

Female Sexual Anatomy and Physiology  
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## Chapter 2: Female Sexual Anatomy and Physiology

### Learning Objectives

LO 2.1 Describe the external female sex organs and their functions.

LO 2.2 Describe the internal female sex organs, their functions, and health problems that may affect them.

LO 2.3 Describe the composition and functions of the breasts.

LO 2.4 Discuss risk factors for and detection and treatment of breast cancer.

LO 2.5 Describe the regulation and the phases of the menstrual cycle.

LO 2.6 Define and discuss menopause, perimenopause, and the climacteric.

LO 2.7 Define menstrual problems and discuss what can be done about them.

### Chapter Outline

- External Sex Organs
  - Describe the external female organs and their functions.
    - The derivation of the word pudenda, which refers to the external female genitals, speaks volumes about sexism in the ancient Mediterranean world. Even today, this cultural heritage may lead women to develop negative attitudes toward their genitals. Girls and boys are both sometimes reared to regard their genitals with shame or disgust. Both may be reprimanded for expressing normal curiosity about them. They may be reared with a “hands-off” attitude, to keep their “private parts” private, even from themselves. Taken collectively, the external sexual structures of the female are termed the pudendum, or the vulva. Vulva is a Latin word that means “wrapper” or “covering.” The vulva consists of the mons veneris, the labia majora and minora (major and minor lips), the clitoris, and the vaginal opening.
    - The Mons Veneris
      - The mons veneris consists of fatty tissue that covers the joint of the pubic bones in front of the body, below the abdomen and above the clitoris. At puberty, the mons becomes covered with pubic hair that may be thick and curly but varies from person to person in waviness, texture, and color. The mons cushions a woman’s body during sexual intercourse, protecting her and her partner from the pressure against the pubic bone that stems from thrusting. There is an ample supply of nerve endings in the mons, so that caresses can produce pleasurable sensations.
    - The Labia Majora
      - The labia majora are large folds of skin that run downward from the mons along the sides of the vulva. When close together, they hide the labia minora and the urethral and vaginal openings. The outer surfaces of the labia majora, by the thighs, are covered with

pubic hair and darker skin than that found on the thighs or labia minora. The inner surfaces of the labia majora are hairless and lighter in color. They are amply supplied with nerve endings that respond to stimulation and can produce sexual pleasure. The labia majora also shield the inner female genitals.

- The Labia Minora
  - The labia minora are hairless, light-colored membranes, located between the major lips. They surround the urethral and vaginal openings. The outer surfaces of the labia minora merge with the major lips. At the top they join at the prepuce (hood) of the clitoris. The labia minora differ in appearance from woman to woman. When stimulated, they darken and swell, engorging with blood.
- The Clitoris
  - Worldwide, the clitoris is known by many names, from bijou (French for “jewel”) to pokhotnik (Russian for “lust”). The word clitoris derives from the Greek word kleitoris, meaning “hill” or “slope.” It receives its name from the manner in which it slopes upward in the shaft and forms a mound of spongy tissue at the glans. The body of the clitoris—the clitoral shaft—is about 1 inch long and ¼ inch wide. The shaft consists of erectile tissue that contains two spongy masses called corpora cavernosa (“cavernous bodies”) that fill with blood (become engorged) and become erect in response to sexual stimulation. The stiffening of the clitoris is less apparent than the erection of the penis, because the clitoris does not swing free from the body. The prepuce (meaning “before a swelling”), or hood, covers the clitoral shaft. It is a sheath of skin formed by the upper part of the labia minora. The clitoral glans is a smooth, round knob or lump of tissue above the urethral opening. The glans is revealed by gently separating the labia minora and retracting the hood. It is highly sensitive to touch because of the rich supply of nerve endings. The size of the clitoris varies from woman to woman. Because the clitoral glans is highly sensitive to touch, women usually prefer to be stroked or stimulated on the mons, or on the clitoral hood, rather than directly on the glans. In some respects, the clitoris is the female counterpart of the penis. Both organs—clitoris and penis—develop from the same embryonic tissue, which makes them similar in structure, or homologous. They are not fully similar in function, or analogous, however. Both organs receive and transmit sexual sensations, but the penis is directly involved in reproduction and excretion by serving as a conduit for sperm and urine, respectively. Cutting out the clitoral hood—clitoridectomy—is common among Muslims in the Near East and Africa.
- The Vestibule
  - The word vestibule, which means “entranceway,” refers to the area within the labia minora that contains the openings to the vagina

and the urethra. The vestibule is richly supplied with nerve endings and is very sensitive to tactile or other sexual stimulation.

▪ The Urethral Opening

- Urine passes from the female's body through the urethral opening, which is connected by a short tube (the urethra) to the bladder. The urethral opening lies below the clitoral glans and above the vaginal opening. The urethral opening, urethra, and bladder are unrelated to the reproductive system. The proximity of the urethral opening to the external sex organs can pose hygienic problems for sexually active women. The urinary tract, which includes the urethra, bladder, and kidneys, may become infected by bacteria from the vagina or rectum. Disease organisms may pass from the partner's sex organs or hands to the urethral opening during sexual activity. Anal intercourse followed by vaginal intercourse may transfer disease organisms from the rectum to the bladder. For similar reasons, women should first wipe the vulva, then the anus, when using the toilet. Cystitis is a bladder inflammation that may stem from any of these sources. Its symptoms include burning and frequent urination (also called urinary urgency). Pus or a bloody discharge is common, and there may be discomfort above the pubic bone. These symptoms may disappear after several days, but consultation with a gynecologist is recommended because untreated cystitis can lead to kidney infections. A few precautions may help women prevent inflammation of the bladder:
  - Drinking two quarts of water a day to flush the bladder.
  - Drinking orange or cranberry juice to maintain an acid environment that discourages growth of infectious organisms.
  - Decreasing use of alcohol and caffeine (from coffee, tea, or cola drinks) that may irritate the bladder.
  - Washing the hands before masturbation or self-examination.
  - Washing one's partner's and one's own genitals before and after intercourse.
  - Preventing objects that have touched the anus (fingers, penis, toilet tissue) from subsequently coming into contact with the vulva.
  - Urinating soon after intercourse to help wash away bacteria.

▪ The Vaginal Opening

- One does not see an entire vagina, but rather the vaginal opening, or introitus, when one parts the labia minora. The introitus lies below and is larger than the urethral opening. Its shape resembles that of the hymen. The hymen is a fold of tissue across the vaginal opening that is usually present at birth and may remain at least partly intact until a woman engages in coitus. For this reason the

hymen has been called the “maidenhead.” Its presence has been taken as proof of virginity, and its absence as evidence of coitus. However, some women are born with incomplete hymens, and other women’s hymens are torn accidentally, such as during horseback riding, strenuous exercise or gymnastics, or even when bicycling. A punctured hymen is therefore poor evidence of coital experience. A flexible hymen may also withstand many coital experiences, so its presence does not guarantee virginity. Nevertheless, many Muslim women in Europe are having hymenoplasty before marriage—an operation that restores the hymen to provide the illusion of virginity on their wedding night. Now and then the hymen consists of tough fibrous tissue and is closed, or imperforate, as in the fourth drawing. An imperforate hymen may not be discovered until after puberty, when menstrual discharges begin to accumulate in the vagina. In these rare cases, a surgical incision will perforate the hymen. A woman may also have a physician surgically perforate her hymen if she would rather forgo the tearing and discomfort that may accompany her initial coital experiences. A woman may also stretch the vaginal opening over several days in preparation for intercourse by inserting a finger and gently pressing downward toward the anus. After several repetitions, she may insert two fingers and repeat the process, spreading the fingers slightly after insertion. The hymen is found only in female horses and humans. It is not present in animal species closest to humans on the evolutionary scale, such as chimps and gorillas. The hymen remains something of a biological mystery because it serves no apparent biological function.

- The Perineum

- The perineum incorporates the skin and underlying tissue between the vaginal opening and the anus. The perineum is rich in nerve endings. Stimulation of the area may heighten sexual arousal. Many physicians make a routine perineal incision during labor, called an episiotomy, to facilitate childbirth.

