# Hormonal Birth Control and Abortifacient Mechanisms

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Abstract

Recently, there has been a growing controversy, especially among evangelicals, over whether the birth control pill might have an abortifacient mechanism that sometimes causes early chemical abortions. An understanding of this controversy necessitates a clear definition of *abortion*, *abortifacient*, *pregnancy*, *implantation*, and especially *personhood*. If a zygote (fertilized egg) is not a person, then it has no fundamental rights and there is essentially no debate concerning the possible link between birth control pills and abortion. There is strong indirect evidence of post-fertilization, or abortive, effects of hormonal birth control. If zygotes are people, and birth control pills do kill them, health professionals and the public, especially Christians, need to be informed about the situation.

# Hormonal Birth Control and Abortifacient Mechanisms

Of the 64 million women in the U.S. who are of childbearing age, 62% of them use some form of contraception. Approximately 31% of women choose not to use contraception for either personal or health-related reasons, because they are trying to conceive, or because they are not sexually active. Only 7% of women who are sexually active do not use any method of contraception (Davidson, London, & Ladewig 2008). There are various types of birth control, including intrauterine devices (IUDs), abstinence, sterilization, barrier methods, natural contraception, and hormonal contraception (Lehne, 2010). Hormonal birth control includes both regular birth control pills (the Pill and the minipill) and emergency contraception, or pills taken after intercourse. Regular birth control pills bear striking similarity to Plan B, a common form of emergency contraception (Anderson, et al., 2006). Recently, there has been a growing controversy, especially among Christians, over whether the common Pill might have an abortifacient mechanism that sometimes causes early chemical abortions (Larimore, 2004). Evidence for the hypothesis that hormonal birth control may have an abortifacient mechanism is indirect and qualitative, but quite strong nonetheless (Alcorn, 2011). (*Qualitative* evidence is generally data that is in the form of pictures, words, or objects, while *quantitative* data is in the concrete form of statistics and numbers (Neill, 2007)). Fortunately, there are effective alternatives to hormonal birth control that are not abortifacient in nature. Informing women of hormonal birth control's probable abortifacient mechanism is warranted (Larimore & Stanford, 2000; Wilson, 2008). A good understanding of the female reproductive system and the fertilization process is needed in order to understand the mechanism of action of various types of hormonal birth

control. Once these processes are understood, exploring the personhood of zygotes (fertilized eggs) will establish the importance of the lives of human persons.

## Medical Terms Defined

### Abortion

Abortion is defined as "premature expulsion from the uterus of the products of conception; termination of pregnancy before the fetus is viable." (http://medical-dictionary.thefreedictionary.com/abortion, para. 10). Abortion includes both spontaneous abortions, or miscarriages, and induced abortions, which are completed intentionally with medication or instruments (http://medical-dictionary.thefreedictionary.com/abortion). (In this paper the definition *abortion* will encompass all abortions except spontaneous abortions).

### Abortifacient

According to http://medical-dictionary.thefreedictionary.com/abortifacient in para. 1, an abortifacient is "an agent that induces abortion." According to this definition, if an agent (chemical or otherwise) works in a way that always, or even just sometimes, causes abortions, it is considered an abortifacient. Defining *abortifacient* is important because hormonal birth control has three primary mechanisms of action, and one of the mechanisms causes abortions. This would make hormonal birth control sometimes work as an abortifacient (Alcorn, 2011).

### Pregnancy

When is a woman considered pregnant? Interestingly, Lehne defined pregnancy as "implantation of a fertilized egg" (2010, p. 747). Choosing definitions so as to make conception, pregnancy, and implantation all synonymous masks the reality that a new life

has begun when an egg is fertilized, producing a zygote, and that any hormone or device that prevents the zygote from implanting can be considered abortifacient (Alcorn, 2011). According to http://medical-dictionary.thefreedictionary.com/pregnancy in para. 1, pregnancy is defined as “the period from conception to birth.”

> After the egg is fertilized by a sperm and then implanted in the lining of the uterus, it develops into the placenta and embryo, and later into a fetus. Pregnancy usually lasts 40 weeks, beginning from the first day of the woman's last menstrual period, and is divided into three trimesters, each lasting three months (http://medical-dictionary.thefreedictionary.com/pregnancy, para. 1).

Therefore, as soon as conception takes place, a woman is pregnant and carries a person inside of her who, if not aborted (either spontaneously or through other means) will grow, be born after about nine months, and continue developing as a person. For the purpose of clarity, *pregnancy* will refer to all pregnancies, whether detected (embryo implants and emits hormones) or undetected (fertilization occurs and zygote is formed). *Detected pregnancy*, on the other hand, will refer to a pregnancy that can be detected (embryo implants and emits hormones).

**Contraceptive**

Historically, a contraceptive has meant a device or hormone that prevents conception, or fertilization, from happening. In other words, a contraceptive has been seen as an agent that prevents the union of egg and sperm. However, recently there has been some confusion regarding terms. As quoted in Randy Alcorn’s book, Dr. Diamond explained the following:

> Prior to 1976, a *contraceptive* was understood to be an agent that prevented union of sperm and ovum. In 1976 the American College of Obstetricians and Gynecologists (ACOG)…changed the definition. A contraceptive now meant anything that prevented implantation of the blastocyst, which occurs six or seven days after fertilization. Conception, as defined by Dorland's Illustrated Medical Dictionary (27th Edition), became "the onset of pregnancy marked by implantation of the blastocyst" (Alcorn, 2011, p. 356).

