mundy, 29.
[16] Spar, 24.
[17] Mundy, 9.
[18] Spar, 28.

IVF grew explosively in the 80s and 90s, enhanced by the technology to freeze extra embryos,[19] the development of an easier egg extraction method,[20] and a procedure called intracytoplasmic sperm injection (ICSI), in which a single sperm is isolated and injected into an egg.[21] The number of IVF clinics in the United States grew from 41 in 1986, to 300 in 1996, to 400 clinics nearly a decade later.[22] In 2005, 135,000 IVF cycles were performed in the U.S. alone.[23]

The enormous increase in IVF has created more demand for related technologies, such as egg donation, sperm donation, and surrogacy. IVF and other fertility treatments have also been credited with a significant rise in multiple births, as the rate of twins nearly doubled from 1980 to 2004.[24] In addition, genetic testing of embryos, or pre-implantation genetic diagnosis (PGD), now allows many IVF parents to screen their embryos for genetic diseases before implanting them.[25] In a relatively short amount of time, then, ARTs have grown from a few isolated experiments into a huge medical and commercial industry with increasing societal importance.

[19] Best, 340.
[20] Mundy, 36.
[21] Ibid., 18.
[22] Ibid., 38.
[23] Ibid., 345.
[24] Ibid. 345.
[25] Ibid., 319.

Basic Overview of Assisted Reproductive Technologies (ARTs)[26]

Below are some of the most common ARTs with basic definitions. Please note this list is not comprehensive, and that some ARTs are used in combination with each other.

Artificial Insemination (AI): an umbrella term for transferring sperm into a woman without intercourse. If the sperm has been donated, the terms used are **Artificial Insemination by Donor (AID) or Donor Insemination (DI).**

Intrauterine insemination (IUI): the most common form of AI. The procedure places semen directly into the woman's uterus to increase the amount of sperm that reach the uterus. IUI is most effective if the woman also uses ovulation-stimulating medicine.

In vitro fertilization (IVF): the name translates "in glass" fertilization, because conception occurs in the laboratory. Usually, egg(s) are taken by needle from the woman and then combined with live male sperm. If fertilized, embryo(s) grow for 3-5 days in the lab before being placed into the uterus.

Ovarian stimulation: hormonal medication that stimulates the ovaries to produce multiple mature eggs. The most common of these medications is Clomid. Ovarian-stimulating medications can be used alone or as part of IVF or IUI treatments.

Egg donation: the process of harvesting eggs from a woman (usually under 35) for another woman who has difficulty producing healthy eggs. The donor usually takes ovarian-stimulating medication before her eggs are harvested. In the U.S., donors are allowed to receive payment for donating eggs.

Surrogacy: Surrogates agree to carry and deliver a baby on the behalf of another mom. There are several forms of surrogacy, including traditional surrogacy (in which the surrogate births her own genetic child on behalf of another) or gestational surrogacy (in which an embryo is transferred into the uterus of the surrogate). In the U.S. it is legal for surrogates to receive payment.

Embryo freezing (embryo cryopreservation): During IVF, multiple eggs are often harvested. If more eggs are successfully fertilized than are implanted, those embryos can be frozen. Because frozen embryos do not deteriorate over time, they can be stored indefinitely (for a fee).

Sperm freezing (sperm cryopreservation): a procedure commonly used for any donated sperm. Freezing sperm before AI prevents the risk of disease transmission.

Egg Freezing (oocyte cryopreservation): a situation in which eggs are harvested from a woman and are frozen *before* being fertilized. This process is sometimes encouraged if a woman is aging and would like to preserve her eggs. The technology has been slower to develop than sperm freezing because of the high water content of eggs.

Intracytoplasmic Sperm Injection (ICSI): the injection of a single sperm into an egg. Often this procedure is used as part of IVF when a man's sperm count is low, or if sperm have abnormal mobility.

Preimplantation Genetic Diagnosis (PGD): the process of screening embryos for genetic disease. Eggs are fertilized in the same way as IVF, but are biopsied before implantation. Typically only embryos unaffected by disease are implanted.

Embryo Adoption: purchasing and using an embryo from a donor, usually from their frozen surplus.

[26] List compiled from Best, Chapter 12; D. Evans, Chapter 5; and Deech and Smajdor, Chapter 1.

Assisted Reproductive Technology according to the Christian Medical and Dental Associations (CMDA)

As Christians, reflection on assisted reproductive technologies (ART) must begin with recognition that each individual, beginning at fertilization, is a unique creation with special worth to God.

