The Biological and Sociological Mechanisms Affecting the Development of Male Hormonal Contraception

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Abstract

Hormonal contraception is still not commercially available to men even though pharmacological mechanisms used for inhibiting spermatogenesis have been adapted through the use of androgen and progestin therapy, which is the same pharmacological mechanism used to inhibit fertility in women (Grimes et. al. 1999). This paper details the similarities and differences of the implications of these pharmacological mechanisms in the male and female bodies, as well as analyzes the sociologically contrived perception of reproductive responsibility in women in comparison to men. It is concluded here that sociological rather than physiological limitations are to blame for the lack of commercial availability of a male hormonal contraception, and that the availability of male hormonal contraception will aide in equalizing the reproductive responsibility of men and women.

Introduction

Contraceptive use allows men and women the ability to engage in physical relationships with each other without the consequence of pregnancy (Jain and Muralidhar 2012). The ability for partners to practice family planning results in better allocation of familial resources, which allows more financial success, as well as lower abortion rates, which protects the health of the pregnant woman (Bernstein and Jones 2019). Primitive forms of contraception have been used for generations, however in the 20th century the market for reliable contraception skyrocketed (Grimes et. al. 1999). Currently eleven methods of contraception are commercially available to women, which is over ten times the two methods available to men— the condom and the vasectomy (Campo-Engelstein 2012). Of the eleven types of female contraception, the most

popular methods are hormone based, while there are still no hormonal contraceptives commercially available to men.

The first hormonal contraceptives for women became commercially available in the 1960s, with the development of an oral contraceptive colloquially known as "the pill" (Grimes et. al.). From the 1960s to the modern era "the pill," which is a steroid treatment usually synthesized by specific concentrations of estrogen and progestin to cause reversible infertility, became the most notorious and widely used form of family planning in the United States (Grimes et. al.; Littlejohn 2013).

The development of a male hormonal contraception began in the 1970s, however nearly fifty years later there are no commercially available hormonal contraception methods for men (Festin et. al. 2016). Clinical trials have explored the use of androgens and progestin to reversibly limit sperm counts by inhibiting spermiogenesis, the development of mature sperm cells, to great success (Festin et. al.). The use of androgens and progestin in male hormonal contraception mirrors the use of estrogens and progestin in female birth control, and both treatments inhibit the same gonadotrophins—luteinizing hormone and follicle stimulating hormone (Festin et. al.). Though the differences between the male and female reproductive systems are vast, the hormone treatments that can bring on temporary infertility are not, yet there are still no hormonal contraceptives available to men.

The lack of commercial accessibility of male hormonal contraception is not due to biological or pharmacological limitations based on the complexity of the male reproductive system, but rather is based off of sociological factors that put the majority of the burden of reproductive responsibility on women rather than their male counterparts. Even though

contraceptive use benefits both men and women, women contribute more to the gestation and development of children than men do in both a biological and traditionally social way, and therefore there are greater consequences facing women who experience unplanned pregnancy—consequences that are not equal between the males and females even though the sex act to create a child is equal in responsibility. For many women, the burdens that come along with taking of hormonal contraception are worth the absence of the emotional and physical burden of an unplanned pregnancy, while for men, those burdens may not be worth it. The lack of development of hormonal birth control for men has not stemmed from lack of biological resources or knowledge, it has come stemmed from the lack of incentive to equalize the reproductive responsibility of men and women.

Reproductive Responsibility

The modernization of male and female roles in society has led to greater equalization between the two genders, and this equalization of responsibility has not failed to reach that of parental roles. Now more than ever, men are staying home with their children and embracing the childcare aspect of fatherhood. While the responsibilities associated with fatherhood have changed, the responsibilities associated with preventing unplanned pregnancy have not, since only two methods of contraception are available to men (Campo-Engelstein 2012). Since there are so little contraceptive options for men, many men rely on women to bear contraceptive responsibility. This lack of control of their own contraceptive use is problematic because when sexual relations result in unplanned pregnancy, it is the woman who generally retains the right to determine whether she will have an abortion, keep the baby, or give the baby up for adoption.