The important question is whether birth control pills do or do not cause abortions (Alcorn, 2011). Conception refers to fertilization and simultaneous creation of a zygote, and marks the beginning of personhood and the onset of pregnancy. Thus contraception will retain the following historical definition: "diminishing the likelihood of or preventing conception" (http://medical-dictionary.thefreedictionary.com/contraceptive, para. 12). *Abortifacient contraceptives* will refer to modern birth control pills that are erroneously considered to act solely as contraceptives by the redefining of terms (Alcorn, 2011).

Now that various terms have been defined, it is important to understand the mechanisms of action of various types of abortifacient contraceptives. First, determining whether some contraceptives used today really work as contraceptives or if they sometimes also work as abortifacients is important. If they are found to work as abortifacients, determining the next action steps is significant (Alcorn, 2011). Before contraceptives' mechanisms of action can be understood, a discussion of a woman's reproductive cycle and fertilization is helpful.

## A Woman's Reproductive Cycle

### Hormones

Before the mechanisms of various types of birth control pills and their implications can be understood, a woman's reproductive cycle and the process of fertilization are both important concepts to comprehend. Each female reproductive hormone has specific functions. The female reproductive cycle includes ovarian and menstrual cycles, which are controlled through various proportions of reproductive hormones. In response to follicle-stimulating hormone (FSH) and luteinizing hormone (LH) from the pituitary gland, the ovaries produce estrogens, progesterone, and testosterone. There are three major types of estrogen hormones, including estrone, B-estradiol, and estriol, of which B-estriol is the main estrogen. Estrogens have many functions, but in relation to the female reproductive cycle, they assist in the maturation of the ovarian follicles and help the endometrium grow and mature after menstruation. Estrogen also causes contractions in both the uterus and fallopian tubes. Estrogen causes the uterus to become bigger and heavier because of the increased amounts of nutrients such as glycogen, amino acids, electrolytes, water, and the increased blood supply. Estrogens also stimulate the production of LH and decrease the production of FSH (Davidson, et al., 2008).

Another hormone that plays a major role in the reproductive cycle is progesterone. This hormone is secreted predominantly during the secretory phase of menstruation and helps decrease the uterine contractility caused by estrogens, which helps prepare the uterus for implantation after the egg is fertilized. Progesterone also causes the endometrium of the uterus to increase even more its glycogen, blood, and

other nutrient supplies. Progesterone sometimes is called the hormone of pregnancy because it helps maintain a pregnancy by causing the endometrium of the uterus to increase its nutrient supplies. It also prepares the female body in other ways for pregnancy, such as preparing the breasts for lactation (Davidson, et al., 2008).

Estrogen and progesterone are definitely not the only hormones involved in the female reproductive cycle. Gonadotropin-releasing hormone (GnRH) is secreted by the hypothalamus. Other names for GnRH are follicle-stimulating hormone-releasing hormone (FSHRH) and luteinizing hormone-releasing hormone (LHRH) because it causes the anterior pituitary gland to release FSH and LH. Follice-stimulating hormone and LH in turn stimulate the growth of the ovaries (Davidson, et al., 2008).

**Ovarian and Menstrual Cycles**

The female reproductive cycle consists of two separate cycles that occur simultaneously, the ovarian and menstrual cycles. For purposes of clarification, these cycles will be discussed concurrently. The ovarian cycle consists of two phases: the follicular phase (days 1-14) and the luteal phase (days 14-28). The second phase, the luteal phase, is approximately the same in all women (14 days). However, women have differing cycle lengths because the follicular phase differs among women. In the ovarian cycle, FSH and LH contribute to the development and growth of the graafian follicle, which is mature by day 14. As this graafian follicle is maturing, it secretes increasing amounts of estrogen. In the menstrual cycle, this release of estrogen stimulates the proliferative phase in which the endometrium develops and prepares for a fertilized ovum. Just prior to ovulation the graafian follicle secretes the highest amount of estrogen. When the graafian follicle completely matures, ovulation occurs. As the

mature egg ruptures from the graffian follicle, it is drawn into the fallopian tube by the fimbria, which are fingerlike projections on the outer portion of the fallopian tubes. The egg then travels to the ampulla, the outer third of the fallopian tube, which is the primary site of fertilization. It is estimated that the ovum is only fertile for a window of 6-24 hours. The ovum travels to the uterus within 72-96 hours after its release from the ovary. The second part of the ovarian cycle is the luteal phase. This phase begins right after ovulation. Luteinizing hormone causes the ruptured graafian follicle to turn into the corpus luteum (the mass of cells that have been fully luteinized), which secretes progesterone. The release of progesterone causes the endometrium to swell and grow and occurs during the secretory phase of the menstrual cycle. Progesterone also causes the glandular epithelial cells of the uterus to grow and secrete fluid in order to get ready for a fertilized ovum. After ovulation, the entire uterus becomes increasingly vascular to favor implantation (Davidson, et al., 2008).

