NAME: ESAN FAITH

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COURSE TITLE: RENAL PHYSIOLOGY, BODY FLUID, TEMPERATURE REGULATION AND AUTONOMIC NERVOUS SYTEM

ASSIGNMENT TITLE: MALE REPRODUCTIVE FUNCTION

QUESTION: WRITE SHORT NOTES ON THE FOLLOWING :

1. SPERMATOGENESIS
2. TESTOSTERONE
3. SEMEN
4. MALE ORGASM
5. MALE INFERTILITY

SPERMATOGENESIS: Mammalian spermatogenesis is a highly synchronized, regular, long and extremely complex process of cellular differentiation by which a spermatogonial “stem-cell” is gradually transformed into a highly differentiated haploid cell ‘Spermatozoon.”This differentiation involves three distinct classes of germinal cells—the spermatogonia, the spermatocytes, and the spermatids, which usually are arranged in concentric layers in the seminiferous tubules. In the adult mammals spermatogenesis is a continuous process, which can be divided into two distinct phases and each characterized by specific morphological and biochemical changes of nuclear and cytoplasmic components. It has 2 phases

**Formation of spermatids:**This phase of spermatogenesis is further subdivided into three phases.

**1. Multiplication phase:**

This phase is also known as proliferation and renewal of spermatogonia. During this phase the diploid spermatogonia which are situated at the periphery of the seminiferous tubule, multiply mitotically to form spermatocytes and also to give rise to new spermatogonia! stem cells and enter the phase of growth

**2. Growth phase:**

During this phase, a limited growth of spermatogonia takes place; their volume becomes double and they are now called primary spermatocytes which are still diploid in number. Now these primary spermatocytes enter into the next phase namely, maturation phase.

**3. Maturation phase:**

The primary spermatocyte enter into the prophase of meiotic or maturation division. Meiotic prophase is a very complex process characterised by an ordered series of chromosal rearrangements which are accompanied by molecular changes. During meiosis, first nuclear DNA duplicates, each homologous chromosome starts pairing (synapsis) and longitudinally spilts up into two chromatids, both of which remain joined by a common centromere.By chiasma formation mutual exchange of some chromosome material between two non-sister chromatids of each homologous pair (tetrad) occurs (crossing over) to provide an almost indefinite variety of combinations of paternal and maternal genes in any gamete.Lastly, two chromosomes of each homologous pair (tetrad) migrate towards opposite poles of the primary spermatocyte. Now each pole of primary spermatocyte has haploid set of chromosomes. Each set of chromosome is surrounded by the nuclear membrane developed from the endoplasmic reticulum. The first meiotic division, as a rule, is followed by the division of cytoplasm (cytokinesis) which divides each primary spermatocyte into two haploid, secondary spermatocyte.

**Spermiogenesis:**

The changes in the spermatids leading to the formation of spertmatozoa constitute the process of spermiogenesis. Because a spermatozoon is a very active and mobile cell, in order to provide real mobility to it, all the superfluous materials of the developing spermatozoa are to be discarded and a high degree of specialization takes place in the sperm cell through a number of steps.

**. Formation of head:**

The two major parts of sperm head i.e. the nucleus and acrosome, undergo the following changes to form a sperm head.

**(a) Changes in the nucleus:**The spherical shape of the nucleus also becomes elongated and narrow. This shape is an obvious adaptation for the propulsion in any fluid medium, as well as penetrating the ovum. In different animals, it assumes different shapes which ultimately determine their prospective shapes.

**(b) Golgi phase:** The young spermatid is round with a spherical nucleus. The Golgi apparatus secretes glycoprotein rich granules which are stained with the periodic acid-Schiff technique. These granules referred to as proacrosomic granules, fuse to form a single large acrosomal granule attached to the nuclear membrane.

**(c) Cap phase:** The acrosomal granule flattens on the nucleus of the spermatid to form the head cap. The Golgi apparatus which secretes the acrosome separates from the head cap and move towards the opposite pole. The Centrioles which are close to the nucleus, on the side opposite the acrosonic cap develop a flagellum.

