BIBLIOGRAPHY


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BIOTECHNOLOGY ETHICS

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BIRTH CONTROL

Birth control, or contraception, is the practice of preventing or reducing the probability of pregnancy without abstaining from sexual intercourse. In premodern texts references to the enhancement of fertility and birth outweigh references to their restriction, and the development of contemporary contraceptive technologies emerged from work on fertility enhancement. Today, however, one of the most common ways in which scientific and technological advances are experienced is through people's control of fertility and birth.

History of Birth Control

The desire to control fertility has always existed in tension with the desire to procreate and with social motives to preserve population sizes. Infanticide and abortifacients were used frequently in premodern and early modern societies to control the number of offspring. However, diverse contraceptive techniques also existed, including the natural rhythm method (avoiding intercourse during ovulation), coitus interruptus (withdrawal before ejaculation), coitus obstructus (using pressure to block the male urethra), and coitus reservatus (avoiding ejaculation). Other methods included suppositories such as crocodile dung in ancient Egypt, cervical barriers, and intrauterine devices (IUDs).

Neither the ancient Greeks nor the Romans considered contraception immoral. That also was the case...
among the Germanic, Celtic, and other non-Mediterranean peoples in much of the medieval period. It is not surprising that the Christian Church had difficulty enforcing rules and moral norms against contraception. Early Church fathers made the moral standing of sexual intercourse an important feature of their teachings. Most important, Augustine (354–430) saw the procreation of children as one of the three justifications for Christian marriage. If sexual intercourse was performed with the specific intent of engendering offspring, it was done without sin. Augustine’s views influenced subsequent treatments of contraception in the Catholic Church (Dupre 1964), and certain medieval canons criminalized contraception.

Life in modern industrial societies removed the agrarian incentive to produce numerous children. Emerging individual perspectives on procreation clashed with received social norms and many religious teachings. Technological improvements in contraceptive techniques decreased their cost and increased their availability. For example, the vulcanization of rubber in the mid-nineteenth century by Charles Goodyear (1800–1860) led to the mass production of condoms, which were made from animal intestines in seventeenth-century Europe, and other birth control devices.

Although most Catholic authorities reacted with renewed criticism of contraception, several groups that were promoting birth control challenged them. For example, neo-Malthusians in England in the early nineteenth century wanted to increase the standard of living of the poor by reducing birth rates. Others argued that birth control techniques promoted greater sexual freedom or aided eugenic attempts to improve the hereditary “stock.” Many women went to extreme lengths to avoid pregnancy because of the disproportionate burden it placed on them. Those efforts were made more difficult by the declining authority of midwives in the nineteenth century in favor of male doctors, many of whom did not recognize the right of women to terminate or prevent pregnancy.

By the end of the nineteenth century many people were interpreting the increasing prevalence of birth control as a sign of social decadence and moral degradation. Some people in the United States argued that women, especially upper-class women, were shirking their “patriotic duty” to have children, sinning against nature, and committing “race suicide” (Reed 1978). Anthony Comstock (1844–1915) became the most eminent crusader against the dissemination of contraception literature. In 1873 Congress passed the Comstock Act, which defined information about contraception as obscene and prohibited the dissemination of contraceptives through the mail or across state lines. Several states also banned or restricted the dissemination of contraceptives. The strictest laws were passed by Connecticut, where married couples could be arrested for using birth control.

The most common arguments against birth control were that it promoted lewd or sinful behavior, weakened the stability provided by large families, signified a rebellion by women against their primary social role of motherhood, and undermined certain racial ideals. By contrast, those in favor of birth control argued that it promoted autonomy for women, stronger families and marriages, economic equality, and environmental health.

In the early twentieth century Margaret Sanger (1879–1966), an advocate for contraceptives who coined the phrase birth control, attempted to increase access to birth control by using arguments based primarily on socioeconomic justifications (Reed 1978). She crusaded against the Comstock Act, beginning with the creation of a birth control clinic in 1916. Sanger popularized the image of birth control as a means of individual freedom, self-determination, and gender equality. Legislative changes slowly followed, along with the growing legitimization of birth control methods by much of society, especially the medical community. Sanger’s American Birth Control League and other organizations became known as Planned Parenthood in 1942.

In the 1960s population control became a popular movement to reduce poverty and conserve natural resources. Some anthropologists argued that irresistible reproductive pressures arising from, the lack of safe, effective contraception had led all past cultures into a self-destructive pattern of production intensification and environmental degradation. Modern contraceptive technologies, however, offered an opportunity to alter that perennial pattern by lowering fertility rates (Segal 2003). The new emphasis on birth control in response to concerns about the disparity between lowered death rates and continued high birth rates in the developing world was made clear in the “Proclamation of Teheran” (paragraph 16) by the 1968 International Conference on Human Rights.