Then one of two processes occurs. If a fertilized ovum implants in the endometrium, this fertilized ovum secretes human chorionic gonadotropin (hCG), which is necessary for the corpus luteum to continue to exist. If fertilization does not occur, the ischemic phase of the menstrual cycle commences. The corpus luteum degenerates, and thus secretion of both progesterone and estrogen decline. The menstrual phase of the menstrual cycle will then occur. The outer layer of the endometrium sloughs off and exits through the vagina. Above is an abbreviated version of how the ovarian and menstrual cycles work and how together they constitute a woman’s reproductive cycle. Fertilization and implantation occur at a specific time into a woman’s reproductive cycle (Davidson, et al., 2008).

## Beginning of Life: Fertilization to Implantation

Fertilization usually occurs in the outer third of the fallopian tube, known as the ampulla. During intercourse, a man's penis will often ejaculate about 200 to 500 million spermatozoa into the vagina. Of these, mere hundreds successfully travel to the ampulla. Uterine smooth muscle contractions and seminal fructose help propel the sperm to the ampulla. The dual ciliary action of the fallopian tubes helps the ovum and the sperm travel toward each other. The ovum is fertile for only about 6-24 hours after ovulation, while the sperm can survive for 48-72 hours in the female genital tract. However, the sperm are healthiest and most fertile for only 24 hours. The window of fertilization is not very large. Before fertilization can occur, capacitation and the acrosomal reaction must occur. Capacitation is the disintegration of the sperm's glycoprotein coat. The acrosomal reaction follows capacitation and occurs when the sperm releases enzymes that penetrate the ovum's outer wall. Once a sperm penetrates the outer layer of the ovum, the ovum undergoes a reaction that prevents other sperm from penetrating it. True fertilization occurs when the nuclei of the sperm and ovum meet, and the genetic material of another human individual is present. At this stage the fertilized egg is termed a *zygote*. At fertilization the sex of the zygote is determined (Davidson, et al., 2008).

After fertilization, the first 14 days are the *pre-embryonic* stage of the embryo in which the zygote's cells multiply and differentiate. The zygote moves from the ampulla to the uterus, which takes around three days, and then it undergoes rapid division. Soon there is an inner mass of cells called the *blastocyst* surrounded by an outer layer called the *trophoblast*. While the blastocyst in essence floats around in the uterus, it is nourished by various nutrients the uterine glands produce. Soon the trophoblast attaches

to the endometrium for more nourishment. Between 7 and 10 days after fertilization, the blastocyst burrows deep into the uterine lining until it is completely buried. Implantation, also known as nidation, is then complete (Davidson, et al., 2008).

## Overview of Abortion

Certain moral arguments need to be addressed. For those who believe that God is the Creator and Taker of life and who believe that abortion is wrong, the possibility of hormonal birth control causing abortions has definite moral implications (Alcorn, 2011). There is a long-standing debate about the morality of abortion with arguments on each side of the debate. The major focus point is that of personhood. First, two major arguments for abortion are the right to privacy argument and the non-personhood argument (Foreman, 1999).

### Right to Privacy Argument

Those in favor of abortion may argue that a woman has absolute privacy when it comes to deciding what to do with her own body. Generally, people's relationships with their children are private, but there are limits to the right to privacy. For example, if parents are abusing their children, they give up their right to privacy (Foreman, 1999).

Judith Thomson wrote a famous, compelling paper in favor of abortion based on the right to privacy argument. She wrote a scenario in which a famous violinist needs a kidney transplant or he will die. A woman is a perfect match, and she is physically connected to the violinist via a machine so the violinist's blood can be filtered through her kidneys. Thomson argued that just as the woman has a right to choose what to do with her own body and has no obligation to stay attached to the violinist, a pregnant woman is not obligated to continue carrying her child. There are a couple of problems

with this argument. First, this illustration does not take into account the special relationship and duty that a mother has toward her own child. The second problem is that there is a difference between passively letting someone die and actively killing someone. Unhooking the violinist from the machine is analogous to removing him from life-saving measures. He is already dying of kidney disease. Abortion is actively killing a child (Foreman, 1999).

Also, a pro-life advocate would argue that a fetus is not part of a woman's body. It is a completely distinct human being, and not just any human-being, but her own child (Foreman, 1999). A mother has a primae facie duty to protect and care for her own children. Dr. Mark Foreman gave a fitting example (1999). If a mother's three-year-old needs a life-saving measure to stay alive, most people would think there is something wrong with the mother if she left her child to die and argued that she has no duty to protect her child. People have prima facie duties toward their children (Foreman, 1999).

**Non-personhood Argument**

Another major argument that pro-abortionists purport is the most serious and has the most implications if true. The argument is that the fetus is not a person and that therefore it is morally permissible to kill it. John Harris and others argued that while embryos are humans, they are not individual human beings, or persons (Oderberg, 2008). If fetuses are not people, then it is true that abortion would be justifiable in any circumstance (Foreman, 1999). It is quite true that with personhood comes moral rights. According to Lugosi,

> The Supreme Court can define *person* to include all human beings, born and unborn. It chooses not to do so. Science, history and tradition establish that

> unborn humans are, from the time of conception, both persons and human beings, thus strongly supporting an interpretation that the unborn meet the definition of person under the Fourteenth Amendment (Lugosi, 2006, p. 119).

## Personhood

The thought process behind the view that personhood and moral rights are inseparable is that, in general, people can do what they want to inanimate objects and do those objects no moral wrong. If someone dashes his computer to pieces, he has done the computer no moral wrong. However, if this same person dashes another person to pieces he can be charged with the moral wrong of murder (Foreman, 1999). According to Genesis 9:6, it is wrong to murder another person because people are made in the image of God (The Holy Bible, NKJV).

