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QUESTION: Write short notes on the following:

1. Spermatogenesis
2. Testosterone
3. Semen
4. Male orgasm
5. Male infertility
6. **Spermatogenesis**: this is the origin and development of the sperm cells within the male reproductive organ, the testes. The testes are composed of numerous thin, tightly coiled tubules known as the seminiferous tubules; the sperm cells are produced within the walls of the tubules. Within the walls of the tubules, also, are many randomly scattered cells, called Sertoli cells, that function to support and nourish the immature sperm cells by giving them nutrients and blood products. As the young germ cells grow, the Sertoli cells help to transport them from the outer surface of the seminiferous tubule to the central channel of the tubule. Sperm cells are continually being produced by the testes, but not all areas of the seminiferous tubules produce sperm cells at the same time. One immature germ cell takes as long as 74 days to reach final maturation. The immature cells are all derived from cells called stem cells in the outer wall of the seminiferous tubules. The stem cells are composed almost entirely of nuclear material. The stem cells begin their process by multiplying in the process of cell duplication known as mitosis. Half of the new cells from this initial crop go on to become the future sperm cells, and the other half remain as stem cells so that there is a constant source of additional germ cells. Spermatogonia destined to develop into mature sperm cells are known as primary sperm cells. These move from the outer portion of the seminiferous tubule to a more central location and attach themselves around the Sertoli cells. The primary sperm cells then develop somewhat by increasing the amount of cytoplasm and structures called organelles within the cytoplasm. After a resting phase the primary cells divide into a form called a secondary sperm cell. During this cell division there is a splitting of the nuclear material. In the nucleus of the primary sperm cells there are 46 chromosomes; in each of the secondary sperm cells there are only 23 chromosomes. Once the sperm has matured, it is transported through the long seminiferous tubules and stored in the epididymis of the testes until it is ready to leave the male body.

1. **Testosterone:** it is a hormone produced by the male testis that is responsible for development of the male sex organs and masculine characteristics, including facial hair and deepening of the voice. Testosterone serves as a circulating prohormone for a more active androgen called dihydrotestosterone. Testosterone is converted to dihydrotestosterone in most tissues that are sensitive to androgens, including the testes, prostate gland, hair follicles, and muscles. Although testosterone itself has androgenic actions, its conversion to dihydrotestosterone is critical to the development of external genitalia in boys. Testosterone is also converted to estradiol in adipose tissue, which is the most important source of estrogen in men. Furthermore, testosterone is interconvertible with androstenedione, which can be converted into estrogens. When androstenedione is formed in adipose tissue, it may be converted to a form of estrogen called estrone. Testosterone has several major actions. It provides negative feedback inhibition on the secretion of gonadotropin-releasing hormone from the hypothalamus and the secretion of luteinizing hormone from the pituitary gland. It also directs the development of the embryonic Wolffian ducts into the vas deferens (ductus deferens) and seminal vesicles and stimulates the formation of muscle and bone. Dihydrotestosterone is responsible for sperm maturation during spermatogenesis, for the formation of the prostate gland and external genitalia, and for sexual maturation at puberty.
2. **Semen:** also called seminal fluid, 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. Sperm cells constitute about 2 to 3 percent of the total semen volume. Fluids contributed by the seminal vesicles are approximately 60 percent 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. The total volume of semen for each ejaculation of a human male averages between 2 and 5 ml, in stallions the average ejaculate is about 125 ml. In human beings each ejaculation contains normally 200 to 300 million sperm. Semen frequently contains degenerated cells sloughed off from the network of tubules and ducts through which the semen has passed.
3. **Male orgasm**: is the sudden discharge of accumulated sexual excitement during the sexual response cycle, resulting in rhythmic muscular contractions in the pelvic region characterized by sexual pleasure. Orgasms are controlled by the involuntary or autonomic nervous system. They are often associated with other involuntary actions, including muscular spasms in multiple areas of the body, a general euphoric sensation and, frequently, body movements and vocalizations. The period after orgasm (known as the refractory period) is often a relaxing experience, attributed to the release of the neurohormones oxytocin and prolactin as well as endorphins (or "endogenous morphine").

1. **Male infertility**: The causes of male infertility include problems with sperm production, blockage of the sperm-delivery system, the presence of antibodies against sperm, testicular injury, anatomic abnormalities, and the presence of a varicose vein around the testicle (varicocele)—all of which can affect sperm quality or quantity. Infertility is also more likely to occur in men born with a low birth weight compared with those born with an average weight for gestational age. Sperm number, concentration, motility, and morphology (shape) are usually assessed by means of a microscopic examination of the semen. Sperm count is the total number of sperm in the ejaculate; counts vary widely, but values below 20 million are usually considered low. Low sperm count is generally referred to as oligospermia. In some cases, male infertility is caused by complete absence of spermatozoa in the ejaculate, a condition known as azoospermia. This condition can be caused by an obstruction of the genital tract, by testicular dysfunction associated with congenital disorders such as sickle cell disease, or by various illnesses.