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SPERMATOGENESIS

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. These cells are called spermatogonial 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 spermatocytes. The primary spermatocyte divides meiotically (Meiosis I) into two secondary spermatocytes; each secondary spermatocyte divides into two equal haploid spermatids by Meiosis II. The spermatids are transformed into spermatozoa (sperm) by the process of spermiogenesis. These develop into mature spermatozoa, also known as sperm cells. Thus, the primary spermatocyte gives rise to two cells, the secondary spermatocytes, and the two secondary spermatocytes by their subdivision produce four spermatozoa and four haploid cells.

Spermatogenesis starts in the bottom part of seminiferous tubes and, progressively, cells go deeper into tubes and moving along it until mature spermatozoa reaches the lumen, where mature spermatozoa are deposited. The division happens asynchronously; if the tube is cut transversally one could observe different maturation states. A group of cells with different maturation states that are being generated at the same time is called a spermatogenic wave. 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. This is the cornerstone of sexual reproduction and involves the two gametes both contributing half the normal set of chromosomes (haploid) to result in a chromosomally normal (diploid) zygote.

To preserve the number of chromosomes in the offspring – which differs between species – one of each gamete must have half the usual number of chromosomes present in other body cells. Otherwise, the offspring will have twice the normal number of chromosomes, and serious abnormalities may result. In humans, chromosomal abnormalities arising from incorrect spermatogenesis results in congenital defects and abnormal birth defects (Down syndrome, Klinefelter syndrome) and in most cases, spontaneous abortion of the developing foetus.

TESTOSTERONE

Testosterone is the primary male sex hormone and anabolic steroid. In male humans, testosterone plays a key role 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. Insufficient levels of testosterone in men may lead to abnormalities including frailty and bone loss.

Testosterone is 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. In humans and most other vertebrates, testosterone is secreted primarily by the testicles of males and, to a lesser extent, 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 addition to its role as a natural hormone, testosterone is used as a medication in the treatment of low testosterone levels in men, transgender hormone therapy for transgender men, and breast cancer in women. Since testosterone levels decrease as men age, testosterone is sometimes used in older men to counteract this deficiency. It is also used illicitly to enhance physique and performance, for instance in athletes.

SEMEN

Semen, also known as seminal fluid, is an organic fluid that contains spermatozoa. It is secreted by the gonads (sexual glands) and other sexual organs of male or hermaphroditic animals and can fertilize the female ovum. In humans, seminal fluid contains several components besides spermatozoa: proteolytic and other enzymes as well as fructose are elements of seminal fluid which promote the survival of spermatozoa, and provide a medium through which they can move or "swim". Semen is produced and originates from the seminal vesicle, which is located in the pelvis. The process that results in the discharge of semen is called ejaculation. Semen is also a form of genetic material. In animals, semen has been collected for cryoconservation. Cryoconservation of animal genetic resources is a practice that calls for the collection of genetic material in efforts for conservation of a particular breed.

MALE ORGASM

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. Experienced by males and females, 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").

Human orgasms usually result from physical sexual stimulation of the penis in males (typically accompanying ejaculation) and of the clitoris in females. Sexual stimulation can be by self-practice (masturbation) or with a sex partner (penetrative sex, non-penetrative sex, or other sexual activity).

The health effects surrounding the human orgasm are diverse. There are many physiological responses during sexual activity, including a relaxed state created by prolactin, as well as

changes in the central nervous system such as a temporary decrease in the metabolic activity of large parts of the cerebral cortex while there is no change or increased metabolic activity in the limbic (i.e., "bordering") areas of the brain. There is also a wide range of sexual dysfunctions, such as anorgasmia. These effects impact cultural views of orgasm, such as the beliefs that orgasm and the frequency/consistency of it are either important or irrelevant for satisfaction in a sexual relationship, and theories about the biological and evolutionary functions of orgasm. In a clinical context, orgasm is usually defined strictly by the muscular contractions involved during sexual activity, along with the characteristic patterns of change in heart rate, blood pressure, and often respiration rate and depth. This is categorized as the sudden discharge of accumulated sexual tension during the sexual response cycle, resulting in rhythmic muscular contractions in the pelvic region.

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.

Prevention

Some strategies suggested or proposed for avoiding male infertility include the following:

- 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).
- Wearing a protective cup and jockstrap to protect the testicles, in any sport such as baseball, football, cricket, lacrosse, hockey, softball, paintball, rodeo, motorcross, wrestling, soccer, karate or other martial arts or any sport where a ball, foot, arm, knee or bat can come into contact with the groin.
- Diet.