- Structures that Underlie the External Sex Organs

- The vestibular bulbs and Bartholin’s glands are active during sexual arousal and are found on both sides. Muscular rings (sphincters) that constrict bodily openings such as the vaginal and anal openings are also found on both sides. The clitoral crura are wing-shaped, leglike structures that attach the clitoris to the pubic bone beneath. The crura contain corpora cavernosa, which engorge with blood and stiffen during sexual arousal. The vestibular bulbs are attached to the clitoris at the top and extend downward along the sides of the vaginal opening. Blood congests them during sexual arousal, swelling the vulva and lengthening the vagina. This swelling contributes to coital sensations for both partners. Bartholin’s glands lie just inside the minor lips on each side of the

vaginal opening. They secrete a couple of drops of lubrication just before orgasm. This lubrication is not essential for coitus. In fact, the fluid produced by the Bartholin's glands has no known purpose. It was once believed that the source of the vaginal lubrication or "wetness" that women experience during sexual arousal was produced by the Bartholin's glands. It is now known that engorgement of vaginal tissues during sexual excitement causes moisture from the many small blood vessels that lie in the vaginal wall to be forced out and to pass through the vaginal lining, forming the basis of the lubrication. Pelvic floor muscles permit women to constrict the vaginal and anal openings. They contract automatically, or involuntarily, during orgasm, and their tone may contribute to coital sensations.

- Internal Sex Organs

- Describe the internal female sex organs, their functions, and health problems that may affect them.

- The internal sex organs of the female include the innermost parts of the vagina, the cervix, the uterus, and two ovaries, each connected to the uterus by a fallopian tube. These structures comprise the female reproductive system.
- The vagina extends back and upward from the vaginal opening. It is usually 3 to 5 inches long at rest. Menstrual flow and babies pass from the uterus to the outer world through the vagina. During coitus, the penis is contained within the vagina. The vagina is commonly pictured as a canal or barrel; but, when at rest, it is collapsed, like the inner tube of a bicycle tire. The vagina expands in length and width during sexual arousal. The vagina can also expand to allow insertion of a tampon, as well as the passage of a baby's head and shoulders during childbirth. The vaginal walls have three layers. The inner lining, or vaginal mucosa, is made visible by opening the labia minora. It is a mucous membrane similar to the skin that lines the inside of the mouth. It feels fleshy, soft, and corrugated. It may vary from very dry to very wet. The middle layer of the vaginal wall is muscular. The outer or deeper layer is a fibrous covering that connects the vagina to other pelvic structures. The vaginal walls are rich with blood vessels but poorly supplied with nerve endings. Unlike the sensitive outer third of the vaginal barrel, the inner two-thirds are so insensitive to touch that minor surgery may sometimes be performed on those portions without anesthesia. The entire vaginal barrel is sensitive to pressure, however, which can be experienced as pleasurable. The vaginal walls secrete substances that help maintain the vagina's normal acidity (pH 4.0 to 5.0). Normally, they taste salty, but their odor and taste may vary during the menstrual cycle. The secretions may contain substances that act as sexual attractants. Women who frequently douche or use feminine deodorant sprays may remove or mask substances that arouse sex partners. Douching or spraying may also alter the natural chemical balance of the vagina, which can increase the risk of infections. Feminine

deodorant sprays can also irritate the vagina and evoke allergic reactions. The normal, healthy vagina cleanses itself through regular chemical secretions that are evidenced by a mild white or yellowish discharge. Vaginitis refers to any vaginal inflammation, whether it is caused by an infection, birth control pills, antibiotics that alter natural body chemistry, an allergic reaction, chemical irritation, or lowered resistance as may be caused by fatigue or poor diet. Changes in body chemistry or lowered resistance permit microscopic organisms normally found in the vagina to multiply to infectious levels. Vaginitis may be recognized by abnormal discharge, itching, burning of the vulva, and urinary urgency. Women with vaginitis are advised to seek medical attention, but note some suggestions that may help prevent vaginitis:

- Wash your vulva and anus regularly with mild soap. Pat dry (taking care not to touch the vulva after dabbing the anus).
  - Wear cotton panties. Nylon underwear retains heat and moisture that cause harmful bacteria to flourish.
  - Avoid pants that are tight in the crotch.
  - Be certain that sex partners are well washed. Condoms may also reduce the spread of infections from one's sex partner.
  - Use a sterile, water-soluble jelly such as K-Y jelly if artificial lubrication is needed for intercourse. Do not use Vaseline. Birth control jellies can also be used for lubrication.
  - Avoid intercourse that is painful or abrasive to the vagina.
  - Avoid diets high in sugar and refined carbohydrates; they alter the normal acidity of the vagina.
  - Women who are prone to vaginal infections may find it helpful to douche occasionally with plain water, a solution of 1 or 2 tablespoons of vinegar in a quart of warm water, or a solution of baking soda and water.
  - Watch your general health. Eating poorly or getting insufficient rest will reduce your resistance to infection.
- The Cervix
- The cervix is the lower end of the uterus. Its walls, like those of the vagina, produce secretions that contribute to the chemical balance of the vagina. The opening in the middle of the cervix, or os, is normally about the width of a straw, although it expands to permit passage of a baby from the uterus to the vagina during childbirth. Sperm pass from the vagina to the uterus through the cervical canal.
  - Cervical Cancer
    - Cervical cancer is relatively uncommon in the United States, although there are about 13,000 new cases a year as well as 4,000 deaths. The primary cause of cervical cancer is infection with the human papilloma. A vaccine has been developed that makes most women immune to the form of HPV connected with cancer. The woman is best vaccinated

before she becomes sexually active and may be exposed to the virus. Cervical cancer is more common among women who have had many sex partners, became sexually active at a relatively early age, have sex with partners who have had many sex partners, and have sex with uncircumcised males. The mortality rate is higher for African American women than for European American women, at least in part because HPV tends to be diagnosed later in African Americans. However, the death rate has been declining, especially for African American women — down by more than 50% over the past 30 years. A Pap test examines a sample of cervical cells that are smeared on a slide to screen for cervical cancer and other abnormalities. The HPV test is also appropriate because it finds infections that can lead to cancer. We'll note here and elsewhere in the text that HPV infections are common, and most clear up by themselves. But there is also a vaccine for HPV, and we strongly advise readers to talk to their doctors about it. According to the Centers for Disease Control and Prevention (2016), Cervical cancer is the easiest gynecologic cancer to prevent, with regular screening tests and follow-up. Two screening tests can help prevent cervical cancer or find it early—

- The Pap test (or Pap smear) looks for precancers, cell changes on the cervix that might become cervical cancer if they are not treated appropriately.
- The HPV test looks for the virus (human papilloma virus) that can cause these cell changes.

The Pap test is recommended for all women between the ages of 21 and 65 years old, and can be done in a doctor's office or clinic. During the Pap test, the doctor will use a plastic or metal instrument, called a speculum. This helps the doctor examine the vagina and the cervix, and collect a few cells and mucus from the cervix and the area around it. The cells are then placed on a slide or in a bottle of liquid and sent to a laboratory. The laboratory will check to be sure that the cells are normal. The only cancer for which the Pap test screens is cervical cancer. It does not screen for ovarian, uterine, vaginal, or vulvar cancers.

- The Uterus

- The uterus, or womb is the organ in which a fertilized ovum implants and develops until birth. The uterus usually slants forward (antroverted), although about 10% of women have uteruses that tip backward (retroverted). In most instances a retroverted uterus causes no problems, but some women with one find certain positions of female–male coitus to be painful. A retroverted uterus

normally tips forward during pregnancy. The uterus is suspended in the pelvis by flexible ligaments. In a woman who has not given birth, it is about 3 inches long, 3 inches wide, and 1 inch thick near the top. The uterus expands to house a fetus during pregnancy and shrinks after pregnancy, although not to its original size. The uppermost part of the uterus is called the fundus. The uterus is shaped like an inverted pear. If a ceramic model of a uterus were placed on a table, it would balance on the fundus. The central region of the uterus is called the body. The narrow lower region is the cervix, which leads downward to the vagina. Like the vagina, the uterus has three layers. The innermost layer, or endometrium, is richly supplied with blood vessels and glands. Its structure varies according to a woman's age and phase of the menstrual cycle. Endometrial tissue is discharged through the cervix and vagina at menstruation. In some women, endometrial tissue may also grow in the abdominal cavity or elsewhere in the reproductive system. This condition is called endometriosis, and the most common symptom is menstrual pain. If untreated, it may lead to infertility. The second layer of the uterus, the myometrium, is well muscled. It endows the uterus with flexibility and strength and creates the powerful contractions that propel a fetus outward during labor. The third or outermost layer, the perimetrium, provides an external cover.