The question is, "When does personhood begin?" The answer to this question directly answers the question about whether abortion in general is right or wrong. There are multiple theories about when personhood begins. Dr. Foreman said that, in general, there are three major positions in this debate: agnostic, gradualist, and decisive moment theories. There are many differing beliefs about what decisive moment marks the beginning of personhood, but Foreman provided good evidence for why one decisive moment theory is the best explanation for the beginning of personhood (Foreman, 1999).

### Agnostic Theory of Personhood

People who hold to the agnostic theory believe that no one can know when personhood begins. They believe that because not everyone agrees exactly when personhood begins, no one can really know, and thus it does not really matter (Foreman, 1999).

**Gradualism Theory of Personhood**

Gradualists believe that personhood does not begin at a certain point. They believe that as a conceptus develops, it becomes more and more a person. Gradualists would argue that a fetus has more rights than an embryo, which has more rights than a zygote (Foreman, 1999).

**Decisive Moment Theories of Personhood**

Decisive moment theories are the last theories to be discussed concerning personhood. There are varying beliefs about what exactly is the decisive moment in which a human organism becomes a person. What all these theories have in common, though, is that they hold that there is a certain point in pregnancy when a person comes into existence. Many, including Foreman, believe that personhood exists at conception. This is the most traditional view of the beginning of personhood, and according to Foreman, the most plausible view as well. There is a completely new life that forms from the sperm and egg. The egg and sperm are separate until they unite. Then the egg and sperm no longer exist. There is a zygote, a new individual with its own genetic code. It only needs food, water, oxygen, and shelter in order to stay alive and develop (Foreman, 1999).

Another point Foreman made is that the new being is the sexual product of human parents which means that it must be human, and personhood is a quality attributed to being human. Also, a zygote, which comes into existence at conception, exists as the same individual through time. The zygote develops into an embryo, fetus, infant, toddler, teenager, and adult, but it was the same person the entire time. There are no “radical breaks” after conception (Foreman, 1999, p. 86). A final reason pointing toward

personhood beginning at conception is the sheer process of elimination. No other decisive moment theories give adequate explanations concerning the beginning of personhood (Foreman, 1999). However, personhood is not simply a biological concept based on science. It is a philosophical concept as well (Foreman, 1999).

There are two major views of personhood: the functionalistic view and the substance view. Proponents of the functionalistic view hold that there are certain functions a being must have in order to be a person. These functions include, but are not limited to, consciousness of the external world, self-consciousness and self-will, rational capacities, emotions, and the ability to communicate (Foreman, 1999).

The other view of personhood is the substance view. Foreman stated that "metaphysically speaking, this new being [conceptus] is a particular kind of *being* with a nature and it is in the process of *becoming* in accordance with that nature. It is not a 'becoming' who is striving toward 'being'" (Foreman, 1999, p. 87). Foreman explained that the new being is not a potential person but is *essentially* a person. He maintained that the new being develops as a person just like sunflower seeds develop as sunflowers and watermelon seeds develop as watermelons (Foreman, 1999). Dr. Francis Beckwith held the substance view, as well.

> The human being is a particular type of substance – a rational moral agent – that remains identical to itself as long as it exists, even if it is not presently exhibiting the functions, behaving in ways, or currently able to immediately exercise these activities that we typically attribute to active and mature rational moral agents (Beckwith, 2007, p. 132).

Beckwith gave the example of a domestic feline and said that even if the feline dies as a kitten and never develops the ability to purr, the kitten will be a feline as long as it exists because it has a certain nature and has the ultimate capacity to develop purring ability. In the same way, a human being who is very young or is disabled and thus does not have the ability to think rationally is still a person because of his nature (Beckwith, 2007).

**Personhood of Zygote**

Wall and Brown (2006) maintained that the zygote (fertilized egg) is not a person. They said that it should not be regarded as a person in the traditional philosophical sense, and they disagreed with the genetic argument that a zygote should be considered a full person. They supported their point by stating wide-scale changes to society they believe would need to take place if zygotes were considered people. Sleasman (2006), on the other hand, took a multi-dimensional approach to understanding personhood. He purported that personhood is granted by God and that is why it should be respected. He then applied this definition of personhood to current debates, including abortion. For those who hold the view that personhood begins at conception, killing any human person after conception would be wrong. Dr. Foreman stated the following:

> From the moment of conception the embryo [or zygote] has a human nature and…will develop and grow in accordance with that nature. The destruction of the life of any innocent human person at any stage of his development without just cause is morally impermissible (Foreman, 2009, p. 29).

## Hormonal and IUD Birth Control Overview

When they hear the words *birth control*, many people think of the *pill*, or oral contraceptives. But birth control pills are not the only form of birth control. The various

types of birth control include IUDs, abstinence, sterilization, natural contraception, barrier methods (e.g., condoms and diaphragms) and hormonal methods (Lehne, 2010). Since some abortifacient contraceptives, namely hormonal birth control and IUDs, may sometimes work as abortifacients, the focus first will be on those contraceptives (Alcorn, 2011).