Men therefore have limited control over whether or not they will become a father, and that may seem unfair, however it can be justified by the reality that it is the woman's body that must carry a child to term for 9 months and that only 17% of single-parents who have primary custody of their children are men (United States Census). Pregnancy does not have a biological effect on a man's body, nor does it seem likely a man will become a primary caregiver of an unplanned child, so therefore pregnancy as a whole can be seen as less lifechanging to men as it is to women. Because women seem to take on more on the burden of consequences of an unplanned pregnancy, it makes sense that the market for new mechanisms of contraception is skewed towards women.

Even though many contraceptive methods are available for women, each method is far from perfect. Research indicates that some women go through cycles of taking their contraceptives and refusing to take their contraceptives due to severity of side effects (Littlejohn 2013). Weight gain and mood swings have been found to be especially damaging to the female psyche because of societal expectations about what women should look and act like (Littlejohn). These cycles of taking and refusing contraceptive use often do not correlate with women's behavioral cycles of sexual activity, so therefore these women put themselves and their partners at risk of unplanned pregnancy in order to relieve the physical and psychological effects that hormonal contraception has on them (Littlejohn). This practice proves that the burdens of taking hormonal contraception have the potential to severely affect women in a negative way, and they are indicative that men are not as safe from unplanned pregnancy as they may think they are if they believe their partners are consistently using hormonal contraception while they may in fact not be.

While female hormonal contraceptives have their issues, most pharmaceutical companies focus their resources on developing more alternative methods of contraception for women to ease the burden of contraceptive use, rather than developing novel contraceptive methods for men, which would give women the reproductive option to trust their partners with contraceptive responsibility. This could be explained because according to one study, most men actually do believe that they should have an equal share of contraceptive responsibility as women, however 70% of those questioned were reluctant to express that they would be able to withstand the side effects of a hormonal contraceptive (Eberhardt et. al. 2009). Since pharmaceutical companies only get a handful of drugs approved each year by the Food and Drug Administration (FDA), it is in the best financial interest of those companies to fund research on drugs that they will think will be commonly used by society. The evidence showing that contraception is valued as more important to women over men explains why these drug companies may believe they are wasting their time creating a hormonal contraceptive for men. In order for male hormonal contraception to be successfully approved by the FDA, the importance of the equalization of contraceptive and reproductive responsibility must be embraced by society.

Mechanism of Male Hormonal Contraception

The mechanism of male hormonal contraception serves primarily to inhibit spermatogenesis. Spermatogenesis is the development of mature sex cells in males, and it begins at the start of puberty when the anterior pituitary gland (APG) is signaled by gonadotrophin releasing hormone (GnRH) to begin releasing follicle stimulating hormone (FSH) and luteinizing hormone (LH) (Festin et. al. 2016). FSH serves to induce activity in sertoli cells,

which nourish sperm cells and facilitate spermatogenesis. This nourishment is aided by testosterone, which is released due to the effect of LH on Leydig cells in the testes, as well as progesterone which has a smaller yet still important role in spermatogenesis and testosterone biosynthesis (Gava and Meriggiola 2019). While testosterone has a stimulatory effect on spermatogenesis, it is also part of a negative feedback loop. When sperm counts and testosterone levels get too high, testosterone inhibits the activity of the GnRH and the APG, therefore inhibiting release of FSH and LH (Gava and Meriggiola). This negative feedback loop allows for regulated spermatozoa formation throughout the entirety of a male's life.

The adaptation of male hormonal contraception has taken advantage of this negative feedback loop by introducing higher levels of testosterone and progestin, the artificial form of progesterone, in the body (Festin et. al.). Administration of additional testosterone into the male specimen turns on the negative feedback loop and inhibits spermatogenesis while still allowing testosterone to feed into secondary sex characteristics such as the characteristic deep voice, hair growth, and muscle tone in men (Gava and Meriggiola). While testosterone alone has proven to be efficient in inhibiting spermatogenesis, the addition of progestin has been found to lead to faster rates of spermatogenesis as well as lower concentrations of testosterone needed to be used to achieve that same inhibitory results (Festin et. al.; Gava and Meriggiola; Oettel and Mukhopadhyay 2004). Different types and concentrations of testosterone and progestin are being used to develop male hormonal contraception, and even though each variation of the drug has its differences, they all serve to add to the negative feedback pathway between the hypothalamus, anterior pituitary gland, and testes.