- Endometrial Cancer
  - Cancer of the endometrial lining—the body of the uterus—is called endometrial cancer. There are about 55,000 new cases each year, and 10,000 deaths. Endometrial cancer is rarer in women younger than 45. It is more common among European American women, but African American women are at greater risk of dying from it.
  - Risk factors are as follows:
    - A shift in the balance between progesterone and estrogen toward higher estrogen levels
    - Hormone replacement therapy
    - Increased number of menstrual cycles during one's lifetime
    - Obesity (fatty tissue can change other hormones into estrogen)
    - Tamoxifen (a breast cancer–treatment drug, which acts like an antiestrogen medicine in breast tissue and like an estrogen in the uterus)
    - Tumors (which sometimes produce estrogen)
    - Age
    - A high-fat diet
    - Diabetes

- Endometrial or colon cancer in the family
- A history of breast or ovarian cancer

The following factors help protect against endometrial cancer (American Cancer Society, 2016b):

- Use of birth control pills
- Pregnancy
- Use of an intrauterine device (IUD)
- Exercise

Endometrial cancer is symptomized by abnormal uterine staining or bleeding, especially after menopause. The most common treatment is surgery, but women may also be treated with radiation therapy, hormonal therapy, and chemotherapy. The five-year survival rate for endometrial cancer is about 90% if it is discovered early and limited to the endometrium. (Endometrial cancer is usually diagnosed early because women tend to report postmenopausal bleeding to their doctors quickly.) The survival rate drops when the cancer invades surrounding tissues or metastasizes. (The survival rate drops to 15% when the cancer has metastasized.)

- The Fallopian Tubes

- The fallopian tubes are about 4 inches in length and extend from the upper end of the uterus toward the ovaries. The part of each tube nearest the uterus is the isthmus, which broadens into the ampulla as it approaches the ovary. The outer part, or infundibulum, has fringed projections called fimbriae that extend toward, but are not attached to, the ovary. Ova pass through the fallopian tubes on their way to the uterus. The fallopian tubes are not just passageways. They help nourish and conduct ova. The tubes are lined with tiny hairlike projections termed cilia (“lashes”) that help propel ova through the tube at about 1 inch per day. Because ova must be fertilized within a day or two after they are released from the ovaries, fertilization usually occurs in the infundibulum within a couple of inches of the ovaries. The form of sterilization called tubal ligation ties off the fallopian tubes, so that ova cannot pass through them or become fertilized. About 2% of pregnancies are ectopic pregnancies; that is, the fertilized ovum implants outside the uterus, most often in the fallopian tube where fertilization occurred. Ectopic pregnancies can eventually burst fallopian tubes, causing hemorrhaging and death, so such pregnancies are terminated before the tube ruptures. Ectopic pregnancies are not easily recognized, however, because their symptoms—missed menstrual period, abdominal pain, irregular bleeding—suggest many conditions. Any of these symptoms is an excellent reason to consult a gynecologist. Risk factors for ectopic pregnancy include a previous ectopic pregnancy, inflammation or

infection of the fallopian tubes or uterus (as from the sexually transmitted infections gonorrhea or chlamydia), use of fertility drugs, or an unusually shaped fallopian tube (Mayo Clinic, 2012).

▪ The Ovaries

- The two ovaries are almond-shaped organs that are each about 1½ inches long. They lie on either side of the uterus, to which they are attached by ovarian ligaments. The ovaries produce ova (egg cells) and the female sex hormones estrogen and progesterone. Estrogen is a generic term for several hormones (such as estradiol, estriol, and estrone) that promote the changes of puberty and regulate the menstrual cycle. Estrogen also helps older women maintain cognitive functioning and feelings of psychological well-being (Castanho et al., 2014). Progesterone is a hormone that also has multiple functions, including regulating the menstrual cycle and preparing the uterus for pregnancy by stimulating the development of the endometrium (uterine lining). Estrogen and progesterone levels vary with the phases of the menstrual cycle. The human female is born with about 2 million ova, but they are immature in form. Of these, about 400,000 survive into puberty, each of which is contained in the ovary within a thin capsule, or follicle. During a woman's reproductive years, from puberty to menopause, only 400 or so ripened ova (typically 1 per month) will be released by their follicles for possible fertilization. How these ova are selected remains a mystery.
- Ovarian Cancer
  - Each year some 21,000 women in the United States are diagnosed with ovarian cancer, and about 14,000 die from it. Ovarian cancer most often strikes women between the ages of 40 and 70 and ranks as the fifth-leading cancer killer of women, behind lung cancer, breast cancer, and colon cancer. It is more common in European American women than African American women. Risk factors for ovarian cancer include (American Cancer Society, 2016c):
    - Increased age (half of cases are found in women older than the age of 63)
    - Obesity
    - Use of the fertility drug clomiphene citrate
    - Use of androgens
    - Use of estrogen therapy (especially without progesterone)
    - Family history of ovarian cancer, breast cancer, or colorectal cancer
    - Personal history of breast cancer (especially if the woman is found to have an inherited mutation in the BRCA1 or BRCA2 genes)
    - Use of talcum powder in the genital region

On the other hand, the following factors appear to lower the risk of ovarian cancer (American Cancer Society 2016c):

- Having had children
- Breast feeding
- Prolonged use of birth control pills
- Tubal ligation
- A low-fat diet
- Use of aspirin or acetaminophen

Early detection is the key to fighting ovarian cancer. When it is detected before spreading beyond the ovary, the five-year survival rate is 89% to 99%, depending on how aggressive the cancer is. When it has metastasized, the survival rate drops to as low as 17% (American Cancer Society, 2016c). Unfortunately, ovarian cancer is often “silent” in the early stages, showing no obvious signs or symptoms. And unfortunately again, early symptoms tend to overlap with symptoms caused by other thing, such as bloating—that is, enlargement of the abdomen, which is caused by the accumulation of fluid. Pelvic pressure or pain in the stomach, trouble eating or feeling full rapidly, and feeling the urge to urinate frequently are additional symptoms. The Pap test, which is useful in detecting cervical cancer, does not reveal ovarian cancer. The most commonly used tests in screening for ovarian cancer are the transvaginal ultrasound (TVUS) and the CA-125 blood test. The TVUS inserts a wand into the vagina; the wand detects masses, but not whether they are cancerous. If ovarian cancer is suspected, the gynecologist usually does a biopsy—a minor surgical procedure in which the doctor obtains and then examines a sample or ovarian tissue. Surgery, radiation therapy, and drug therapy are treatment options. One, two, or all of these methods may be recommended. Surgery usually includes the removal of one or both ovaries, the uterus, and the fallopian tubes.

- Hysterectomy
  - One in three women in the United States has a hysterectomy by the age of 60. Most women who obtain them do so between the ages of 35 and 45. The hysterectomy is the second-most commonly performed operation on women in the United States. (Cesarean sections are the most common.) A hysterectomy may be performed when a woman develops cancer of the uterus, ovaries, or cervix, or another disease that causes pain or excessive uterine bleeding. A complete hysterectomy is the surgical removal of the ovaries, fallopian tubes, cervix, and uterus. It is usually performed to reduce the risk of cancer

spreading throughout the reproductive system. A partial hysterectomy is the removal of the uterus, but the ovaries and fallopian tubes are spared; thus, the woman continues to ovulate and produce adequate quantities of female sex hormones. The hysterectomy can relieve symptoms associated with various gynecological disorders and improve the quality of life for many women. However, many gynecologists believe that hysterectomies are recommended too often, before proper diagnostic steps are taken or when less radical interventions might alleviate the problem (Corona et al., 2015). We strongly suggest that women whose physicians advise a hysterectomy seek a second opinion before proceeding.

▪ The Pelvic Examination

- Women are advised to have an internal (pelvic) examination at least once a year by the time they reach their late teens (or earlier if they become sexually active) and twice yearly if they are older than age 35 or use birth control pills. The physician (usually a gynecologist) first examines the woman externally for irritations, swellings, abnormal vaginal discharges, and clitoral adhesions. The physician normally inserts a speculum to help inspect the cervix and vaginal walls for discharges (which can be signs of infection), discoloration, lesions, or growths. This examination is typically followed by a Pap test to detect cervical cancer. A sample of vaginal discharge may also be taken to test for the sexually transmitted infection (STI) gonorrhea. To take a Pap test, or a Pap smear, the physician will hold open the vaginal walls with a plastic or (hopefully prewarmed!) metal speculum so that a sample of cells (a “smear”) may be scraped from the cervix with a wooden spatula. Women should not douche before Pap tests or schedule them during menstruation because douches and blood confound analysis of the smear. The speculum exam is normally followed by a bimanual vaginal exam in which the index and middle fingers of one hand are inserted into the vagina while the lower part of the abdomen is palpated (touched) by the other hand from the outside. The physician uses this technique to examine the location, shape, size, and movability of the internal sex organs, searching for abnormal growths and symptoms of other problems. Palpation may be somewhat uncomfortable, but severe pain is a sign that something is wrong. A woman need not hide such discomfort from the examiner. She may only be masking a symptom (that is, depriving the physician of useful information). Physical discomfort is usually mild, however, and psychological discomfort is sometimes lessened by discussing it. Finally, the physician should do a recto-vaginal examination in which one finger is inserted into the rectum while the other is inserted into the vagina. This

procedure provides additional information about the ligaments of the uterus, the ovaries, and the fallopian tubes. The procedure also helps the physician evaluate the health of the rectum. Although it may be somewhat uncomfortable, the pelvic examination is not ordinarily painful. It is normal for a woman who has not had one, or who is visiting a new doctor, to be anxious about the examination. The doctor should be reassuring if the woman expresses concern. If the doctor is not, the woman should feel free to consult another doctor. She should not forgo the pelvic examination itself, however. It is essential for early detection of problems.

