Semen analysis: how to read results and common abnormalities

What a semen analysis is, and what it is not

A semen analysis is a laboratory test that evaluates the ejaculate. It typically measures semen volume, sperm concentration, total sperm number, motility, morphology, pH, liquefaction, viscosity, and sometimes the presence of round cells, white blood cells, agglutination, or antisperm antibody-related findings. It is commonly used during evaluation for infertility, after vasectomy to confirm clearance of sperm, and in some cases before fertility preservation or assisted reproduction.

For couples trying to conceive, the test is best understood as one part of a broader fertility assessment. Conception depends on multiple interacting factors: ovulation, ovarian reserve, tubal patency, uterine and cervical factors, timing of intercourse, sperm production and delivery, and the chance events of fertilization and implantation. A semen report that is within reference limits does not guarantee pregnancy, and an abnormal result does not necessarily mean pregnancy is impossible.

Laboratories may use slightly different reporting formats or reference intervals. Many commonly cited lower reference limits are based on populations of men whose partners conceived within a defined time frame. They are

statistical thresholds, not hard biological cutoffs. This is why clinicians look for patterns across the whole report rather than reacting to one isolated value.

Before reading the numbers: collection quality matters

Many semen analysis errors begin before the sample reaches the microscope. The usual recommendation is a period of sexual abstinence before collection, often in the range of 2 to 7 days, because too short or too long an interval may affect volume, concentration, and motility. The sample is typically collected by masturbation into a sterile, non-toxic container supplied or approved by the laboratory. Lubricants, saliva, condoms not designed for collection, and incomplete capture of the first portion of the ejaculate can alter results.

Transport also matters. Sperm motility is time- and temperature-sensitive. Laboratories usually ask that the sample be delivered within a specified time, often around one hour, and kept near body temperature rather than exposed to heat or cold. If the report notes delayed delivery, partial sample loss, or collection difficulty, the interpretation should be cautious.

Recent fever, acute illness, heat exposure, testosterone or anabolic steroid use, some medications, heavy alcohol or cannabis use, smoking, occupational exposures, and varicocele can affect sperm parameters. Because sperm development is continuous over approximately several weeks to months, a temporary insult may be reflected in one test and improve later. For this reason, an abnormal result is often repeated, commonly after several weeks, according to the clinician’s judgment.

How to read the main parameters

Volume: Semen volume reflects contributions from the seminal vesicles, prostate, and other accessory glands, as well as collection completeness. A commonly used lower reference point is around 1.5 mL. Low volume can occur from incomplete collection, short abstinence, retrograde ejaculation, ejaculatory duct obstruction, androgen deficiency, or congenital absence of parts of the reproductive tract. High volume is less often clinically significant but may dilute sperm concentration.

pH: Semen is usually slightly alkaline. A low pH, especially when combined with low volume and absent or very low sperm counts, may raise concern for obstruction or seminal vesicle contribution problems. An unusually high pH can sometimes be seen with inflammation or infection, but pH alone is not diagnostic.

Liquefaction and viscosity: Fresh semen normally coagulates and then liquefies, often within about 20 to 60 minutes. Delayed liquefaction or high viscosity can interfere with accurate measurement and may impair sperm movement in the sample. These findings can be associated with accessory gland dysfunction or inflammation, but they require interpretation with the rest of the report.

Sperm concentration and total sperm number: Concentration is the number of sperm per milliliter; total sperm number is concentration multiplied by semen volume. A frequently cited lower reference limit for concentration is around 15 million sperm/mL, while total sperm number is often considered alongside this. A low concentration is called oligozoospermia; no sperm seen in the ejaculate is azoospermia. Total count can be clinically more informative than concentration alone because a small volume and a large volume can change the total number of sperm available.

Motility: Motility describes sperm movement. Reports may separate progressive motility, meaning sperm moving forward effectively, from non-progressive movement and immotile sperm. Total motility combines progressive and non-progressive movement. Progressive motility is particularly relevant because sperm must move through cervical mucus and the reproductive tract to reach the egg. Low motility is called asthenozoospermia.

Morphology: Morphology is the percentage of sperm with normal size and shape under strict microscopic criteria. Strict morphology thresholds can look surprisingly low to patients because even fertile men often have many sperm labeled abnormal. A commonly cited lower reference point is around 4% normal forms by strict criteria. Low morphology is called teratozoospermia, but morphology alone has limitations and should be interpreted with concentration, motility, and the couple’s full fertility picture.