**Hormonal Contraceptives**

The hormonal methods of birth control include patches, vaginal rings, and birth control pills. Patches and vaginal rings are applied to the skin and in the vagina, respectively; the hormones are then absorbed into the body. There are two primary forms of hormonal oral contraceptives: progesterone-only contraception and combined hormone contraception (Hennefer, 2009). Progesterone-only pills contain only progestins. Combined hormonal contraception, on the other hand, includes both an estrogen and a progestin. The estrogen is either ethinyl estradiol or mestranol, which actually converts to ethinyl estradiol inside the body. Progestins that can be used in the combined oral contraceptive include norethindrone, levonorgestrel, ethynodiol diacetate, norgestrel, desogestrel, norgestimate, and even the new drospirenone. The combined pill has three major effects. One of its effects is suppressing ovulation. A second effect is thickening a woman’s cervical mucus, which helps block sperm from reaching the egg. A third effect is changing the endometrium (inside lining of the uterus), which makes it harder for implantation to occur. However, if the zygote does manage to implant in the endometrium (i.e., the third mechanism of the Pill fails), the hormones are said not to affect the implanted embryo (Lehne, 2010). Progestin-only pills have the same

mechanisms of action as the combination pills except ovulation is inhibited in only about 50% of cycles (Hatcher, et al., 1999).

The failure rate of combined oral contraceptives is defined as “the percentage of women who have an unplanned pregnancy during first year of use” (Lehne, 2010, p. 737). Lehne defined pregnancy as “implantation of a fertilized egg” (2010, p. 747). Choosing definitions so as to make conception, pregnancy, and implantation all synonymous obscures the reality that a new life has begun when an egg is fertilized and that any hormone or device that prevents this new zygote from implanting can be considered abortifacient (Alcorn, 2011). The *perfect use* failure rate, or the failure rate with women who take the pill exactly as they should is usually lower than the *typical use* failure rate, or the failure rate that is observed in women actually taking the pill. The perfect use failure rate of combined oral contraceptives is 0.1%, while the typical use failure rate is 3% (Lehne, 2010). These failure rates predict how many women will have a detected pregnancy while on the combined pill, not how often a zygote is formed and is prevented from implanting in the endometrium, which is the third mechanism of action of the combined pill, as previously stated (Alcorn, 2011). Instead, this failure rate as discussed by Lehne is measured by the failure of each of the combined pill’s three main mechanisms of action, resulting in a detected pregnancy (2010). Therefore loss of zygotes who cannot implant is not indicated in these failure rates, and this is early chemical abortion (Alcorn, 2011).

**Progesterone-only Oral Contraceptives**

The other type of birth control pill is the progestin-only pill, often called the *minipill*. This pill does not contain an estrogen, only a progestin, namely norethindrone

or norgestrel. This pill's mechanism of action is slightly different from the mechanism of action of the combined pills that contain estrogen. The minipill's reduction of fertility is achieved through thickened cervical mucus and changing the endometrium so it is less conducive to implantation. The minipill is a weak inhibitor of ovulation (Lehne, 2010). Most women who take the minipill ovulate. The hostile endometrium preventing implantation is an important mechanism contributing to the efficacy of the minipill. If the first mechanism of the minipill, i.e., cervical mucus thickening, fails, then the question is how often the second mechanism (thinning the endomentrium) prevents a zygote from implanting, which would be considered an early abortion (Alcorn, 2011). It should be noted that if the zygote manages to implant in the endometrium, the estrogen and progesterone are said not to affect the already implanted embryo (Wertheimer, 2000). The percentage of women in whom the zygote manages to implant and in which a detectable pregnancy occurs is the failure rate of the pill. The perfect failure rate is 0.5%, a little higher than the perfect failure rate of combined pills. The typical use failure rate is 3%, the same as for combined pills (Lehne, 2010).

**Intrauterine Devices**

Intrauterine devices are inserted through the vagina into the uterus. They are quite effective, last a long time, and are reversible (Kubba, Guillebaud, Anderson, & MacGregor, 2000). Intrauterine devices are T-shaped and come in two forms: a copper T 380A, which can remain inside the woman for 10 years and the levonorgestrel-releasing intrauterine system, which lasts for 5 years. Intrauterine devices do not prevent ovulation at all. They thicken cervical mucus and cause the endometrium to become involuted, as well as cause an inflammatory response that kills sperm (Lehne, 2010). If the

spermicidal action and cervical mucus thickening mechanisms fail and the remaining mechanism, namely the hostile endometrium, prevails, an abortion occurs. This anti-implantation mechanism is abortive, not contraceptive (Alcorn, 2011). Again, the failure rate, or the detected pregnancy rate, is an indication of how often all the IUD's mechanisms of actions, including the anti-implantation effect, fail. The Copper T 380A and Levonorgestrel T perfect use failure rates are 0.8 and 0.1%, respectively. Their typical use failure rates are <1% and 0.1%, respectively (Lehne, 2010). There are a few other forms of hormonal birth control that can be considered abortifacient (Alcorn, 2011).

**Patches, Vaginal Rings, Injectables**

Other hormonal forms of birth control include the transdermal patch and the vaginal ring, both of which are combined hormonal contraceptives. The only difference between these methods and combined pills is their route of delivery. Thus they have the same anti-implantation effect as do the combined oral contraceptives. The patch and vaginal ring have the same failure rates. Their perfect use failure rates and typical use failure rates are 0.3% and 8%, respectively (Lehne, 2010).