**(d) Acrosome phase:** The definitive morphological contours of the acrosome become clearly defined. The remaining part of the Golgi apparatus is gradually reduced and ultimately discarded from the sperm as “Golgi -rest” along with some cytoplasm

**2. Formation of the tail of the spermatozoon:**

The Centrosome of a spermatid after the second meiotic divisionconsists of two Centrioles which have the structure of two cylindrical bodies, lying at right angle to each other. During early stages of sperm metamorphosis, the two Centrioles move to a position just behind the sperm, nucleus in the future neck region. A depression is formed in the posterior surface of the nucleus and one of the two Centrioles becomes placed in the depression with its axis approximately at right angles to the main axis of the spermatozoon.

This is the proximal Centriole and the other centriol i.e. the distal Centriole takes up a position behind the proximal one with its axis coinciding with the longitudinal axis of the spermatozoon. The distal Centriole now give rise to the axis filament of the flagellum of the spermatozoon for which it serves as basal granule.Most of the mitochondria of spermatids concentrate around the distal Centriole and proximal (upper) part of the axial filament and form the neck and middle piece of the tail of spermatozoon. In the middle piece of the sperm the mitochondria lose their individuality by fusing to a greater or lesser extent. In mammals, the mitochondria join in one continuous body which becomes twisted spirally around the proximal part of the axial filament and the proximal Centriole.In other animals, however, no spiral arrangement of mitochondria occurs, but instead, mitochondria fuse together to form massive clumps called mitochondrial bodies. The cytoplasm forms a condensed layer called sanchette around the periphery of the middle piece. The manchette also surrounds the posterior part of the head of the spermatozoa, where it is not covered by the cap. A dark ring called ‘Ring Centriole’ of unknown function is sometimes seen at the posterior end of the middle piece. It forms the boundary between the middle piece and the principal piece of sperm tail. In most animals, except mammals, the principal piece and tail piece of the sperm are composed of the axial filament only. In mammals, the axial filament of the principal piece is accompanied on the outer side by much thicker fibres which are wedge-shaped in cross section.These fibres start in the middle piece but do not reach upto the end piece of the spermatozoon tail. The fibres of axial filament of a mammalian sperm tail are also surrounded by flattened bands which occur as semi-circular ribs articulating with each other on the opposite sides of the sperm tail. The end piece has only axial filament which remains covered with cytoplasm and plasma membrane.

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. Testosterone 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. The hormone also plays a role in sex drive, sperm production, fat distribution, red cell production, and maintenance of muscle strength and mass, according to the Mayo Clinic. For these reasons, testosterone is associated with overall health and well-being in men. One 2008 [study](http://www.karger.com/Article/Abstract/176049) published in the journal Frontiers of Hormone Research even linked testosterone to the prevention of osteoporosis in men.

In women, the ovaries and adrenal glands produce testosterone. Women's total testosterone levels are about a tenth to a twentieth of men's levels.

**Low testosterone**

Levels of testosterone naturally decrease with age, but exactly what level constitutes "[low T](https://www.livescience.com/37101-testosterone-therapy-prescription-increase.html)," or hypogonadism, is controversial, [Harvard Medical School](http://www.health.harvard.edu/newsletters/Harvard_Mens_Health_Watch/2014/February/is-testosterone-therapy-safe-take-a-breath-before-you-take-the-plunge?utm_source=mens&utm_medium=pressrelease&utm_campaign=Mens0214) said. Testosterone levels vary wildly, and can even differ depending on the time of day they're measured (levels tend to be lower in the evenings). The [National Institutes of Health](http://www.nlm.nih.gov/medlineplus/tutorials/lowtestosterone/ur189103.pdf) includes the following as possible symptoms of low testosterone:

* Reduced sex drive
* Erectile dysfunction or impotence
* Increased breast size
* Lowered sperm count
* Hot flashes
* Depression, irritability and inability to concentrate
* Shrunken and softened testes
* Loss of muscle mass or hair
* Bones becoming prone to fracture

It is important to note, however, that conditions other than low T can cause erectile dysfunction, such as diseases in the nerves or blood.

Doctors typically to treat men for hypogonadism if they have symptoms of low testosterone and their testosterone levels are below 300 nanograms per deciliter.