Common abnormalities and what they may mean

Oligozoospermia, or low sperm concentration: This may be mild, moderate, or severe depending on the value. Possible contributors include varicocele, hormonal disorders, genetic factors, prior testicular injury, heat exposure, medications, anabolic steroids or exogenous testosterone, systemic illness, and lifestyle factors. In some cases, no single cause is found. Severe oligozoospermia may prompt hormonal testing, genetic testing, or specialist evaluation.

Azoospermia, or no sperm in the ejaculate: Azoospermia requires careful confirmation, often including centrifugation of the semen sample and repeat testing. Broadly, it may be obstructive, where sperm production occurs but sperm cannot enter the ejaculate, or non-obstructive, where sperm production is very low or absent. This distinction cannot be made from one semen analysis alone and typically needs examination, hormone testing, and sometimes imaging or genetic evaluation.

Asthenozoospermia, or low motility: Reduced motility can reflect prolonged transport time, temperature exposure, infection or inflammation, varicocele, oxidative stress, antisperm antibodies, or intrinsic sperm tail problems. If nearly all sperm are immotile, the lab and clinician may consider whether the sperm are alive but immotile or nonviable, which may require additional testing.

Teratozoospermia, or low normal morphology: Abnormal head, midpiece, or tail forms may reduce the efficiency of natural conception, especially when combined with low count or motility. However, isolated low morphology is often the most anxiety-provoking and least straightforward parameter. Clinical decisions usually depend on the full semen profile, duration of infertility, partner factors, and whether assisted reproductive techniques are being considered.

Leukocytospermia, or increased white blood cells: White blood cells in semen may suggest inflammation or infection and can be associated with oxidative stress. However, round cells can include immature germ cells as well as leukocytes, so confirmatory staining may be needed. Treatment decisions should not be based only on a vague report comment; symptoms, cultures, examination, and clinician assessment matter.

Patterns clinicians look for across the whole report

A semen analysis becomes more useful when parameters are interpreted together. For example, low volume plus acidic pH and absent sperm may suggest a different differential diagnosis than normal volume with azoospermia. Low concentration with low motility and low morphology, sometimes called oligoasthenoteratozoospermia, points to a more global impairment of sperm production or function. Normal concentration but very low progressive motility raises different questions than low concentration with preserved motility.

Another useful concept is total motile sperm count, often calculated from semen volume, concentration, and motility. This number can help clinicians discuss the relative likelihood of success with timed intercourse, intrauterine insemination, or in vitro fertilization approaches, although exact thresholds vary by clinic and clinical situation. Patients should avoid using online calculators as a substitute for individualized medical advice.

Trends are also important. One abnormal result after influenza, high fever, a sauna-heavy vacation, or a collection problem may not reflect baseline sperm production. Conversely, repeated severe abnormalities deserve a timely evaluation, particularly if there are symptoms such as testicular pain, small testes, erectile or ejaculatory problems, prior undescended testis, history of chemotherapy, or known genetic conditions.

Why repeat testing is often recommended

Semen parameters vary naturally from sample to sample. Variation can occur because of abstinence interval, collection completeness, laboratory methods, illness, sleep, stress, medications, and environmental exposures. A single borderline or abnormal result is therefore not always enough to characterize reproductive potential.

Many clinicians repeat a semen analysis if the first result is abnormal, especially when the finding could change management. The timing of repeat testing depends on the severity of abnormality and clinical context. A repeat test may be done sooner if there is concern about collection error, or later if the clinician wants to allow time for sperm production to recover after illness or exposure.

If repeat abnormalities persist, the next step may include medical history,

physical examination, reproductive hormone testing such as FSH, LH, testosterone, and prolactin in selected cases, scrotal examination for varicocele, genetic tests for severe sperm count abnormalities, urinalysis after ejaculation for suspected retrograde ejaculation, or referral to a reproductive urologist. The goal is not only to improve chances of conception where possible but also to identify general health issues that may present through reproductive findings.

Emotional context: abnormal results are not a verdict

For many people, semen analysis results can feel personal, even though they are medical data. Words such as abnormal, poor morphology, or low count may trigger shame, guilt, or fear. These reactions are common, but they are not evidence of blame. Male-factor findings are frequent in infertility evaluations, and many couples have more than one contributing factor.

It can help to review the report with a clinician rather than trying to interpret every flag alone. Ask what the abnormality means, whether the sample quality was adequate, whether the test should be repeated, what reversible factors should be considered, and whether partner evaluation should proceed in parallel. Fertility care is most effective when it treats the couple or reproductive partnership as a whole rather than placing the entire emotional burden on one test result.