

Male and Female Anatomy and Physiology

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ANATOMY & PHYSIOLOGY

I. MALE REPRODUCTIVE SYSTEM

A. Parts and functions

1. Testicles

- a. two oval glands about the size of plums
- b. feel firm without being hard or lumpy
- c. the left gland will usually hang lower than the right
- d. functions —
 - 1) produce hormone
 - a) testosterone — primary male hormone, responsible for male sex characteristics
 - 2) produce sperm — called spermatogenesis
 - a) sperm is produced within the tightly coiled seminiferous tubules — 700 feet long when uncoiled
 - b) sperm is produced at a rate of 100 million/day
 - c) temperature and sperm production
 - d) illness, drug use and sperm production, poor nutrition, stress can reduce sperm count
 - e) sperm production takes 90 days to complete

HEALTH CONCERN — Male testicles need to be examined after puberty for testicular cancer. This needs to be done by a clinician once a year and a self exam monthly. Males between the ages of 15 and 35 are at highest risk.

2. Scrotum

- a. sac containing testicles
- b. located behind the penis
- c. controls temperature of testicles
- d. consists of two layers
 - 1) outer skin
 - 2) underlying smooth involuntary muscles that regulate tension of scrotum, and therefore temperature. Also react when sexually aroused
 - a) temperature must be below body temp for normal sperm production
 - b) when the testicles are warm, after a shower, or in hot weather etc. the scrotum will hang lower
 - c) when the testicles are cold or if a male is frightened the testicles draw up against the body

3. Epididymis

- a. C-shaped structure above the testicles
- b. holding area for sperm to continue to mature
- c. complete sperm production to maturation takes about 90 days

4. Vas Deferens

- a. tube where sperm travels, housed inside the spermatic cord and connects to the epididymis on one end and the ejaculatory duct on the other.
- b. passageway for sperm
- c. leading from testicles and joining with the urethra
- d. site of vasectomy (male sterilization)
- e. about 16 inches long on average

5. Penis

- a. organ of intercourse and urination.
- b. consists of
 - 1) shaft
 - 2) glands
 - 3) root
- c. internal
 - 1) three chambers important in producing an erection
 - a) 2 large cavernous bodies side by side on top of the penis
 - b) lower spongy body
- d. penis glands - head of the penis
 - 1) highly sensitive
 - 2) naturally covered by foreskin
 - a) circumcision
 - removal of foreskin for religious, cultural, societal reasons
 - hygiene prevents smegma (build up of bacteria dead skin and oil)
 - retract the foreskin when applying condom to uncircumcised penis
- e. two sensitive areas of the glands
 - 1) corona -rim or crown
 - 2) frenulum — thin layer of skin on the underside of the penis, connects the glands to the penis shaft
- f. root of penis
 - 1) connects the shaft to the pubic bone
- g. Circumcision
 - 1) the process of removing the foreskin from the glans of the penis.

- 2) proper hygiene is important to prevent smegma, a build up of tissue, oils and bacteria that naturally collect under the foreskin
- 3) reasons for circumcision include, culture, religious, aesthetics, and personal choice
 - a) there is no biological need to circumcise. However, recent studies show that the foreskin is more porous than other tissue on the penis allowing viruses and bacteria to enter the foreskin itself increasing the risk of STI transmission including HIV

6. Seminal Vesicle

- a. secretes thick fluid that forms a part of the semen. Makes up almost 70% of semen
- b. supplies fructose to help keep sperm alive
- c. secretes alkaline fluid to protect sperm

7. Cowper's Gland

- a. two pea sized glands
- b. secretes clear fluid
 - 1) neutralize urethra of acid from urine for sperm passage
 - 2) fluid may contain sperm
 - 3) some males have noticeable secretion with early sexual arousal, others not until just before ejaculation, both are normal
- c. fluid can contain 40 to 50 thousand sperm

8. Prostate Gland — about the size of a walnut

- a. secretes a thick milky fluid, alkaline substance that forms a part of the semen. This makes up almost 30% of semen
- b. where the vas deferens and urethra merge
- c. internal urethral sphincters located just above the prostate act as a valve to prevent ejaculation and urination from occurring at the same time

HEALTH CONCERN — Men over forty are at increased risk for prostate cancer. To help detect early signs of cancer men should have annual prostate exam and blood test to screen for cancer.