In the United States antcontraceptive laws remained in effect until the U.S. Supreme Court struck down the Comstock Act as unconstitutional in 1965. Until that time most pharmaceutical companies had refrained from investing in birth control technologies because of those laws and fear of religious objections,
especially from the Catholic Church. The independent development of synthetic progestosterone in the early 1950s by Frank Colton, a chemist at J. D. Searle Pharmaceutical, and Carl Djerassi, working for Syntex, a pharmaceutical company based in Mexico, allowed Gregory Pincus to create what would become known as the birth control pill. That development sparked a revolution in contraception.

The pill received approval from the U.S. Food and Drug Administration (FDA) as a contraceptive in 1960 after controversial research was done on women in third world nations. Five years later more than 6.5 million U.S. women were taking oral contraceptives. In the 1970s and 1980s contraceptive technologies continued to develop, including lower-dose birth control pills (the initial doses were found to be ten times higher than the necessary amount, causing many dangerous side effects) and a T-shaped IUD. The IUD fell out of favor because it was linked to pelvic inflammatory disease. In the 1990s the FDA approved the first hormone injections and emergency contraceptives.

The twenty-first century continues to bring new contraceptive technologies, including the birth control patch, continuous birth control pills that schedule fewer menstrual cycles per year, and male birth control pills. Despite the increased use of these technologies contraception still stimulates a wide range of ethical judgments that range from mortal sin to moral imperative. It also spans the legal and policy spectrum from laws that ban birth control to those, such as the 1979 “one child per couple” policy in China, that practically mandate it.

Issues of birth control and reproductive rights remain highly controversial elements of modern politics. Hence, whereas rising rates of teenage pregnancy lead many people to applaud the greater use of birth control, others have promoted abstinence. However, there were increasing debates about the abstinence-only education programs encouraged by the administration of U.S. President George W. Bush. Many critics argued that the administration was misusing science to promote an anticontraception moral agenda (Union of Concerned Scientists 2004).

Technological Methods

Contraceptive techniques can be divided into three categories: blockage of sperm transport to the ovum, prevention of ovulation, and blockage of implantation. Both men and women can use methods in the first category, whereas those in the latter two categories are available to women only. Each technique presents different tradeoffs among variables such as comfort, price, availability, safety, and effectiveness.

BLOCKAGE OF SPERM TRANSPORT TO THE OVUM. Natural contraception, also known as the rhythm method of birth control, relies on abstinence from intercourse during a woman’s fertile period. Carefully tracking menstrual cycles and/or monitoring fluctuations in body temperature can predict ovulation. Neither method is very effective (average failure rates range from twenty to thirty annual pregnancies per hundred women) because of variability in ovarian cycles. Coitus interruptus has a similar failure rate.

Other techniques in this category involve chemical contraceptives such as spermicidal foams, sponges, creams, jellies, and suppositories. When inserted into the vagina, these contraceptives can remain toxic to sperm for roughly an hour. These techniques are usually not very effective and are used mostly in conjunction with barrier methods that mechanically prevent sperm transport to the ovum. Those methods include condoms (thin, strong rubber or latex sheaths), which are available for both male and female use. Females also can use the diaphragm, which is a flexible rubber dome positioned over the cervix. An alternative to the diaphragm is the cervical cap, which is smaller and is held in place by suction. Sterilization is a more permanent and highly effective method of birth control. It involves the surgical disruption of the ductus deferens (vasectomy) in men and the oviduct (tubal ligation) in women.

PREVENTION OF OVULATION. Oral contraceptives, or birth control pills, function by manipulating the complex hormonal interactions in the ovarian cycle. They contain synthetic estrogen-like and progesterone-like steroids and are taken for three weeks and then discontinued for one week. The steroids inhibit the secretion of certain hormones, preventing follicle maturation and ovulation. The one-week period of discontinuation allows menstruation to occur, although without the presence of an ovum. Recent developments prolong the length of the menstrual cycle and thus can reduce the annual number of menstruations. Oral contraceptives also prevent pregnancy by increasing the viscosity of cervical mucus, making the uterus less likely to accept implantation, and decreasing muscular contractions in the female reproductive tract.

Birth control patches also have been developed. They are applied directly to the skin and secrete synthetic steroids that work in the same way as do those in the contraceptive pill. Also available are long-acting subcutaneous contraceptives such as Norplant®.
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Plant® consists of six matchstick-size capsules that gradually release progestin. The patches are inserted under the skin in the inner arm above the elbow. Once implanted, these contraceptives are effective for roughly five years. Additionally, injectable time-release synthetic hormones, which provide contraceptive effects for one to three months depending on the product, can be obtained. In the United States all these methods are available only with a prescription and are quite effective, with average failure rates of less than one annual pregnancy per hundred women.