- The Breasts
  - Describe the composition and functions of the breasts.
    - In some cultures, the breasts are viewed merely as biological instruments for feeding infants. In American culture, however, breasts have such erotic significance that a woman's self-esteem may become linked to her bust line. The breasts are secondary sex characteristics. Like the rounding of the hips, they distinguish females from males, but they are not directly involved in reproduction. Each breast contains 15 to 20 clusters of milk-producing mammary glands. Each gland opens at the nipple through its own duct. The mammary glands are separated by soft, fatty tissue. It is the amount of this fatty tissue, not the amount of glandular tissue, that largely determines the size of the breasts. The nipple, which lies in the center of the areola, contains smooth muscle fibers that erect the nipple when they contract. The areola, or area surrounding the nipple, darkens during pregnancy and remains darker after delivery. Oil-producing glands in the areola help lubricate the nipples during breast feeding. Milk ducts conduct milk from the mammary glands through the nipples. Nipples are richly endowed with nerve endings, so that stimulation of the nipples heightens sexual arousal for many women. Male nipples are similar in sensitivity. The sensitivity of the breasts to sexual stimulation is unrelated to their size. Small breasts may have as many nerve endings as large breasts, but they will be more densely packed. Women can prompt their partners to provide breast stimulation by informing them that their breasts are sensitive to stimulation. They can also guide a partner's hands in ways that provide the type of stimulation they desire. The breasts vary in sensitivity with the phases of the menstrual cycle, and some women appear less responsive to breast stimulation than others. However, some less sensitive women may learn to enjoy breast stimulation by focusing on breast sensations during lovemaking in a relaxed atmosphere.
  - Discuss the risk factors for and detection and treatment of breast cancer
    - Susan contracted breast cancer in her 30s. A lump "suddenly" appeared in her mammography. She and her family dwelled in fear over the next couple of weeks as tissue from the tumor was biopsied, found to be malignant, and arrangements were made to remove the breast. Given the "aggressiveness" of the tumor—the rapidity with which it had

grown—every physician she consulted recommended mastectomy (surgically removing the breast) rather than lumpectomy (surgically removing a lump from the breast). The question arose as to whether Susan should remove the healthy breast as a precautionary measure. A blood test determined that she did not possess genetic mutations in the BRCA1 or BRCA2 genes that are connected with early-onset breast cancer, so the healthy breast was preserved. There was additional anxiety following the removal of the breast as tissues were examined to determine whether the cancer had spread within the breast or to lymph nodes. Fortunately, it had apparently remained within a duct despite the rapidity of its growth. Susan then dealt with the psychological issues of feeling unwhole, which were to some degree mitigated by attending a support group of women undergoing similar experiences. Reconstruction of the breast was an unexpected and lengthy process during which the muscles that normally underlie breasts were gradually ballooned out to surround and support a silicone implant. A new cosmetic nipple was constructed from thigh tissue. It was decided that she did not need chemotherapy or radiation, but she did go on tamoxifen, a drug that decreases the body's supply of estrogen—a factor in the development of cancerous tissue in the breast. There was no evidence of remaining malignant tissue after Susan reached the “magical” five-year postsurgical survival date. Breast cancer strikes more than 230,000 women in the United States each year and takes about 40,000 lives. Men can also develop breast cancer, but the disease is 100 times more common in women. People do not die from cancer in the breast per se, but rather from its spread to other body parts such as the brain, bones, lungs, or liver. Breast cancer is the second leading cancer killer of women, following lung cancer. Even so the incidence of breast cancer has been on the decline, presumably related to decreased use of hormone replacement therapy following menopause. In clinical breast examinations (CBEs), physicians feel the breasts for lumps that may be breast cancer during clinical examination. Women with breast cancer have lumps in the breast, but most lumps are not cancerous. Most are either cysts or benign tumors called fibroadenomas. Breast cancer involves lumps in the breast that are malignant. Women can also detect lumps in their own breasts by means of breast self-examination (BSE). But keep in mind that even though the American Cancer Society no longer recommends BSE, regular clinical visits are essential. More early cases of breast cancer are being detected because of an increased use of mammography, a kind of X-ray that detects cancerous lumps in the breast. Advances in early detection and treatment have led to increased rates of recovery among women from age 40 into their 70s (National Cancer Institute, 2015). On the other hand, health professionals admit that mammography has led to the detection and treatment of some localized cancers that might never have grown (National Cancer Institute, 2015). The American Cancer Society (2016d) counters that the majority of these small tumors would grow. In any event, the National Cancer Institute (2015) recommends that women aged 40 and

older talk to their healthcare providers about the frequency of mammograms. The following factors increase the risk of breast cancer (American Cancer Society, 2016d):

- Gender—being female
- Family history of breast cancer, especially if a mother, sister, or daughter has been diagnosed with the disease
- Inherited mutation of BRCA1 and BRCA2 genes. In some families the lifetime risk of breast cancer from these mutations is 80% of BRCA1 genes and 45% for BRCA2 genes (American Cancer Society, 2016d). Ashkenazi Jewish women are at greater risk than the general population of BRCA mutations.
- Higher breast density
- First menstrual period before the age of 12, menopause after age 55, delayed childbearing, and never having children—all of which increase lifetime exposure to estrogen
- Long-term use of menopausal hormone therapy (especially women who have used a combination of estrogen and progestin for more than 5 years)
- Radiation therapy to the chest (as for Hodgkin lymphoma)
- Alcohol (the more you drink, the higher the risk)
- Use of DES
- Being overweight or obese (fatty tissue produces estrogen)
- Physical inactivity (exercise may reduce the risk of breast cancer by decreasing the amount of fatty tissue in the body)

A number of women whose family histories and genetics seem to place them at extraordinarily high risk for breast cancer have chosen to have their breasts removed prophylactically—meaning to prevent disease, not to treat disease. In some cases, women who developed cancer in one breast chose to have both removed at the same time. But in some case, women without any symptoms but just with the genetic risk have had them removed. Film actress and United Nations special envoy Angelina Jolie lost her mother to breast cancer at the age of 56, and she, Angelina, shares, in her words, the “faulty” gene. Angelina’s doctors estimated that she had an 87% chance of developing breast cancer herself, along with a 50% risk of developing ovarian cancer, which is genetically related. She writes, “I decided to be proactive and to minimize the risk as much I could. I made a decision to have a preventive double mastectomy. . . . I can tell my children that they don’t need to fear they will lose me to breast cancer” (Jolie, 2013). In sum, the current recommendations for breast cancer screening of the American Cancer Society (2016d), are as examination:

- Since 2003: BSE
  - Age 20 and older, optional
- Since 2003: Clinical breast exam (CBE),
  - Ages 20–39, preferably every three years
  - Ages 40 and older, preferably every year
- Since 2015: Mammogram

- Ages 40–44, women should have the choice to request screening, and women with higher-risk profiles should be screened
- Ages 45–54, yearly
- Ages 55 and older, every two years, although women should have the choice to continue annual screening

In any event, the 5-year survival rate for women whose breast cancers have not spread beyond the breast is about 93%, up from nearly 80% in the 1950s (American Cancer Society, 2012d). The 5-year survival rate drops to about 80% if the cancer has spread to the surrounding region and to about 15% if it has spread to more distant sites. Does abortion increase a woman's risk of breast cancer? Some writers have speculated that because pregnancy decreases the risk of breast cancer, having an abortion will indirectly increase the risk (Malec, 2003).