9. Ejaculatory Duct

- a. connects the vas deferens and the seminal vesicle to the urethra inside the prostate
- b. allows either urine to pass or ejaculation

10. Urethra
 - a. tube which carries urine from the bladder.
 - b. carries semen out during ejaculation
 - c. urethral opening — opening at the end of the penis
11. Bladder
 - a. Organ that stores urine.
12. Rectum
 - a. Passage for feces.
13. Anus
 - a. Muscular opening to the rectum.

II. MALE REPRODUCTIVE FUNCTIONING

A. Erection — Physiological and psychological response.

1. Adult sexual arousal triggers the nervous system causing the expansion of the arteries leading to the penis.
 - a. the inflow of blood is faster than the outflow causing a pooling of blood in the cavernous and spongy bodies of the penis
 - 1) the lower spongy body can be felt on an erect penis
 - b. an erection will remain until the message is stopped, either through change in stimulus or ejaculation.
2. Males are capable of erections from birth.
 - a. can be observed during pregnancy as early as 16 weeks gestation
3. Erections occur every 90 minutes while a male sleeps
4. Common for males to wake with an erection as a result of basal hormone levels
5. A smaller flaccid penis may enlarge proportionately more in erection than a larger flaccid penis

B. Ejaculation — release of semen

- 1) Cremastic muscle pulls the testicles up.
- 2) Two phases of ejaculation
 - a. emission phase — contraction of the prostate, seminal vesicles and upper part of vas deferens forcing fluid into upper part of the ejaculatory duct
 - 1) the internal urethral sphincters in the prostate close off the bladder, and the external urethral sphincter (below the prostate) cause a pooling of fluid in the urethral bulb in the prostate. At this time a man will feel ejaculation is about to occur, "feeling of no return".
 - b. expulsion phase — rhythmic contractions occur in muscles around the urethral bulb and the root of the penis, along the urethra. The external urethral sphincter relaxes allowing semen to be expelled. The internal sphincter stays closed to prevent urine from escaping.
 - 1) the muscle contractions at the root of the penis are the strongest and are most responsible for the spurting of semen

- 2) total volume of semen is about 1 tablespoon per ejaculation
- 3) contraction slow and become less intense
- 4) complete expulsion stage last 3 to 10 seconds
- 5) the sphincters need to shift after ejaculation for urination to occur

c. Retrograde ejaculation — seminal fluid is released into the bladder, due to function of internal and external urethral sphincters acting in reverse.

- a. not harmful unless recurs often
- b. may be a result of prostate surgery, illness congenital anomaly, or medications
- c. normal feelings of orgasm with absence of semen

III. FEMALE REPRODUCTIVE SYSTEM

A. Parts and functions

1. Vulva — external genitalia
2. Ovaries
 - a. two oval shaped glands about the size of unshelled almonds
 - b. contain immature ova (eggs)
 - c. females are born with immature ova, about 400,000
 - 1) about 100 eggs are lost with each cycle
 - d. produce female hormones
 - 1) estrogen
 - 2) progesterone
3. Fallopian tubes
 - a. Tubes where mature ovum will travel
 - b. About 4-6 inches long in mature woman
 - c. Attached to the uterus and curve around the ovaries.
 - d. Place where fertilization takes place.

HEALTH CONCERN - The fallopian tubes can easily be damaged from infections that go untreated. These infections may be a result of an untreated sexually transmitted infection, vaginal infections, or yeast infections. This damage may be irreversible; and cause a woman to be unable to have children.