Additionally, marriage and the family are the basic social units designed by God. Marriage is a man and a woman making an exclusive commitment for love, companionship, intimacy, spiritual union, and, in most cases, procreation. Children are a gift and responsibility from God to the family. Parents are entrusted with providing and modeling love, nurture, protection and spiritual training.

In addition to natural conception and birth, married couples may choose adoption or seek assisted reproductive technology, especially when they are unable to have children naturally. Adoption emulates God's adoption of us as spiritual children. Many assisted reproductive technologies may be an appropriate expression of mankind's God-given creativity and stewardship. A husband and wife who suffer from infertility should pray together for God's wisdom (James 1:5). They should be encouraged to seek godly counsel and guidance when considering these technologies.

However, while we are sensitive to the heartbreak of infertility, certain assisted reproductive technologies present direct and indirect dangers to sanctity of human life and the family. As technology permits further divergence from normal physiologic reproduction, it can lead to perplexing moral dilemmas. Not every technological procedure is morally justified and some technologies may be justified only in certain circumstances. The moral and medical complexities of assisted reproductive technologies require full disclosure both of the medical options available and their ethical implications.

These principles should guide the development and use of assisted reproductive technologies:

- Fertilization resulting from the union of a wife's egg and her husband's sperm is the biblical design.
- Individual human life begins at fertilization.
- God holds us morally responsible for our reproductive choices.
- ART should not result in embryo loss greater than natural occurrence. This can be achieved with current knowledge and technology. CMDA finds the following consistent with God's design for reproduction:

    - Medical and surgical intervention to assist reproduction (e.g., ovulation-inducing drugs or correcting anatomic abnormalities hindering fertility)
    - Artificial insemination by husband (AIH)
    - Adoption (including embryo adoption)
    - In-vitro fertilization (IVF) with wife's egg and husband's sperm, with subsequent:

        a. Embryo Transfer to wife’s uterus [See Guideline #1]
        See CMDA Statement: The Non-Traditional Family and Use of Adoption of Reproductive Technologies

        b. Zygote intrafallopian transfer (ZIFT) to wife’s fallopian tube

        c. Gamete intrafallopian transfer (GIFT) to wife’s fallopian tube: Cryopreservation

of sperm or eggs

CMDA considers that the following may be morally problematic:

- Introduction of a third party, for example: o Artificial insemination by donor (AID) o The use of donor egg or donor sperm for:
- In-vitro fertilization § Gamete Intrafallopian Transfer § Zygote Intrafallopian Transfer
- Gestational Surrogacy (third party carries child produced by wife's egg and husband's sperm) [See Guideline #2]
- Cryopreservation of Embryos [See Guideline #3]

CMDA opposes the following procedures as inconsistent with God's design for the family:

- Discarding or destroying embryos
- Uterine transfer of excessive numbers of embryos
- Selective abortion (i.e., embryo reduction)
- Destructive experimentation with embryos
- True surrogacy (third party provides the egg and gestation)
- Routine use of Pre-implantation Genetic Diagnosis
- Pre-implantation Genetic Diagnosis done with the intent of discarding or destroying embryos. Conclusion CMDA affirms the need for continued moral scrutiny of developing reproductive technology. We recognize that as physicians we must use our technological capacity within the limits of God's design [See Guideline #2]. Example of appropriate gestational surrogacy: The wife of a couple that has frozen embryos has a change in health status (e.g., loss of her uterus or a major medical problem) that prohibits her from providing gestation. Rather than have their embryos adopted (another acceptable alternative), the couple may choose a gestational surrogate to provide birth to their child. [See Guideline #3]

GUIDELINES FOR CRYOPRESERVATION OF EMBRYOS:

1. Cryopreservation of embryos should be done with the sole intent of future transfer to the genetic mother.

2. The number of embryos produced should be limited to eliminate cryopreservation of excessive numbers of embryos.

3. There should be agreement that all frozen embryos will be eventually transferred back to the genetic mother. Should it become impossible to transfer the frozen embryos to the genetic mother, embryo adoption or gestational surrogacy should be pursued. Approved by the House of Representatives Passed with 37 approvals, 2 opposed, 2 abstentions April 29, 2010. Ridgecrest, North Carolina

Infertility has long been a source of anguish for some married couples (e.g., I Samuel 1). The Bible presents infertility as a condition in which God may choose to intervene (e.g. Hannah, Sarah, Rebecca, Manoah, Elizabeth). God has also granted mankind the ability to gain knowledge and develop technologies to treat our maladies, including infertility. Medical treatment for infertility first became available over 100 years ago with the introduction of artificial insemination, but these practices did not become widely available until the 1960's.

