ABNORMAL SEMEN pH

A semen pH value outside of the normal range which is harmful to sperm and can cause infertility.

.mods:Diagnosis, Male & Female

Related Diagnoses:
- Azoospermia
- Benign prostatic hyperplasia
- Hypospermia
- Obstructive azoospermia

About Abnormal semen pH

An abnormal semen pH indicates the other than normal pH of human semen that has a range of 7.2-8.0, which is higher than the neutral pH. Pure water is neutral, at pH 7, being neither an acid nor a base. Solutions with a pH less than 7 are acidic and solutions with a pH greater than 7 are basic.

The balance between the alkaline secretion of the seminal vesicles and the acidic prostatic secretion determines the semen pH. The importance of assessing the semen pH and its physiological reference range has been a matter of intense debate. Acidic ejaculate (lower pH value) may indicate one or both of the seminal vesicles are blocked. A basic ejaculate (higher pH value) may indicate an infection. Semen pH tends to increase with time after ejaculation. A pH value outside of the normal range is harmful to sperm and affect their ability to penetrate the egg.

Abnormalities in semen pH may be due to factors:
- Clinical – prostatitis (inflammation of prostate; both chronic or acute), low semen volume
- Procedural – longer semen incubation

Although semen pH is significantly increased in patients with infection of the male reproductive tract, its sensitivity and specificity to detect infection are low. The measuring of semen pH is the part of common semen analysis, together with sperm count, motility, morphology, volume, and fructose level. The pH is determined using pH meter or pH paper indicator strips.

The treatment may be done by urologist or assisted reproductive techniques (ART).

Associated diseases
- Azoospermia (no sperm in semen)
- Retrograde ejaculation (entry of semen into the bladder instead of going out through the urethra during ejaculation)
- Chronic prostatitis (low pH)
- Acute prostatitis (high pH)

Complications

Azoospermic ejaculates with a normal volume and alkaline pH indicate functional seminal vesicles and patent ejaculatory ducts. Therefore, in cases of azoospermia, attention to the details of semen volume and pH may be quite helpful in establishing the diagnosis.

An abnormally high pH i.e. greater than 8.5 may indicate an infection or dysfunction of one of the accessory glands. A very low pH indicates acidic prostate fluid ejaculate.
Risk factors

- prostatitis
- long semen incubation
- toxic exposure
- unbalanced diet (poor in fruits, vegetables and healthy proteins)

Impact on fertility

Semen pH has little direct significance to sperm fertility potential. It is essential for protect of sperm from the environment in vagina. Also, the chemical environment of semen can have a profound effect on sperm quality, such as motility. Since pH affects the metabolic rate and the motility of sperm, it consequently alters the vitality of sperm.

In vitro, external pH is an important factor in the regulation of sperm physiology. An acid pH contributes to maintain a non-capacitated state preventing premature acrosomal reaction that event of the utmost importance for the development of mammalian fertilisation.

Prevention

Patients should eat a balanced diet, avoid toxins and take supplements (fertility blend supplements) to stabilize the semen pH.

Symptoms

An abnormally low pH i.e. less than 7.0 may indicate retrograde ejaculation when combined with a very low ejaculate volume. A pH of below 7.0, normal volume and azoospermia may indicate an obstruction of the ejaculatory ducts or congenital bilateral absence of the vas.

Therapies

Self therapy

Diet and take supplements rich in nutrients specific for sperm and male reproductive health (such as zinc, selenium and anotthers) have a big impact on sperm health and male fertility.

Conventional medicine

Abnormal semen pH could be treated by several ways. Anti-inflammatory, fibrinolytic, and antioxidant compounds, oligo elements, and vitamin supplementation may be prescribed. Infection, inflammation, and/or increased oxidative stress (imbalance between production and accumulation of oxygen reactive species (ROS)) often require a specific treatment with antibiotics, anti-inflammatory drugs, and/or antioxidants. Combined therapies can contribute to improve sperm quality. Surgical kind of treatment could be used if the abnormal semen pH is due to ejaculatory duct obstruction.

Pharmacotherapy

Nonsteroidal anti-inflammatory drugs

Nonsteroidal anti-inflammatory drugs (NSAIDs) are a drug class that groups together drugs that reduce pain, decrease fever, and, in higher doses, and decrease inflammation. They are usually used for the
treatment of acute or chronic conditions where pain and inflammation are present, such as prostatitis.

**Antibiotics**

Antibiotics are drugs used in the treatment and prevention of bacterial infections. They may either kill or inhibit the growth of bacteria. Thus, antibiotics can treat infections in the reproductive tract.

**Surgical therapy**

In the case of ejaculatory ducts obstruction, a surgical investigation such as transurethral resection could be recommended. This operative procedure is relatively invasive, has some severe complications, and has led to natural pregnancies of their partners in approximately 20% of affected men. A disadvantage is the destruction of the valves at the openings of the ejaculatory ducts into the urethra such that urine may flow backwards into the seminal vesicles. Another, experimental approach is the recanalization of the ejaculatory ducts by transrectal or transurethral inserted balloon catheter. Though much less invasive and preserving the anatomy of the ejaculatory ducts, this procedure is probably not completely free of complications either and success rates are unknown. There is a clinical study currently ongoing to examine the success rate of recanalization of the ejaculatory ducts by means of balloon dilation.

