



Tests Explained

Polycystic Ovarian Syndrome Panel

- **Dehydroepiandrosterone Sulfate (DHEA-S)**

DHEA S is a steroid hormone produced by the adrenal glands. PCO is often associated with adrenal hyper-androgenism (high production of male hormones). High DHEA-S levels are a common finding in PCO (Polycystic Ovary Syndrome), and generally associated with elevated levels of androgens. There may also be association with excess prolactin levels.

- **Total Testosterone**

- **Free Testosterone**

Testosterone (male hormone) is normally produced by the adrenal gland in women and is responsible for libido. Excessive production may lead to infertility, the formation of male secondary sex characteristics and the suppression of LH and FSH production by the pituitary gland. Elevation of testosterone levels is a sign of hyper-androgenism (over production of male hormones). It causes an increase in luteinizing hormone (LH) that leads to an increase in the ratio of LH to FSH. An elevated LH:FSH ratio results in major changes to a woman's menstrual cycle and fertility functions. Mild to moderately high levels are associated with PCOS or adrenal hyperplasia. Persistently high levels of total testosterone indicate androgen-producing tumors in the ovaries.

- **Luteinizing Hormone (LH)**

Luteinizing Hormone in men is necessary for spermatogenesis (sperm production) and stimulates the Leydig cells in the testicles to produce testosterone. Low levels of LH may indicate a hormonal cause for low sperm production.

- **Follicle Stimulating Hormones (FSH)**

Follicle Stimulating Hormone in men is a hormone produced by the pituitary gland. The hormone has a key role in the development and release of sperm in the testes. Testicular failure azoospermia results in a raised FSH level due to failure of the testes to produce the hormone called inhibin B (which normally suppresses FSH levels to their normal range). A high FSH level is usually diagnostic of primary testicular failure, a condition in which the seminiferous tubules in the testes do not produce sperm normally, because they are damaged. A common cause is undescended testes.

- **Prolactin**

Prolactin in males is involved in the production of testosterone. Higher titer of this hormone in the blood stream can cause infertility by interfering with the pituitary production of FSH and LH, adversely affecting the function of testicles, causing decreased testosterone levels, or causing abnormal sperm. High prolactin levels can be caused by tumors or certain medications. Prolactin levels are used with other tests, to diagnose prolactinomas (tumors of the pituitary gland that produce prolactin), investigate potential infertility issues and erectile dysfunction in males.

- **Oral Glucose Tolerance Test (GTT)**

The oral glucose tolerance test involves quickly drinking a sweetened liquid (called Glucola), which contains 50 - 75 grams of glucose. The body absorbs this glucose rapidly causing blood glucose levels to rise within 30 to 60 minutes. A blood sample will be taken from a vein in your arm about 60 minutes after drinking the solution. In some cases blood shall be withdrawn fasting, after 1, 2 and 3 hours. The blood test measures how the glucose solution was metabolized.

- **Insulin Tolerance Test (ITT)**

Insulin is a hormone that controls the glucose level in blood. Blood glucose levels increase after consuming carbohydrates, which stimulates the pancreas to release insulin to regulate the blood glucose level and then decrease to normal levels when blood glucose drops again. Women with PCO may have chronically high levels of insulin that do not drop back to normal levels (hyperinsulinism). Fasting insulin measures insulin between meals when it should be at its lowest level and is used to determine if a patient is insulin resistant. This test is done in conjunction with glucose tolerance testing (GTT) to evaluate a patient's metabolic status. Insulin resistance is thought to be one of the main causes of PCO (Polycystic Ovarian Syndrome).

- **Hemoglobin A1c**

Hemoglobin is present in the red blood cells. Glucose attaches to hemoglobin to form a compound called "Hemoglobin A1c" or Glycosylated Hemoglobin. Red blood cells have a life span of about 3 months after which they are destroyed and new ones made. As a result, the amount of Hemoglobin A1c in the red blood cell is an indicator of the average blood sugar over the past 3 months. The benefit of measuring A1c is that it gives a more reasonable view of what's happening over the course of time (3 months) and the value does not fluctuate as much as finger stick blood sugar measurements.

- **Comprehensive Metabolic Panel (CMP)**

The Comprehensive Metabolic Panel (CMP) is a frequently ordered panel of tests that gives your doctor important information about the current status of your kidneys, liver, and electrolyte and acid/base balance as well as of your blood sugar and blood proteins. Abnormal results, and especially combinations of abnormal results, can indicate a problem that needs to be addressed. The CMP is typically a group of 14 specific tests that have been approved, named, and assigned a CPT code (a Current Procedural Terminology number) as a panel by Medicare, although labs may adjust the number of tests up or down. Since the majority of insurance companies also use these names and CPT codes in their claim processing, this grouping of tests has become standardized throughout the United States.

The CMP includes:

- 1- Liver Function Panel**

A liver (hepatic) function panel is a blood test to check how well the liver is working. This test measures the blood levels of total protein, albumin, bilirubin, and liver enzymes. High or low levels may mean that liver damage or disease is present.