There are three injectable long-acting abortifacient contraceptives. Implanon is a subdermal system that is an injection of etonogestrel, and its mechanisms of action are exactly the same as the combined pills (Lehne, 2010). Norplant was also a subdermal system, but it was taken from the market in 2000 (Watkins, 2010). Depot medroxyprogesterone acetate (DMPA; Depo-Provera) can be injected intramuscularly or subcutaneously, and it has the same mechanism of action as the combined pills. DMPA plus estradiol is the first abortifacient contraceptive to contain both a progestin and an

estrogen. The perfect use and typical use failure rates for Implanon and DMPA (Depo-Provera), are 0.5% and 0.5%, 0.3% and 3%, respectively (Lehne, 2010).

**Emergency Contraception**

There are also several types of emergency contraception, referring to contraception taken after sexual intercourse. One study found that low-dose mifepristone and two regimens of levonorgestrel were very effective as emergency contraception (Hertzen, et al., 2002). Many people recognize emergency contraception under the names of Plan B or RU-486. The terms are often confused, as one study of a university population indicated (Corbett, Mitchell, Taylor, & Kemppainen, 2006). Plan B consists of two high-dose pills of a progestin called levonorgestrel, and it works partly the same way that oral contraceptives taken before intercourse work. Plan B primarily inhibits ovulation, but it can also inhibit fertilization and sometimes prevent implantation (Lehne, 2010). It is notable that Lehne maintained that Plan B is not an abortifacient because it prevents pregnancy, which he defined as beginning after implantation. Note that this does not address the fact that Plan B sometimes prevents implantation of a zygote (Alcorn, 2011). It may prevent detected pregnancies, but it does not *prevent* all pregnancies. RU-486 has more extreme, definite effects. It works up to 49 days after implantation, destroys an already implanted embryo, and is unquestionably an abortifacient (Anderson, et al., 2006). RU 486, or Mifepristone, works by blocking progesterone receptors, which in turn causes the endometrium to break down and the implanted embryo to be pulled away from the endometrium. Mifepristone also dilates the cervix and causes the uterus to contract. These mechanisms result in an early abortion (Lehne, 2010).

## Debate Regarding Abortifacient Mechanism of Hormonal Contraceptives

This issue of anti-implantation (abortifacient) mechanisms of hormonal birth control and IUDs is a hotly debated subject, especially among Christians (Larimore, 2004). Both sides of this issue have been thoroughly canvassed. It is time to look at some of the specific arguments involved.

### Breakthrough Ovulation

A major question concerns how often these abortifacient hormonal contraceptives actually prevent ovulation. If, while a woman is taking hormonal contraception, ovulation (first mechanism) occurs (i.e., breakthrough ovulation) and the second mechanism of cervical mucus thickening fails, the major ethical concern involves whether and how often the third mechanism of preventing implantation of the zygote is successful. If it is successful, it could be ending true pregnancies and preventing detected pregnancies, which occur at implantation (Alcorn, 2011). Breakthrough ovulation obviously occurs at some point because even with perfect use and more so with typical, or imperfect use, women still have detected pregnancies. Although women forgetting to take pills is the most common cause of breakthrough ovulation, factors such as obesity, vomiting, diarrhea, and drug interactions can contribute as well (Fraser & Jansen, 1983). Drug interactions that can decrease the efficacy of the combined pill include rifampin, ritonavir, and various antiepileptics. It should be noted that various herbs can also interact with hormonal contraceptives. For example, St John's Wort is an herb commonly used for depression (Lehne, 2010). Its interactions with oral contraceptives can produce the effects of bleeding and even unwanted pregnancy (Corns, 2003). What then is the true breakthrough ovulation rate of the combined pill (Alcorn, 2011)?

A Dutch gynecologist named Dr. Nine Van der Vange completed an award-winning study that showed that of the women in her study who took low-dose birth control pills, there was proof of breakthrough ovulation in about 4.7% of cycles. This conclusion was based upon ultrasound examinations as well as hormonal markers. She concluded that other factors other than inhibition of ovulation contributed to the efficacy of low-dose oral contraceptive use, including cervical mucus, vaginal pH changes, and changes in the endometrium (Alcorn, 2011).

The failure rates of the various hormonal forms of birth control may actually be higher because the failure rates do not take into account the detected pregnancies that end in elective abortion. After taking into account elective abortions, one national analysis estimated that the percentages of unintended detected pregnancies (this means all three mechanisms have failed, including the anti-implantation effect) in the first year of use are as follows: good compliers, 4%; poor compliers, 8%; and in other women as much as 29%. The rate of unplanned detected pregnancies in users of progestin-only pills is higher than the rate in users of combined pills (Larimore & Stanford, 2000).

**Evidence of Post-fertilization Effects**

There is much indirect evidence supporting the theory that hormonal contraception and IUDs have postfertilization effects, but there is no direct evidence. Direct evidence would mean measuring the rate of fertilization and loss of preembryos (zygotes). This has not been done on women taking oral contraceptives (Larimore & Stanford, 2000). However, there is indirect evidence that hormonal contraception and IUDs have postfertilization effects (Larimore & Stanford, 2000).

