PHS 212

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Pharmacology

A.) Spermatogenesis is the process by which haploid spermatozoa develop from germ cells in the seminiferous tubules of the testis. This process starts with the mitotic division of the stem cells located close to the basement membrane of the tubules.[1] These cells are called speematogonial stem cells. The mitotic division of these produces two types of cells. Type A cells replenish the stem cells, and type B cells differentiate into primary spermatocyte. The primary spermatocyte divides meotically.

 Spermatozoa are the mature male Gamates in many sexually reproducing organisms. Thus, spermatogenesis is the male version of gametogenesis, of which the female equivalent is oogenesis.

Spermatogenesis produces mature male gametes, commonly called sperm but more specifically known as spermatozoa, which are able to fertilize the counterpart female gamete, the oocyte, during conception to produce a single-celled individual known as a zygote.

Hormonal control of spermatogenesis varies among species. In humans the mechanism is not completely understood; however it is known that initiation of spermatogenesis occurs at puberty due to the interaction of the hypothalamus pituitary gland and Leydig cells If the pituitary gland is removed, spermatogenesis can still be initiated by follicle stimulating hormones (FSH) and testosterone.

Reference: www. Wikipedia.com, www.toppr.com

B.) Testosterone: A "male hormone" -- a sex hormone produced by the testes that encourages the development of male sexual characteristics, stimulates the activity of the male secondary sex characteristics, and prevents changes in them following castration. Chemically, testosterone is 17-beta-hydroxy-4-androstene-3-one.

Testosterone is the most potent of the naturally occurring androgens. The androgens cause the development of male sex characteristics, such as a deep voice and a beard; they also strengthen muscle tone and bone mass.

High levels of testosterone appear to promote good health in men, for example, lowering the risks of high blood pressure and heart attack. High testosterone levels also correlate with risky behavior, however, including increased aggressiveness and smoking, which may cancel out these health benefits.

Testosterone may be given to treat medical conditions, including female (but not male) breast cancer , hypogonadism (low gonadal function) in the male, cryptorchism (nondescent of the testis into the scrotum), and menorrhagia (irregular periods).

What Does Testosterone Do?

\* Fuels the sex drive

\* Adds muscle mass

\* Regulates mood

\* Regulates bone strengt

Testosterone levels decrease as men age. Sometimes this lower level of testosterone is termed "andropause" or "male menopause." Symptoms of male menopause may not be caused by low testosterone, but additional research is needed. Many men do not show any symptoms of decreasing levels of testosterone.

Symptoms of Male Menopause

\* Irritable moods

\* Decreased interest in sex

\* Hot flashes

\* Fatigue

\* Weakness

\* Depression

Causes of low testosterone

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\* Diabetes

\* Kidney disease

\* Liver disease

\* Chronic obstructive pulmonary disease (COPD)

\* Testicular injuries

\* Pituitary gland problems

\* Radiation therapy

\* Chemotherapy

\* Steroid medication

Reference:medicinenet.com

C.) Semen is a greyish white bodily fluid that is secreted by the gonads of male animals. It carries sperm or the spermatozoa and fructose and other enzymes that help the sperm to survive to facilitate successful fertilization.

The whitish opalescence is due to the large amount of protein that it contains and its slightly turbid appearance is due to the spermatozoa contained within it.

Semen is released during the process of ejaculation and is processed in the seminal vesicle in the pelvis, which is where it is produced.

Ejaculation is controlled by the central nervous system and occurs when there is friction on the genitalia and other forms of sexual stimulation. The stimuli lead to impulses that are sent up the spinal cord and into the brain.

Ejaculation has two phases:

Phase 1: emission in which the vas deferens (the tubes that store and transport sperm from the testes) contract to squeeze the sperm toward the base of the penis through the prostate gland and into the urethra. The seminal vesicles release their part of the semen that combine with the sperm. The ejaculation is unstoppable at this stage.

Phase 2: ejaculation in which the muscles at the base of the penis and urethra contract. This leads to forcing the semen out of the penis (ejaculation and orgasm) and this phase also has a bladder neck contraction. The bladder neck contracts to prevent the back flow of the semen into the urinary tract. Dry orgasm can occur even without delivery of semen (ejaculation) from the penis. Erection declines normally following ejaculation.

The semen comprises of:

\* fructose

\* ascorbic acid

\* zinc

\* cholesterol

\* protein

\* calcium

\* chlorine

\* blood group antigens

\* citric acid

\* DNA

\* Magnesium

\* vitamin B12

\* phosphorus

\* sodium

\* potassium

\* uric acid

\* lactic acid

\* nitrogen

\* other nutrients

Ejaculation is a complex process and the compositions of the final semen come together in the posterior urethra and only become mixed after ejaculation is complete.

The volume of semen released per ejaculate varies. Approximately an average around 3.4 milliliters is ejaculated at one time. It can be as high as 4.99 milliliters or as low as 2.3 milliliters.

If there is a prolonged gap between ejaculations, the number of sperm in the semen increases but there is no overall increase in the semen.

Reference:1 http://www.cysonline.org/temp/ChronYoungSci1330-7548606\_205806.pdf

1. http://www.urologyhealth.org/content/moreinfo/pe.pdf

D.) Men achieve orgasm through a series of steps involving a number of organs, hormones, blood vessels, and nerves working together. The typical result is ejaculation of fluid that may contain sperm through strong muscle contractions. The fuel for the process leading to orgasm is testosterone, a hormone produced in steady supply by the testicles. The testicles also make millions of sperm each day, which mature and then are mixed with whitish, protein-rich fluids. These fluids nourish and support the sperm so they can live after ejaculation for a limited time.

