

Associated Urologists of North Carolina

Hypogonadism

Hypogonadism is a condition that is characterized by low ('*hypo*') blood levels of a male hormone called testosterone that is manufactured in the testicles ('*gonads*').

Normal testosterone production:

Special cells in the testicles, called *leydig* cells, manufacture testosterone from cholesterol. The blood level of testosterone is continually changing according to body's needs. Special organs in the brain, called the hypothalamus and pituitary, carefully monitor the testosterone level in the blood. When more testosterone is needed, the hypothalamus dispatches a chemical messenger in the blood stream that causes the pituitary to release another substance called leutinizing hormone (LH). LH travels in the blood stream to the testicles and stimulates special receptors on the *leydig* cells to produce more testosterone. The pituitary stops releasing LH when the target testosterone level is met and then LH stimulation resumes again when the testosterone level falls. Testosterone levels are highest in the early morning and lowest later in the day. Most of the male hormone is bound to a protein called sex hormone binding globulin (SHBG). A small percentage of male hormone is 'free' or unbound to SHBG. Free testosterone is the active form of male hormone.

Normal effects of testosterone:

Normal reproductive and sexual function depends upon a normal testosterone level. In addition, sufficient testosterone is required for normal bone growth, glucose and lipid regulation, blood cell production, muscle mass, and mental function.

Abnormal testosterone production:

Abnormal testosterone production occurs when there is an abnormality of the hypothalamic-pituitary-testicular function. Blood tests can usually differentiate where the problem lies.

Testosterone production gradually decreases with each decade beyond age 40. Approximately 10% of men between the ages of 40-49, 12% between ages 50-59, 15% between ages 60-69, and 25% between ages 70-79 have low total testosterone levels. *Free* testosterone levels fall more quickly as men age. Approximately 8% of men between the ages of 40-49, 30% between ages 50-59, 45% between ages 60-69, and 70% between ages 70-79 have low *free* testosterone levels.

Although the definition of a low testosterone varies, if a man has a serum testosterone below 300 ng/dl and he has symptoms of hypogonadism, testosterone replacement therapy is warranted.

Signs of hypogonadism:

Signs of hypogonadism include depression, fatigue, decreased sex drive, erectile dysfunction, obesity, enlarged breasts, insulin resistance, anemia, decreased muscle mass, and impaired mental function.

Tests for hypogonadism:

- A first morning blood test (before 10AM) for total and free testosterone is the initial test for hypogonadism. It is not necessary to fast for this blood test.
- If the total or free testosterone level is abnormal, the blood test is often repeated since a repeat test is normal up to 50% of the time. In addition, an additional blood test for LH can help determine if the pituitary gland is functioning properly. Another blood test, called a prolactin level may be ordered if the testosterone is abnormally low.
- If the LH or prolactin level is inappropriately abnormal, further testing may be indicated, which may include a MRI of the brain to rule out a pituitary tumor.

Treatments for hypogonadism:

Testosterone replacement therapy can reverse the symptoms of hypogonadism listed above and improve quality of life. In addition, normalizing testosterone levels may prevent or improve certain chronic diseases associated with aging such as diabetes and obesity and thereby improve longevity.

Formulation	Dosage	Adverse effects
Injectable: (1) Pellets (2) testosterone cypionate and testosterone enanthate	(1) 10 (75mg) pellets every 3-4 mo. (2) 50-400 mg every 1-4 wk	(1) potential infections, protrusion (2) peak and trough mood swings, pain at injection
Topical: (1) topical gel (androgel® and Testim®, Axiron®) <i>see package insert for application instructions</i>	(1) 5-10 gm daily	(1) potential transference to partner
Oral: (1) Buccal system (2) Fluoxymesterone	(1) 30 mg every 12 hrs. (2) 5-40 mg daily	(1) alterations in taste, irritation of gums (2) liver toxicity

Side effects of Testosterone replacement therapy:

Testosterone replacement can thicken the blood, worsen sleep apnea, promote prostate growth, prevent sperm production and shrink the testicles, and cause acne, breast swelling, and fluid retention.

Monitoring Testosterone replacement therapy:

As long as a man is being treated with testosterone replacement therapy, serial monitoring of blood tests and physical examinations are recommended according to the following schedule:

- One month after initiation of therapy: total and free testosterone, CBC, PSA
- Six months after initiation of therapy: total and free testosterone, CBC, PSA plus prostate and breast examination
- Yearly thereafter: total and free testosterone, CBC, PSA plus prostate and breast examination