

# 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
<b>Estrogen</b> (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)
<b>Progesterone</b> (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
<b>Testosterone</b> 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](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](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>)