**Endometrial alterations.** Oral abortifacient contraceptives affect the endomentrium in various ways. They cause the endometrium to thin and induce wasting and atrophy of the glands. Oral abortifacient contraceptives also make parts of the endometrium edematous and other parts cellularly dense, as well as change the endometrium's protein and biochemical composition (Larimore & Stanford, 2000). It is a widely held belief, although not directly proven, that these changes in the endometrium make it less favorable to implantation of a zygote. The Food and Drug Administration's (FDA's) product information found in the Physicians Desk Reference (PDR) and numerous textbooks list reduction of the likelihood of implantation as the third mechanism of birth control pills (Alcorn, 2011; Larimore & Stanford, 2000). As explained earlier, Lehne mentioned reduction of the likelihood of implantation as a third mechanism of all the hormonal types of birth control (2010). Hatcher also listed the anti-implantation effect as a mechanism of action of the various types of hormonal birth control (Hatcher et al., 1999).

Some studies concerning in vitro fertilization procedures and their success rates in correlation with endometrial thickness are notable. The results of some early studies contradicted each other, but newer, more technical studies have shown that endometrial thickness is related to successful implantation and that if the endometrium is too thin, implantation does not occur. In patients who are having vitro fertilization done, the endometrium must be between 5 and 13 millimeters thick to be able to support a pregnancy successfully. The average thickness of the endometrium of oral contraceptive users is 1.1 millimeters (Larimore & Stanford, 2000).

Another action of oral abortifacient contraceptives is that of changing integrin communication in the endometrium. Integrins are molecules in the endometrium that are indicators of endometrial receptivity to implantation of a zygote. They are also markers of normal fertility and are missing in people with unexplained infertility and other disorders of the reproductive organs. The fact that oral contraceptives have been shown to alter integrin communication greatly is good evidence for the hypothesis that loss of zygotes or preembryos result from anti-implantation effects of oral abortifacient contraceptives. Some people have argued that after breakthrough ovulation occurs, ovarian and blastocyst synthesis of steroid hormones could in effect turn on the endometrium and cause it to become normal before the zygote attempts to implant. However, this idea has no scientific basis. Studies have shown that it takes multiple cycles for a woman's menstrual flow to reach normal amounts after she discontinues oral abortifacient contraceptive use. Also, in women who ovulated after missing two low-dose oral abortifacient contraceptives, in the luteal phase of the ovulatory cycle the endometrium was actually nonsecretory (Larimore & Stanford, 2000).

**Intrauterine versus extrauterine pregnancy rates.** One argument is that if there are no postfertilization, or abortifacient, effects of the pill, then the reduced rate of intrauterine pregnancy (in the uterus) should be equal to the reduced rate of extrauterine pregnancy (in the tubes or otherwise outside the uterus). The ectopic pregnancy rate being significantly higher than the intrauterine pregnancy rate would be strong evidence that the pill is acting in an abortifacient manner. This is because conception has taken place in both ectopic pregnancies and intrauterine pregnancies. Hormonal birth control has anti-implantation effects on the uterine lining, not the lining of the tubes or elsewhere outside

the uterus. Fewer detected pregnancies (i.e., pregnancies after the zygote successfully implants) than ectopic pregnancies implies that there are conceptions taking place that are not able to implant due to post-fertilization, or anti-implantation effects of hormonal contraception. There are at least two studies that have shown that there is an increased rate of ectopic pregnancies versus intrauterine pregnancies in women taking the pill (Larimore, 2004). These studies involved 484 women with ectopic pregnancies and another 389 controls (women who had detectable pregnancy while on the pill). Secular researchers who looked over the studies said that they believed the data pointed toward the pill having a postfertilization or abortifacient effect (Larimore, 2004).

**Qualitative data**. Many proponents of the hormonal contraceptive-abortifacient hypothesis (i.e., that hormonal contraceptives have an intended and effective abortifacient mechanism) believe that the evidence for their hypothesis is quite strong. However, both sides would agree that the evidence is qualitative rather than quantitative. There is not enough data to be able to estimate very well any exact numbers concerning the pill's apparent abortifacient effect (Larimore, 2004). Thus, in conclusion, the pill does seem to have an abortifacient effect, at least some of the time in some women. Estimating the exact occurrence of loss of preembryonic life is just speculation at this point. However, since the loss of some life with hormonal contraceptives is probable, the next question is what should be done with this knowledge (Alcorn, 2011).

## Non-hormonal, Non-abortifacient Alternatives

### Natural Family Planning (NFP)

According to Dr. Larimore, there is an old joke about NFP that goes like this: "What do you call a couple who uses the rhythm method for birth control?" The answer,

"Parents!" (Larimore, 2004, Natural Family Planning section, para. 2). Actually, modern NFP is very effective. One meta-analysis showed that one form of NFP called the NaPro' method, developed at Creighton University, actually prevents pregnancy more effectively than the Pill (Larimore, 2004). (The NaPro' method is natural procreative technology in which fertility care teachers help couples track various biological markers of fertility (NaPro Fertility Care, n.d.)). In this meta-analysis, five studies tracked 1,876 couples who used the NaPro' method for over a year. At the 12-month mark, efficacy rates for both the method and use effectiveness were 99.5 and 96.8, respectively. At the 18-month mark, they were 99.5 and 96.4. There was another study performed on 701 couples at a hospital clinic in Houston that show the great efficacy of the NaPro' method and how it was similarly effective in women who were breastfeeding, recently stopped taking the Pill, had regular menstrual cycles, or had irregular menstrual cycles (Larimore, 2004). There is also another form of NFP called the Billings Ovulation Method, which involves assessing cervical mucus throughout the menstrual cycle (Davidson, et al., 2008). This method is simple and is taught to couples around the world, even those who are illiterate (Larimore, 2004). There are many other types of non-hormonal contraceptives besides NFP. They all have varying rates of efficacy. Safety, personal preference, and efficacy are all important to consider when choosing a contraceptive (Lehne, 2010).

