Reproductive System
REPRODUCTIVE SYSTEM

Genetics
A gene on the Y chromosome causes the embryonic gonads to differentiate into testes. Females are not encumbered by a Y chromosome, and the absence of this gene results in the development of ovaries. The embryonic testes secrete testosterone, which triggers the development of male accessory sex organs and external genitalia. It is the absence of testosterone in a female embryo that causes the development of the female accessory sex organs.

The complexity of structure and function in living beings could not be produced in future generations by chance; mechanisms must exist to transmit the genetic code from one generation to the next. This could be accomplished by either asexual or sexual reproduction. But sexual reproduction, in which genes from two individuals are combined in random and novel ways with each new generation, offers the advantage of introducing variety into a population. This variability of genetic constitution helps to ensure that some members of a population will survive changes in the environment over evolutionary time.

In sexual reproduction, germ cells, or gametes (sperm and ova) are formed within the gonads (testes and ovaries) by a process of reduction division. During this type of cell division, the normal number of chromosomes in most human cells (46) is halved, so that each gamete receives 23 chromosomes. Fusion of a sperm cell and an egg cell during fertilization results in restoration of the original chromosome number of 46 in the fertilized egg.

There are 23 chromosomes inherited from the mother and 23 chromosomes from the father. This lines up as 23 pairs of chromosomes rather than become 46 different ones. With the exception of the sex chromosomes, the pairs are structurally identical and contain similar genes for things such as coding for eye color, height, etc.

It is the 23rd pair of chromosomes that are considered the sex chromosomes. A normal female has two X chromosomes, and a normal male has only one X chromosome and one Y. The X and Y look different and contain different genes.

Fetal Development
As an embryo develops after fertilization, for the initial six weeks there will be no difference of the sexes. In the seventh or eighty week the genetic males start developing testis in a region close to the adrenal glands. The testis begin secreting hormones that cause the development of the male internal and external genitalia. In genetic females, the absence of the Y chromosomes and lack of male hormones is responsible for the development of the female internal and external genitalia.

Puberty
In a period of final maturation, known as puberty or adolescence, the pituitary sends secretions activating the growth of the gonads. Puberty is the period when the endocrine and gonads have developed to the point where reproduction is possible.
Abnormally early sexual development is known as precocious puberty. This is due to the exposure of immature children to the sex hormones brought on by puberty. It may be due to abnormalities in the hypothalamus or the pituitary. This has been known to happen in children as young as three and a half.

Puberty can also be abnormally delayed as well, happening as late as age 20. These delays in females is called amenorrhea, in males it is called eunuchoidism.

**The Male Reproductive System**

**Testes – Function**
- Two testicles are enclosed in an external sac called the scrotum. The testicles produce sperm.
- Sperm production begins at puberty.

**Accessory Glands – Function**
- Seminal Vesicles – these are paired glands that secrete alkaline fluid into the sperm to keep it at the proper Ph level.
- Prostate Gland – this is donut shaped and encircles the urethra. There are small ducts that pass into the urethra. The prostate also secretes an alkaline substance adding to the sperm’s Ph balance.
- Bulbourethral Gland – these are two paired small glands at the base of the penis. They secrete an alkaline fluid prior to sex to act as a lubricant.

**Semen – Function**
- This is the fluid of ejaculation from the testes, bulbourethral glands, seminal vesicles and prostrate.
- It is this material that fertilizes an egg (ovum).

**Scrotum – Function**
- This is the external sac of skin and the subcutaneous tissue.
- The scrotum keeps the paired testicles in separated compartments.
- Protection for the testicles.

**Penis – Function**
- This is the male copulatory organ.
- There are specialized erectile tissues to allow it to do its job.

**Endocrine Function of the Testis**
- Male sex hormones are known as androgens.
- Testosterone is the major hormone secreted.
- Testosterone secretion is controlled by FSH (follicular stimulating hormone) and LH (lutenizing hormone) from the anterior pituitary.
- FSH and LH are controlled by GnRH (gonadotropin releasing hormone) secreted by the hypothalamus.
• FSH is required for the manufacture of sperm, while LH mainly stimulates production of testosterone.
• Testis also produce a hormone called inhibin which helps to regulate the secretion of FSH.

Testosterone
• The most important androgen produced. It stimulates maturation to begin at puberty.
• Secondary characteristics of maturation are growth of body hair, increased muscle development, increased development of heavier bones and a deepening of the voice.

Disorders
• Prostalatitis – this is inflammation of the prostate gland. It will appear enlarged and tender.
• Enlarged Prostrate – this is when the prostate enlarges without the inflammation. It happens as the androgen secretion decreases. This is also called benign prostatic hypertrophy. The prostrate when enlarged can obstruct the urethra producing stagnation of urine in the bladder and urinary tract infections, and in severe cases, kidney failure will follow. Actually 33% of males over the age of 60 have this condition to one degree or another.
• Prostate Cancer – This is the second leading cause of death from cancer in males. The inflammation left unchecked can turn into cancer.
• Impotence – this is the inability to attain and maintain an erection.
• Infertility – This is the inability to produce enough sperm to be able to fertilize an ovum. The semen is analyzed in these individuals. In addition to the sperm count, the motility and appearance of the sperms are studied. Normally, more that 60% of sperms are motile.

