

Tests Regarding Sex Hormones

To measure levels of estrogen, progesterone, and testosterone.

Estrogen fraction test

Principle

- There are 3 main types of estrogen: estrone (E1), estradiol (E2), and estriol (E3)
- Estrone (E1) - major estrogen after menopause
- Estradiol (E2) - in women
 - mainly produced in ovary
 - normal levels regulate ovulation, conception and pregnancy, bone structuring, and cholesterol levels
- in men
 - produced by testes and adrenal glands
- Estriol (E3) - major estrogen in pregnancy (mainly by the placenta)

Method

1. blood sample drawn from arm's vein OR
1. 24-hour urine sample collected OR
1. fresh saliva sample collected in a plastic tube

Purpose

- in females - to evaluate sexual maturity, menstrual and fertility problems
- to test if there are tumors that excrete estrogen
- in pregnancy, helps to determine fetal-placental health
- in males - to evaluate gynecomastia, feminization syndromes

Progesterone assay test (EIA kit)

Principle

- quantitative measurement of progesterone in human plasma
- use direct competitive EIA (enzyme immunoassay)

Method

1. blocking reagent is used to displace progesterone from serum binding proteins; and are then bound by monoclonal anti-progesterone antibody
2. complexes are isolated by adsorption to magnetic anti-mouse IgG
3. unoccupied anti-progesterone sites bound by alkaline phosphatase
4. coloured enzyme substrate added (complexes with alkaline phosphatase colour change from yellow to pink)
5. optical density measured using spectrophotometer or colorimeter

Purpose

- to evaluate women having difficulties to become pregnant or to maintain a pregnancy
- to monitor high - risk pregnancies

Total Testosterone Test

Method

- blood sample drawn from arm's vein

Purpose

- to evaluate
 - ambiguous sex characteristics
 - early / delayed puberty
 - virilizing syndromes in the female

- infertility in the male
- rare tumors of the ovary and testicle

SHBG Test

Principle

- In plasma, 60% testosterone is bound to sex hormone binding globulin (SHBG), 38% to albumin and only about 2% is unbound. Total cholesterol does not differentiate bound and unbound testosterone, so it would not be an accurate representation of amount of testosterone available to patient's tissues when SHBG level is abnormal

Method

- blood sample drawn from arm's vein

Purpose

- to evaluate inconsistency of total testosterone results do not seem to be consistent with clinical signs, such as decreased sex drive in men or hirsutism in women

Possible reasons for abnormal results

Levels of	Men		Women	
	Decreased	Increased	Decreased	Increased
Estrogen (in blood) Normal Men: 12-34 pg/ml; Women: 24-149 pg/ml		male begins to develop female secondary sex characteristics; testicular or adrenal tumor	failing pregnancy; menopause; anorexia nervosa; primary and secondary hypogonadism; turner's syndrome	early puberty; develop secondary sexual characteristics at an abnormally early age; ovarian or adrenal tumor; in normal pregnancy; cirrhosis; and increased thyroid levels (hyperthyroidism)
Progesterone (in blood) Women: 150 - 2,000 ng/dl; In pregnancy 1,500 - 20,000 ng/dL			toxemia of pregnancy; threatened abortion; placental failure; after fetal death; amenorrhea; ovarian dysfunction	ovulation and pregnancy; certain types of ovarian cysts; tumor of the ovary known as a choriocarcinoma
Testosterone Men: 300 - 1,200 ng/dL; Boys: < 100 ng/dL; Women: 30-95 ng/dL; Girls < 40 ng/dL	Klinefelter syndrome; primary and secondary hypogonadism; surgical removal of the testicles; Down syndrome; cirrhosis	early puberty; viral infection of encephalitis; tumors involving adrenal glands; testicular tumors; excessive thyroid production (hyperthyroidism); testosterone resistance syndromes		ovarian and adrenal tumors and in the presence of excessive hair growth of unknown cause (hirsutism)

References

- [1] (<http://www.labtestsonline.org/understanding/analytes/estrogen/sample.html>)
- [2] (http://www.healthatoz.com/healthatoz/Atoz/common/standard/transform.jsp?requestURI=/healthatoz/Atoz/ency/sex_hormones_tests.jsp)
- [3] (http://www.immunometrics.co.uk/en/en_kit-progesterone.jsp)
- [4] (<http://www.labtestsonline.org/understanding/analytes/shbg/sample.html>)
- [5] (<http://www.labtestsonline.org/understanding/analytes/shbg/test.html>)