- Treatment
  - Early detection of breast cancer offers many benefits. Smaller lumps are sometimes removed by lumpectomy, sparing the breast. More advanced cancers are likely to be treated by mastectomy. Many drugs are also used to treat breast cancer, and others are in the research pipeline. Tamoxifen locks into the estrogen receptors of breast cancer cells, thereby blocking estrogen's stimulation of the cells to grow and proliferate. However, tamoxifen increases the risks of uterine cancer and of blood clots in the lungs, along with some other side effects. The risks of these side effects were lowest among women younger than the age of 50. The drug raloxifene has also been shown to reduce the risk of breast cancer (Wickerham et al., 2015). Moreover, raloxifene does not appear to have the side effects associated with tamoxifen. Other drugs are also being studied for use against breast cancer. Many women who have had mastectomies have had surgical breast implants to replace the tissue that has been removed. Other women have breast implants to augment their breast size. Research suggests that breast implants probably have no effect on the probability of developing breast cancer, rheumatoid arthritis, and a number of other health problems, casting doubts on previous studies that had implicated them in the development of these problems.
- The Menstrual Cycle
  - Describe the regulation and the phases of the menstrual cycle.
    - Menstruation is the cyclical bleeding that stems from the shedding of the uterine lining (endometrium). Menstruation takes place when a reproductive cycle has not led to the fertilization of an ovum. The word menstruation derives from the Latin mensis, meaning "month." The menstrual cycle averages 28 days. The cycle is regulated by the hormones estrogen and progesterone and can be divided into four phases. The first phase, the proliferative phase, follows menstruation. During this phase, estrogen levels increase, causing the ripening of perhaps 10 to 20 ova (egg

cells) within their follicles and the proliferation of endometrial tissue in the uterus. During the second phase of the cycle, estrogen reaches peak blood levels, and ovulation occurs. Normally only one ovum reaches maturity and is released by an ovary during ovulation. Then the third phase (the secretory, or luteal, phase) of the cycle begins. The luteal phase begins right after ovulation and continues through the beginning of the next cycle. The term luteal phase is derived from corpus luteum, the name given to the follicle that releases an ovum. The corpus luteum functions as an endocrine gland and produces large amounts of progesterone and estrogen. Progesterone causes the endometrium to thicken, so that it will be able to support an embryo if fertilization occurs. If the ovum goes unfertilized, however, estrogen and progesterone levels plummet. The drops trigger the fourth phase, the menstrual phase, which leads to the beginning of a new cycle. Ovulation may not occur in every menstrual cycle. Anovulatory (“without ovulation”) cycles are most common in the years just after menarche (the first menstrual period). They may become frequent again in the years before menopause, but they may also occur irregularly at any age. Although the menstrual cycle averages 28 days, variations among women, and in the same woman from month to month, are common. Girls’ cycles are often irregular for a few years after menarche but later assume regular patterns. Variations from cycle to cycle tend to occur during the proliferative phase that precedes ovulation. Menstruation tends to reliably follow ovulation by about 14 days. Hormones regulate the menstrual cycle, but psychological factors can affect the secretion of hormones. Stress can delay or halt menstruation. Many women in otherwise good health stopped menstruating during imprisonment in Nazi concentration camps during World War II.

- Regulation of the Menstrual Cycle

- The menstrual cycle involves finely tuned relationships between structures in the brain (the hypothalamus and the pituitary gland) and the ovaries and uterus. All these structures are parts of the endocrine system, which means that they secrete chemicals directly into the bloodstream. The chemicals secreted by endocrine glands are called hormones. The ovaries and uterus are also reproductive organs. The gonads—the ovaries in the female and the testes (or testicles) in the male—secrete sex hormones directly into the bloodstream. The female gonads, the ovaries, produce the sex hormones estrogen and progesterone. The male gonads, the testes, produce the male sex hormone testosterone. Males and females also produce relatively small amounts of the sex hormones of the opposite gender. The hypothalamus is a pea-sized structure in the front part of the brain. It lies above the pituitary gland and below (hence the prefix hypo-, for “under”) the thalamus. Despite its small size, it is involved in regulating many states of motivation, including hunger, thirst, aggression, and sex. Human sexuality is not so stereotyped or mechanical—although in the

cases of people who have fallen into ruts, it may seem to be. The pituitary gland, which is about the size of a pea, lies below the hypothalamus at the base of the brain. Because many pituitary secretions regulate other endocrine glands, the pituitary has also been called the master gland. Pituitary hormones regulate bone and muscle growth and urine production. Two pituitary hormones are active during pregnancy and motherhood: prolactin, which stimulates production of milk, and oxytocin, which stimulates uterine contractions in labor and the ejection of milk during nursing. The pituitary gland also produces gonadotropins (literally, “that which ‘feeds’ the gonads”) that stimulate the ovaries: follicle-stimulating hormone (FSH) and luteinizing hormone (LH). These hormones play key roles in regulating the menstrual cycle. The hypothalamus receives information about bodily events through the nervous and circulatory systems. It monitors the blood levels of various hormones, including estrogen and progesterone, and releases a hormone called gonadotropin-releasing hormone (Gn-RH), which stimulates the pituitary to release gonadotropins. Gonadotropins, in turn, regulate the activity of the gonads. It was once thought that the pituitary gland ran the show, but it is now known that the pituitary gland is regulated by the hypothalamus. Even the “master gland” must serve another.

- Phases of the Menstrual Cycle
  - The menstrual cycle has four stages or phases: proliferative, ovulatory, secretory, and menstrual. It might seem logical that a new cycle begins with the first day of the menstrual flow because this is the most clearly identifiable event of the cycle. Many women also count the days of the menstrual cycle beginning with the onset of menstruation. Biologically speaking, however, menstruation is really the culmination of the cycle. In fact, the cycle begins with the end of menstruation and the initiation of a series of biological events that lead to the maturation of an immature ovum in preparation for ovulation and possible fertilization.
  - The Proliferative Phase
    - The first phase, or proliferative phase, begins with the end of menstruation and lasts about 9 or 10 days in an average 28-day cycle. During this phase the endometrium develops, or “proliferates.” This phase is also known as the preovulatory or follicular phase because certain ovarian follicles mature and the ovaries prepare for ovulation. Low levels of estrogen and progesterone are circulating in the blood as menstruation draws to an end. When the hypothalamus senses a low level of estrogen in the blood, it increases secretion of Gn-RH, which in turn triggers the pituitary gland to release a FSH. When FSH reaches the

ovaries, it stimulates some follicles (perhaps 10 to 20) to begin to mature. As the follicles ripen, they begin to produce estrogen. Normally, however, only one of them—called the graafian follicle—will reach full maturity in the days just preceding ovulation. As the graafian follicle matures, it moves toward the surface of the ovary, where it will eventually rupture and release a mature egg. Estrogen causes the endometrium in the uterus to thicken to about 1/8 inch. Glands develop that would eventually nourish an embryo. Estrogen also stimulates the appearance of a thin cervical mucus. This mucus is alkaline and provides a hospitable, nutritious medium for sperm. The chances are thus increased that sperm that enter the female reproductive system at the time of ovulation will survive.

- The Ovulatory Phase
  - During ovulation, or the ovulatory phase, the graafian follicle ruptures and releases a mature ovum near a fallopian tube—not into a fallopian tube. The other ripening follicles degenerate and are reabsorbed by the body. If two ova mature and are released during ovulation and both are fertilized, fraternal (nonidentical) twins will develop. Identical twins occur when one fertilized ovum divides into two separate zygotes. Ovulation is set into motion when estrogen production reaches a critical level. The hypothalamus detects the high level of estrogen and triggers the pituitary to release copious amounts of FSH and LH. The surge of LH triggers ovulation, which usually begins 12 to 24 hours after the level of LH in the body has reached its peak. The synthetic hormone clomiphene is chemically similar to LH and has been used by women who ovulate irregularly to induce reliable ovulation and thus increase the chances of conceiving. A woman's basal body temperature, taken by oral or rectal thermometer, dips slightly at ovulation and rises by about 1° F on the day following ovulation. Many women use this information to help them conceive or avoid conceiving. Some women have discomfort or cramping during ovulation, termed mittelschmerz. This condition is sometimes confused with appendicitis. Mittelschmerz, however, may occur on either side of the abdomen, depending on which ovary is releasing an ovum. A ruptured appendix always causes pain on the right side.
- The Secretary Phase
  - The phase following ovulation is called the postovulatory or secretary phase. Some people refer to it as the luteal phase, which reflects the name given to the ruptured

(graafian) follicle—the corpus luteum. Under the influence of LH, the corpus luteum, which has remained in the ovary, begins to produce large amounts of progesterone and estrogen. Levels of these hormones peak at around the 20th or 21st day of an average cycle. These hormones cause the glands in the endometrium to secrete nutrients to sustain a fertilized ovum that becomes implanted in the uterine wall. If implantation does not occur, the hypothalamus responds to the peak levels of progesterone by signaling the pituitary to stop producing LH and FSH. This feedback process is similar to that of a thermostat in a house reacting to rising temperatures by shutting down the furnace. The levels of LH and FSH decline rapidly, leading the corpus luteum to decompose. After its decomposition, levels of estrogen and progesterone fall precipitously. The corpus luteum sows the seeds of its own destruction: Its hormones signal the brain to shut down secretion of substances that maintain it.