Adapted methods of administration created for male hormonal contraception are injection, implantation, and transdermal application (Gava and Meriggiola). Oral contraceptives have been tested; however, they have failed to pass to further levels of drug testing due to ineffective absorption rates for daily use, and the causing of hepatoxicity (chemically driven liver damage) (Gava and Meriggiola). These alternative methods must be administered on a weekly or monthly basis to allow for continuation of sterility (Festin et. al.).

Side effects of hormonal administration of contraception for men have been recorded to be weight gain, acne, libido changes, fatigue, and mood changes (Festin et. al.). Prominence of side effects has been a factor in the suspension of many studies of male hormonal contraception, especially due to the moderate to severe mood swings men were experiencing (Gava and Meriggiola).

Comparison to Female Hormonal Contraception

The development of mature female oocytes is based off of the same hormonal axis as the development of mature male sperm cells; GnRH, LH, and FSH. When a female reaches puberty, GnRH triggers the APG to release PSH and LH (Grimes et. al. 1999). FSH serves to develop the follicles in the ovaries, which in turn allows estrogen to be released (Grimes et. al.). These follicles hold secondary oocytes, and one secondary oocyte a month will reach the tertiary follicle phase to break out of the follicle and be ovulated (Grimes et. al.). Ovulation is prompted by LH and causes the secondary oocyte to be released from the ovaries and travel down the fallopian tubes into the uterus, where it has the potential to be fertilized (Grimes et. al.). In the ovaries the ruptured tertiary follicle transforms into the corpus luteum, a hormonal structure which releases progesterone and more estrogen (Grimes et. al.). Progesterone and

estrogen serve to prepare the uterus for fertilization and allow uterine lining to grow and become nutrient rich (Nichols H. 2014). If fertilization does not take place, progesterone and estrogen levels drop which causes the female body to excrete the lining during menstruation.

Female hormonal contraception uses the same pharmacological mixture of androgens and progestin as male hormonal contraception does, except the androgen used in female hormonal contraception is estrogen as opposed to testosterone (Grimes et. al.). In the same hormonal axis as male hormonal contraception, in female hormonal contraception the increased levels of the androgen estrogen participate in a negative feedback loop that inhibits GnRH, which inhibits the release of FSH and LH from the APG (Grimes et. al.).

Since female hormonal contraception inhibits FSH and LH, this causes the follicles in the ovaries to never become developed and ovulation to never take place, so the secondary oocyte is never released (Grimes et.al.). The follicle therefore never transforms into the corpus luteum, and therefore the corpus luteum does not secrete progesterone (Grimes et. al.). Progestin in the form of hormonal contraception steps in to mimic progesterone and keeps the lining of the uterus in a constant state of high nutrients. This state of high nutrients makes the lining very thick and full of blood vessels, which decreases sperm mobility (Grimes et. al.).

There are many different hormonal contraceptive options for women which vary chemically by dosage and synthesis, and mechanically by administration. Many contraceptive types such as implants, shots, and the intrauterine device (IUD) provide a consistent influx of estrogen and progestin to the body over the course of months, maintaining that rich uterine lining (Grimes et. al.). Other types of contraception, such as oral contraception, typically methodize 21-day cycles of estrogen-progestin maintenance, followed by 7 days of placebo pills

which decrease estrogen and allow the uterine lining to shed while still inhibiting ovulation (Grimes et. al.).

Side effects of hormonal contraception for females include weight gain, headaches, decreased libido, and mood swings (Littlejohn). These side effects are again very similar to the side effects seen in men participating in clinical trials of male hormonal contraception. Another know risk of hormonal contraception for women is the increased incidence of blood clots, heart attack and stroke (Littlejohn).

Critiques of Male Hormonal Contraception

Like most other drugs, the types of male hormonal birth control being tested are not perfect. In order to understand the lack of commercial availability for methods of male hormonal contraception, a deep understanding of the critiques of male hormonal contraception, as well as how these critiques hold up against similar aspects of female hormonal contraception is necessary.

The male spermatogenic cycle is 75 days, and because of this there is an associated delayed onset the contraceptive effects of male hormonal contraception (Handelsman et. al. 2005). In order to reach clinical infertility, men must reach either azoospermia, which entails no sperm counts in ejaculate, or oligozoospermia, which entails a sperm count of less than 1 million per milliliter ejaculate (Festin et. al.). Information found through the large-scale World Health Organization database of male hormonal contraceptive studies found that in treatments containing just androgens, sperm counts indicating infertility were found at the 3-month mark (Handelsman et. al. 2003). The addition of progestin to hormonal contraceptive treatments significantly decreases the onset time of infertility, however even with progestin the onset of

infertility is substantially longer than the onset of female hormonal contraception, which is 7 days for oral contraceptives (Handelsman et. al.; Grimes et. al. 1999). The exception to these results was found in Chinese participants, who significantly developed infertility faster and recovered slower than all other populations treated (Handelsman et. al.).