An increase in the incidence of infertility in the modern era has been associated with social factors such as voluntarily delayed child-bearing, the use of contraceptives, and multiple sexual partners with the consequent transmission of diseases which impair fertility. Current estimates are that one out of six couples experience infertility.

Before the 1970's adoption was the common solution for couples facing infertility - a solution encouraged and lauded by society. Some have argued that the decriminalization of abortion in 1973 made it more difficult for infertile couples to find adoptable babies, thus magnifying the anguish of this affliction.

A better understanding of reproductive physiology combined with advances in medical technology led to the development of several methods of assisted reproductive technology (ART). Most notable of these methods involved in vitro fertilization (IVF), the union of sperm and egg outside of the womb (in vitro = in glass). The birth of Louise Brown in England in 1978 (the first IVF baby) heralded a new era in the treatment of infertility. IVF quickly became a growth industry.

As oft occurs, science and medicine adopted new technology with little consideration for ethical/moral appropriateness. As history has demonstrated, just because technology is available does not mean that it is morally justified to use it.

Paradoxically, the advent of IVF has increased the anguish for some infertile couples. Because these technologies are now available (to those who can afford them), couples must make choices about whether to undergo such assistance, how many cycles to attempt, etc. Such additional choices can cause turmoil - socially, financially, relationally, and morally.

Moral/Ethical Questions

Assisted Reproductive Technology (ART) has raised many ethical questions: Is infertility a disease? Is

there a ‘right' to conceive, or to have a baby? What is a family? What is the moral status of gametes (unfertilized egg and sperm), of pre-implantated embryo, and of implanted embryo? The advance of technologies that made these become practical questions occurred at a time when many societies around the world were legalizing the termination of pregnancy as a choice.

In response, the Ethics Commission of the Christian Medical and Dental Society (now Christian Medical & Dental Associations – CMDA) addressed the issue in an Ethical Statement on IN VITRO FERTILIZATION in 1983. Considerable discussion subsequently took place prior to proposal and acceptance of the more nuanced and detailed statement on REPRODUCTIVE TECHNOLOGY adopted in 1990. There was agreement on the biblical principles articulated in the preamble of the 1990 statement, but there was not total agreement on the practical application of these principles, as reflected in the body of the statement. The conclusion encourages "continued moral scrutiny" of this still-developing field. The Ethical Statement has subsequently been refined, most recently in 2010. This document provides background for the Ethical Statement.

Biblical Principles

Reflection on ART possibilities by Christians should begin by recalling the sanctity of human life. Each individual is a unique creation with special worth to God. In addition, God is sovereign. He has ultimate control over who will conceive and bear a child. At the same time, we are stewards of our bodies and our resources. We will be held accountable for how we use the gifts He has given us. Children resulting from that union are a gift from God. Also, Scripture demonstrates God’s approval of adoption by the fact that believers are adopted into His family by their redemption in Christ Jesus (Romans 8:23).

Concerns

One moral concern of Christians regarding ART is the multitude of embryos which do not develop to maturity. While there is a natural attrition of embryos in both natural reproduction and in ART, the specific concern regards the decisions made in the ART process that result in intentional loss of embryos. Disturbing is the number of embryos (early human life) discarded in the process. Also disturbing are the embryos that remain frozen and not implanted as a result of ART. While some debate their moral status, there is nothing scientifically or biblically that denies that these embryos are unique human beings, simply at an early stage of development. Therefore, CMDA has taken the position that human life is to be honored and protected from its beginning at fertilization – whether that fertilization occurs within the mother’s body or in the laboratory.

As mentioned above, normal human reproduction results in the natural loss of a many embryos. After fertilization some embryos do not continue to develop. While the precise loss-rate is not known, it is estimated to be greater than 50%. Artificial reproductive technologies will also result in loss of many embryos. It is CMDA’s opinion that ART procedures should not be chosen that knowing result in a loss-rate of embryos greater than that estimated to occur naturally.