- The Menstrual Phase: An End and a Beginning
  - The menstrual phase occurs when decreasing estrogen and progesterone levels can no longer sustain the uterine lining. The lining then disintegrates and is discharged from the body along with the menstrual flow. The low estrogen levels of the menstrual phase signal the hypothalamus to release Gn-RH, which in turn stimulates the pituitary to secrete FSH. The FSH, in turn, prompts ovarian secretion of estrogen and the onset of another proliferative phase. Thus, a new cycle begins. The menstrual phase is a beginning as well as an end. Menstrual flow contains blood from the endometrium (uterine lining), endometrial tissue, and cervical and vaginal mucus. Although the flow can appear persistent and last for five days or more, most women lose only a total of 2 or 3 ounces of blood (4 to 6 tablespoonfuls). A typical blood donor, by contrast, donates 16 ounces of blood at a sitting. Extremely heavy or prolonged (over a week) menstrual bleeding may reflect health problems and should be discussed with a healthcare provider. Prior to 1933, women generally used external sanitary napkins or pads to absorb the menstrual flow. In that year, however, tampons were introduced. Tampons are inserted into the vagina and left in place to absorb menstrual fluid. Women who use tampons can swim without concern while menstruating, wear more revealing or comfortable apparel, and feel less burdened. Questions have arisen about whether or not tampons cause or exacerbate infections, such as toxic shock syndrome (TSS),

which is sometimes fatal. Signs of TSS include fever, headache, sore throat, vomiting, diarrhea, muscle aches, rash, and dizziness. Peeling skin, disorientation, and a plunge in blood pressure may follow. TSS is caused by the *Staphylococcus aureus* (“staph”) bacterium, which is most likely to overbreed when highly absorbent tampons are left in place for many hours. As a result, many women now use regular rather than superabsorbent tampons. Others change their tampons three or four times a day, or alternate them with sanitary napkins. Women are encouraged to consult their healthcare providers about TSS.

- Sex during Menstruation
  - Many couples continue to have sex during menstruation; others abstain. Some people abstain because of religious prohibitions. Others express concern about the “fuss” or the “mess” of the menstrual flow. Women may be sexually aroused at any time during the menstrual cycle. The preponderance of the research evidence, however, points to a peak in sexual desire in women around the time of ovulation. Human sexual patterns during the phases of the menstrual cycle reflect personal decisions and not just hormone fluctuations. Some couples may decide to increase their frequency of coitus at ovulation to optimize the chances of conceiving or to abstain during menstruation because of cultural or religious beliefs. Some may also increase their coital activity preceding menstruation to compensate for anticipated abstinence during menses or to increase coital activity afterward to make up for deprivation. In contrast, females of other species that are bound by the estrous cycle generally respond sexually only during estrus.
- Menopause, Perimenopause, and the Climacteric
  - Define and discuss menopause, perimenopause, and the climacteric.
    - Two years after she had her breasts removed, Angela Jolie decided to remove her ovaries. In addition to having the BRCA1 gene, three women in her family had died from cancer. As a result of the operation, she was placed in a “forced menopause”— meaning that female sex hormones from her ovaries would no longer be circulating in her bloodstream. Menopause, or the “change of life,” is the cessation of menstruation. Menopause is a process that most commonly occurs between the ages of 46 and 50 and lasts for about two years. However, it may begin any time between the ages of 35 and 60. Perimenopause refers to the beginning of menopause and is usually characterized by 3 to 11 months of amenorrhea (lack of menstruation) or irregular periods. Perimenopause ends with menopause. Menopause, in other words, is a specific event in a longer-term process known as the climacteric (“critical period”). The term climacteric specifically refers to the gradual decline in the reproductive capacity of the ovaries. The climacteric generally

lasts about 15 years, from about ages 45 to 60. After age 35 or so, the menstrual cycles of many women shorten, from an average of 28 days to 25 days at age 40 and to 23 days by the mid-40s. By the end of her 40s, a woman's cycle may become erratic, with some periods close together and others missed. In menopause, the pituitary gland continues to pour normal levels of FSH and LH into the bloodstream; but, for reasons that are not well understood, the ovaries gradually lose their capacity to respond. The ovaries no longer ripen egg cells or produce the sex hormones estrogen and progesterone. The deficit in estrogen may lead to a number of unpleasant perimenopausal sensations, such as night sweats and hot flashes (suddenly feeling hot) and hot flushes (suddenly looking reddened). Hot flashes and flushes may alternate with cold sweats, in which a woman feels suddenly cold and clammy. Anyone who has experienced "cold feet" or hands from anxiety or fear will understand how dramatic the shifting patterns of blood flow can be. Hot flashes and flushes stem largely from "waves" of dilation of blood vessels across the face and upper body. All of these sensations reflect vasomotor instability. That is, there are disruptions in the body mechanisms that dilate or constrict the blood vessels to maintain an even body temperature. Additional signs of estrogen deficiency include dizziness, headaches, pains in the joints, sensations of tingling in the hands or feet, burning or itchy skin, and heart palpitations. The skin usually becomes drier. Women may also encounter sleep problems, such as awakening more frequently at night and having difficulty falling back to sleep. Many perimenopausal women also experience migraine headaches. There is some loss of breast tissue, vulvovaginal atrophy (loss of tissue in the genital region), and decreased vaginal lubrication during sexual arousal. Surveys by the North American Menopause Society (2013) asked women how vaginal discomfort affected them. This is what they reported:

- Eighty percent reported that vaginal discomfort negatively affected them, and 25% said it reduced their quality of life
- Thirty-six percent reported that it made them feel old, and 26% said it lowered their self-esteem
- three in four (75%) said that vaginal discomfort impaired their sex life, and one in three (33%) reported that it impacted their marriage or primary relationship
- Twenty-nine percent said that it had a negative effect on their sleep patterns

Long-term estrogen deficiency has also been linked to brittleness and porosity of the bones, known as osteoporosis. Bones break more readily, and some women develop "dowager's hump." Osteoporosis can be handicapping, even life-threatening. The increased brittleness of the bones increases the risk of serious

fractures, especially of the hip, and many older women never recover from them. Estrogen deficiency can also impair cognitive functioning and feelings of psychological well-being.

- **Hormone Replacement Therapy: Good Medicine or Menace?**
  - Hormone replacement therapy may help reduce the hot flashes and other symptoms brought about by hormonal deficiencies during menopause. There is also evidence that estrogen replacement lowers women's risks of osteoporosis. The connection between estrogen and colon cancer is unclear. Use of vaginal estrogen has been shown to be helpful with vulvovaginal atrophy. So do moisturizers. Yet, HRT is controversial. In addition to stimulating the growth of breast cancer, the combination of hormones also makes the tumors harder to detect, causing dangerous delays in diagnosis. Although estrogen stimulates proliferation of breast cancer cells, research suggests that women who have had hysterectomies might actually have a lower risk of breast cancer. The researchers point out the importance of distinguishing between hormone therapy that is estrogen-only versus estrogen plus progestin. HRT also appears to increase the risk of lung cancer in postmenopausal women who smoke or smoked.
  - Research results on the benefits and dangers of HRT are mixed, and women considering HRT are well advised to explore the latest findings with their healthcare providers. They might also consider alternatives. Selective serotonin reuptake inhibitors (SSRIs), such as Lexapro, Prozac, and Zocor are of help. Women using SSRIs to treat hot flashes usually take half the dose used to treat depression, which is their main usage, although they are also helpful with premenstrual syndrome (PMS), premenstrual dysphoric disorder (PMDD), eating disorders, and other problems. Vaginal dryness can be treated with estrogens that are used locally—that is, placed in the vagina rather than the bloodstream, as hormones usually are. Creams (e.g., Estrace), suppositories (Vagifem), and a plastic ring (Estring) are available for this purpose. Drinking milk, which is high in calcium, increases bone density among girls and is likely to help prevent against osteoporosis later in life. Calcium supplements and the bisphosphonates (Actonel or Fosamax) also help maintain bone strength. Some women use HRT to help get through the years leading up to menopause and then stop it. At this time, it appears that the one thing we can predict is that different healthcare providers are likely to have different views on the matter.