BLOCKAGE OF IMPLANTATION. These are the most controversial techniques because they act after fertilization has taken place by preventing the implantation of a fertilized ovum in the uterus. The most common technique in this category is the IUD, which is inserted into the uterus by a physician. The mechanism of action of the IUD is not completely understood, but evidence suggests that the presence of this foreign object in the uterus produces a local inflammatory response that prevents implantation of the fertilized ovum. Early IUD techniques were associated with serious complications. More recent methods are much safer, but the popularity of IUDs has waned.

Implantation also can be blocked by emergency contraception, or “morning-after” pills. These pills can prevent pregnancy when they are taken within seventy-two hours after intercourse. Often used in the case of rape, emergency contraceptive kits usually involve high doses of hormones that either suppress ovulation or cause premature degeneration of the corpus luteum. The latter effect removes the hormonal and nutritive support required by a fertilized ovum. The controversial “abortion pill” RU 486 (Mifepristone®) blocks the female hormone progesterone, making it impossible for the body to sustain a pregnancy. The association of this pill with abortion explains why it took twenty years after its invention in 1980 by a French pharmaceutical company for the FDA to approve it in 2000.

CURRENT RESEARCH. Research continues in all these categories, partly because unplanned pregnancies continue to present personal and public health problems (Institute of Medicine 2004). Advances in genome sequencing, materials science (a multidisciplinary field focused on the properties of functional solids), and drug delivery are important factors in new techniques. Longer-lasting hormone-releasing IUDs are being developed along with improved methods for inserting and removing them. Other techniques target chemical reactions between ova and sperm or manipulate the pituitary secretion of certain reproductive hormones in both males and females.

In 2005 researchers in the United States partnered with a European biotechnology company to develop a male contraceptive pill. Such contraceptives could be based on a variety of techniques, ranging from inhibiting spermatogenesis to disabling the motility of sperm. Research involving reversible chemical sterilization also is being carried out.

Additionally, efforts are under way to develop immunocontraception that would allow the use of vaccines that prod the immune system to produce antibodies targeted against a protein that is critical to the reproductive process (Ada and Griffin 1991). Such vaccines would work for both males and females. In males vaccines would create antibodies against the production of gonadotropin-releasing hormone (GnRH), which is essential for sperm production. In this case supplemental testosterone injections would be needed because of the loss of GnRH. In females some vaccines that are being tested induce the formation of antibodies against the creation of human chorionic gonadotropin (hCG), which is essential for supporting the corpus luteum during pregnancy. These techniques present concerns about endocrine disruption and autoimmune pathologies. Immunocontraception is fairly commonly used as a strategy for the control of wildlife populations. Although research on human applications has proceeded since a special working group was formed by the World Health Organization (WHO) in 1973, no safe and effective methods had been developed by 2004. Clinical trials continue.

Ethical and Political Issues

The association of contraceptive practices with prostitution, extramarital affairs, and the perceived breakdown of sexual mores is related directly to the discomfort with which most religious traditions have responded to these methods. Today, however, most laypeople, along with most scholars in different traditions, accept the morality of contraception within marriage. However, that acceptance has not extended to all religious traditions.

The clearest example of continuous opposition to the use of artificial birth control methods comes from official Roman Catholic teachings. Catholic teachings on contraception remain important for contemporary debates, especially the 1930 encyclical issued by Pope Pius XI titled Casti Connubii [On Christian Marriage], which called birth control a sin and opposed birth control by artificial means. In 1968 Pope Paul VI condemned contraception but permitted the use of natural
rhythm methods. Today, although Catholic doctrine still advocates the use of natural methods such as abstinence during fertile periods, it completely condemns the use of artificial contraception or voluntary sterilization. The grounds for this rejection are related to what is claimed to be an inseparable connection between the sexual and procreative acts. Because many developing countries have large Catholic communities, many have criticized the official position of the Catholic Church as insensitive to overpopulation problems and to the effects of continuous childbearing on the well-being of women and children. The spread of HIV and AIDS in many developing countries has provided an important reason for criticizing Catholic opposition to methods that can be effective in preventing the spread of a deadly disease.

In spite of Catholic opposition to artificial contraception many other Christian churches have become more accepting of the role of birth control within marriage. In most cases the reasons for that openness are related to the consequences unlimited procreation can have on a marriage, other children, or the community in general. For many Christian denominations the use of both natural and artificial contraceptives methods is a way to express responsible parenthood. Other religion traditions, such as Islam, Orthodox Judaism, and Hinduism, also accept the morality of contraception as long as it is not harmful to the persons involved. Islamic teachings, for example, historically have been fairly tolerant of contraception. That allowed discussion and development of birth-control techniques by medieval Arabic writers, including the Muslim physician Ibn Sina (980–1037). The Jewish tradition also tends to support birth control, although with many qualifications, and makes it primarily the responsibility of women (Feldman 1968).