The testosterone flowing through a man's body, along with psychological factors, determines the strength of his desire for sex. Testosterone is the primary factor which drives sexual desire, says Michael Ingber, MD, a physician in urology and female pelvic medicine and reconstructive surgery at the Atlantic Health System in Morristown, New Jersey, and a fellow of the International Society for the Study of Women's Sexual This sexual desire, or libido, is key in kicking off the process that will lead to orgasm. If a man has no sex drive — for example, if he has clinically low testosterone  or is suffering from depression his body may not respond to sexual stimuli and he may not be able to experience orgasm.

The steps that lead a man to successful orgasm include:

1. Arousal The man perceives something or someone that prompts sexual interest. That perception prompts the brain to send a signal down the spinal cord to the sex organs, causing an erection. The penis becomes erect when blood fills spongy tissue inside its shaft, brought by arteries that have expanded to allow blood to race in at up to 50 times its normal speed. The veins in the penis that normally drain blood out squeeze shut so that more blood remains inside, producing a firm erection. The scrotum pulls toward the body, and muscles throughout the body increase in tension.

2. Plateau The male body prepares for orgasm in this phase, which can last from 30 seconds to 2 minutes. Muscle tension increases even more and involuntary body movements, particularly in the pelvis, begin to take over. The man's heart rate increases to between 150 and 175 beats per minute, says Ingber. A clear fluid may begin to flow from the urethra. This pre-ejaculatory fluid is meant to change the pH balance of the urethra, to improve the chances of sperm survival

3. Orgasm The orgasm itself occurs in two phases, emission and ejaculation. In emission, the man reaches ejaculatory inevitability, the "point of no return." Semen is deposited near the top of the urethra, ready for ejaculation. Ejaculation occurs in a series of rapid-fire contractions of the penile muscles and around the base of the anus. Involuntary pelvic thrusting may also occur. The nerves causing the muscle contractions send messages of pleasure to the man's brain.

4. Resolution and refraction After ejaculation, the penis begins to lose its erection. About half of the erection is lost immediately, and the rest fades soon after. Muscle tension fades, and the man may feel relaxed or drowsy, according to Ingber. Men usually must undergo a refractory period, or recovery phase, during which they cannot achieve another erection. This period is variable in men, says Ingber. In an 18-year-old, this is typically less than 15 minutes. In elderly men, it can be up to 10 to 20 hours. The average refractory period is about half an hour. Men differ from women in that men usually are satiated after one orgasm. Women can experience more than one orgasm with no loss of sexual arousal, and do not have to undergo a refractory period.

Some men can have problems reaching orgasm. These most often stem from psychological factors; for example, they are still affected by a traumatic event or a restrictive upbringing, or they have fallen into masturbation patterns that could have conditioned the body to take longer to orgasm. However, the problem also can be caused by certain medications or by a neurological or cardiovascular disease, or by having surgery where nerves are cut, says Beverly Whipple, PhD, RN, professor emerita at Rutgers University in Newark New Jersey, and past president of the American Association of Sex Educators, Counselors and Therapists (AASECT).

Reference: everydayhealth.com

E.) Male infertility refers to a male's inability to cause pregnancy,in a fertile female. In humans it accounts for 40–50% of infertility. It affects approximately 7% of all men. Male infertility is commonly due to deficiencies in the semen, and semen quality is used as a surrogate measure of male fecundity.

 Causes

Antisperm antibodies (ASA) have been considered as infertility cause in around 10–30% of infertile couples.[7] ASA production are directed against surface antigens on sperm, which can interfere with sperm motility and transport through the female reproductive tract.

Genetics

Chromosomal anomalies and genetic mutations account for nearly 10–15% of all male infertility cases.

Klinefelter Syndrome

One of the most commonly known causes of infertility is Klinefelter syndrome affecting 1 out of 500-1000 newborn males.Klinefelter Syndrome is a chromosomal defect that occurs during gamete formation due to a non-disjunction error during cell division. Resulting in males having smaller testes, reducing the amount of testosterone and sperm production.

Y chromosome deletions

Y chromosomal infertility is a direct cause of male infertility due to its effects on sperm production, occurring in 1 out of every 2000 males.[12] Usually affected men show no sign of symptoms other than at times can exhibit smaller teste size. Men with this condition can exhibit azoospermia (no sperm production), oligozoospermia (small number of sperm production), or they will produce abnormally shaped sperm (teratozoospermia).

\* Age

\* Abnormal set of chromosomes

\* Centriole

\* Neoplasms e.g. seminoma

\* Idiopathic failure

\* Cryptorchidism

\* Trauma

\* Hydrocele

\* Hypopituitarism in adults, and hypopituitarism untreated in children (resulting in growth hormone deficiency and proportionate dwarfism.)

\* Mumps

\* Malaria

 Prevention

\* Avoiding smoking as it damages sperm DNA

\* Avoiding heavy marijuana and alcohol use.

\* Avoiding excessive heat to the testes.

\* Maintaining optimal frequency of coital activity: sperm counts can be depressed by daily coital activity and sperm motility may be depressed by coital activity that takes place too infrequently (abstinence 10–14 days or more).

Reference:en.m.wikipedia.org

 Www.urologyhealth.org

 Www.mayoclinic.org