The Female Reproductive System

Ovaries – Function
• These are paired.
• They begin formation of immature sex cells by way of cell division.

Oogenesis
• The process of forming ova, or female sex cells (eggs).

Ovulation
• This is the cycle of the ovary as it undergoes stages of egg development.

Uterus – Function
• This is a hollow organ with thick, muscular walls. It provides the appropriate internal environment for the developing baby to live in.

Vagina – Function
• This is a muscular, elastic tube about three to three and a half inches long extending from the cervix to the external genitalia.
• It is the female copulatory organ.

External Accessory Organs – Function
• Vulva – this is the name for the external organs.
• Perineum – this is the pelvic floor.
• Labia Major & Minor – this is adipose tissue covered with skin. It is very similar to the scrotum in a male as it is made of the same sort of tissue.
• Vestibule – This is where the vagina & urethra open.
• Vestibular Glands – these release secretions into the vestibule.
• Clitoris – This is a nodule of erectile tissue. The clitoris corresponds with the penis in a male.

Estrogen
• Estrogen – this hormone stimulates maturation at puberty in females.
• Progesterone – this hormone is for development and maintenance of the uterine lining during pregnancy.

Disorders
• Dysmenorrhea – this is referring to painful menstruation (cramping & heavy flow of blood).
• Amenorrhea – this is the absence of menstruation.
• Oligomenorrhea – this refers to a very light menstrual flow during a normal period.
• Menorrhagia – this refers to very heavy menstrual flow during a normal period.
• Metrorrhagia – this refers to bleeding between the menstrual periods.
• Premenstrual Syndrome (PMS) – this is referring to severe stress prior to menstruation and after ovulation. The cause is unknown. There will usually be a combination of symptoms such as irritability, bloating, edema, emotional stress, inability to concentrate, headaches, constipation and cramping.
• Toxic Shock Syndrome – the symptoms are high fever, fatigue, headaches, sore throat, vaginal irritation, vomiting and diarrhea. This syndrome is produced by a toxin caused by a bacteria that forms within a tampon. This does not happen with all women. Evidently some are prone to this and others are not.
• Endometriosis – this is the growth of endometrial tissue outside of the uterus. This condition causes severe pre menstrual and menstrual pain (cramping) because it is breaking down during menstruation wherever it is now located. The condition may cause tubal obstruction and infertility.
• Infertility – this is the inability to conceive for various reasons.
• Pelvic Inflammatory Disease – this refers to any inflammation and infection of the female reproductive organs and/or pelvic tissues. The uterine tubes may
be affected, and scar tissue may form putting the individual at risk to conditions such as infertility and tubal pregnancy.

- **Cancer** – breast cancer is prevalent in women along with cervical cancer. Breast cancer usually occurs after age 30 and more often after menopause. Cervical cancer is very slow to grow. It could be caused by receiving an infection from a male partner.
- **Tubal Pregnancy** – if the uterine tube is scarred, the movement of the ova may be slower than normal and fertilized ova may be retained in the tube, embedding in the walls of the tube. If left there it will eventually rupture the tube. This is also known as ectopic pregnancy. This is a dangerous condition due the chances being high of rupture and then bleeding into the abdominal cavity.
- **Uterine Prolapse** – often in women the ligaments and other structures supporting the uterus may become weak with resultant shifting of the position of the uterus. The uterus begins to descend down into the vagina and sometimes the cervix of the uterus may actually project through the vagina into the perineal area. Surgery will help by re-suspending the uterus.
- **Placenta Praevia** – occasionally the placenta may grow close to the cervical opening. As pregnancy progresses, or when the cervix dilates late in pregnancy, severe bleeding may occur. This is considered abnormal implantation of placenta.

### Multiple Pregnancies

- Twin pregnancies happen in about one in eighty-five pregnancies. If it results from two ova being fertilized by two sperms in the same cycle, they are fraternal twins. These twins can be the same or opposite sex. Identical twins are formed from a single egg. They are always the same sex and genetically identical. If the egg does not split fully, there will be what is called conjoined twins (Siamese Twins).
- Triplets, Quadruplets, etc. could be from one or more than one ovum. Often they result from maturation of many ova in one menstrual cycle and usually induced by fertility drugs.
**Sexually Transmitted Disease**

AIDS – this develops from the HIV virus. It is transmitted via intercourse and/or the sharing of needles for drug use. It can also be passed on to a baby from an infected mother.

Gonorrhea – this is caused by a bacteria transmitted through intercourse. It can cause infertility in females. It can also cause blindness in the unborn baby if a woman is pregnant.

Chlamydia – this is caused by a bacteria transmitted through intercourse. It is similar to Gonorrhea in action and is also a similar disease to syphilis.

Genital Herpes – This is the herpes simplex virus type 2. It presents itself as painful blisters in the genital area along with flu-like symptoms. It can be transmitted to a baby during birth and to an adult by way of intercourse.

Genital Warts – This is caused by a virus which is usually transmitted during intercourse.