There are other ethical debates beyond the scope of this paper. One example regards the grading of IVF embryos as a determinate for implantation. While we may gain knowledge that guides us to know that certain embryos have no chance of further development (and therefore implantation would be futile), when there is doubt, deference should be given to providing an opportunity for continued development for each embryo.

Future technologies will raise new dilemmas, as well as provide some ethically acceptable solutions. But for Christians, decisions to accept or apply these technologies must first be determined by biblical

instruction. While there will be grey areas requiring discernment guided by prayer and godly counsel, decisions that result in destruction of early human life are not morally acceptable.

Appendix 1: ARTs and Contraception: An Ethical Framework for Christians

	Yes, ethical
	Maybe ethical
	Maybe not ethical
	Not ethical

Appendix 2: Frequently Asked Questions

1. How do those not struggling with infertility walk well with those who are? Vice versa?
2. How do those who are pregnant grieve with those struggling with infertility?
3. Where in the bible can I point to those struggling with infertility?
4. What is God's purpose in reproduction?
5. What does the bible say about how God thinks about infertility?
6. Why should anyone have kids when there are so many needing to be adopted/fostered?
7. When exactly does life begin?
8. How do we biblically plan a family in light of so many unknowns, potential idols and areas out of our control?
9. Why would God put it on my heart to be a parent and have a child of my own if we cannot conceive?
10. How does infertility affect the husband? How does he balance the desire to be "strong" for his wife while sharing in the pain and struggle?

Appendix 3: Glossary of Terms

Taken From *The Infertility Companion*

Adhesion: Adjacent tissues sticking to one another. They can be thin and filmy like plastic wrap or thick, tenacious, and difficult to divide. Adhesions in the abdominal cavity, fallopian tubes, or inside the uterus can interfere with the egg's movement and implantation of the embryo.

Amenorrhea: The absence or abnormal cessation of menstruation.

Artificial Insemination: The process of depositing sperm at the cervix or directly into the uterus (intrauterine insemination, IUI), with the use of a syringe.

ARTs (assisted reproductive technologies): According to the broadest definition (which we use), ARTs are procedures used to bring about conception without sexual intercourse (such as IUI, IVF ICSI, and ZIFT). A more limited definition would include only those procedures that involve handling of eggs and sperm.

Assisted hatching: The use of mechanical or chemical thinning of the outer shell of a fertilized egg prior to embryo transfer to enhance the embryo's ability to more easily divide and implant after transfer.

Azoospermia: The absence of sperm in the seminal fluid.

Basal body temperature (BBT): The body temperature when taken at its lowest point, usually in the morning before getting out of bed. Charting one's BBT is used to predict ovulation.

Beta HCG test (Beta human chorionic gonadotropin test): A blood test given to detect the presence of an early pregnancy and to monitor embryo development.

Biochemical pregnancy: A pregnancy initially determined to be positive via measuring the blood serum HCG (human chorionic gonadotropin) level but that turned negative because the embryo stopped growing.

Bioethics: The morality of health care.

Blastocyst: An early stage of embryo development (reached approximately five days after fertilization). The blastocyst looks like a hollow ball of cells with a secondary cluster of cells on the inner wall at one end. The inner group of cells will develop into the baby, while the outer sphere becomes the supporting structures such as a placenta and amniotic sac.

Cervical mucus: A substance that plugs the opening of the cervix. Usually it prevents sperm and bacteria from entering the womb, but at ovulation, under the influence of estrogen, the mucus becomes thin, watery, and stretchy to allow sperm to pass.

Chromopertubation: The process of injecting colored dye through the fallopian tubes and observing through a laparoscope to determine if the tubes are open or blocked.

Clomid: Clomiphene citrate (also Serophene and Milophene). A fertility drug that stimulates the release of gonadotropins from the pituitary gland.

"Compassionate" transfer: Embryo transfer done at a time in the menstrual cycle that is unlikely to support a pregnancy, using thawed embryos that were cryopreserved.

Conception: Used by many to refer to the moment when sperm fertilizes an egg and when DNA aligns (as in the case of cloning), resting in the creation of a new human being. However, since 1972, the medical dictionaries have defined conception as the time when an embryo implants in the uterus, an even that happens well after fertilization.

Cryopreservation: Freezing a human embryo at super cold temperatures, which puts it in suspended animation, a state in which it can retain its viability for an undetermined length of time.