 SEMEN: **Semen**, also known as **seminal fluid**, is an organic [fluid](https://en.wikipedia.org/wiki/Fluid) that contains [spermatozoa](https://en.wikipedia.org/wiki/Spermatozoon). It is secreted by the [gonads](https://en.wikipedia.org/wiki/Gonad) (sexual glands) and other sexual organs of [male](https://en.wikipedia.org/wiki/Male) or [hermaphroditic](https://en.wikipedia.org/wiki/Hermaphrodite) [animals](https://en.wikipedia.org/wiki/Animal) and can [fertilize](https://en.wikipedia.org/wiki/Fertilization) the [female](https://en.wikipedia.org/wiki/Female) [ovum](https://en.wikipedia.org/wiki/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](https://en.wikipedia.org/wiki/Seminal_vesicle), which is located in the pelvis. The process that results in the discharge of semen is called [*ejaculation*](https://en.wikipedia.org/wiki/Ejaculation). Semen is also a form of genetic material. In animals, semen has been collected for cryoconservation. [Cryoconservation of animal genetic resources](https://en.wikipedia.org/wiki/Cryoconservation_of_animal_genetic_resources" \o "Cryoconservation of animal genetic resources) is a practice that calls for the collection of genetic material in efforts for conservation of a particular breed.

**Fertilization**

Depending on the [species](https://en.wikipedia.org/wiki/Species), spermatozoa can fertilize ova externally or internally. In [external fertilization](https://en.wikipedia.org/wiki/External_fertilization), the spermatozoa fertilize the ova directly, outside of the female's sexual organs. Female [fish](https://en.wikipedia.org/wiki/Fish), for example, [spawn](https://en.wikipedia.org/wiki/Spawn_(biology)) ova into their aquatic environment, where they are fertilized by the semen of the male fish. During [internal fertilization](https://en.wikipedia.org/wiki/Internal_fertilization), however, fertilization occurs inside the female's sexual organs. Internal fertilization takes place after [insemination](https://en.wikipedia.org/wiki/Insemination) of a female by a male through [copulation](https://en.wikipedia.org/wiki/Copulation_(zoology)). In most [vertebrates](https://en.wikipedia.org/wiki/Vertebrate), including [amphibians](https://en.wikipedia.org/wiki/Amphibian), [reptiles](https://en.wikipedia.org/wiki/Reptile), [birds](https://en.wikipedia.org/wiki/Bird) and [monotreme](https://en.wikipedia.org/wiki/Monotreme" \o "Monotreme) mammals, copulation is achieved through the physical mating of the [cloaca](https://en.wikipedia.org/wiki/Cloaca) of the male and female. In [marsupial](https://en.wikipedia.org/wiki/Marsupial) and [placental mammals](https://en.wikipedia.org/wiki/Placentalia), copulation occurs through the [vagina](https://en.wikipedia.org/wiki/Vagina).

