## Testicular disorders and fertility impact

### Why testicular function matters for fertility

The testes perform two fertility-critical tasks: spermatogenesis and androgen production. Spermatogenesis occurs inside the seminiferous tubules, where developing sperm cells mature under the influence of follicle-stimulating hormone, luteinizing hormone, intratesticular testosterone, Sertoli cells, and Leydig cell function. This process takes roughly several weeks from early germ cell development to ejaculated sperm, which is why semen quality can change over time after illness, injury, or treatment.

Testosterone also supports libido, erectile function, ejaculation, muscle and bone health, and the internal environment required for sperm production. Low testosterone symptoms do not automatically mean infertility, and a normal testosterone level does not guarantee normal sperm production. In some cases, external testosterone therapy can suppress the hormonal signals needed for sperm production, so men trying to conceive should discuss hormone treatment choices with a reproductive urologist or endocrinologist.

Fertility can also be affected by testicular temperature, blood flow, prior developmental problems such as undescended testes, infection, obstruction, genetic factors, and systemic illness. Because several mechanisms may overlap,

a complete evaluation is often more useful than focusing on a single semen parameter.

## How testicular disorders can change semen parameters

Clinicians often describe male fertility using semen analysis terms. Oligospermia means a low sperm count. Azoospermia means no sperm are seen in the ejaculate. Asthenozoospermia refers to reduced sperm motility, and teratozoospermia refers to abnormal sperm morphology. These findings are not diagnoses by themselves; they are clues that guide further testing.

Testicular disorders can affect semen quality through several pathways:

Impaired sperm production: Damage to seminiferous tubules from cancer, chemotherapy, radiation, torsion, trauma, severe infection, or genetic conditions may reduce sperm output.
Hormonal disruption: Low or dysregulated testosterone, abnormal pituitary signaling, or high gonadotropins can suggest primary testicular failure or central endocrine causes.
Inflammation and oxidative stress: Infections, orchitis, or inflammatory states may affect sperm motility and DNA integrity.
Obstruction: Sperm production may be normal, but sperm cannot reach the ejaculate because of blockage in the epididymis, vas deferens, or ejaculatory ducts.
Heat and vascular effects: Conditions such as varicocele can alter scrotal temperature and are associated with poorer sperm quality in some men.

A single abnormal semen analysis should usually be repeated because sperm counts vary. Fever, recent illness, medications, cannabis or anabolic steroid use, occupational heat exposure, and collection factors can all influence results.

## Common testicular conditions linked with fertility concerns

Several testicular disorders may be relevant when a couple is trying to conceive. The impact varies widely; some men remain fertile, while others need medical or assisted reproductive support.

Varicocele: Enlarged scrotal veins are common and may be associated with reduced sperm count, motility, or morphology. Not every varicocele needs treatment, but evaluation is reasonable when semen parameters are abnormal or infertility is present.
Undescended testis history: Cryptorchidism, especially when bilateral or corrected later in childhood, can increase the risk of impaired sperm production and testicular cancer. Men with this history may benefit from earlier fertility assessment.
Testicular torsion: Torsion is an emergency in which the spermatic cord twists and compromises blood flow. Even after treatment, fertility impact depends on duration of ischemia, whether one or both testes are affected, and testicular recovery.
Trauma: Blunt or penetrating injury can damage testicular tissue, blood supply, or ducts. Prompt assessment is important for pain, swelling, bruising, or suspected rupture.
Orchitis and epididymo-orchitis: Viral or bacterial inflammation can impair sperm production or lead to scarring. Sexually transmitted infections and urinary pathogens require appropriate medical evaluation and partner considerations.
Testicular atrophy: Reduced testicular size may reflect prior injury, hormonal suppression, varicocele, genetic conditions, infection, or anabolic steroid exposure.

Because testicular disorders may coexist with erectile or ejaculation problems, endocrine disorders, or partner-related fertility factors, both partners often benefit from parallel evaluation.

**Testicular cancer, treatment, and fertility preservation**

Testicular cancer often occurs in younger men, including those who have not yet started or completed their families. Fertility may be affected by the cancer itself even before treatment. Some men have reduced sperm counts at diagnosis, possibly related to underlying testicular dysfunction, tumor-related effects, or shared risk factors such as prior undescended testis.

