Semen analysis

Seminal fluid analysis: Semen analysis has long represented the standard test for evaluating male fertility. A semen analysis measures the amount of semen a man produces and determines the number and quality of sperm in the semen sample. A semen analysis is usually one of the first tests done to help determine whether a man has a problem fathering a child (infertility).

Seminal Fluid: It is seminal plasma resulting from the secretions of all sperm from the follicles and prostate gland and Cowper's gland.

1. Urethral glands (2-5%) are very small mucus secreting glands.

2. Prostate: (produce about 13-33 % of the fluid volume of semen). Prostate glands secretion is a milky, acidic fluid that plays a role in activating sperm, the secretion contains acid phosphatase and proteolytic enzymes that act on the fluid from the seminal vesicles, resulting in the coagulation and liquefaction of the semen.

3. Seminal vesicles (produce about 46-80 % of the fluid volume of semen alkaline) Viscous, yellowish secretion is rich in fructose, vitamin C, prostaglandin, and other substances, which nourish and activate the sperm passing through the tract.

4. Testis & Epididymis: (5%) Spermatozoa are produced in the testis under the influence of testosterone, and then the epididymis (is the first part of the duct system) provides a temporary storage site for the immature sperm that enter it from testis. This fraction still in the inactive form until ejaculation.

What is the spermatozoon or Formation of sperm:

1- The human sperm cell is about 70 µm long.
2- The nucleus is in the head contain the 23 chromosomes.
3- It is the head which binds to the egg at fertilization.
4- Midpiece: the energy for motility is generated.
5- Tail: (motility the beat is initiated just behind the mid piece, and then propagated along the tail).

Sperm function

1. The ejaculated sperm pass through the cervix, then the uterus, and enter the oviduct. The fertilizing sperm swims through the layers of cells around the egg (cumulus and corona), and reaches the zona pellucida, is a glycoprotein layer surrounding the plasma membrane of mammalian oocytes.
2. The sperm then loses the front membranes of its head (the acrosome reaction), binds to the zona, then forces its way through the zona to the egg membrane.
3. When the sperm head binds to the egg membrane, its tail stops beating and the egg incorporates the whole sperm cell.
4. The egg unpacks the sperm, then the male and female pronuclei form.

What the purpose of the test: 1-Investigation of fertility. **2-** Identify treatment options (surgical treatment, medical treatment, assisted conception treatment, Determine the suitability of semen for IVF **In vitro fertilisation** (artificial insemination). **3-**Occasionally a man will have a semen analysis done as part of routine pre-pregnancy testing.**4-** Animals semen analysis is commonly used in farm animal breeding. **5-**Evaluate the function of the accessory glands.

- **Type of assays:**

1-descriptive assay: spermatozoa
2- Functional assay

- **Collection of the semen sample**

The specimen should be collected by directly in to a plastic or glass container with a wide neck or petridish.

- **Normal valus of semen variables**

Volume	2ml- 6ml
pH	7.8-8.3
sperm concentration	60 million/ml
Totat sperm count	40-150 million/ml
Motility	70% Active motile. Sluggishly 20%. Non motile
Morphology	30% or more with normal morphology
Vitality	75% or more

White blood cells	Fewer than $1*10^6$ is the more milky coulour to yellowish semen fluid because pus cells more in infection of semen fluid.
Red cells	Found in semen fluid in infection case the colour to brownish because of the presence of hemorrhage in the region of the urethra.
Fructose level	This is a measure of the amount of a sugar called fructose in the semen. The fructose provides energy for the sperm. Absence of fructose may indicate a problem with the seminal vesicles.
The liquefaction	is the process when the gel formed by proteins from the seminal vesicles is broken up and the semen becomes more liquid. It normally takes less than 20 minutes for the sample to change from a thick gel into a liquid. An abnormally long liquefaction time (more than 40 - 45 minutes at 37 °C) may indicate an infection.

Semen analysis Abnormal

Semen volume

Abnormal: An abnormally low or high semen volume is present, which may sometimes cause fertility problems.

Liquefaction time

Abnormal: An abnormally long liquefaction time is present, which may indicate an infection.

Sperm count

Abnormal: A very low sperm count is present, which may mean infertility. **Total sperm number** (million/ejaculate) normal (40-80 million) the abnormal or infertility is 10.5-12 million.

Sperm shape (morphology)

Abnormal: Sperm can be abnormal in several ways, such as having two heads or two tails, a short tail, a tiny head (pinhead), or a round (rather than oval) head.