**Human semen**

**Composition**

During the process of [ejaculation](https://en.wikipedia.org/wiki/Ejaculation), sperm passes through the [ejaculatory ducts](https://en.wikipedia.org/wiki/Ejaculatory_duct) and mixes with fluids from the [seminal vesicles](https://en.wikipedia.org/wiki/Seminal_vesicle), the [prostate](https://en.wikipedia.org/wiki/Prostate), and the [bulbourethral glands](https://en.wikipedia.org/wiki/Bulbourethral_gland) to form the semen. The seminal vesicles produce a yellowish viscous fluid rich in fructose and other substances that makes up about 70% of human semen. The prostatic secretion, influenced by dihydrotestosterone, is a whitish (sometimes clear), thin fluid containing proteolytic enzymes, citric acid, acid phosphatase and lipids. The bulbourethral glands secrete a clear secretion into the lumen of the [urethra](https://en.wikipedia.org/wiki/Urethra) to lubricate it. [Sertoli cells](https://en.wikipedia.org/wiki/Sertoli_cell), which nurture and support developing [spermatocytes](https://en.wikipedia.org/wiki/Spermatocyte), secrete a fluid into seminiferous tubules that helps transport sperm to the genital ducts. The ductuli efferentes possess cuboidal cells with [microvilli](https://en.wikipedia.org/wiki/Microvillus) and [lysosomal](https://en.wikipedia.org/wiki/Lysosome) granules that modify the ductal fluid by reabsorbing some fluid. Once the semen enters the ductus epididymis the principal cells, which contain [pinocytotic vessels](https://en.wikipedia.org/w/index.php?title=Pinocytotic_vessel&action=edit&redlink=1) indicating fluid reabsorption, secrete glycerophosphocholine which most likely inhibits premature [capacitation](https://en.wikipedia.org/wiki/Capacitation). The accessory genital ducts, the [seminal vesicle](https://en.wikipedia.org/wiki/Seminal_vesicle), [prostate glands](https://en.wikipedia.org/wiki/Prostate_gland), and the [bulbourethral glands](https://en.wikipedia.org/wiki/Bulbourethral_gland), produce most of the seminal fluid. Seminal plasma of humans contains a complex range of [organic](https://en.wikipedia.org/wiki/Organic_compound) and [inorganic](https://en.wikipedia.org/wiki/Inorganic) constituents. The seminal plasma provides a nutritive and protective medium for the spermatozoa during their journey through the female reproductive tract. The normal environment of the [vagina](https://en.wikipedia.org/wiki/Vagina) is a hostile one (c.f. [sexual conflict](https://en.wikipedia.org/wiki/Sexual_conflict)) for [sperm](https://en.wikipedia.org/wiki/Sperm) cells, as it is very [acidic](https://en.wikipedia.org/wiki/Acidic) (from the native microflora producing [lactic acid](https://en.wikipedia.org/wiki/Lactic_acid)), viscous, and patrolled by immune cells. The components in the seminal plasma attempt to compensate for this hostile environment. Basic [amines](https://en.wikipedia.org/wiki/Amines) such as [putrescine](https://en.wikipedia.org/wiki/Putrescine), [spermine](https://en.wikipedia.org/wiki/Spermine" \o "Spermine), [spermidine](https://en.wikipedia.org/wiki/Spermidine) and [cadaverine](https://en.wikipedia.org/wiki/Cadaverine" \o "Cadaverine) are responsible for the smell and flavor of semen. These alkaline bases counteract and buffer the acidic environment of the vaginal canal, and protect [DNA](https://en.wikipedia.org/wiki/DNA) inside the [sperm](https://en.wikipedia.org/wiki/Sperm) from acidic denaturation.

**MALE ORGASM**: The male orgasm is a complex experience. The major function of the male orgasm is to [ejaculate](https://www.verywellhealth.com/facts-about-ejaculation-ejaculate-2329073) 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). In the 1950s, Alfred Kinsey, the first scientist to study human sexuality in detail, described the orgasm as "an explosive discharge of neuromuscular tension." In the years since those initial studies, we have come closer to understanding both the physiological and emotional components of the male orgasm, as well as the conditions that impede or promote it. 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.With that being said, a man often only requires physical stimulation to achieve arousal, while women typically need physical and mental stimulation to achieve the same. Men differ from women in that their orgasms—the climax of the sexual response—come on faster and are shorter than women's. By and large, the male orgasm will last for five to 10 seconds. Women will last 10 to 15 seconds on average, although some have reported orgasms that last as long as a minute (a virtual impossibility for men). The male ejaculate, [semen](https://www.verywellhealth.com/facts-about-semen-an-indication-of-health-status-2328524), is comprised of sperm cells and seminal fluid, the latter of which contains phosphorylcholine (an enzyme that aids in fertility) and fructose (which provides fuel for sperm). The average volume of semen expelled by a healthy man is around a teaspoon.

**4 Phases of the Male Orgasm**.

Arousal: Arousal is the stage in which physical, sensory, and emotional cues prompt the brain to release a neurotransmitter known as acetylcholine. This, in turn, triggers the release of nitric oxide into the arteries of the penis, causing them to expand and rapidly fill with blood. The resulting erection is generally accompanied by changes in respiration, increased overall muscle tension, and the retraction of the scrotal sac.

Plateau: Plateau is the phase immediately preceding orgasm in which the voluntary thrusts of the body, specifically the pelvis, suddenly become involuntary, increasing both in intensity and speed.2﻿ It is at this stage that the heart rate increases to between 150 and 175 beats per minute, accompanied by a marked rise in blood pressure and body temperature.Traces of seminal fluid ("pre-cum") may leak from the urethra. The release of pre-ejaculatory fluid is more than just incidental; it alters the pH of the urethra so that the sperm has a better chance of survival.All told, the plateau phase lasts between 30 seconds and two minutes.