Danazol: A medication occasionally used to treat endometriosis. It suppresses the production of luteinizing hormone (LH) and follicle stimulating hormone (FSH) by the pituitary and causes a state of amenorrhea, during which the endometrial implants (endometriosis) waste away. Many women experience oily skin, acne, weight gain, abnormal hair growth, deepening of the voice, and muscle cramps with this medication.

DES (diethylstilbestrol): A medication prescribed for several decades to prevent miscarriage. Fetuses exposed in utero to this drug developed numerous problems, including cancer, deformities, and infertility. DES is no longer prescribed for this indication but may be useful prior to conception for improving cervical mucus.

Donor egg (DE): Ovum (or plural, ova) provided by the genetic rather than the biological or "birth" mother. Also refers to the procedure by which an egg from a female donor is mixed with sperm to create an embryo, which is then transferred to the uterus of the woman who will carry it to term (the gestational carrier).

Ectopic pregnancy: A potentially life-threatening situation in which pregnancy takes place outside of the uterus, usually in a fallopian tube.

Egg retrieval: Also called egg harvest. A procedure used (often following superovulation) to obtain eggs from ovarian follicles for use in in vitro fertilization. The procedure may be performed by laparoscopy or by using a transvaginal sonographically guided needle to locate the follicle within the ovary.

Embryo: A human life in its earliest form. An embryo is formed when egg and sperm unite, followed within twenty-four hours by the alignment of their DNA.

Embryo adoption: The release of one's "leftover" cryopreserved embryos for adoption by another (usually infertile) couple. Or from the other side, the process of receiving for thaw and transfer the frozen embryos from another couple. This process often involves home study and legal agreements.

Embryo transfer (ET): The process of placing an egg that was fertilized outside of the womb into a woman's fallopian tube or uterus. Often ET appears in conjunction with in vitro fertilization (IVF) as IVF-ET.

Endometrial ablation: An outpatient surgical procedure to eliminate or reduce bleeding from the uterus by destroying the uterine lining, using heated fluid, electrocautery, or various types of laser.

Endometrial biopsy: A procedure in which the physician collects a sample of the uterine lining for analysis. The biopsy results can confirm ovulation and the proper preparation of the endometrium for implantation.

Endometriosis: A condition in which endometrial tissue forms outside the uterus, sometimes causing pain and infertility.

Fertilization: The process in which the sperm penetrates the egg, resulting in a human embryo when the chromosomes align and activate.

Fertiloscope: A small needlelike scope that goes through the back wall of the vagina into the pelvic cavity. Slightly larger than a large-bore needle, it can be used in the doctor's office in conjunction with local anesthesia. Saline, is injected, allowing the operator to examine parts of the pelvis and ovaries that fall naturally into view. If no adhesions are present, the doctor can see the back of the uterus, the ovaries, and sometimes even into the ends of the fallopian tubes.

Fertinorm HP: A highly purified preparation of follicle-stimulating hormone (FSH), a gonadotropin. Its principal action is the induction of follicular growth in infertile women who do not have primary ovarian failure.

Follicle: Fluid-filled sac in the ovary that contains the egg to be released at ovulation.

Follicular phase: The portion of a woman's cycle prior to ovulation (usually between seven and twenty-one days) during which a follicle grows and high levels of estrogen cause the lining of the uterus to proliferate.

FSH (follicle-stimulating hormone): A pituitary hormone that stimulates sperm, development in the male and follicular development in the female. In both men and woman, elevated levels of this hormone indicate gonadal failure. Brand names in clude Gonal F, Fertinex, Follistim, and Bravelle.

Gestational surrogacy: A third-party reproduction arrangement in which a woman carries to term an embryo to which she is not genetically related.

GIFT (gamete intrafallopian transfer): A procedure in which, following egg retrieval, sperm and eggs are mixed and injected into the fallopian tubes, allowing fertilization to take place in its natural environment.

Gonadotropin-releasing hormone (GnRH; also GnRHa, for Gonadotropin-releasing hormone agonist): A hormone secreted by the hypothalamus approximately every ninety minutes, enabling the pituitary to secrete gonadotropins, such a s luteinizing hormone (LH) and follicle-stimulating hormone (FSH), which stimulate the gonads. See also FSH and LH. Brand names of GnRH agonists include Lupron, Zoladex, and and Synarel.

GnRHa: Gonadotropin-releasing hormone-agonist.

GnRHa analog: Medication that works like a gonadotropin-releasing hormone. It results in an initial stimulation of the pituitary followed by a prolonged suppression of pituitary hormones. It is often used to shut down the natural menstrual cycle before beginning a cycle using assisted reproductive technologies.