**Abstinence, Sterilization, Barrier, and Hormonal Methods**

There are a few more non-hormonal, non-abortifacient alternatives, some of which are more practical than others. Abstinence is one hundred percent effective contraception, although, of course, it is not a viable option for many people. Sterilization

is another option. This is not a viable option for people who want to use contraception temporarily, but it is the most popular method chosen by those over 35 years old in some developed countries. Female sterilization is somewhat riskier than male sterilization. Natural methods include avoiding sexual intercourse during ovulation. This can be done by timing cycles by a calendar or by changes in temperature or mucous discharge. Many couples find this technique difficult to follow (Kubba, et al., 2000). However, as mentioned before, new methods of NFP are much more effective than they have been in the past (Larimore, 2004). Other methods include condoms, diaphragms, cervical caps, spermicides, and spermicidal sponges (Lehne, 2010).

There are herbal methods of birth control, as well. Herbal contraception has generally been used when medical contraception is not available, but it is not known how often these methods are still used today. Some herbs are believed to work as contraceptives, and others are believed to work as abortifacients. Scientific research has been done on this subject with rats and mice, but little research has been conducted on humans because of the possible harmful effects (Breuner, 2005). One important aspect of this issue remains to be discussed in light of the probability of the abortifacient effects associated with hormonal contraceptives. This aspect is that of informed consent (Larimore & Stanford, 2000).

## Informed Consent

Informed consent is vital for the millions of women who use hormonal contraceptives. Women who believe that human life and personhood begin at conception have a right to know about the possibility of hormonal contraception having post-fertilization (abortifacient) effects on their preembryonic children (zygotes). This

knowledge empowers them to make educated decisions in alignment with their morals. Some people in the medical field insist that this information does not need to be included in informed consent unless there is direct proof that this mechanism occurs and/or it is a common effect of the Pill. However, Larimore and Stanford pointed out that rare events or side effects of medical procedures or medications are always presented to patients if patients regard these effects to be important. For example, even though anesthesia-related deaths are only 1:25,000, the possibility of death is presented because this effect is deemed important to patients. If a woman chooses to take the Pill but would have made a different decision had she been informed about its apparent abortifacient mechanism, it can be argued that her autonomy has been thwarted (Larimore & Standford, 2000).

Providers often present hormonal methods of contraception as viable options while offering little to no education as to their method of action. Informed consent necessitates that those consenting be fully informed prior to consent. Addressing all methods of action of hormonal contraceptives is vital so that women can make choices in alignment with their moral and ethical beliefs. In a study in which 848 Spanish women, ages 18-49, were surveyed, 39% of those using some form of birth control method said that their provider had not talked about how the method worked (Burgo, Fez, Osorio, Guzman, & Irala, 2010). Family planning programs should be based on autonomy and informed choice, according to the United States Agency for International Development. The World Health Organization has guidelines for providing informed consent regarding family planning methods. Information that should be taught includes a method's effectiveness, correct use, side-effects, *mechanism of action*, and reversibility, as well as protection against various sexually transmitted diseases. Often while performing client

teaching, clinicians may spend less time on information regarding mechanism of action (Burgo et al., 2010).

What do women say about the evidence pointing toward hormonal contraception having post-fertilization effects? A study involving numerous clinics in Utah and Oklahoma found that 53% of women said that they would not use a family planning method which included post-fertilization effects. In the large-scale study of Spanish women, 45% of the women said that they would not consider using a birth control method that had post-fertilization effects, and 48% of women said that if they found out they were using a method that had post-fertilization effects, they would stop using that method. Women who were more likely to have objections to using a family planning method with post-fertilization effects were married women, women who practiced a religion, and women who believed that human life begins at conception. Since such a large percentage of women base their choice of family planning methods on their beliefs about mechanism of action, thorough education about hormonal birth control methods and IUDs is imperative in order for women to be able to make wholly informed choices (Burgo et al., 2010).

## Conclusion

This controversy over whether or not the Pill causes early abortions of preembryonic (i.e., zygotes) people is growing (Larimore, 2004). What can be concluded at this point? The research presented in this paper gives much evidence that the Pill does, in fact, have an abortifacient mechanism, that is, that it makes implantation much less likely for a zygote should the first two mechanisms of the Pill fail. This would appear to be early chemical abortion (Alcorn, 2011). It would seem that people who believe life

begins at conception should not use the Pill in light of current research data. There are very effective non-hormonal contraceptive alternatives to the Pill, and thus for now, people who believe human life and personhood begin at conception and that all persons have the right to life, should explore alternative non-abortifacient contraceptives such as natural family planning (Larimore, 2004). Furthermore, women needed to be thoroughly educated regarding the mechanisms of action of hormonal birth control so they can make completely informed decisions regarding the lives of their preborn children. God's Word, the Bible, says, "I call heaven and earth as witnesses against you today, that I have set before you life and death, blessing and cursing. Therefore choose life, that you and your offspring may live" (Deuteronomy 30:19, NKJV).

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