Treatment effects depend on the clinical situation. Removal of one testis, called unilateral orchidectomy or orchiectomy, often leaves the remaining testis able to produce sperm and testosterone. However, fertility may still be

reduced if the remaining testis has impaired function. When both testes are removed, sperm production is no longer possible and testosterone replacement is required for hormonal function, though previously banked sperm may allow future use with assisted reproduction.

Chemotherapy and radiotherapy can reduce or stop sperm production. In many patients, fertility improves with time after treatment, but recovery is not guaranteed and may depend on treatment type, dose, baseline sperm quality, and individual susceptibility. Retroperitoneal lymph node dissection can sometimes affect ejaculation if nerves are damaged, leading to reduced or absent semen emission despite sperm production.

For these reasons, sperm banking before treatment is strongly recommended whenever feasible. This usually involves producing one or more semen samples for cryopreservation. Even men with low sperm counts may still be able to bank usable sperm, and stored samples may later be used with intrauterine insemination, in vitro fertilization, or intracytoplasmic sperm injection depending on sperm quantity and quality. If urgent cancer treatment is needed, the oncology team can help coordinate rapid fertility counseling.

**Evaluation: what clinicians may check**

A fertility evaluation usually begins with history, physical examination, and semen analysis. The clinician may ask about time trying to conceive, prior pregnancies, testicular pain or swelling, childhood surgery, mumps orchitis, cancer treatment, medications, anabolic steroids, testosterone use, heat exposure, infections, and sexual function. Physical examination may assess testicular size and consistency, varicocele, vas deferens presence, epididymal abnormalities, and secondary sexual characteristics.

Common tests may include:

Semen analysis: Measures volume, sperm concentration, total sperm number, motility, morphology, and sometimes white blood cells or other markers.
Hormone testing: Follicle-stimulating hormone, luteinizing hormone, total testosterone, prolactin, estradiol, and thyroid-related testing may be considered based on findings.
Scrotal ultrasound: Used when a mass, asymmetry, persistent pain, varicocele,

or structural abnormality is suspected.
Genetic testing: May be recommended for severe oligospermia or azoospermia, including karyotype or Y-chromosome microdeletion testing in selected cases.
Post-ejaculatory urine or specialized testing: May be used when retrograde ejaculation or ejaculatory dysfunction is suspected.

Results are best interpreted in context. For example, high follicle-stimulating hormone with small testes may suggest impaired sperm production, while normal testicular size with azoospermia could raise the possibility of obstruction. Treatment options vary and may include addressing reversible exposures, treating infection, repairing selected varicoceles, hormonal management in appropriate cases, sperm retrieval procedures, or assisted reproductive technologies.

**Emotional impact and planning for pregnancy**

Learning that a testicular condition may affect fertility can bring fear, grief, shame, or urgency. These reactions are understandable. Male factor infertility is common, and it is not a measure of masculinity, sexual adequacy, or personal worth. Many people need time to process medical information, especially when fertility decisions must be made before cancer therapy or surgery.

Practical planning can reduce uncertainty. Ask the treating clinician whether the condition or proposed treatment could affect sperm production, testosterone levels, ejaculation, or future use of assisted reproduction. If treatment is time-sensitive, ask whether same-day or rapid referral to a fertility preservation service is possible. Couples may also benefit from counseling, support groups, or a reproductive specialist who can explain realistic pathways to pregnancy.

When pregnancy is the goal, it is also helpful to evaluate the partner’s reproductive health at the same time. Fertility is shared, and combined factors are common. A coordinated approach can prevent delays and help identify the most appropriate next step.

**Protecting fertility when risk is known**

Not every testicular disorder can be prevented, but some fertility-protective steps are reasonable. Seek prompt care for acute scrotal pain, avoid non-prescribed anabolic steroids, discuss fertility goals before starting testosterone or chemotherapy, use safer-sex practices to reduce infection risk, and attend follow-up after testicular cancer or childhood cryptorchidism. Men with a known testicular mass, persistent swelling, or unexplained testicular change should not delay medical assessment.

Sperm banking is particularly important before chemotherapy, radiotherapy, bilateral testicular surgery, or procedures that may impair ejaculation. It may also be worth discussing before gender-affirming hormone therapy, vasectomy, or other treatments that could affect fertility, depending on individual goals. Fertility preservation is not a guarantee of future pregnancy, but it can preserve options at a moment when options may otherwise narrow quickly.