

BLOOD SPOT TEST SPECIFICATIONS

Sex Hormone Binding Globulin

Clinical Information

Sex hormone binding globulin (SHBG) is a protein produced by the liver in response to any type of estrogen, whether produced endogenously, administered in an oral contraceptive or postmenopausal estrogen therapy, present in consumed foods or herbs (phytoestrogens), or through environmental exposure to estrogenic compounds. SHBG levels give a good index of the extent of the body's overall exposure to estrogens. In the bloodstream, SHBG binds tightly to circulating estradiol and testosterone, preventing their rapid metabolism and clearance, and thereby regulating the relative amounts of free and bound hormone and consequently their bioavailability to target tissues. SHBG levels are used to calculate free (unbound) testosterone levels from total testosterone. Testosterone binds about three times more tightly to SHBG than does estradiol. Many factors, in addition to estrogen exposure, can affect SHBG levels. Thyroid hormone increases SHBG production, whereas insulin and androgens decrease SHBG levels. Hyperandrogenic conditions such as polycystic ovarian syndrome and hirsutism can therefore be associated with low SHBG. Low levels are seen in obesity and insulin resistance in men and women, and SHBG levels have been found to correlate inversely with obesity, insulin resistance, and risk factors for cardiovascular disease. The reference range for blood spot SHBG in women is 15–120 nmol/L and in men 15–50 nmol/L.

References:

Worthman CM, Stallings JF. Hormone measures in finger-prick blood spot samples: new field methods for reproductive endocrinology. *Am J Phys Anthropol.* 1997;104:1-21.

Selby C. Sex hormone binding globulin: origin, function and clinical significance. *Ann Clin Biochem.* 1990;27:532-41.

Caldwell JD, Jirikowski GF. Sex hormone binding globulin and aging. *Horm Metab Res.* 2009;41:173-82.

Akin F, Bastemir M, Alkiş E, Kaptanoğlu B. SHBG levels correlate with insulin resistance in postmenopausal women. *Eur J Intern Med.* 2009;20:162-7.

Tchernof A, Després JP. Sex steroid hormones, sex hormone-binding globulin, and obesity in men and women. *Horm Metab Res.* 2000;32:526-36.

Assay Method: Chemiluminescent Immunoassay

Intra-assay Precision

Intra-assay precision was determined by choosing three samples spanning the reference range, and analyzing them multiple times within the same run. Results are shown below:

Mean SHBG Concentration (nmol/L)	Standard Deviation	Coefficient of Variation (C.V. %)
24	0.80	3.3
73	2.79	3.8
129	10.04	7.8

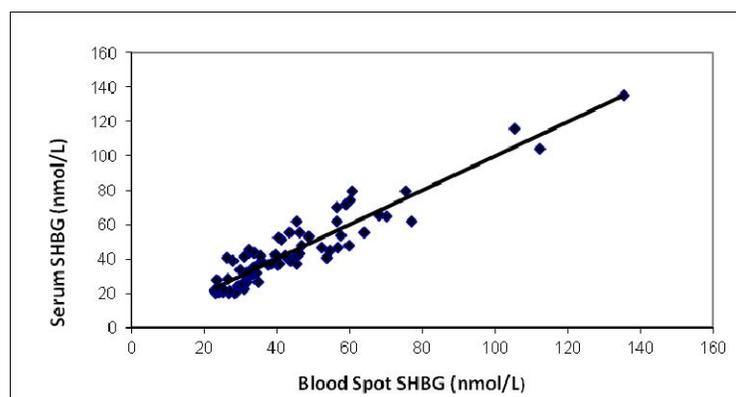
Inter-assay Precision

Inter-assay precision was determined by choosing three samples spanning the reference range, and analyzing them multiple times throughout different runs. Results are shown below:

Mean SHBG Concentration (nmol/L)	Standard Deviation	Coefficient of Variation (C.V. %)
25	0.90	3.6
70	4.94	7.0
129	9.43	7.3

Accuracy

To test the accuracy of the dried blood spot assay for SHBG, dried blood spot samples collected at the same time as corresponding serum samples were analyzed by linear regression. Resulting correlation data are shown below ($R = 0.94$):



Analyte Stability

The dried blood spot samples are stable for more than 1 month at room temperature.

Specimen Collection

Kits for blood spot collection contain a filter paper collection card, finger lancets, an alcohol prep pad, sterile gauze, a band-aid, easy-to-follow instructions, and a mailer to return the sample for analysis.