This delayed onset is not ideal for many men, especially site one of the common routes of administration is weekly injection, and prolonged use of male hormonal contraception prompts uncomfortable injection site pain (Festin et. al. 2016). Male hormonal contraceptive use also proved to be inconvenient for men involved in trails, since their sperm counts were monitored weekly (Handelsman et. al.). Administration of male hormonal contraception commercially may not require weekly sperm count monitoring by a physician; however, sperm counts would need to be monitored regularly to ensure oligospermia or azoospermia (Handelsman et. al.).

The delayed onset of male hormonal contraception makes the rewards of consistent contraceptive use less immediate than condom use, though it still provides a reversible solution to the other alternative method, vasectomy. Though the other methods of contraception may be more convenient for men such as the condom or having their partners taken contraceptive responsibility, hormonal contraception allows sexually active men who are not in relationships or who do not want to have children in the near future more control over reproductive results. The monitoring of male sperm counts throughout the months of administration could also be seen as a beneficial tool since failure rate of male hormonal contraception is proportional to the concentration of sperm in the ejaculate (Handelsman et. al). This beneficial especially since human error in contraceptive use is a large cause of unplanned pregnancies in women using

hormonal contraceptives, so the fact that male hormonal contraception is thoroughly monitored through quantitative analysis is reassuring to its contraceptive efficiency (Littlejohn 2013). The three month delayed onset of male hormonal contraception should not be seen as a deterrent prohibiting the use of hormonal contraception because it still allows men control over their contraceptive responsibility and three months of taking a drug with no effect is a small price to pay compared to the commitment of having a child for the rest of that person's life.

Another critique of male hormonal contraception is that the long-term effects of use are unknown since the medication has not been approved for long-term or commercial use. Since hormonal contraceptives influence the body's hormonal axes which are extremely complex, there is a chance that hormone sensitive diseases could develop (Mostaghel et. al. 2012). An organ that has the potential for especially high-risk hormone sensitive disease in the reproductive system is the prostate since it is an area directly impacted by the specific hormonal axis of male contraception. In a ten-week study, it was found that administration of hormonal contraception had no effect on androgen related gene expression in the prostate (Mostaghel et. al). This finding is promising because it shows male hormonal contraceptives are relatively safe since for normal prostate function since they do not affect the prostate after ten weeks, however this study cannot be designated as long term because it usually takes at least ten weeks to reduce sperm counts to induce infertility.

Even though we do not know the dangers long-term effects of male hormonal contraception, we do know that there are some very serious long-term effects of female hormonal contraception. Since female hormonal contraceptives have been around since the

1970s, many studies have explored the long-term effects of administration, yet the entire scope of influence of these hormones on the body is vastly unknown. Oral contraceptive use has been found to be associated with a three to seven times higher risk of thrombosis and two times higher risk of heart attack in women due to the effect of the hormones on the metabolic pathways of the cardiovascular system (Wang et. al. 2016). While other long-term effects have been studied such as decreased bone mineral density, decreased verbal and spatial function, and increased incidences of cervical and breast cancers, no other condition is as directly linked to usage of hormonal contraception than those affecting the cardiovascular system (Wang et. al. 2016; La Vecchia 2001). It is likely that male hormonal contraception will have similar long-term effects on the body as female hormonal contraception due to the fact that the side-effects and hormonal axes are similar, however further research must determine that conclusively. Regardless, female hormonal contraception has been commercially available for over fifty years and it remains commercially available even though the long-term effects on the cardiovascular system are well known. An explanation for this could be that for many women, contraceptive use is worth these long-term side effects. The argument that male hormonal contraception is potentially dangerous since the long-term side effects are unknown is of lesser value when you place it next to the fact that women are still using female hormonal contraception even though the known effects could be potentially fatal.