Orgasm: The orgasm phase is divided into two parts. The first, known as emission, is the stage where ejaculation is inevitable. This is immediately followed by the second stage, ejaculation, in which strong contractions of the penile muscle, anus, and perineal muscles help propel the semen from the body.During orgasm, the reward center of the brain (specifically the cerebellum, amygdala, nucleus accumbens, and ventral tegmental area) is flooded with neurochemicals, inciting the intense emotional response associated with an orgasm. At the same time, the [lateral orbitofrontal cortex](https://www.verywellhealth.com/the-frontal-lobes-2488715) located behind the left eye shuts down entirely. This is the part of the brain that plays a central role in judgment and self-control. The effect explains why people often describe an orgasm as a state where "nothing else matters."

Resolution and Refraction: Resolution is the phase following orgasm where the penis starts to lose its erection. This is often accompanied by feelings of extreme relaxation or even drowsiness.Refraction, also known as the refractory period, is the stage following climax when a man is unable to achieve another erection even with stimulation. In younger men, the refractory period may be as short as 15 minutes. In older men, it may last as long as an entire day.

**Male infertility** refers to a male's inability to cause [pregnancy](https://en.wikipedia.org/wiki/Pregnancy) in a fertile female. In humans it accounts for 40–50% of [infertility](https://en.wikipedia.org/wiki/Infertility). It affects approximately 7% of all men.Male infertility is commonly due to deficiencies in the [semen](https://en.wikipedia.org/wiki/Semen), and [semen quality](https://en.wikipedia.org/wiki/Semen_quality) is used as a surrogate measure of male fecundity.

Causes

**Immune infertility:** [Antisperm antibodies](https://en.wikipedia.org/wiki/Antisperm_antibodies) (ASA) have been considered as infertility cause in around 10–30% of infertile couples. ASA production are directed against surface antigens on sperm, which can interfere with sperm motility and transport through the female reproductive tract, inhibiting capacitation and [acrosome reaction](https://en.wikipedia.org/wiki/Acrosome_reaction), impaired [fertilization](https://en.wikipedia.org/wiki/Fertilisation), influence on the implantation process, and impaired growth and development of the [embryo](https://en.wikipedia.org/wiki/Embryo). Risk factors for the formation of antisperm antibodies in men include the breakdown of the blood‑testis barrier, trauma and surgery, orchitis, [varicocele](https://en.wikipedia.org/wiki/Varicocele" \o "Varicocele), infections, [prostatitis](https://en.wikipedia.org/wiki/Prostatitis), [testicular cancer](https://en.wikipedia.org/wiki/Testicular_cancer), failure of immunosuppression and unprotected receptive anal or oral sex with men.

**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](https://en.wikipedia.org/wiki/Klinefelter_Syndrome" \o "Klinefelter Syndrome), affecting 1 out of 500–1000 newborn males[[]](https://en.wikipedia.org/wiki/Male_infertility#cite_note-:04-10) 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.[[]](https://en.wikipedia.org/wiki/Male_infertility#cite_note-11) Males with this syndrome carry an extra X chromosome (XXY), meaning they have 47 chromosomes compared to the normal 46 in each cell. This extra chromosome directly affects sexual development before birth and during puberty (links to learning disabilities and speech development have also been shown to be affected). There are varieties in Klinefelter Syndrome, where some cases may have the extra X chromosome in some cells but not others, referred to as Mosaic Klinefelter Syndrome, or where individuals have the extra X chromosome in all cells. The reduction of testosterone in the male body normally results in an overall decrease in the production of viable sperm for these individuals thereby forcing them to turn to fertility treatments to father children.

**Y chromosome deletions**: [Y chromosomal infertility](https://en.wikipedia.org/wiki/Y_chromosome_deletions) is a direct cause of male infertility due to its effects on sperm production, occurring in 1 out of every 2000 males.[[12]](https://en.wikipedia.org/wiki/Male_infertility#cite_note-:12-12) Usually affected men show no sign of symptoms other than at times can exhibit smaller teste size. Men with this condition can exhibit [azoospermia](https://en.wikipedia.org/wiki/Azoospermia) (no sperm production), [oligozoospermia](https://en.wikipedia.org/wiki/Oligozoospermia" \o "Oligozoospermia) (small number of sperm production), or they will produce abnormally shaped sperm (teratozoospermia).[[12]](https://en.wikipedia.org/wiki/Male_infertility#cite_note-:12-12) This case of infertility occurs during the development of gametes in the male, where a normal healthy male will produce both X and a Y chromosome, affected males have genetic deletions in the Y chromosome. These deletions affect protein production that is vital for [spermatogenesis](https://en.wikipedia.org/wiki/Spermatogenesis). Studies have shown that this is an inherited trait; if a male is fathered by a man who also exhibited y chromosome deletions then this trait will be passed down. These individuals are thereby “Y-linked”, although daughters are not affected due to the lack of the Y chromosome.