HCG (human chorionic gonadotropin): A hormone produced in early pregnancy that signals the corpus luteum to keep producing progesterone. HCG is also injected to trigger ovulation in women and is used to stimulate testosterone production in men. Brand names include Ovidrel, Novarel, Pregnyl, and Profasi.

Heterotopic gestation: A pregnancy in which at least two embryos are present, one being in the uterus and one outside the uterus (ectopic).

HMG (human menopausal gonadotropin): A combination of hormones (LH and FSH) used to induce ovulation in a variety of fertility treatments. (Historically, HMG was collected and purified from the urine of nuns.) Brand names include Pergonal and Repronex.

Host uterus: Also called a "surrogate gestational mother" A couple's embryo is transferred to the uterus of another woman (the "host) who carries the pregnancy to term, having agreed to give the baby to the genetic parents immediately after birth.

Hyperstimulation: Also called superovulation. The use of fertility drugs to stimulate the ovary to produce multiple eggs.

Hyperthyroidism: The overproduction of hormones by he thyroid gland.

Hysterosalpingogram (HSG): A procedure in which dye is injected through the vagina and cervix into the uterus. Once the uterine cavity fills with the dye, if the fallopian tubes are open, the fluid spills into the abdominal cavity. X-ray images may indicate if the tubes are blocked and, if so where. Uterine cavity shape and presence of polyps or fibroids can also be determined.

ICSI (intracytoplasmic sperm injection): A micromanipulation procedure in which a single sperm is injected into the egg. This sometimes allows for fertilization even in the case of low sperm count or non-motile sperm.

Implantation: The embedding of the embryo into the tissue of the uterine wall so it can establish contact with the mother's blood supply. Implantation ideally occurs in the lining of the uterus; in an ectopic pregnancy, however, implantation occurs outside the uterus.

Infertility, primary: The inability to conceive after one year of unprotected intercourse and/or the inability to carry a pregnancy to term.

Infertility, secondary: The inability to conceive or carry to term after having had one or more children.

IUI (Intrauterine insemination): A doctor uses a catheter to place specially treated sperm directly into a women's uterus.

IVF-ET (in vitro fertilization—embryo transfer): The process of surgically removing eggs from a woman (often following superovulation), mixing the eggs with sperm in a culture dish in the laboratory, and later transferring the embryo(s) to the uterus.

Laparoscopy: A procedure in which a small telescope is inserted into an incision in the abdominal wall to view the internal organs. This allows diagnosis and treatment of a number of fertility problems, including endometriosis, abdominal adhesions, and polycystic ovaries. Laparoscopy is also used by some clinics in egg retrieval for IVF and with GIFT (gamete intrafallopian transfer) and ZIFT (zygote intrafallopian transfer) procedures.

LH (luteinizing hormone): A pituitary hormone that stimulates the gonads. LH is necessary for sperm and testosterone production in males and for estrogen production in females. When estrogen reaches its peak, the pituitary releases a surge of LH, which releases the egg from the follicle.

Luteal phase: The postovulatory phase, or second half, of a woman's cycle. During this phase, the corpus luteum produces progesterone, making the uterine lining thicker so it can support the implantation and growth of the embryo.

Luteal phase defect (LPD): A deficiency in the amount of progesterone produced (or in the length of time it is produced) by the corpus luteum. An LPD can render the endometrium unable to sustain a pregnancy.

Male-factor infertility: Infertility in which a male factor is the cause or a contributing cause.

MESA (microscopic epididymal sperm aspiration): The process of harvesting immature sperm by needle aspiration of the existing duct-work, then using micromanipulation for fertilization.

Metrodin: Pure FSH (follicle-stimulating hormone) in injectable form used to stimulate ovulation.

Micromanipulation: Procedures in which fertilization is induced by various methods designed for overcoming infertility. These techniques involve securing or "stabilizing" a harvested egg under the microscope with a special glass instrument and then piercing the egg with a tiny glass "needle" before injecting a single sperm. Micromanipulation also includes "assisted hatching," the use of mechanical or chemical thinning of the outer shell of a fertilized egg prior to embryo transfer to enhance the embryo's ability to more easily divide and implant after transfer.

Milophene: One brand name for clomiphene citrate, a fertility drug that simulates the release of gonadotropins from the pituitary gland.