Sperm movement (motility)

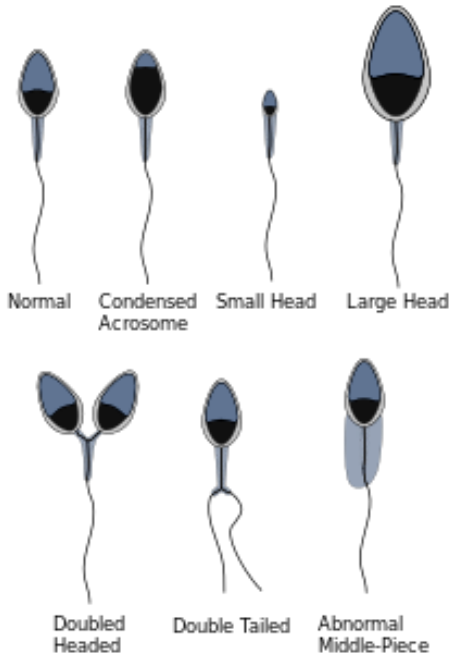
Abnormal: Sperm must be able to move forward (or "swim") through cervical mucus to reach an egg. A high percentage of sperm that cannot swim properly may impair a man's ability to father a child.

Semen pH

Abnormal: An abnormally high or low semen pH can kill sperm or affect their ability to move or to penetrate an egg.

White blood cells

Abnormal: Bacteria or a large number of white blood cells are present, which may indicate an infection.



Germ cell development in the postnatal testis

Spermatogenesis is a complex process involving interaction of multiple cells with several hormones and growth factor over a relatively long period of time which could be studied only invivo. Spermatogenesis occur in all seminiferous tubeles during active sexual life, beginning at an average age of (13) years, as a result of stimulation by adenohypophysical gonadotropin hormones and continous throughout the reminder of life. There are different types of cells responsible for spermatogenesis coud be seen in seminiferous tubules which are include from the basement membrane of seminiferous tubules to the lumen:

The Spermatogenesis is a continous process with the spermatozoa stored within the epididymis and vas deferens until they are joined with seminal fluid at the moment of ejaculation. During this storage time the Spermatozoa undergo maturation and later deterioration.

These periods of processes in human attain to 74 ± 4 days.

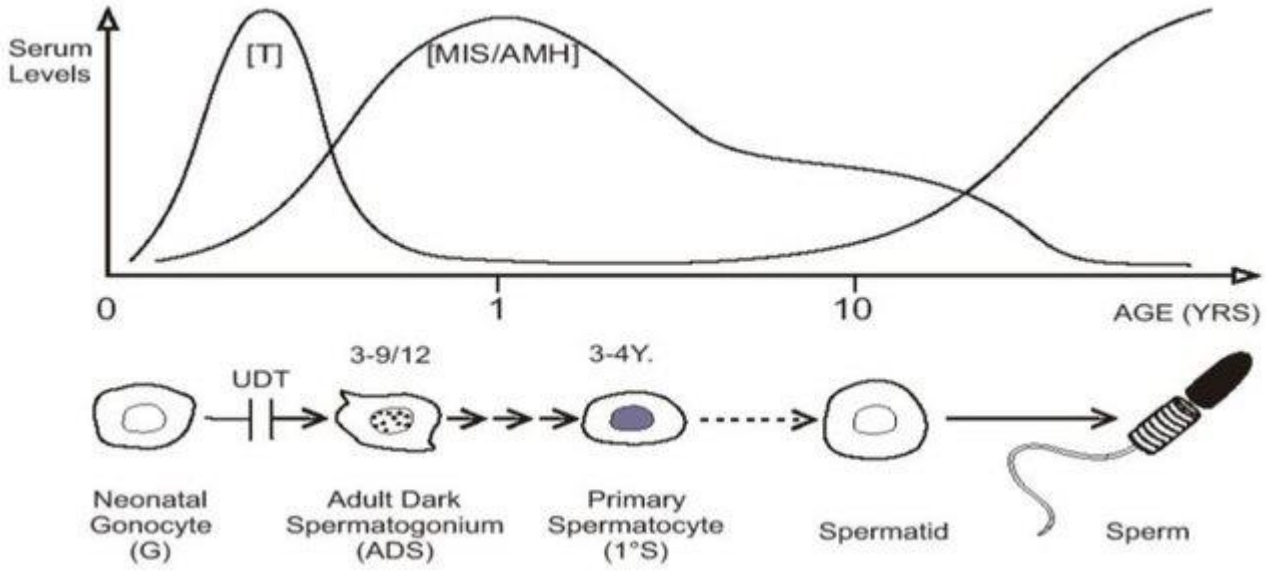


Figure formation spermatoza

Signs and Symptoms of Common sexually transmitted disease (STD)
STDs in Men

1-Chlamydia: *Chlamydia trachomatis* is an obligate intracellular, Gram-negative bacterium, Common symptoms of chlamydia in men include:

- pain when urinating
- penile discharge
- swollen testicles

Less common symptoms can occur when chlamydia has infected your rectum. These symptoms can include:

- rectal pain
- discharge
- bleeding

2-Gonorrhea: small Gram Negative Diplococci, Gonorrhea is a bacterial infection that can affect the anus, throat, or urethra. It's transmitted during anal, oral, or vaginal sex with a man or woman who has been infected. Most men with gonorrhea don't display any symptoms at all. For those who do, common symptoms include:

- pain when urinating

- a green, white, or yellow discharge from the penis

Less common symptoms can include:

- swollen or painful testicles
- painful joints
- rash

3-Herpes: is a viral infection that is caused by the herpes simplex virus (HSV). Herpes may affect the mouth (oral herpes or HSV type 1) or the genitals (genital herpes or HSV type 2). The virus is transmitted through direct contact with the mouth or genitals of a person who has been infected with the virus through sexual intercourse or oral sex and kissing. While types of HSV prefer certain locations, either type can be found in either location.

The symptoms of herpes can be difficult to spot. Many people won't have any symptoms at all. Those who do will develop blisters that are often mistaken for other skin conditions like pimples. Symptoms often occur between two days and two weeks after infection. The initial outbreak can be severe.

Common symptoms of herpes in men are:

- tingling, itching, or burning of the skin in the area where the blisters will appear.
- blisters on the penis or testicles, or on and around the anus, buttocks, or thighs.
- blisters on the lips, tongue, gums, and other parts of the body aching muscles in the lower back, buttocks, thighs, or knees swollen and sometimes tender lymph nodes in the groin.
- loss of appetite.
- Fever.
- feeling unwell.

4-Syphilis: Syphilis is a sexually transmitted disease (STD) caused by the bacterium *Treponema pallidum*. Syphilis can cause serious health sequelae if not adequately treated.

Common symptoms of syphilis: Syphilis has four different phases: primary, secondary, latent, and tertiary. Each phase has its own set of symptoms. The symptoms of **primary syphilis** in men may include:

- a very small, firm, and painless sore where the bacteria entered the body, usually on the penis, anus, or lips
- swollen lymph nodes in the area near the sore

Symptoms of secondary syphilis may include:

- a skin rash that doesn't itch, commonly found on the palms of the hands or soles of the feet
- tiredness
- sore throat
- headache
- swollen lymph nodes

Tertiary syphilis is the fourth stage. It's rare, as few people actually enter the fourth stage even when the syphilis is left untreated. It can cause serious complications, including:

- damage to the heart
- damage to the nervous system, including the brain
- joint damage
- damage to other parts of the body

What is a prostate infection?

A prostate infection (prostatitis) occurs when your prostate and the surrounding area become inflamed. The prostate is about the size of a walnut. It's located between the bladder and the base of the penis. The tube that moves urine from the bladder to the penis (urethra) runs through the center of your prostate. The urethra also moves semen from the sex glands to the penis.

Types of prostatitis

There are four types of prostatitis:

- Acute bacterial prostatitis: This type is the least common and lasts a short time. It can also be life-threatening if left untreated. This is the easiest type of prostatitis to diagnose.
- Chronic bacterial prostatitis: Symptoms are less intense and develop over several years. It's more likely to affect young and middle-aged men and cause recurring urinary tract infections(UTIs).

- Chronic prostatitis, or **chronic pelvic pain syndrome**: This condition causes pain and discomfort around the groin and pelvic area. It can affect men of all ages.
- **prostatic hyperplasia** or enlarment: this case is base hormonal changes

There are many different hormones and hormone families in the body. Most are controlled by signals from the pituitary gland that tell various organs what to do and when to do it. This article discusses only those hormones that are considered to be in the "Sex Steroid Hormone Family."

The family consists of the key hormones **progesterone**, **Dehydroepiandrosterone (DHEA)**, **androstenedione**, **testosterone**, **dihydrotestosterone (DHT)** and the **estrogens**, **estriol**, **estrone** and **estradiol**. The family is generally the same in both men and women and controls reproductive and sexual organs as well as their characteristics. These hormones are present in differing levels in both males and females but they carry similar messages for both sexes. For example, the male hormone testosterone has a lot to do with sexual desire (libido) higher testosterone levels usually result in increased libido in both sexes.

Certain enzymes in the body, notably 5-alpha-reductase and **aromatase** convert testosterone to dihydrotestosterone (DHT) and/or estradiol, and an excess of either of these hormones can cause detrimental effects.

Excess estradiol or DHT in a man can cause undesired breast or prostate growth (BPH). In a woman, excess estradiol can increase the risk of breast or uterine cancer and excess DHT can cause a condition known as "Androgenetic Alopecia" or hair loss similar to male pattern baldness.