What could be considered the most serious critique facing the development of male hormonal contraception is that as a whole it only has an efficiency rate of about 80%, which is low for a contraceptive since female hormonal contraceptives have efficiency rates of approximately 90-100% (Festin et. al.; Grimes et. al.). This poor statistic has been is due to the

fact that some men fail to suppress spermatogenesis to levels of oligospermia or azoospermia that are low enough to cause infertility (Amory et. al. 2013). It has been found that the inability to suppress spermatogenesis when taking male hormonal contraception has been linked to an increased amount of insulin-factor 3 (INSL3) (Amory et. al.). The mechanism of this phenomenon was studied first through mice, where it was found that administration of INSL3 was shown to prevent apoptosis of germ cells when gonadotrophins were inhibited (Amory et. al.). When levels of INSL3 were studied in humans using male hormonal contraception, it was found that men with naturally high levels of INSL3 experienced less success reaching oligospermia and azoospermia, and therefore could not reach contraceptive effects (Amory et. al.). The mechanism by which INSL3 effects spermatogenesis and the retention of sperm counts is not well understood, so more research into INSL3's effect on the male reproductive system is needed to be able to improve the efficiency rate of male hormonal contraception so that it could be used as a contraceptive option for everyone (Amory et. al.).

While the efficiency rate of male hormonal contraception is characterized as low because not all men achieve sperm counts resulting in the characterization of oligospermia or azoospermia while taking hormonal contraceptives, the failure rate characterized by the percentage of unplanned pregnancies resulting from male hormonal contraceptive use is low (Handelsman et. al.). This is because heavy monitoring of sperm counts allows quantitative data to show men whether or not they are fertile or could be engaging in sexual relationships without the use of other methods of contraception (Handelsman et. al.). Men who reach sperm counts low enough to be categorized as infertile have an efficiency rate in preventing unplanned pregnancy of 90-100%, which is comparable to that of female hormonal

contraception (Handelsman et. al.; Grimes et. al). This high efficiency rate for men monitored with low sperm counts indicates that current methods of male hormonal birth control are sufficient contraceptives for most of the male population, yet pharmaceutical companies cite lack of efficiency as one of the reasons hormonal contraception is not yet available to men.

These critiques are inhibitory of the development and approval of male hormonal contraception because of the perceived weight they have on whether or not men will use hormonal contraception if it was available to them. Pharmaceutical companies will not use their resources on the development of a drug that they are not sure will be actually used by a decent population of people (Lézé and Sidi-Boumedine 2015). The critiques can be easily countered by valid reasoning pointing to the importance of contraceptive use on life-long consequences and pointing to the approved standards of female hormonal contraception which are not much better than that of male treatment. The fact that the development of male hormonal contraception has been stalled is indicative of the societal view that the responsibility, discomfort, and long-term effects of hormonal contraceptive treatment should be left to women in sexual relationships. If the concept of reproductive responsibility were equalized between men and women, these critiques would be more accepted by the male population as necessary burdens contributing to the common goal of preventing unplanned pregnancy.

Development and Approval of Male Hormonal Contraception

Different molecules have been synthesized by various pharmaceutical companies as male hormonal contraceptives such as testosterone enanthate and testosterone undecanoate, which are compounds with various concentrations of progestins like depot

medroxyprogesterone acetate (Festin et. al. 2016). Since different pharmaceutical companies are working toward approval male hormonal contraception, there is competition between these companies to get the drug approved first—if at all. The process of drug development and approval in the United States is coordinated through the Food and Drug Administration's Center for Drug Evaluation and Research (CDER) (Roth and Amory 2011). Before a drug is approved, its efficiency and safety must be heavily studied in preclinical animal and human clinical trials (Lézé and Sidi-Boumedine 2015).

There are three phases of human clinical trials that a drug must pass before it is approved and commercially available. Phase I includes a small sample size of usually twenty to eighty healthy people, and it is used to determine the metabolism of the drug, best method of administration for the drug, and whether the drug is harmful on human subjects (Lézé and Sidi-Boumedine). Phase II includes a larger sample size of a few hundred people, and it is used to determine the benefit-tolerance ratio of a drug as well as the optimal dose (Lézé and Sidi-Boumedine). Phase III includes the largest sample size of a few thousand people, and it is used to determine whether that medication is at least as safe and effective as its competitors, as well as longer term side effects (Lézé and Sidi-Boumedine).