4. Fimbria — fingerlike ends of fallopian tubes that sweep across the ovary at time of ovulation to pick up the egg and draws the egg into the tube
5. Uterus
 - a. lining of the uterus (endometrium) contains blood rich cells to nourish a fertilized egg
 - b. when no fertilized egg is present a hormonal message signals menstruation
 - c. where fetus grow during pregnancy
 - d. pear shaped hollow muscular organ
 - e. normally it is 3" long and 2" wide
 - 1) during pregnancy it stretches and grows with the fetus, and returns to almost the same size after

6. Cervix

- a. small opening to uterus
- b. holds the fetus in the uterus during pregnancy
- c. contains mucus producing glands
- d. feels like the tip of the nose
- e. protrudes into the upper most part of the vagina
- f. stretches to allow a baby to be born

HEALTH CONCERN — A woman needs to be examined annually by a clinician to make sure there are no changes in the cells of the cervix that might indicate an infection or possible cancer. This exam, called a Pap smear, is a very important exam that every woman should have. This exam should begin when a woman becomes sexually active or about age 18 and continue for the rest of her life. Ninety Percent of all cervical cancer is related to human papilloma virus. A vaccine currently available, Gardasil will reduce cervical cancer risk by 70%.

7. Vagina

- a. where intercourse takes place
- b. secretes lubrication during sexual arousal
- c. extends from the uterus to the outside of the body
- d. elastic muscular canal
- e. about 3" to 5" long
- f. canal where baby passes during delivery
- g. can stretch to accommodate various sizes
 - 1) birth
 - 2) penis
 - 3) tampon
- h. maintains a healthy environment by shedding mucus and dead cells
- i. passageway of menstrual flow
- j. it is tilted and angled towards the back
- k. hymen
 - 1) small web of skin partly covering the opening to the vagina
 - 2) easily ruptured with normal activity, use of tampon, or intercourse

HEALTH CONCERN - The vagina has a natural way of cleansing itself. With proper hygiene a woman would not need to use a douche. Douching is a method of cleaning the vagina by squirting a liquid into the vaginal canal. A douche should be only be used when prescribed by a clinician. Deodorants and hygiene sprays are also unnecessary with proper hygiene. The perfumes in these can cause vaginal infections.

8. Labia
 - a. folds of skin that protect external genitals
 - b. will become covered with pubic hair at puberty
 - c. provides protection to the clitoris, and the urethral and vaginal openings
9. Clitoris
 - a. small sensitive organ, similar in structure to the male penis
 - 1) becomes erect when stimulated
 - 2) contains similar nerve endings as the glans of the penis
 - b. focal point of sexual pleasure
 - c. located in the folds of skin created by the labia above the urethral opening
 - d. clitoral hood
 - 1) fold of skin above the clitoris
 - 2) clitoris retracts into the hood when not aroused
10. Urethra
 - a. tube which carries urine from the bladder
 - b. above the vaginal opening
 - c. urethra opening and vaginal opening are not the same
11. Rectum
 - a. passage for feces
12. Anus
 - a. muscular opening to the rectum
13. Bladder
 - a. organ that stores urine
14. Breasts
 - a. primarily made up of fatty tissue, and mammary glands, with underlying muscle
 - b. mammary glands produce milk when the hormone prolactin is present
 - 1) this hormone is triggered during pregnancy.
 - 2) hormone elevates allowing milk production and will remain elevated for several weeks to months after delivery or as long as a woman continues to nurse.
 - c. areola
 - 1) dark glands around the nipple
 - 2) secrete a substance that cleanses, lubricates, and protects the nipple during nursing

- 3) contain anti-bacterial properties to help prevent infection in mother and baby
- d. nipple
 - 1) contains 15 to 25 tiny openings through which milk is excreted
 - 2) a nursing baby stimulates the many nerve endings causing the milk to enter the milk ducts

HEALTH CONCERN — Women need to be aware that they are at risk for breast cancer. A woman needs to be examined by a clinician every year and a self breast exam every month. Mammogram should begin around age 40, annually after age 50.

B. Other Terms and Functions

1. Mons Veneris
 - a. fatty tissue covering pubic bone
 - b. many nerve endings makes it sensitive to stimulation
 - c. means "mound of Venus"
2. Labia Majora
 - a. outer lips covering the labia minora, urethral opening, and vaginal opening
3. Labia minora
 - a. inner lips contain sweat and oil glands many nerve endings and blood vessels
 - b. the labia come in a variety of shapes, thicknesses, and colors
 - c. smegma may build up between the outer and inner lips
4. Vestibule
 - a. located inside the labia minora, many blood vessels and nerve endings
5. Introitus — opening to the vagina
6. Perineum — area between vaginal opening and the anus
 - a. many nerve endings sensitive to stimulation

