Executive Summary

Several types of drugs and devices exist to prevent fertilization of an egg or terminate an implanted fertilized egg. Emergency contraceptives, in general, delay ovulation and prevent the fertilization of an egg before pregnancy is established. In contrast, abortion drugs and devices terminate a fertilized egg.

Highlights

- Most classes of contraceptives work similarly by disrupting or delaying the release of an unfertilized egg from an ovary during the fertile window, which prevents fertilization.
- Emergency contraception (Plan B and Ella) is a one-time use, higher dose of basic birth control that prevents pregnancy by disrupting ovulation after unprotected sexual intercourse. These drugs prevent fertilization of an egg.
- Abortifacient drugs (mifepristone and misoprostol) and devices (manual vacuum aspirators) terminate a fertilized egg after it has implanted in the uterus.

Limitations

- Current evidence indicates that the emergency contraceptives discussed below do not affect the ability of eggs that have already been fertilized to implant on the uterine lining, but this is still an active area of research.
- Abortion surveillance data does not account for abortions performed outside of licensed facilities. This means that reports of abortion numbers likely undercount the number of procedures at the state and national level.

Research Background

Ovulation and the Fertile Window

The fertile window is a 6 to 7-day time frame in the average female menstrual cycle that ends with the release of an egg cell from the ovary (ovulation).\(^1\) Ovulation typically occurs around day 14 of the menstrual cycle, but varies between individuals. Once an egg is released from the ovary, it can fuse with a sperm cell (fertilization), but will die if it does not fuse with a sperm cell within 12 to 24 hours.\(^1\) Fertilization can occur within 48 hours after sexual intercourse.\(^1\) The next stage of prenatal development is implantation, which occurs anywhere from 7 to 14 days after fertilization. During this stage, the fertilized egg attaches to the uterine lining, where it will continue to develop until birth (Figure 1).\(^1,2\) The probability of successfully
establishing a pregnancy via sexual intercourse during the fertile varies between individuals, but generally ranges from 10-40%.³

**Figure 1.** Stages of an egg from ovulation to implantation. (1) An unfertilized egg is released from the ovary around day 14 of the menstrual cycle. (2) Once an egg is released from the ovary, it can be fertilized within 48 hours after sexual intercourse. (3) The fertilized egg attaches to the uterine lining, where it will continue to develop until birth. Emergency Contraceptives impact (1) ovulation and (2) fertilization. Abortifacient drugs terminate an existing pregnancy after (3) the fertilized egg has implanted in the uterus and began to develop. Figure adopted and reproduced from Merck Manuals.¹⁴

**Contraceptives**

Contraception is the deliberate use of artificial methods to prevent pregnancy. This includes barrier methods, such as condoms, and contraceptive pills, which are often referred to as “birth control.” Long-acting reversible contraceptives (LARCs), including intrauterine devices (IUDs), are another form of female contraception. Most classes of contraceptives work similarly by disrupting or delaying ovulation, thereby preventing fertilization.⁵ While the main use for hormonal birth control is to prevent pregnancy, there are other medical indications for these drugs, such as irregular and heavy menstrual cycles, severe acne, endometriosis management, and polycystic ovarian syndrome (PCOS).⁵⁶ The FDA has approved contraceptives for heavy menstrual cycles and severe acne, however, not all medical indications have been approved.

*Oral Contraceptives:* Oral contraceptive pills contain either a combination of estrogen and a progestin, or solely progestin.⁵ The primary mechanism of action is to prevent the surge of luteinizing hormone (LH) that triggers ovulation, but they also thicken the cervical mucus to inhibit a sperm’s motility, decreasing the chance of fertilization.⁵ To be
most effective, the pill must be taken at the same time daily. Failure rates (i.e., unintended pregnancy rates): less than 1% with perfect use and 7% to 9% with typical use.5

Hormonal IUDs: Hormonal intrauterine devices (IUDs) are small t-shaped devices placed in the uterus that release a small dose of progestin each day. Hormonal IUDs function similarly to oral contraceptives, suppressing ovulation and thickening mucus in the cervix to prevent sperm from fertilizing an egg.5 However, they are left in the uterus for an extended period of time (sometimes several years) after insertion; unlike oral contraceptives, they do not require daily action by the user in order to be effective. Failure rates with both typical and perfect use are below 1%.5

Copper IUDs: Copper IUDS are non-hormonal and, therefore, do not delay ovulation. The copper ions create an inflammatory response within the uterus which makes the environment inhospitable for sperm.5 More specifically, the copper ions are spermicidal and kill sperm at the opening of the uterus, preventing sperm from fertilizing an egg.5 Failure rates with both typical and perfect use are below 1%.5

Emergency Contraception

Emergency contraception (EC) is designated to prevent pregnancy after unprotected sexual intercourse, including contraceptive failure and sexual assault.7 While different types of ECs exist, their mechanisms of action typically block or disrupt the hormones involved in the menstrual cycle that would naturally prepare the uterine environment for conception and implantation (Figure 1).7,8 When taken prior to ovulation, EC can prevent or delay ovulation, which can prevent fertilization from occurring.7 Reviews of clinical evidence indicate that the EC methods listed below do not prevent the implantation of an already fertilized egg, but this is still an active area of study.9 Once a fertilized egg is implanted, EC use will not affect the implanted egg.9

Levonorgestrel (Plan B): This pill (or, less commonly, two pill regimen) contains progestin, a form of progesterone, which is a hormone that regulates the menstrual cycle. Levonorgestrel temporarily stops ovulation and prevents fertilization when administered before the level of luteinizing hormone (LH) increases.7,9 It is most effective at preventing fertilization when taken within 72 hours after intercourse. This EC is available over-the-counter at pharmacies. The failure rate ranges from 0.3–2.6%.7

Ulipristal acetate (Ella): This pill contains a progesterone blocker, which prevents or delays ovulation via suppression of the LH surge even when administered shortly before LH peak.9 This EC is only accessible with a prescription. The failure rates range from 0.0–1.8%.7

Abortion

Abortion is the termination of an existing pregnancy after the fertilized egg has implanted in the uterus. In 2019, there were 1,471 recorded abortions in Missouri.10 In 2018, 77.7% of abortions in
the United States were performed at earlier than 9 weeks’ gestation, and nearly all (92.2%) were performed before 13 weeks’ gestation or (i.e., within the first trimester). In Missouri, 53.9% of abortions were performed before 9 weeks’ gestation, and 81.9% were performed before 13 weeks’ gestation.

Approximately 42% of unintended pregnancies in the United States end in abortion. Survey data provide several reasons that abortions are sought, including concerns about pregnancy timing and the health of the mother and/or child.

Mifepristone: Terminates an early pregnancy (10 weeks’ gestation or less) by blocking progesterone. Without progesterone, the lining of the uterus breaks down and the pregnancy cannot continue. Mifepristone is also used in other medical indications such as medical management of a miscarriage, cervical preparation for later second trimester abortion, and management of second and third trimester pregnancies when the fetus is lost before birth (stillbirth).

Misoprostol: Companion medication taken immediately following or up to 48 hours after ingestion of mifepristone. This medication causes the uterus to empty.

Manual Vacuum Aspirator (MVA): MVAs are used to remove tissue from the uterus during elective abortions, the management of incomplete abortions or miscarriages, and endometrial sampling in nonpregnant women. MVAs are hand-operated, 60-mL syringes in which a vacuum is produced by sealing one end of the syringe and retracting a plunger at the other.

References