The liver serves several important functions in the body, including changing nutrients into energy for the body and breaking down toxic substances.

The Panel includes checking the levels of the following:

- Total Protein.
- Albumin.

Albumin, a small protein produced in the liver, is the major protein in serum. Total protein measures albumin as well as all other proteins in serum. Both increases and decreases in these test results can be significant.

- Bilirubin (total and direct).
- Alkaline Phosphatase (ALP).
- Aspartate Amino Transferase (AST).
- Alanine Amino Transferase (ALT).

ALP, ALT, and AST are enzymes found in the liver and other tissues. Bilirubin is a waste product produced by the liver as it breaks down and recycles aged red blood cells. All can be found in elevated concentrations in the blood with liver disease or dysfunction.

- 2- Electrolytes**

- Sodium

- Potassium
- CO₂ (carbon dioxide, bicarbonate)
- Chloride

The concentrations of sodium and potassium are tightly regulated by the body, as is the balance between the four molecules. Electrolyte (and acid-base) imbalances can be present with a wide variety of acute and chronic illnesses. Chloride and CO₂ tests are rarely ordered by themselves.

3- Kidney Tests

- BUN (Blood Urea Nitrogen)
- Creatinine

BUN and creatinine are waste products filtered out of the blood by the kidneys. Increased concentrations in the blood may indicate a temporary or chronic decrease in kidney function. When not ordered as part of the CMP, they are still usually ordered together.

4- Glucose

Both increased and decreased levels can be significant illnesses related to diabetes .

5- Calcium

Both increased and decreased levels can be significant illnesses regarding bone density and fracture tendencies and Vitamin D levels.

• Complete Blood Count with Differential White Cell Count (CBC with Diff)

A complete blood count (CBC) gives important information about the kinds and numbers of cells in the blood, especially red blood cells, white blood cells, and platelets. CBC helps to check any symptoms, such as weakness, fatigue, or bruising, anemia, infection, and many other disorders.

CBC test includes:

- **White blood cell** (WBC, leukocyte) count. White blood cells protect the body against infection. If an infection develops, white blood cells attack and destroy the bacteria, virus, or other organism causing it. White blood cells are bigger than red blood cells but fewer in number. When a person has a bacterial infection, the number of white cells rises very quickly. The number of white blood cells is sometimes used to find an infection or to see how the body is dealing with cancer treatment.
 - **White blood cell types** (WBC differential). The major types of white blood cells are **neutrophils, lymphocytes, monocytes, eosinophils, and basophils**. Immature neutrophils, called band neutrophils, are also part of this test. Each type of cell plays a different role in protecting the body. The numbers of each one of these types of white blood cells give important information about the immune system. Too many or too few of the different types of white blood cells can help find an infection, an allergic or toxic reaction to medicines or chemicals, and many conditions, such as leukemia.
- **Red Blood Cell** (RBC) count. Red blood cells carry oxygen from the lungs to the

rest of the body. They also carry carbon dioxide back to the lungs so it can be exhaled. If the RBC count is low (anemia), the body may not be getting the oxygen it needs. If the count is too high (polycythemia), there is a chance that the red blood cells will clump together and block capillaries. This also makes it hard for your red blood cells to carry oxygen.

Red Blood Cell indices. There are three red blood cell indices:

- **Mean Corpuscular Volume (MCV)**, shows the size of the red blood cells.
 - **Mean Corpuscular Hemoglobin (MCH)**, value is the amount of hemoglobin in an average red blood cell.
 - **Mean Corpuscular Hemoglobin Concentration (MCHC)**, measures the concentration of hemoglobin in an average red blood cell. These numbers help in the diagnosis of different types of anemia.
 - **Red blood cell Distribution Width (RDW)** shows if the cells are all the same or different sizes or shapes.
- **Hematocrit (HCT, packed cell volume, PCV)**. This test measures the amount of space (volume) red blood cells take up in the blood. The value is given as a percentage of red blood cells in a volume of blood. For example, a hematocrit of 38 means that 38% of the blood's volume is made of red blood cells. Hematocrit and hemoglobin values are the two major tests that show if anemia or polycythemia is present.
 - **Hemoglobin (Hgb)**. The hemoglobin molecule fills up the red blood cells. It carries oxygen and gives the blood cell its red color. The hemoglobin test measures the amount of hemoglobin in blood and is a good measure of the blood's ability to carry oxygen throughout the body.
 - **Platelet (thrombocyte) count**. Platelets (thrombocytes) are the smallest type of blood cell. They are important in blood clotting. When bleeding occurs, the platelets swell, clump together, and form a sticky plug that helps stop the bleeding. If there are too few platelets, uncontrolled bleeding may be a problem. If there are too many platelets, there is a chance of a blood clot forming in a blood vessel. Also, platelets may be involved in hardening of the arteries (atherosclerosis).
 - **Mean Platelet Volume (MPV)**. Mean platelet volume measures the average amount (volume) of platelets. Mean platelet volume is used along with platelet count to diagnose some diseases. If the platelet count is normal, the mean platelet volume can still be too high or too low.