Morphology: In the context of infertility treatment, the study of the structure of sperm to determine the number or percentage of sperm in a sample that appear to have been formed normally. Sperm that are structured abnormally are kinked or have double heads or boiled tails.

Multifetal pregnancy reduction: The destruction of one or more fetuses in a multiple gestation resulting from an in vitro fertilization procedure. The goal is usually to improve the chances of survival for the remaining embryos, though sometimes it is done to reduce a pregnancy to one embryo when only one child is desired.

Oocyte: An egg before maturation

Ovulation: The release of the mature egg (ovum) from an ovarian follicle.

Ovulation induction: Treatment performed using medication to initiate, or induce, ovulation.

Pergonal: A brand name for human menopausal gonadotropin (HMG). Medication used to replace the pituitary hormones (luteinizing hormone and follicle-stimulating hormone). It is I used to induce ovulation in women and to stimulate sperm production in men.

Polycystic ovarian syndrome (PCOS): Also called Stein-Leventhal syndrome. A condition found in women who don't ovulate regularly, if at all. Characterized by excessive production of male sex hormones (androgens) and the presence of cysts in the ovaries.

Pre-embryo: An ill-defined term sometimes applied to the embryo in the first ten to fourteen days following fertilization.

Preimplantation genetic diagnosis (PGD): A procedure whereby an embryo can be tested for genetic or chromosomal abnormalities before transfer to the uterus. Embryos found to be carriers of genetic disorders are discarded, and only embryos deemed healthy are transferred. For those who consider the human embryo to have the full rights of personhood, this procedure is deemed unethical.

Premature ovarian failure: A condition in which the ovary runs out of follicles before the normal age associated with menopause (forty-five to fifty-two years, on average). Primitive germ cells ultimately provide the 1 to 2 million oocytes that are present in the ovaries at birth. This number is reduced at puberty through cell death to approximately 300,000.

Progesterone: The female sex hormone secreted by the corpus luteum during the second half of a woman's cycle (following ovulation). It thickens the lining of the uterus to prepare it to accept implantation of a fertilized egg and to sustain an ongoing pregnancy.

Prolactin: The hormone produced by the pituitary gland that stimulates production of milk in breastfeeding women. Excessive prolactin levels when a woman is not breastfeeding may result in infertility.

Reproductive cloning: Taking the genetic material from an "adult cell" (such as blood or skin) and placing it into a human egg from which the nucleus has been removed, then stimulating the cell with electrical current or a chemical solution to "switch on" the proper cells for embryonic growth. After growing to the blastocyst stage, the embryo is transferred to the womb, where the embryo can implant and develop. Such cloning for the purpose of creating a child is illegal in many places; it's considered immoral almost universally.

Reproductive endocrinologist (RE): A subspecialist in ob-gyn with advanced training (a fellowship) in reproductive endocrinology and infertility. While the typical ob-gyn resident receives between five and twelve weeks of training focused on infertility, a fellow spends two to three years specializing in reproductive endocrinology after completion of the ob-gyn residency. Following a year of research and after publishing in a fertility medical journal, the subspecialist becomes board eligible in infertility. Then comes a written test and an oral examination to become a board-certified subspecialist in the field of reproductive endocrinology and infertility. Generally, these highly specialized physicians direct IVF clinics.

ROSNI (round spermatic nuclear injection): The process of harvesting immature sperm by needle aspiration from the testes. The resulting sperm can be used in the micromanipulation process.

Selective reduction: The termination of one or more fetuses in a multiple pregnancy, leaving the rest to continue to term. The procedure is usually performed between nine and eleven weeks of pregnancy. The term "selective reduction" is sometimes used interchangeably with "multifetal pregnancy reduction." However, some use "selective reduction" to refer only to those pregnancies in which a specific fetus is targeted for reduction because it has been shown to have an abnormality.

Semenalysis: A laboratory test used to assess semen quality: sperm quantity, concentration, morphology, and motility. It also measures semen volume and can be sued to determine whether infection is present.

Sperm bank: A place where sperm are kept frozen with liquid nitrogen for alter use in artificial insemination.

Sperm count: Also called sperm concentration. The number of sperm in a man's ejaculate, given as the number of sperm per milliliter. The World Health Organization defines a normal sperm count as having 20 million sperm per ejaculate, with 50 percent motility and 60 percent normal morphology (form). The amount of semen in the ejaculation matters, too. If the concentration is less than 20 million sperm per milliliter of ejaculate, it may impair fertility.

