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Write short notes on the following

### 1. Spermatogenesis:

Spermatogenesis is a complex process involving mitotic cell division, meiosis and the process of spermiogenesis. The regulation of spermatogenesis involves both endocrine and paracrine mechanisms. The endocrine stimulation of spermatogenesis involves both follicle stimulating hormone (FSH) and luteinizing hormone, the latter acting through the intermediary testosterone, produced by the Leydig cells in the testis. Since the germ cells do not possess receptors for FSH and testosterone, the hormonal signals are transduced through the Sertoli cells and peritubular cells by the production of signals that have yet to be defined. Although the hormonal signals are essential for successful spermatogenesis, there is increasing evidence that a multiplicity of growth factors and cytokines are involved in local control mechanisms influencing stem cell renewal by mitosis and the complicated process of the two meiotic cell divisions. The final complex metamorphosis which converts a round cell into the complex structures of the spermatozoa is well defined at a structural level, but the control systems regulating this process still remain to be elucidated.

### 2. Testosterone:

Testosterone is a male sex hormone that is important for sexual and reproductive development. The National Institutes of Health regards testosterone as the most important male hormone. Women also produce testosterone, but at lower levels than men. It belongs to a class of male hormones called androgens, which are sometimes called steroids or anabolic steroids. In men, testosterone is produced mainly in the testes, with a small amount made in the adrenal glands. The brain's hypothalamus and pituitary gland control testosterone production. The hypothalamus instructs the pituitary gland on how much testosterone to produce, and the pituitary gland passes the message on to the testes. These communications happen through chemicals and hormones in the bloodstream.

Testosterone is involved in the development of male sex organs before birth, and the development of secondary sex characteristics at puberty, such as voice deepening, increased penis and testes size, and growth of facial and body hair.

### 3. Semen:

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

### 4. Male Orgasm:

The male orgasm is a complex experience. The major function of the male orgasm is to ejaculate sperm, although not all men will ejaculate during an orgasm. Beyond delivering pleasure, the role of the female orgasm is less clear, although it may help move the sperm closer toward the ovum (egg).

The male orgasm is a complex system involving multiple hormones, organs, and nerve pathways. The hormone testosterone, produced in the testicles, plays a central role by enhancing the sexual desire (libido) that leads to arousal, erection, and ultimately orgasm. By contrast, low testosterone not only decreases a man's energy and mood, it makes him less responsive to sexual stimuli, both physical and mental.

#### 5. Male infertility:

Male infertility is due to low sperm production, abnormal sperm function or blockages that prevent the delivery of sperm. Illnesses, injuries, chronic health problems, lifestyle choices and other factors can play a role in causing male infertility.

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)