Feminists' attitudes toward artificial birth control methods are, as with many other reproductive technologies, ambivalent. On the one hand, contraception has freed women from unlimited reproduction, facilitated their incorporation into the labor force, and allowed them to make autonomous choices about whether and when to have children and about how many of them to bring into the world. On the other hand, birth control methods are developed, implemented, and used in the context of patriarchal societies that still are involved in controlling women's lives and in many cases continue to show little interest for women's well-being.

In this context the fact that most contraceptive methods have been developed for women is a matter of concern, especially because women rarely have been involved in making decisions about what technologies to develop. Also a matter of feminist concern is the fact that many contraceptive methods, such as those involving hormones, appear to have been developed with more interest in their efficacy than in their safety. Similarly, although male reproductive biology seems to be more difficult to interrupt, it appears that part of the scarcity of research in that area can be attributed to fear of affecting the male libido, a concern that has not affected research on female contraception.

Many feminists have objected to the testing of new contraceptives on women in developing countries and have expressed worries about possible social abuses in both industrialized and nonindustrialized nations arising from the use of long-acting implantable contraceptives such as Norplant®. Once implanted, Norplant® can be removed only surgically. That makes this contraceptive far more effective than many others in which compliance can be a problem. These worries are not easily dismissible in light of the fact that in the United States, for example, several state legislatures have considered regulations that would pay women on welfare to use Norplant®. Some judges have imposed the use of this drug as an alternative to a lengthy prison sentence for women convicted of child abuse.

In developing countries the likelihood of abuses resulting from the use of this type of contraceptive is even more obvious. Powerful population control interests can result in subtly or clearly coercive methods to assure women's use of birth control. The fact that Norplant® requires surgery, together with the scarcity of health care resources, makes concerns about the possibility of coercion even more pressing.

Also feeding feminists' worries about possible abuses of birth control methods were attempts by members of eugenics movements in the early twentieth century to control the reproductive activities of those considered undesirable. In most cases involuntary sterilization was the method of choice to prevent those with mental problems, criminals, immigrants, and poor and minority women from reproducing under the idea that if they were not stopped, lower-class offspring would outnumber the upper classes' progeny.

New demographic trends such as below-replacement birth rates in some European nations, together with what appears to be an environmentally caused decline in fertility among both men and women in industrialized countries, may put discussions of birth control in a different framework in the future, especially in nations with strong welfare systems. In those nations the aging population has been putting a serious strain
on public resources. In this context some might argue for the need to encourage births rather than control them.

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SEE ALSO Bioethics; Eugenics; Population.

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BLACKETT, PATRICK

Patrick Maynard Stuart Blackett (1897–1974) was born in Kensington, London, on November 18, and became a Nobel Prize–winning physicist who at once promoted scientific research to defeat Nazism and criticized the World War II Allied bombing of cities. After serving in the Royal Navy during World War I and establishing a successful career in physics, he became a science advisor on military matters during World War II and later to both the Indian and British governments on science and technology policy. He died in London on July 13, as a leading figure in the British scientific community and a defender of science in the service of socialist political ideals and of “small science” practiced independent of large government grants.

Physics

After earning a Ph.D. in physics in 1921 from Cambridge University, Blackett did postdoctoral work in the Cavendish Laboratory and was appointed professor at the University of Manchester in 1937. He developed an international reputation for masterful experimental work in cosmic-ray and particle physics using cloud chambers, Geiger counters, and magnetic fields. He also made important contributions to the study of nuclear transformations as the first to photograph the mutation of one element into another (nuclear into oxygen after bombardment by an alpha particle) and matter arising out of energy (electrons and positrons from gamma rays). In 1933 Blackett and the Italian physicist Giuseppe Occhialini confirmed the existence of the positively charged electron or positron, but were cautious in publishing the results.

When the 1936 Nobel Prize in physics was awarded to the American scientist Carl Anderson for the discovery of the positron, many argued that Blackett deserved equal credit. But Blackett himself never engaged in disputes on this issue and emphasized instead the importance of Anderson’s work. Such conduct highlighted his integrity and collegiality in the scientific community as well as his cautious and disciplined style of research. He subsequently received the 1948 Nobel Prize in Physics “for his development of the Wilson cloud chamber method, and his discoveries made therewith in the fields of nuclear physics and cosmic radiation.”

Blackett began defense related research even before the outbreak of World War II by helping build an air defense network through the establishment of radar stations and antishubmarine research for the Royal Navy.