Sterility: An irreversible condition that prevents conception.

Superovulation: The medication-induced production of exceptional numbers of human ova (eggs) in one menstrual cycle. Also called hyperstimulation.

Surrogate: A woman who becomes pregnant usually by artificial insemination (traditional surrogacy) or surgical transfer of an embryo (gestational surrogacy) for the purpose of carrying the baby to term for another woman.

Therapeutic cloning: Taking the genetic material from an "adult cell" (such as blood or skin) and placing it into a human egg from which the nucleus has been removed, then stimulating the cell with electrical current or a chemical solution to "switch on" the proper cells for embryonic growth. Once the human embryo reaches the blastocyst stage, its embryonic cells are extracted for use in research, thereby killing the embryo. This differs

from reproductive cloning in that the embryo is sacrificed for science rather than being created with the goal of transferring it to a woman's womb, where the embryo may implant and develop. Both types of cloning violate several ethical principles.

Thyroid: The endocrine gland located in the neck that produces hormones necessary for fertility.

Transfer: Also called embryo transfer (ET). The movement of embryos (whether fresh or thawed from cryopreservation) from a laboratory dish to the uterus following fertilization in an in vitro fertilization cycle.

Transvaginal sonogram: A procedure in which a delicately tapered ultrasound probe is inserted into the vagina to generate dramatic detailed images of the pelvic anatomy.

Tubal irrigation: Process of injecting colored dye through the fallopian tubes and observing with a sonogram the movement of fluid to determine if the tubes are open or blocked.

Undescended testicles: Failure of the testicles to descend from the abdominal cavity into the scrotum by one year of age. If not repaired by age six, permanent fertility loss may result. Also called cryptorchidism.

Varicocele: An enlarged vein in the scrotum

Vasectomy reversal: The attempt to restore the flow of sperm through the vas deferns after surgical sterilization.

VIPPS (Verified Internet Pharmacy Practice Sites): A program in which the National Association of Boards and Pharmacy verifies the licensure of online pharmacies.

ZIFT (zygote intrafallopian transfer): A procedure that involves letting egg and sperm "meet" in a laboratory dish. Resulting embryos are then transferred to a healthy fallopian tube, where they can travel to the uterus.

Zygote: A fertilized egg that has not yet divided.

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Basic Overview of Contraceptive Options

Below are common categories of contraceptives with basic definitions. Please note this list is not comprehensive.

Hormone contraceptives: contraceptives that utilize either a combination of oestrogen and progestin, or contain progestogen only. Includes oral contraceptive pills, progestin-only pills, patches, vaginal rings (*Nuvaring*), and others.

Barrier contraceptives: any contraceptive device that places a physical barrier between sperm and egg. Includes condoms, diaphragms, spermicides, etc.

Intrauterine Devices (IUDs): small, T-shaped devices that are inserted into the uterus by a healthcare provider. IUDs can be copper or hormonal. While their effect is not fully understood, they appear to create an inflammatory reaction in which the body tries to destroy the object and makes it less likely for fertilization to occur. A secondary possibility is that they can prevent the embryo from implanting.

Fertility awareness methods: teaching a woman to know the signs of her fertility. Includes various methods of Natural Family Planning (NFP) and lactation amenorrhea method (LAM), or using breastfeeding strategically to prevent pregnancy.

Male contraceptives: These are still primarily at the research level, but include male hormonal contraceptives and vaccine contraceptives.

Permanent contraception: any procedure that causes sterilization. For females, this includes tubal occlusion ("tying tubes") or hysterectomy; for males, vasectomy.

Emergency contraception: medication taken following a barrier method malfunction or unprotected intercourse. Also called a "morning-after pill."

A note on choosing birth control

According to Dr. Megan Best, "contraceptives usually work in one of three ways:
—By stopping production of eggs
—By preventing the egg and sperm from coming into contact with each other
—Once the embryo has formed, by preventing it from implanting into the uterus."

Best says any birth control method that employs the first two functions is ethically permissible; however, the third function is unethical based on the belief that embryos have a right to life. Best devotes an entire Appendix to discussing and defending her belief that the combined oral contraceptive pill is ethically permissible on these grounds, but she also emphasizes that each person should be prayerful and fully convinced about any birth control method they use. For more detailed explanations on how each method of birth control works, consult Chapter 6 and Appendix I of her book.