Quest Diagnostics®

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Testosterone Disorders
In Women and Men

Testosterone plays an important role in health and well-being for both women and men. Blood testosterone levels that are too high or too low can be a sign of certain medical conditions. It's important to test for testosterone levels in people who have symptoms of these conditions.

Testosterone in women

Testosterone helps maintain bone strength and lean muscle mass in women. It enhances their libido and helps maintain overall energy levels. In addition, women's ovaries use it to make estrogens.

Some women make too little testosterone. This occurs most often during menopause and the years leading up to it (perimenopause). Other women make too much testosterone (hyperandrogenism). Causes include:

- Congenital adrenal hyperplasia
- Ovarian or adrenal tumors
- Anabolic steroids
- Polycystic ovary syndrome (PCOS)

PCOS is the most common cause of hyperandrogenism.

About PCOS

About 4% to 8% of women of reproductive age have PCOS.[1] Unfortunately, it's becoming more common. Researchers don't understand why. Nor do they understand what causes it. PCOS cases cluster in families, so it may have a genetic component. But factors in the environment also seem to play a role.

Characteristics of PCOS

The three main characteristics of PCOS are[2]:

- Abnormal ovulation (95% of cases), which leads to infertility
- A high testosterone level (60% of cases), which can cause excess body hair, acne, and thinning of scalp hair
- Polycystic ovaries (17% to 33% of cases)

PCOS is also associated with:

- Insulin resistance with or without high insulin levels
- Abnormal lipid levels
- Being overweight

Quest Diagnostics' testosterone tests

Quest Diagnostics offers direct immunoassay and the gold standard liquid chromatography, tandem mass spectrometry (LC/MS/MS) method. The direct immunoassay is suitable for screening for hypogonadism, but not for quantifying the low levels seen in women, children, and hypogonadal men.[3] The Endocrine Society prefers LC/MS/MS rather than a direct immunoassay when measuring low testosterone levels.[3] LC/MS/MS test results show better clinical correlation.[3]

Quest Diagnostics offers a test for free, bioavailable, and total testosterone. This test is helpful when a sex hormone binding globulin (SHBG) abnormality is suspected.

Test Method	Application
Immunoassay	Screen men for hypogonadism
	Monitor testosterone replacement therapy
LC/MS/MS	All other applications (men)
	All applications (women and children)

Women with these conditions are at increased risk of diabetes and cardiovascular disease. For example, women with PCOS have a 3- to 4-fold higher incidence of type 2 diabetes.[4]

Women with PCOS are also at increased risk of mental health conditions. These include depression, bipolar disorder, anxiety, and eating disorders. Women with PCOS have about a 3-fold greater risk of depression.[5]

Diagnosis of PCOS

PCOS diagnosis can be a challenge. Symptoms vary from woman to woman. And there is no single test that provides an absolute diagnosis. It's important to rule out other conditions that can cause hyperandrogenism. To learn more about tests than can be used to rule out other conditions, go to QuestDiagnostics.com/TestCenter/testguide.action?dc=WP_PCOS.

The Endocrine Society recommends diagnosing PCOS if 2 of these 3 criteria are present[6]:

- High androgen level*
- Abnormal ovulation
- Polycystic ovaries

*The preferred testosterone test for measuring androgen levels in women is the LC/MS/MS assay.

Testosterone in men

Testosterone is important for overall health and well-being in men. It:

- Maintains reproductive tissues
- Stimulates sperm production
- Stimulates and maintains sexual function
- Increases body weight
- Increases lean body mass
- Maintains bone mass
- Promotes body hair growth
- Stimulates production of red blood cells

Testosterone levels peak around age 20. After age 30, they start to decline by about 1% to 2% every year.[7] So a decline in well-being or function in older men may be due to a normal decline in testosterone level. Or it may be due to an abnormally low level. This condition is called male hypogonadism, or "low T."

Prescribing testosterone therapy

In March 2015, the US Food and Drug Administration (FDA) released a safety announcement about testosterone therapy.[8] They cautioned that it's only approved for men with low T caused by certain medical conditions. These include problems in the testicles, pituitary gland, or brain. The FDA emphasized that testosterone therapy is not approved for men with low T simply due to aging. The FDA also stated that the therapy might be associated with an increased risk of heart attack and stroke. More data are needed to explore this risk.

Monitoring testosterone therapy in men

The Endocrine Society recommends monitoring as follows[7]:

- Total testosterone 3 to 6 months after starting therapy
- Hematocrit 3 to 6 months after starting therapy and annually thereafter (to detect erythrocytosis)
- Bone density after 1 to 2 years of therapy (just for men with osteoporosis or low-trauma fracture)
- Digital rectal exam and PSA 3 to 6 months after starting therapy and then per screening guidelines

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Symptoms of low T

- Decreased interest in sex
- Erectile dysfunction
- Reduced sperm count
- Poor concentration and memory
- Hot flashes
- Increased breast size
- Depression
- Decreased energy
- Osteoporosis
- Decreased muscle mass and strength
- Increased body fat
- Hair loss

How to evaluate a man for low T

Here are the Endocrine Society recommendations[6]:

1. Perform a morning total testosterone measurement.
2. If low, exclude any acute or subacute illness, drug, or nutritional deficiency as the cause.
3. Repeat testosterone testing (total, free, or bioavailable) and add tests for LH and FSH.
4. Perform tests for prolactin, iron, other pituitary hormones, and possibly a cranial MRI if the low testosterone confirms and if LH and FSH are not elevated.
5. Karyotype to detect Klinefelter syndrome if the low testosterone confirms and LH and FSH are high.

Sometimes a free or bioavailable testosterone test should be used instead of a total testosterone test. Use the free or bioavailable when the total is near the lower limit of normal and a sex hormone binding globulin (SHBG) abnormality is suspected. If LH and FSH are normal, the additional testing described above can help detect a pituitary tumor or systemic illness.

References

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4. Harris MI, Hadden WC, Knowler WC, Bennett PH. Prevalence of diabetes and impaired glucose tolerance and plasma glucose levels in U.S. population aged 20-74 yr. *Diabetes*. 1987;36:523-534.
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