MENSTRUATION, OVULATION & CONCEPTION

IV. ATTITUDES

A. Attitudes towards menstruation

1. What words are used to describe menstruation and the menstrual cycle?
2. What are the embarrassments associated with menstruation?
 - a. for females
 - b. for males
3. What significance does society give to a female when she begins menarche?
 - a. Now a Woman
 - 1) time of celebration
 - b. able to get pregnant, yet ovulation may have occurred prior to first menstruation

V. MENSTRUAL CYCLE

A. Menarche — first menstrual cycle

B. Cycle length - From bleeding to bleeding

- a. day one of the cycle is the first day of bleeding
 - b. 24 to 36 days are all normal cycle lengths
 - 1) a consistent cycle - what occurs regularly for that woman
1. Menstruation — period, number of days of bleeding
 - a. 2 to 7 days are normal
 2. Irregularity — when cycles are inconsistent
 - a. often due to hormonal problems
 - 1) when menarche begins — may take several years for cycles to regulate

- 2) when nearing menopause cycle are often affected by the decreasing estrogen levels
 3. Cervical mucus - changes throughout a menstrual cycle
 - a. a thick white mucus is produced from the cervix beginning several days after bleeding stops
 - b. near time of ovulation mucus becomes clear and stretchy
 - 1) this is sperm friendly mucus, alkaline in nature to help the sperm enter the cervix and to reduce the acidity of the vagina
 - c. after ovulation the mucus becomes thick and clumpy again.
- c. Ovulation — release of egg from an ovary
1. Timing
 - a. time between onset of menstruation to ovulation can be any length of time
 - b. time between ovulation and next menstrual cycle is 14 days
- d. Conception — fertilization of an egg by a sperm

1. Timing
 - a. five days prior to ovulation and the day of ovulation is when a woman is considered most fertile
 - b. although the egg may be viable for 72 hours the day after ovulation chance of fertilization dramatically decreases
 - c. to reduce the risk of pregnancy a woman should consider the eight days of "fertile time" high risk for pregnancy (5 days before ovulation + 1 day of ovulation + 2 days after ovulation = 8 days)
2. Charting fertility
 - a. you will need to know
 - (1) Cycle length
 - (2) 1st day of the cycle
 - b. estimating ovulation
 - (1) if your cycle is regular
 - (2) looking at last completed cycle count back 14 days, this was the day of ovulation. From day one count forward to ovulation date, this is the day in the cycle where ovulation occurred.
 - Day 1 (bleeding started) February 6th.
 - Cycle length 32 days (cycle ended March 9th)

- Count back from March 9th 14 days (February 23 day of ovulation)
 - In a 32 day cycle ovulation will occur on day 18 ($32 - 14 = 18$)
- c. this is only an estimate, many things can impact a menstrual cycle and therefore the day of ovulation.
- (1) poor nutritional habits
 - (2) being ill
 - (3) stress
 - (4) sexually transmitted infection

E. Menstruation problems

1. Dysmenorrhea — painful periods, normal vs abnormal
 - a. normal cramping often includes pain or cramping during bleeding
 - 1) a persons ability to tolerate pain is variable
 - 2) pain will often go away with mild over the counter pain medication, mild exercise, warm baths, warm heating pad, etc.
 - b. abnormal cramping often includes
 - 1) mild to sever cramping that begins before bleeding, and continues several days after bleeding stops
 - 2) pain that prevents a woman from participating in normal activities
 - 3) pain that requires prescription pain medication monthly
2. Amenorrhea — no period
 - a. primary - not a concern until age 18
 - b. secondary - periods stop for 3 months or more
 - 1) occurs during pregnancy or breast feeding or with use of some hormones
 - 2) lack of body fat due to extreme exercising or eating disorders
3. Irregularity - when cycles are inconsistent
 - a. often due to hormonal problems
4. Endometriosis — when some of the uterine lining retrogrades (endometrium lining flowing through the fallopian tubes) into the abdominal cavity during a woman's period.
 - a. this can cause implants to grow in the abdominal cavity
 - (1) uterus, fallopian tubes, ligaments, ovaries, bowel, bladder, etc

