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ASSIGNMENT

Write short notes on the following:

1. SPERMATOGENESIS

Spermatogenesis involves the production of mature male gametes, commonly known as sperm but particularly known as spermatozoa, which has the unique ability to fertilize the counterpart female gamete (thus, spermatogenesis is the male version of gametogenesis, of which the female equivalent is oogenesis), the oocyte, during conception to produce a single-celled individual known as a zygote.

It can be described as the process by which haploid spermatozoa develop from germ cells in the seminiferous tubules of the testis. The spermatids are transformed into spermatozoa (sperm) by the process of spermiogenesis. These develop into mature spermatozoa, also known as sperm cells. The sperm cells are produced within the walls of the tubules.

Spermatogenesis is greatly essential for sexual reproduction and depends highly upon optimal conditions for the process to occur properly. It starts at puberty and usually continues uninterrupted until death, although a slight decrease can be detected in the quantity of produced sperm with increase in age of the male.

Spermatogenesis takes place within several structures of the male reproductive system. The initial stages occur within the seminiferous tubules of the testes

(where spermatogonial stem cells adjacent to the inner tubule wall divide in a centripetal direction—beginning at the walls and proceeding into the innermost part—to produce immature sperm cells); However, within the walls of the tubules, are many randomly scattered cells, called Sertoli cells, which function to support and nourish the immature sperm cells by giving them nutrients and blood products. As the young sperm cells grow, the Sertoli cells help to transport them from the outer surface of the seminiferous tubule to the central channel of the tubule and progress to the epididymis where maturation of gametes occur and are stored until ejaculation.

One immature germ cell takes as long as 74 days to reach final maturation.

2. TESTOSTERONE

Testosterone is a hormone produced by the human body. It's mainly produced in men by the testicles and is the primary male sex hormone and anabolic steroid.

In male humans, testosterone is vital in the development of male reproductive tissues such as testes and prostate, as well as promoting secondary sexual characteristics such as increased muscle and bone mass, and the growth of body hair. In addition, testosterone is involved in health and well-being, and the prevention of osteoporosis.

Testosterone is also known as a steroid from the androstane class containing a keto and hydroxyl groups at positions three and seventeen respectively. It is biosynthesized in several steps from cholesterol and is converted in the liver to inactive metabolites. It exerts its action through binding to and activation of the androgen receptor.

Testosterone is also found in females but in smaller quantities. It is secreted in the ovaries of females. On average, in adult males, levels of testosterone are about 7 to 8 times as great as in adult females. As the metabolism of testosterone in males is more pronounced, the daily production is about 20 times greater in men. Females are also more sensitive to the hormone.

In general, androgens such as testosterone promote protein synthesis and thus growth of tissues with androgen receptors. Testosterone can be described as having virilising and anabolic effects (though these categorical descriptions are somewhat arbitrary, as there is a great deal of mutual overlap between them).

Anabolic effects include growth of muscle mass and strength, increased bone density and strength, and stimulation of linear growth and bone maturation.

Androgenic effects include maturation of the sex organs, particularly the penis and the formation of the scrotum in the foetus, and after birth (usually at puberty) a deepening of the voice, growth of facial hair (such as the beard) and axillary (underarm) hair. Many of these fall into the category of male secondary sex characteristics.

Testosterone effects can also be classified by the age of usual occurrence. For postnatal effects in both males and females, these are mostly dependent on the levels and duration of circulating free testosterone.

The production of testosterone starts to increase significantly during puberty, and begins to dip after age 30 or so.

Testosterone production typically decreases with age. According to the American Urological Association, about 2 out of 10 men older than 60 years have low testosterone. That increases slightly to 3 out of 10 men in their 70s and 80s. Insufficient levels of testosterone in men may lead to abnormalities including frailty and bone loss.

3. SEMEN

Semen is a fluid that is emitted from the male reproductive tract and that contains sperm cells, which are capable of fertilizing the female eggs. Semen also contains other liquids, known as seminal plasma, which help to keep the sperm cells viable. It is also called seminal fluid.

Structures involved in the production and transport of semen:

In the sexually mature human male, sperm cells are produced by the testes. As sperm travel through the male reproductive tract, they are bathed in fluids produced and secreted by the various tubules and glands of the reproductive system. After emerging from the testes, sperm are stored in the epididymis, in which secretions of potassium, sodium, and glycerylphosphorylcholine (an energy source for sperm) are contributed to the sperm cells. Sperm mature in the epididymis. They then pass through a long tube, called the ductus deferens, or vas deferens, to another storage area, the ampulla. The ampulla

secretes a yellowish fluid, ergothioneine, a substance that reduces (removes oxygen from) chemical compounds, and the ampulla also secretes fructose, a sugar that nourishes the sperm.

During the process of ejaculation, liquids from the prostate gland and seminal vesicles are added, which help dilute the concentration of sperm and provide a suitable environment for them. Fluids contributed by the seminal vesicles are approximately 60% of the total semen volume; these fluids contain fructose, amino acids, citric acid, phosphorus, potassium, and hormones known as prostaglandins. The prostate gland contributes about 30 percent of the seminal fluid; the constituents of its secretions are mainly citric acid, acid phosphatase, calcium, sodium, zinc, potassium, protein-splitting enzymes, and fibrolysin (an enzyme that reduces blood and tissue fibres). A small amount of fluid is secreted by the bulbourethral and urethral glands; this is a thick, clear, lubricating protein commonly known as mucus.

Sulfate chemicals in semen help prevent the sperm cells from swelling; and fructose is the main nutrient to sperm cells.

Semen frequently contains degenerated cells sloughed off from the network of tubules and ducts through which the semen has passed.

4. MALE ORGASM

Although it seems simple enough, the male orgasm is actually a complex process.

Men reach 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. This mixture of fluid and sperm, known as semen, is what is moved through the urethra and out the penis during orgasm.

The Male Orgasm: Steps to Ejaculation

The steps that lead a man to successful orgasm include:

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.

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.

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.

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.

5. MALE INFERTILITY

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.

Male infertility can also be said to be due to low sperm production, abnormal sperm function or blockages that prevent the delivery of sperm.

A man can be said to be infertile if after having sexual intercourse with a woman over a period of time of about a year, she is unable to conceive and in another case of a period of years, if the same occurs, he can also be said to be infertile. Illnesses, injuries, chronic health problems, lifestyle choices and other factors can play a role in causing male infertility.

Symptoms

The main sign of male infertility is the inability to conceive a child. There may be no other obvious signs or symptoms. In some cases, however, an underlying problem such as an inherited disorder, a hormonal imbalance, dilated veins around the testicle or a condition that blocks the passage of sperm causes signs and symptoms.

Although most men with male infertility do not notice symptoms other than the inability to conceive a child, signs and symptoms associated with male infertility include:

Problems with sexual function — for example, difficulty with ejaculation or small volumes of fluid ejaculated, reduced sexual desire, or difficulty maintaining an erection (erectile dysfunction)

Pain, swelling or a lump in the testicle area

Recurrent respiratory infections

Inability to smell

Abnormal breast growth (gynecomastia)

Decreased facial or body hair or other signs of a chromosomal or hormonal abnormality

A lower than normal sperm count (fewer than 15 million sperm per milliliter of semen or a total sperm count of less than 39 million per ejaculate)

Types of Male Infertility

Azoospermia – absence of sperm cells in semen.

Teratospermia – increase in sperm with abnormal morphology.
Asthenozoospermia – reduced sperm motility.

Necrozoospermia – all sperm in the ejaculate are dead.