**Assisted reproduction**

If infertility persists after the treatment, assisted reproductive technologies (ART) give an option. Assisted reproductive technology is the technology used to achieve pregnancy in procedures such as fertility medication, artificial insemination, in vitro fertilization and surrogacy. It is reproductive technology used primarily for infertility treatments, and is also known as fertility treatment.

It mainly belongs to the field of reproductive endocrinology and infertility, and may also include intracytoplasmic sperm injection (ICSI). Intracytoplasmic sperm injection is beneficial in the case of male factor infertility where sperm counts are very low or failed fertilization occurred with previous IVF attempt(s). The ICSI procedure involves a single sperm carefully injected into the center of an egg using a microneedle. With ICSI, only one sperm per egg is needed. Without ICSI, you need between 50,000 and 100,000.

Two techniques that enable to some extent the selection of physiologically normal spermatozoa have recently been developed. One of these is termed intracytoplasmic morphology-selected sperm injection (IMSI). Here, spermatozoa are selected for ICSI and analysed digitally prior to the microinjection procedure in order to deselect morphologically abnormal spermatozoa. With this technique, abnormalities not visible in standard ICSI procedures have been observed. IMSI increases the pregnancy rate during ICSI cycles, and some data suggests that the level of pregnancy termination is also decreased. A second technique recently introduced to assisted reproduction is that of sperm selection with hyaluronic acid (HA), e.g., PICSI. In this technique, mature sperm with HA receptors are distinguished from immature sperm since these do not express such receptors.

Men who ejaculate no sperm, because of blocked tubes in their testes, or because of a genetic condition that prevents their sperm being released, require some form of surgical sperm retrieval to enable ICSI to take place. Epididymal sperm obtained by microsurgical aspiration (MESA) or percutaneous sperm aspiration (PESA) and testicular sperm obtained by surgical excision (TESE) or percutaneous aspiration (TESA) are used in ICSI treatment. Alternatively, the retrieved sperm can be cryopreserved for use in future sperm injection attempts. If all efforts to extract vital sperm cells fails, then donated ones may be recommended.

**Find more about related issues**

Diagnoses
Azoospermia
Complete absence of sperm in the ejaculate of a man. Learn more at: www.fertilitypedia.org/therapy/diag/azoospermia

Benign prostatic hyperplasia
A noncancerous increase in size of the prostate. Learn more at: www.fertilitypedia.org/therapy/diag/benign-prostatic-hyperplasia

Hyposperma
A condition in which a man has an unusually low ejaculate (or semen) volume. Learn more at: www.fertilitypedia.org/therapy/diag/hypospermia

Obstructive azoospermia
Absence of sperm in the ejaculate despite normal spermatogenesis, caused by an obstruction of the genital tract. Learn more at: www.fertilitypedia.org/therapy/diag/obstructive-azoospermia

Therapies

Egg donation
Process by which a woman donates eggs for purposes of assisted reproduction or biomedical research. Learn more at: www.fertilitypedia.org/edu/therapies/egg-donation

ICSI
A micromanipulative fertilization technique in which a single sperm is injected directly into an egg. Learn more at: www.fertilitypedia.org/edu/therapies/icsi

Sperm donation
The procedure in which a man (sperm donor) provides his sperm for fertility treatment. Learn more at: www.fertilitypedia.org/edu/therapies/sperm-donation

Standard IVF
A process in which an egg is fertilized by sperm outside the body: in vitro. Own or donated gametes may be used. Learn more at: www.fertilitypedia.org/edu/therapies/standard-ivf

Sources


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"Semen analysis" [https://en.wikipedia.org/wiki/Semen_analysis] —sourced from Wikipedia licensed under CC BY-3.0

"The importance of semen analysis in the context of azoospermia" [http://www.scielo.br/pdf/cclin/v6s1/a05v6s1.pdf] —by Aziz licensed under CC BY-NC 3.0


"The Semen pH Affects Sperm Motility and Capacitation" [https://www.openaire.eu/search/publication?articleId=dedup_wf_001:4afe2a9eae8b2790864f642cb4126977f] —by Zhou et al. licensed under CC BY-4.0

"Human Physiology/The male reproductive system" [https://en.wikibooks.org/wiki/Human_Phyiology/The_male_reproductive_system] —sourced from Wikibooks licensed under CC BY-SA 3.0


"Conservative Nonhormonal Options for the Treatment of Male Infertility: Antibiotics, Anti-inflammatory Drugs, and Antioxidants" [https://www.hindawi.com/journals/bmri/2017/4650182/] —by Calogero et al. licensed under CC BY-4.0

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The Semen pH Affects Sperm Motility and Capacitation [http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0132974#sec016]"

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