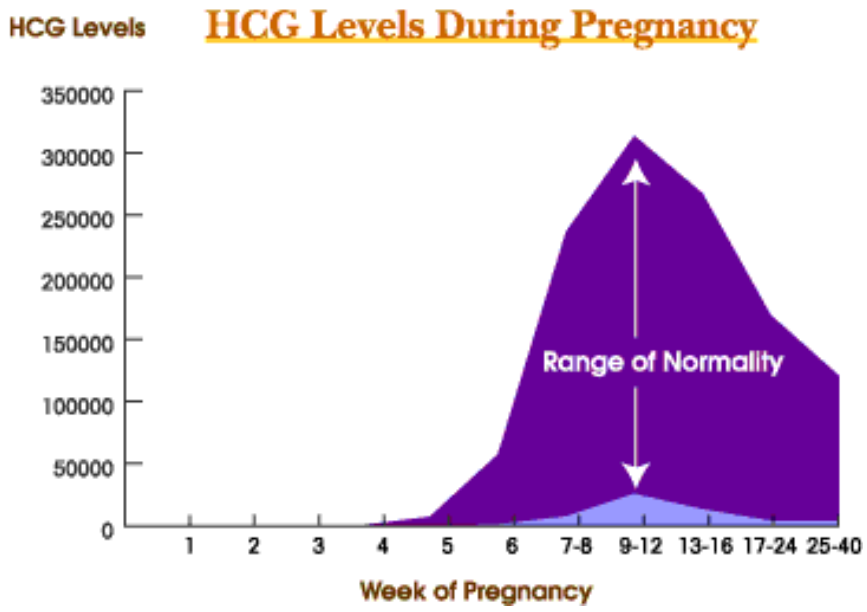
The best remedy for hormonal balance is DIM (diindolylmethane) is a dynamic DIM component that may support the body's estrogen balance. DIM component may provide support for women for menopause, PCOS, acne, weight loss, and skincare. DIM supplements may also provide support for men as an aromatase inhibitor and estrogen blocker.

Pregnancy test

Serological test is done frequently in the laboratory to detect pregnancy in early stage. Laboratory test for pregnancy are based on the fact that during pregnancy the placenta produce a hormone called human chorionic gonadotropin (HCG). The hormone rapidly disappears after delivery. The (HCG) is also produced in other condition as in choriocarcinomia and malignant teratomas of the ovaries and testes. In pregnancy, (HCG) is produced by the langarhans cells of the developing placenta. In is a glycoprotein with a molecular weight of about 30.000 kD.

At about 8 th week of gestation, peak production of (HCG) becomes high, and then it presents in the plasma at a concentration of about 25.000 international unit (I.N)/liter. After the 8 th week of gestation (HCG) production sharply decline until by the twelfth week. The plasma level is about 7000 I.U. this level of (HCG) maintained for the remainder period of pregnancy, until delivery, after which they disappear within 72hr.

The presence of (HCG) is usually measured in the urine because a urine sample is so easy to attain laboratory test for pregnancy are generally used to detect (HCG) in earlier days after the last missed menstrual period and are used through the first trimester or to about the 12th week of pregnancy. After the first trimester the level of (HCG) may be undeletable by routine laboratory methods.



Most of the available commercial tests are slide tests and are based on the inhibition of latex particle agglutination. The accuracy of the commercials immunologic pregnancy tests depends on several factors:

1- The manufacturers direction must be followed.
2- Collected a delivered specimen in the lab.
3- Storage of antigens
4- In the pregnancy normal or abnormal.
5- Presence of interfering substance in the urine including drugs, protein and RBC.
6-The sensitivity and specificity of the assay, procedure and the use quality control programs in the latex particle agglutination.

The HCG in the patient urine specimen is treated with anti (HCG) during the first stage of the procedure anti (HCG) is manufactured by injecting purified HCG in to animals (rabbits), the animals produce the specific antibody to HCG in its serum.

Since detergents may interfere with results, the specimen should be collected in a disposable urine container if possible. If these are not use container a clean rinsed that might not interfere with the test.

- **Method of making the pregnancy test**

Urine (HCG-Ag) + Latex coated with Ab (Anti-HCG)

Not Agglutination (-Ve) Agglutination (+Ve)

- **important commandments in place to ensure the success of analysis of pregnancy**

- For all HCG test an early morning urine sample is best.
- HCG is lost during storage, so the test should be donning as soon as possible.
- The urine should be fresh and clear with specific gravity 1.010.
- The presence of haematuria or proteinuria may cause falsely positive result.

- Phenothiazine and promethazine drugs may also cause falsely positive result.

The stage of pregnancy has a marked influence on the best result, especially on the incidence of falsely negative, between the 7 th or 8 th and 12 th of gestation even a relatively insensitive assay will be almost 100% positive if the assays are made before the 6 th week of gestation, even the most sensitive assay may show an appreciable number of false negative. Sine the levels of HCG fall after the first trimester, falsely negative result may occur in obviously pregnant individuals.