- Menstrual Problems
  - Define menstrual problems and discuss what can be done about them.
    - Although menstruation is a natural biological process, the majority of women experience some discomfort prior to or during menstruation. The problems we explore in this section include dysmenorrhea, mastalgia, menstrual migraine headaches, amenorrhea, PMS, and premenstrual dysphoric disorder (PMDD).
    - Dysmenorrhea
      - Pain or discomfort during menstruation—dysmenorrhea—is the most common menstrual problem. Most women at some time have at least mild menstrual pain or discomfort, so it is perfectly normal, even if annoying. Pelvic cramps are the most common manifestation of dysmenorrhea. They may be accompanied by headache, backache, nausea, or bloated feelings. Women who develop severe cases usually do so within a few years of menarche. Primary dysmenorrhea refers to menstrual pain or discomfort in the absence of known organic pathology. Women with secondary dysmenorrhea have identified organic problems that are believed to cause their menstrual problems. Their pain or discomfort is caused by, or secondary to, these problems. Endometriosis, pelvic inflammatory disease, and ovarian cysts are just a few of the organic disorders that can give rise to secondary dysmenorrhea. Evidence is accumulating, however, that supposed primary dysmenorrhea is often secondary to hormonal changes, although the precise causes have not been delineated. Menstrual cramps sometimes decrease dramatically after childbirth, as a result of the massive hormonal changes that occur with pregnancy. Women who have been pregnant report a lower incidence of menstrual pain but a higher incidence of premenstrual symptoms and menstrual discomfort. Menstrual cramps appear to result from uterine spasms that may be brought about by copious secretion of hormones called prostaglandins. Prostaglandins apparently cause muscle fibers in the uterine wall to contract, as during labor. Most contractions go unnoticed, but powerful, persistent contractions are discomfiting in themselves and may temporarily deprive the uterus of oxygen, another source of distress. Women with more intense menstrual discomfort apparently produce higher quantities of prostaglandins. Prostaglandin-inhibiting drugs, such as ibuprofen, indomethacin, and aspirin, are often helpful. Menstrual pain may also be secondary to endometriosis. Pelvic pressure and bloating may be traced to pelvic edema— the congestion of fluid in the pelvic region. Fluid retention can lead to a gain of several pounds, sensations of heaviness, and mastalgia—a swelling of the breasts that sometimes causes premenstrual discomfort. Masters and Johnson (1966) noted that orgasm can help relieve menstrual discomfort by reducing the pelvic congestion that spawns bloating and pressure. Orgasm may

also increase the menstrual flow and shorten this phase of the cycle. Headaches frequently accompany menstrual discomfort. Most headaches (in both females and males) stem from simple muscle tension, notably in the shoulders, the back of the neck, and the scalp. Pelvic discomfort may cause muscle contractions, therefore contributing to the tension that produces headaches. Women who are tense about their menstrual flow are thus candidates for muscle tension headaches. Migraine headaches may arise from changes in the blood flow in the brain, however. Migraines are typically limited to one side of the head and are often accompanied by visual difficulties.

- Amenorrhea
  - Amenorrhea is the absence of menstruation and is a primary sign of infertility. Primary amenorrhea describes the absence of menstruation in a woman who has not menstruated at all by about the age of 16 or 17. Secondary amenorrhea describes delayed or absent menstrual periods in women who have had regular periods in the past. Amenorrhea has various causes, including abnormalities in the structures of the reproductive system, hormonal abnormalities, growths such as cysts and tumors, and psychological problems, such as stress. Amenorrhea is normal during pregnancy and following menopause. Amenorrhea is also a symptom of anorexia nervosa, an eating disorder characterized by an intense fear of putting on weight and a refusal to eat enough to maintain a normal body weight, which often results in extreme (and sometimes life-threatening) weight loss. Hormonal changes that accompany emaciation are believed responsible for the cessation of menstruation. Amenorrhea may also occur in women who exercise strenuously, such as competitive long-distance runners. It is unclear whether the cessation of menstruation in female athletes is as a result of the effects of strenuous exercise itself, to related physical factors such as low body fat, to the stress of intensive training, or to a combination of factors.
- Premenstrual Syndrome (PMS) and Premenstrual Dysphoric Disorder (PMDD)
  - The term premenstrual syndrome (PMS) describes the combination of physical and psychological symptoms that may affect women during the 4- to 6-day interval that precedes their menses each month. For many women, premenstrual symptoms persist during menstruation. Premenstrual dysphoric disorder (PMDD) is a more technical term used as a diagnostic category by the American Psychiatric Association (2013) in its Diagnostic and Statistical Manual of the Mental Disorders (the DSM–5). PMDD is more severe than PMS, and is characterized by the following symptoms:
    - Depressed mood, as evidenced by crying and feelings of sadness, hopelessness, or worthlessness

- Withdrawal from activities that are usually sought out and enjoyed
- Difficulty concentrating and paying sustained attention to tasks
- Fatigue, lack of energy
- Feelings of tension and anxiety, being “on edge”
- Feelings of irritability or anger, possibly causing conflict with family members and others
- Feeling overwhelmed, that life is out of control
- Significant changes in appetite that can lead to binge eating or the craving of particular foods and often result in weight gain
- Problems in sleeping: sleeping too much (hypersomnia) or too little (insomnia)
- A variety of physical problems may also be present, such as swelling or tenderness of the breasts, pain in muscle, pain in joints, migraine headaches, and feeling bloated

Unlike PMS, PMDD is a persistent problem. The DSM-V does not apply the diagnosis unless the woman has experienced the problem during most menstrual cycles over a period of a year. Moreover, a number of the symptoms must be present. The DSM-V also requires that the symptoms impair the woman’s life, perhaps her functioning at work or in an academic pursuit, perhaps in her social or family relationships. The term PMDD is not always used precisely, and some make the mistake of confusing it with PMS. But the diagnosis of PMDD requires that five or more of the following symptoms be present most of the time during the week before the period and end within a few days after the period begins. At least one symptom must be one of the first four. In addition, to diagnose PMDD, the DSM-V requires that symptoms have been present for most menstrual cycles over the past year and that they notably impair functioning at work or school or in social activities and relationships. Nearly three women in four experience some symptoms of PMS, and nearly half of women can be diagnosed with the problem. The most common symptoms are minor psychological discomfort, muscle tension, and aches or pains. The great majority of cases involve mild to moderate discomfort. Only a small minority of women report menstrual symptoms severe enough to impair their social, academic, or occupational functioning. The causes of PMS and PMDD are unclear, but researchers are looking to possible relationships between menstrual problems, including PMS and PMDD, and chemical imbalances in the body. Also, PMS and PMDD appear to be linked with imbalances in neurotransmitters such as serotonin. Neurotransmitters are the chemical messengers in the nervous system.) Serotonin imbalances are also linked to changes in

appetite. Women with PMS and PMDD show greater increases of appetite during the luteal phase than other women do. Another neurotransmitter, gamma-aminobutyric acid (GABA), also appears to be involved in premenstrual problems; medicines that affect the levels of GABA help many women with these problems. PMS and PMDD may well be caused by a complex interaction between ovarian hormones and neurotransmitters. A couple of generations ago, premenstrual disorders were seen as “a woman’s lot”—something women must put up with. Today there are many treatment options. These include exercise; dietary control (eating several small meals a day rather than two or three large meals, limiting salt and sugar, supplementing diet with vitamins); hormone treatments (usually progestin); and medications that reduce anxiety or increase the amount of serotonin in the nervous system.

- How to Handle Menstrual Discomfort
  - Most women experience some menstrual discomfort. Women with persistent menstrual distress may profit from the suggestions listed here. Researchers are exploring the effectiveness of these techniques in controlled studies.
    - Don’t blame yourself! Menstrual problems were once erroneously attributed to women’s “hysterical” nature. This is nonsense. Menstrual problems appear, in large part, to reflect hormonal variations or chemical fluctuations in the brain during the menstrual cycle. Researchers have not yet fully identified all the causal elements and patterns, but their lack of knowledge does not mean that women who have menstrual problems are hysterical.
    - Keep a menstrual calendar so that you can track your menstrual symptoms systematically and identify patterns.
    - Develop strategies for dealing with days that you experience the greatest distress—strategies that will help enhance your pleasure and minimize the stress affecting you on those days. Activities that distract you from your menstrual discomfort may be helpful. Go see a movie or get into that novel you’ve been meaning to read.
    - Consider whether you harbor self-defeating attitudes toward menstruation that might compound distress. Do close relatives or friends see menstruation as an illness, a time of “pollution,” a “dirty thing”?
    - See a gynecologist about your concerns, especially if you have severe symptoms. Severe menstrual symptoms can be secondary to medical disorders such as endometriosis and pelvic inflammatory disease (PID). Check it out.
    - Ask your gynecologist about oral contraceptives that

- reduce the number of menstrual periods to four per year (Seasonale or Seasonique) or one per year (Lybrel). Still others shorten periods.
- Develop nutritious eating habits—and continue them throughout the entire cycle (that means always). Consider limiting intake of alcohol, caffeine, fats, salt, and sweets, especially during the days preceding menstruation. A low-fat, vegetarian diet may reduce the duration and intensity of PMS.
  - Eat several smaller meals (or nutritious snacks) throughout the day, rather than a few highly filling meals.
  - Some women find that vigorous exercise—jogging, swimming, bicycling, fast walking, dancing, skating, even jumping rope—helps relieve premenstrual and menstrual discomfort. Evidence suggests that exercise helps to relieve and possibly prevent menstrual discomfort.
  - Check with your doctor about vitamin and mineral supplements (such as calcium and magnesium).
  - Ibuprofen (brand names Medipren, Advil, Motrin, etc.) and other medicines available over the counter may be helpful for cramping. Prescription drugs such as anti-anxiety drugs (e.g., alprazolam) and anti-depressant drugs (selective serotonin reuptake inhibitors or SSRIs) may also be of help. Anti-depressants affect levels of neurotransmitters in a way that can be helpful for women with PMS or PMDD. Their benefits do not mean that women with PMS or PMDD are depressed.
  - Remind yourself that menstrual problems are time limited.