- b. symptoms can include
 - (1) can cause pain before, during and after a period
 - (2) painful bowel movements
 - (3) painful intercourse
 - (4) is most likely to occur in women who have 28 day menstrual cycles or less
 - (5) may cause infertility (inability to get pregnant)
- c. it is estimated that as many as 1 in 10 women have endometriosis
- d. treatment options include
 - 1) hormonal medications to prevent ovulation
 - oral contraceptives
 - temporary menopausal inducing hormones
 - 2) pregnancy
 - 3) laser surgery
 - 4) hysterectomy

VI. PREMENSTRUAL SYNDROME (PMS)

A. Definition of PMS

1. Physical & psychological symptoms that occur before each menstrual period.
2. Symptoms can be severe enough to interfere with some aspects of life.
3. Approximately 10% to 20% of women experience severe symptoms, defined as PMDD (premenstrual dysphoric disorder)
4. Approximately 30% to 50% experience mild or moderate symptoms.

B. Symptoms

1. Will occur regularly and cyclically
 - a. occurs 1 to 14 days before period begins
2. Symptoms include:
 - tension
 - depression
 - anxiety or panic attacks
 - irritability
 - angry outbursts
 - crying for no reason
 - fatigue
 - forgetfulness or mental confusion
 - clumsiness
 - cravings for sweets, carbohydrates, salty foods or alcohol,
 - water retention that may cause breast tenderness, bloating of the stomach, ankles, feet or fingers and joint pains
 - headaches, backaches, acne, cold sores, sties, genital herpes, sinus problems, asthmatic attacks and seizures
3. Most women will not experience all symptoms, yet many experience some to many symptoms.

c. Causes

1. Actual causes not fully understood.
2. Common beliefs PMS is affected by
 - a. fluctuations in hormones, most responsible - progesterone

- b. deficiencies in vitamins and minerals
 - 1) including B vitamins
 - 2) magnesium
- 3. Stress and marital problems can increase psychological symptoms

D. Tracking PMS symptoms

- 1. Diagnosis is dependent on the timing of symptoms during the menstrual cycle, more than the specific symptoms.
- 2. Symptoms will go away when period starts until next ovulation.
- 3. Track symptoms for at least two months.
 - a. record dates of menstruation
 - b. record symptoms and dates each appear
 - c. record when symptoms begin, worsen, and stop

E. Reducing symptoms of PMS

1. Diet

- a. supplement with — magnesium and increase B vitamins, especially B6.
NOTE — Too much B6 and magnesium may cause physical problems. Be sure to discuss with your doctor the appropriate amount.
- b. reduce salt, sugar and dairy product intake
- c. reduce caffeine
 - (1) may help for discomfort associated with breasts, and reduce feelings of irritability.
- d. eat smaller, more frequent meals
 - (1) helps in maintaining blood sugar levels
 - (2) eating six small meals keeping the total calorie intake to an appropriate level

2. Exercise

- a. exercise regularly
 - (a) helps the cardiovascular system and helps to feel better in general

3. Reduce stress
 - a. PMS is stressful; additional stress only aggravates symptoms
4. Progesterone supplements
 - a. the use of natural progesterone supplements may help to reduce symptoms of PMS especially for those with severe symptoms
 - b. this is by prescription, talk to a clinician about use
5. Oral contraceptives
 - a. for some women use of oral contraceptives (the pill) may help to reduce PMS symptoms, for others it may increase PMS symptoms
6. Use of the BBT (basal body temperature) charts can also help to see the timing of ovulation and therefore the time when the symptoms of PMS are likely to occur.

F. Getting Help

1. Talk with a gynecologist who believes that PMS is a real disorder.
2. Bring charts from two or more months.
3. Gather as much information as possible about your menstrual cycle as you can.
4. If your Doctor does not respect your feeling, seek out another doctor.
5. Discuss all options for treatment.
 - a. keep open dialogue with your clinician
 - b. talk with clinician if treatments do not seem to be having a positive impact

FERTILITY CHART

	1	2	3	4	5	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34			
24	P	P	P	P	P	P	F	F	F	F	F	O	F	F										E														
25							F	F	F	F	F	F	O	F	F											E												
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34																		F	F	F	F	O	F	F														E

P = period
 F = fertile
 O = ovulation
 E = end of cycle

