Human physiology (II) laboratory

Lab 7: Pregnancy tests

A pregnancy test is used to determine whether a female is pregnant or not. The two primary methods are testing for the female pregnancy hormone (human chorionic gonadotropin (hCG)) in blood or urine using a pregnancy test kit.

human chorionic gonadotropin (hCG) is a glycoprotein hormone that rises quickly in the first few weeks of pregnancy, typically reaching a peak at 8- to 10-weeks gestational age.

hCG is produced by what will become the placenta.[6] hCG testing can be performed with a blood (serum) sample (typically done in a medical facility) or with urine (which can be performed in a medical facility or at home).

The assays used to detect the presence of hCG in blood or urine are generally reliable and inexpensive. Secretion of hCG can occur as soon as 6 days following ovulation and on average 8–10 days following ovulation; this is the earliest hCG can be detected in a blood sample.

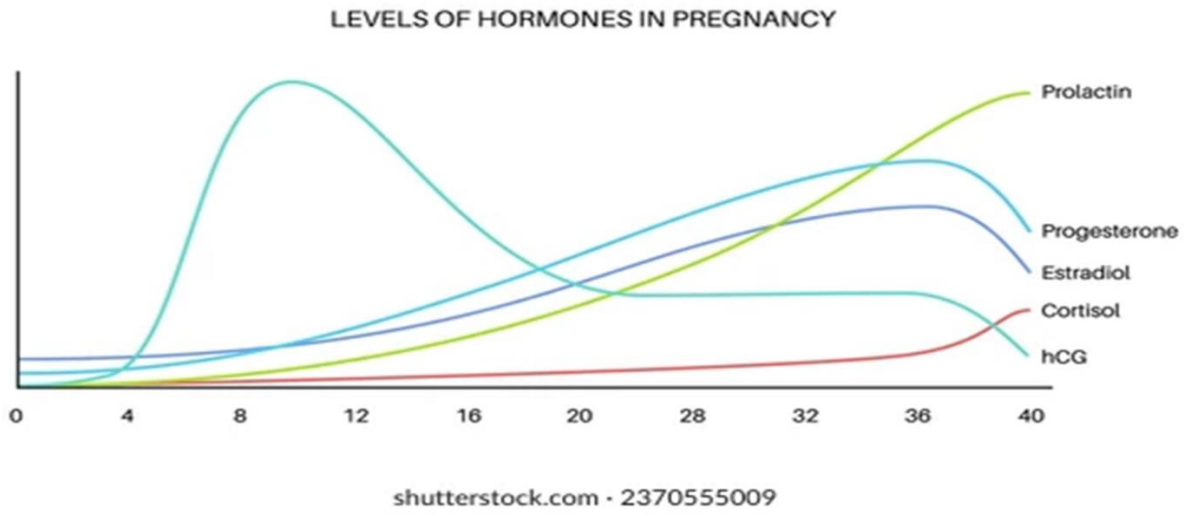
The hCG concentration in blood is higher than in urine. Therefore, a blood test can be positive while the urine test is still negative.

Human Chorionic Gonadotropin (hCG) is a glycoprotein composed of two noncovalently linked subunits, **α and ß**, and is produced in large quantities by the syncytio-trophoblast during pregnancy and in the course of certain malignancies, e.g., molar pregnancy, choriocarcinoma, and testicular cancer.

The α-subunit is identical to that of LH, FSH, and TSH.

The ß-subunit, however, is hormone-specific. Therefore, antibodies for hCG immunoassays are generally produced against the ß-subunit of hCG

Maternal serum hCG peaks at 8–10 weeks (doubles every 48 hours) and then declines to reach a plateau at 18–20 weeks of gestation.



b-hCG is usually detected using one of 2 methods

1- **Qualitative tests** (yes/no or positive/negative results) look for the presence of the beta subunit of human chorionic gonadotropin in blood or urine. Qualitative urine pregnancy tests vary in sensitivity. High-sensitivity tests are more common and typically detect hCG levels between 20 and 50 milli-international units/mL (mIU/mL). Low-sensitivity tests detect hCG levels between 1500 and 2000 mIU/mL.

Cartridge pregnancy tests are accurate up to 98%,

False positive:

1-User error in performing and interpreting the test

2-Biochemical pregnancy (loss of pregnancy before signs of pregnancy are apparent)

3- non-pregnant production of the hCG molecule (i.e. secretion due to a tumor or the pituitary gland, some diseases of the liver, cancers, including choriocarcinoma and other germ cell tumors, False-positive results may be reported with ectopic production of hCG and/or hCG-like substances by neoplasms such as ovarian cysts, testicular tumors and lung carcinomas.

4- Bacterial contamination and blood in urine

5- **Spurious evaporation lines** may appear on many home pregnancy tests if read after the suggested 5-minute window or reaction time.

6- False positives may also appear on tests used past their expiration date.

7- Phantom hCG' which is due to people having human antianimal or heterophilic antibodies.

8-Due to use of medication: Urine tests can be falsely positive in those that are taking the medications: chlorpromazine, promethazine, phenothiazines, methadone, aspirin, carbamazepine and drugs that cause high urinary pH. **The main drug causes false positive is choriomon**.

False negative

1-Testing is done too early

2-Diluted sample

3-False negative results can also occur due to a "hook effect", where a sample with a very high level of hCG is tested without dilution.

Procedures

1-Collect the sample from the patents (urine, serum or whole blood, whole blood samples require a specific buffer and usually less sensitive).

2- Add 2-3 drops on the cartridge well and interpret the results within 5 minutes. (Make sure the control line has appeared otherwise discard the test and repeat.

3- **Quantitative tests** measure the exact amount of hCG in the sample. Blood tests can detect hCG levels as low as 1 mIU/mL, and typically clinicians will diagnose a positive pregnancy test at 10 mIU/mL.

Sample Type: Serum
Stability: 3 Days at 2-8 °C 12 Months at -20 °C
Special Precautions: Freeze only once.
Normal Range
Male: Up to 2.6 mIU/mL
Female Non-pregnant Premenopausal: Up to 5.3 mIU/mL
Female Postmenopausal: Up to 8.3 mIU/mL
Female Non-pregnant: <10 mIU/mL