Prevention

* Avoiding heavy [marijuana](https://en.wikipedia.org/wiki/Marijuana) and [alcohol](https://en.wikipedia.org/wiki/Alcohol_(drug)) use.
* Avoiding excessive heat to the testes.
* Avoid smoking
* 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](https://en.wikipedia.org/wiki/Protective_cup) and [jockstrap](https://en.wikipedia.org/wiki/Jockstrap) to protect the testicles, in any sport such as [baseball](https://en.wikipedia.org/wiki/Baseball), [football](https://en.wikipedia.org/wiki/Football), [cricket](https://en.wikipedia.org/wiki/Cricket), [lacrosse](https://en.wikipedia.org/wiki/Lacrosse), [hockey](https://en.wikipedia.org/wiki/Hockey), [softball](https://en.wikipedia.org/wiki/Softball), [paintball](https://en.wikipedia.org/wiki/Paintball), [rodeo](https://en.wikipedia.org/wiki/Rodeo), [motorcross](https://en.wikipedia.org/wiki/Motorcross), [wrestling](https://en.wikipedia.org/wiki/Wrestling), [soccer](https://en.wikipedia.org/wiki/Soccer), [karate](https://en.wikipedia.org/wiki/Karate) or other [martial arts](https://en.wikipedia.org/wiki/Martial_arts) or any sport where a ball, foot, arm, knee or bat can come into contact with the groin.
* Diet: Healthy diets (i.e. the Mediterranean diet) rich in such nutrients as omega-3 fatty acids, some antioxidants and vitamins, and low in saturated fatty acids (SFAs) and trans-fatty acids (TFAs) are inversely associated with low semen quality parameters. In terms of food groups, fish, shellfish and seafood, poultry, cereals, vegetables and fruits, and low-fat dairy products have been positively related to sperm quality. However, diets rich in processed meat, soy foods, potatoes, full-fat dairy products, coffee, alcohol and sugar-sweetened beverages and sweets have been inversely associated with the quality of semen in some studies. The few studies relating male nutrient or food intake and fecundability also suggest that diets rich in red meat, processed meat, tea and caffeine are associated with a lower rate of fecundability. This association is only controversial in the case of alcohol. The potential biological mechanisms linking diet with sperm function and fertility are largely unknown and require further study.

TREATMENTS: Treatments vary according to the underlying disease and the degree of the impairment of the male's fertility. Further, in an infertility situation, the fertility of the female needs to be considered.Pre-testicular conditions can often be addressed by medical means or interventions. Testicular-based male infertility tends to be resistant to medication. Usual approaches include using the sperm for [intrauterine insemination](https://en.wikipedia.org/wiki/Intrauterine_insemination) (IUI), [in vitro fertilization](https://en.wikipedia.org/wiki/In_vitro_fertilization) (IVF), or IVF with [intracytoplasmatic sperm injection](https://en.wikipedia.org/wiki/Intracytoplasmic_sperm_injection" \o "Intracytoplasmic sperm injection) (ICSI). With IVF-ICSI even with a few sperm pregnancies can be achieved. Obstructive causes of post-testicular infertility can be overcome with either surgery or IVF-ICSI. Ejaculatory factors may be treatable by medication, or by IUI therapy or IVF. [Vitamin E](https://en.wikipedia.org/wiki/Vitamin_E) helps counter oxidative stress.[] which is associated with sperm DNA damage and reduced sperm motility.[[]](https://en.wikipedia.org/wiki/Male_infertility#cite_note-43) A hormone-antioxidant combination may improve sperm count and motility.[] Giving oral antioxidants to men in couples undergoing in vitro fertilisation for male factor or unexplained subfertility may lead to an increase in the [live birth rate](https://en.wikipedia.org/wiki/Live_birth_rate) but overall the risk of adverse effects is unclear.