## Chapter Summary

This chapter starts with an exploration of misconceptions about female genitalia and the widespread “code of silence” with respect to their sexual organs with which most children are reared. The external genitals (vulva) are described. The clitoris is described as being “homologous” but not “analogous” to the penis. The clitoris is the only known organ whose only purpose is to provide sexual pleasure. The controversial procedure known as female genital mutilation historically and currently practiced in some parts of Africa and the Middle East is then described. The myth about the presence or absence of the hymen as proof of virginity is discussed. The internal genitalia are then described. The walls of the vagina normally secrete substances that help maintain the health of the vagina. Some hygienic recommendations are given so that females can decrease the risk of being infected by contamination. The pelvic examination is encouraged and described so that the student knows what to expect if she has not undergone one already. Cancers of the female reproductive tract are described. Effective screening and pelvic examinations have reduced the incidence of these cancers. The issue of hysterectomy is discussed and its forms (complete or partial) are presented. While breasts are not directly involved in reproduction, they are considered a secondary sexual characteristic and have

erotic significance in Western society. A description of the incidence, risk factors, and treatments of breast cancer follows. The importance of physical examination of the breasts and mammograms in early detection of cancer is given. The function, phases, and regulation of the menstrual cycle are described. An interesting cross-cultural view on menstruation is presented. Menopause and the advantages and disadvantages of hormone replacement therapy are discussed. The chapter ends with a description of dysmenorrhea, amenorrhea, and PMS.

## **Lecture Launchers**

### Lecture Launcher 2.1: Drawing Your Knowledge via Pictionary

This activity can be done to begin the lectures on female (and male) anatomy (or as a complete substitute for a lecture). On a series of cards, write the name of various parts of female anatomy. Thus, one card might have “clitoris” and another card might have “nipple.” Because some structures are internal and less well-known (e.g., the fundus), you might consider sticking to more commonplace terms or ones you want to make sure students learn. An exception would be if you want to test them on the reading.

After you have a series of cards prepared before class, divide students into teams. Each team will play against each other. You will show the card to one student from each team. They will have 30 seconds to draw the structure on the board. The students drawing cannot talk and their respective teammates must give the correct answer to you. The team with the correct answer first gets a point. After each round, you can give basic information about the structure that was just drawn. You may wish to have a simple prize for each member of the winning team (e.g., a piece of sugarless candy or gum).

### Lecture Launcher 2.2: Self-Investigation

Suggest that female students examine their genitalia at home in a mirror. When they squeal with horror at this suggestion, remind them that it is vital to be familiar with the normal appearance of their genitalia, so changes that may indicate a problem can be discerned.

Begin a discussion on why women in particular are so uncomfortable with their genitalia. Discuss reasons why most men in our society are not ashamed of their genitals but many women are.

### Lecture Launcher 2.3: Write a Letter to the Female Genitals

Have female students write a letter to their genitals. (You can also have them write about their breasts or entire body—give them choices.) What do they have to say to these parts of the female body? What do they think of them? What emotions do they have about them? Have male students write similar letters. In small groups, students should share their letters. As a class, what themes did they notice in themselves and across students?

### Lecture Launcher 2.4: Discussion: Societal Views on Menstruation

Slang terms for menstruation are usually negative. Have your class make a list of all the slang terms (on the rag, the curse, fell off the roof, visit from Aunt Flo, etc.) they can think of for menstruation. How many have a negative connotation?

Consider how views on menstruation differ in different societies. Discuss different menstruation rituals, such as the laws of separation and the ritual of the Mikvah in Judaism or menarche rites in North American natives.

### Lecture Launcher 2.6: Discussion: Student's Expectations and Experiences

How do the students' views on menstruation relate to how they learned of menstruation? Who told them? How was it presented (positive or negative)?

Ask your female students how they felt about getting their period for the first time? Happy? Scared? Guilty? What were their expectations of menstruation before they first got their period? What was the reaction of their mother? Father? Siblings? Friends?

How would you prepare your daughter for menstruation?

What menstruation myths or false ideas did/do your students have?

Ask your male students what they were told about menstruation and when.

Should monthly periods be optional?

### **Online Discussion Topics**

#### Discussion Starter 2.1: All about Breasts

Breasts mean different things to different people. According to Marilyn Yalom, author of *A History of the Breast*, "Babies see food. Men see sex. Doctors see disease. Business people see dollar signs." Discuss with your class the role breasts hold in American society. Are they a sign of power? Insecurity? Life? Sustenance? Sexuality? In what ways?

How do men feel about breast size? Would they ever ask their partner to get a breast augmentation? Reduction? Under what circumstances? Do the men in the class prefer natural or augmented breasts?

#### Discussion Starter 2.2: Menstruation

Imagine that tomorrow, suddenly, men as well as women menstruated. What would the world be like? Would interactions between men and women change? How and why? Give reasons to support your ideas.

Have the students develop an ad campaign based on products aimed at menstruating men (manpons?) and present their ads to the rest of the class.

## **Student Activities**

### Student Activity 2.1: The Vagina Monologues

Screen *The Vagina Monologues* (HBO) in class, or organize a class trip to a presentation if the production is touring in your area.

- The *Vagina Monologues* is based on stories, anecdotes, and feelings that Eve Ensler got from interviewing hundreds of women.
- Possible discussion questions for students:
  - Which of the monologues was their favorite? Why? Which was the most emotionally powerful? Why? Which monologue was most relevant to their feelings and lives?
  - What were the different responses of the males and the females in the class? Divide the students into small groups, each group including both males and females. Have the men ask questions of the women about issues raised by the monologues. Then have women ask questions of the men.
  - Do you think the monologues are most relevant to a particular age group or ethnicity? Why?

### Student Activity 2.2: Views of Menstruation

Divide students into groups where some groups have men only, some groups have women only, and some are mixed. Have them write out briefly what women experience during menstruation (from beginning to end) and how women use tampons. Have them read their answers aloud and talk about what it was like to write it out. How accurate were the men's writing? For the mixed group, was it helpful to have women involved? How active were the men in participating and what questions did they have?

Have students collect advertisements from magazines or commercials related to menstruation. How is menstruation portrayed? What are the common themes in these ads? What fears and insecurities do the ads play off of?

As a part of this exercise, the boys in the class have to buy tampons. They should share this experience with the rest of the class. Where did they choose to go and why? Did they wait for a male or female clerk? How did they feel buying tampons?

## Web Resources

American College of Obstetricians and Gynecologists

<http://www.acog.org/>

The nation's leading group of professionals providing health care for women.

Breast Self-Exam Demonstration

<http://www.komen.org/bse/>

Clear explanation of how and why you need to do breast self-examination.

Feminist Women's Health Center

<http://www.fwhc.org/>

Concerned with women's health, primarily with facts about birth control, breast care, abortion, PMS, with personal stories and current news.

Feminist.com: Health & Sexuality Links

[http://www.feminist.com/resources/links/links\\_health.html](http://www.feminist.com/resources/links/links_health.html)

Excellent site about women's health, with focus on breast and cervical cancer, reproductive health and rights, women and AIDS, and female sexuality.

Focus on Women's Health

[http://www.medicinenet.com/womens\\_health/focus.htm](http://www.medicinenet.com/womens_health/focus.htm)

Excellent overview of women's health issues.

Forum on Women's Health

<http://www.estronaut.com/>

Facts and tips about women's health issues.

Museum of Menstruation

[www.mum.org](http://www.mum.org)

Everything you want to know about periods.

National Women's Health Organization

<http://gynpages.com/nwho/>

Provides women with exceptional medical services. Dealing primarily with abortion issues, this site includes clinic locations, press releases, and appointment information.

Sex Ed 101: Sexual Health

<http://www.sex-ed101.org>

Information on breast self-exam, testicular self-exam, and other health issues.

Sexual Health.com

<http://www.sexualhealth.com/>

Covers a range of sexual health topics.

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