When it comes to male hormonal contraception, most drugs never get past in Phase II of clinical trials (Roth and Amory 2011). Phase II is all about the benefit-risk ratio, meaning this phase determines whether the side effects of a drug are worth its beneficial effects. Most clinical trials for male hormonal contraception have been cut short during Phase II due to the severity of side effects, which include weight gain, acne, decreased libido, fatigue, and mood changes (Festin et. al. 2016). The most severe of these side effects have been determined to be

mood swings, which could potentially lead to aggressive outbursts (Festin et. al.). For most of these hormonal contraceptive drugs, these risks have been determined to outweigh the benefits of contraception.

Alternately, female hormonal contraceptives have been found to have very similar side effects as male hormonal contraceptives including weight gain, headaches, decreased libido, and mood swings (Littlejohn). While these side effects are similar in both characteristics and severity to male hormonal contraception, many female hormonal contraceptive drugs have been approved by the FDA (Littlejohn). Not only are these contraceptives approved with these side effects, but these side effects are the result of decades worth of pharmacological improvements on originally approved hormonal contraceptives, which were developed with hormonal concentrations of estrogen that were much too high to be safe. The fact that the first female hormonal contraception was passed with much lower standards in the 1970s than the first male hormonal contraceptive will potentially be passed in the 2020s is due to the fact that regulations on the approval of drugs has become stricter over the past fifty years, which is beneficial to the safety of the drug user. At the same however, new and improved modern female hormonal contraceptives go through the same drug approval process as male hormonal contraception does, and the side effects in Phase II of clinical trials do not seem to curb the approval of these female directed drugs nearly as frequently as it curbs the approval of male hormonal contraceptives. For women it seems that these risks have been determined to be secondhand compared to the benefit of contraception.

Phase III of clinical trials is a phase that very few male hormonal contraceptives have reached. In one clinical trial in China, testosterone undecanoate was used as a male hormonal

contraceptive in Phase III, but the study was stopped short because of side effects (Festin et. al.). Phase III of clinical trials is characterized by comparison of medications to see if a novel drug is as safe and effective as that of its competitors. As of modern day, there are no male hormonal contraception competitors because no form of male hormonal contraception is available on the market. Unless of course, you categorize female hormonal contraception as a competitor to male hormonal contraception. In that case, the side effects of the two different contraceptives are very similar, however side effects in women do not stop as many clinical trials—so therefore female hormonal contraceptive could legitimately be characterized as safer than male hormonal contraception due to perceived differences in risk-benefit ratios of the two types of drugs. When it comes to efficiency, various female hormonal contraceptives have efficiency rates of 90-100% and an onset of infertility after 7 days, while many male hormonal contraceptives have efficiency rates along the 80% range with onset of fertility at 3 months (Grimes et. al. 1999; Festin et. al.). Because of this, female hormonal contraceptives are easily categorized as more efficient than male hormonal contraceptives.

The lack of progression of male contraception through clinical trials is indicative of the differential standards put on women compared to men when it comes to contraceptive use. This is mainly due to the skewed perception of the benefit-risk ratio between men and women, in which women place more importance on contraceptive benefit than men do. This once again goes back to the inequal sharing of reproductive responsibility between men and women, since women typically must sacrifice much more if burdened with unplanned pregnancy. It is unfair to characterize the safety and efficiency of male hormonal contraception by how it compares with female hormonal contraception because even though they serve the same

pharmacological purpose, they serve two distinct patient populations. These two forms of hormonal contraception should be compared as agents that can aide each other in the common goal—to reduce the chances of pregnancy and to equalize the reproductive responsibility of men and women.

Conclusion

The concept of reproductive responsibility has been cited throughout this paper as a primary reason that the development of hormonal contraception has not reached stages of approval or use that is commercially available to men everywhere. Male hormonal contraceptive use has its downfalls, however, so does female hormonal contraceptive use. The comparison of the two methods of contraceptives show various similarities in both benefits and risks, however due to the concept that the responsibility of an unplanned pregnancy is unequally weighed on the female in sexual relationships it is questionable whether male hormonal contraceptive use will be embraced by society as a contraceptive necessity. Since women have been dealing with the effects of hormonal contraception for over fifty years, there introducing men to these hormonal treatments is seen as unnecessary. Male hormonal contraception should not be seen as a replacement for female hormonal contraceptive use, rather it should be seen as a contraceptive aide to allow men more control over their reproductive responsibilities in a relationship and to prevent unplanned pregnancy.

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