

Sex Hormone-Binding Globulin (SHBG)

MDL Test Number: 639

Methodology: Immunoassay

CPT Codes: 84270 x 1



Specimen Collection Platform:

Serum in Serum Separator Tube (SST)

Turnaround Time:

24 - 72 hours

Stability:

Room temperature

Test Additions*:

30 days to add tests

Specimen Collection:



1. Immediately after blood collection, invert the tube(s) gently 5 times to ensure mixing of clot activator.



2. Allow the tube to rest upright for at least 30 minutes after collection to ensure proper clotting.



3. Centrifuge for at least 15 minutes at 2200-2500 RPM within one hour of collection.



4. Do not remove the stopper or pour off serum.



What is Sex Hormone-Binding Globulin (SHBG)?

Sex hormone-binding globulin, or SHBG, is not a hormone itself. It is a protein made by the liver, and its job is to carry sex hormones, testosterone and estradiol, among them, through the bloodstream.

That role is what makes it worth measuring. A hormone held by SHBG is in transit and cannot act on the body; only the share that travels free is available to do its work. So the amount of SHBG present helps determine how much of a patient's sex hormone is actually usable, regardless of how much is there in total. SHBG does not hold every hormone equally tightly: its firmest grip is on dihydrotestosterone (a potent form of testosterone), it holds testosterone itself somewhat less tightly, and estradiol more loosely still.

SHBG rises and falls with the rest of a patient's hormonal and metabolic state. Estrogen and thyroid hormone raise it; testosterone, insulin, and steroid medications lower it. This is why women typically run higher than men, and why the reference ranges below are reported separately for each.

Why test for Sex Hormone-Binding Globulin (SHBG)?

SHBG is rarely ordered on its own. It is ordered with a total testosterone so a provider can judge how much of that testosterone the body can actually use, usually as the free androgen index (FAI), the ratio of total testosterone to SHBG.

- **Unwanted hair growth in a male pattern (hirsutism), stubborn acne, or thinning scalp hair**, the usual signs of excess androgen, meaning male hormone, in women.
- **Suspected or confirmed polycystic ovary syndrome, also called polyendocrine metabolic ovarian syndrome (PMOS/PCOS)**, where SHBG is typically low and the free androgen index correspondingly high.
- **Symptoms of too much or too little androgen** when the total testosterone comes back normal, a high or low SHBG often explains the mismatch.
- **Obesity, insulin resistance, or metabolic syndrome**, which lowers SHBG and so raises the share of testosterone that is active.
- **Before and during testosterone therapy in women**, since SHBG sets how much of the dose is available and falls as treatment continues.
- **In men, SHBG is measured alongside total testosterone when low testosterone is suspected**, because obesity, aging, and liver or thyroid disease shift SHBG enough to make a total result misleading.



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Special Instructions:

- **Order total testosterone at the same time:** SHBG is not interpreted on its own. Order a total testosterone from the same sample so the free androgen index can be calculated; that index separates women with androgen-driven symptoms from healthy women more reliably than SHBG alone.
- **Hormonal contraceptives:** Combined pills, patches, and rings contain estrogen, which raises SHBG substantially and drives the free androgen index down, so a patient with real androgen excess can return a normal-looking result while taking them. Note the method on the requisition. Current guidance is to stop combined hormonal contraception for at least three months before androgen excess is assessed from blood work.
- **Record thyroid status, pregnancy status, and medications:** SHBG moves with thyroid function, liver health, body weight, and insulin resistance, and with a long list of drugs — estrogen and testosterone therapy, steroid medications, danazol, and anti-seizure medications such as phenytoin. Without that history, the result cannot be read properly.
- **Sample quality:** Serum is required. Let the sample clot completely before spinning it, particularly for patients on blood thinners, since incomplete clotting leaves fibrin behind and can cause errors. Samples with high triglycerides need extra processing, and results from samples with broken-down red blood cells (hemolysis) should be read with caution.
- **Comparing results over time:** Different laboratories and different instruments can produce somewhat different SHBG numbers from the same sample, and any free androgen index calculated from them carries that variation. When results are tracked over time, use the same test at the same laboratory each time.

Limitations:

Every laboratory test has limits. For SHBG, the main ones are:

- This test reports SHBG up to 180 nmol/L. Higher results are reported as greater than 180 nmol/L, and a free androgen index cannot be calculated from them.
- The test measures the carrier protein, not the hormone. Free and bioavailable testosterone are calculated from SHBG and total testosterone rather than measured directly, and those calculations rest on assumptions that do not hold in every patient.
- SHBG on its own does not diagnose PCOS/PMOS. Current guidance assesses excess male hormone using free or bioavailable testosterone calculated from a total testosterone and SHBG, not from an SHBG result alone.
- SHBG does not point to any single disease. Thyroid problems, liver disease, obesity, insulin resistance, age, and many medications all shift it, so an abnormal result has to be weighed against the patient's full medical and medication history.
- A small number of patients carry natural antibodies in their blood — often people who work closely with animals or who have received certain antibody-based treatments — that can interfere with the test and produce an unexpected result.
- An SHBG result is one piece of a larger picture. It is meant to be read together with the patient's symptoms, medical history, and other test results — never on its own.

Reference Range(s):

SHBG is measured in nanomoles per liter (nmol/L). Expected levels differ by sex, because estrogen raises SHBG and testosterone lowers it:

- **Adult female** (not pregnant): **18 – 144 nmol/L**
- **Adult male:** **10 – 57 nmol/L**

These ranges do not apply during pregnancy, when levels climb well above them. A result outside these ranges is not automatically a problem, and a result inside them does not rule one out. Only the ordering provider can interpret what a given number means for a given patient. Patients should always go by the reference range printed on their own laboratory report.

Analyte	Disorder	Expected Value*
SHBG	PCOS/PMOS	↓
SHBG	Diabetes / metabolic syndrome	↓
SHBG	Obesity	↓
SHBG	Chronic liver disease / cirrhosis	↑
SHBG	Graves' disease / overt hyperthyroidism	↑↑

*↓ – Decreased, ↑ – Increased, ↑↑ – Markedly Increased.

What are some references that discuss the medical necessity of testing Sex Hormone-Binding Globulin (SHBG)?

1. Teede HJ, et al. Recommendations from the 2023 International Evidence-based Guideline for the Assessment and Management of Polycystic Ovary Syndrome. *J Clin Endocrinol Metab*, **108**, 2447–2469 (2023).
2. Martin KA, et al. Evaluation and treatment of hirsutism in premenopausal women: an Endocrine Society clinical practice guideline. *J Clin Endocrinol Metab*, **103**, 1233–1257 (2018).
3. Ding EL, et al. Sex hormone-binding globulin and risk of type 2 diabetes in women and men. *N Engl J Med*, **361**, 1152–1163 (2009).
4. Thaler MA, et al. The biomarker sex hormone-binding globulin – from established applications to emerging trends in clinical medicine. *Best Pract. Res Clin Endocrinol Metab*, **29**, 749–760 (2015).
5. Davis SR, et al. Global consensus position statement on the use of testosterone therapy for women. *J Clin Endocrinol Metab*, **104**, 4660–4666 (2019).
6. Bhasin S, et al. Testosterone therapy in men with hypogonadism: an Endocrine Society clinical practice guideline. *J Clin Endocrinol Metab*, **103**, 1715–1744 (2018).
7. Bulun SE, Babayev E. Physiology and pathology of the female reproductive axis. In *Williams Textbook of Endocrinology* 15th edn (eds Melmed, S. et al.) Ch. 15 (Elsevier, Philadelphia, 2025).



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