

DIAGNOSTIC TESTING

GENERAL TESTING

For a health care provider to reach a diagnosis, they need important information. A medical history and physical examination will probably be the first resources used. In addition, diagnostic-type tests will provide other information which will either assist in the process or confirm the diagnosis. Your body is composed of many different types of cells and fluids, almost all of which can be analyzed. Common samplings are blood, urine, sweat, spinal fluid, joint fluid, sputum, hair, feces, bone marrow, bodily tissue, and bodily scrapings.

Diagnostic testing can be done in many forms to suit the patient's individual requirements and needs. Generally, testing is categorized in one of two ways... it is either "invasive" or "non-invasive". Invasive testing procedures are those that involve puncture of the skin (such as blood tests), or incisions (such as biopsies). Examples of noninvasive testing are x-rays, ultrasound, and EKGs.

It is important that the person who is being tested has a clear understanding of the reasons for the test, the possibilities of any associated risks, and the costs involved. If this information is not offered by the health care provider, the patient must take the responsibility to ask and have these questions answered prior to the beginning of any tests.

It is always possible for errors to occur in the results of any diagnostic-type test. These errors may not always be the fault of the laboratory or diagnostic center. As in any imperfect science, there is always the possibility of physiological factors which can contribute to inaccurate test results. If, however, the patient takes particular care to follow the pre-testing instructions (such as not eating or drinking for a period of time), he or she will have created the best opportunity for a successful outcome.

BLOOD TESTS

With modern laboratory technology, only a small sample of blood is necessary to perform many blood tests at once. Blood for testing is usually obtained by either venipuncture (collecting blood through a syringe inserted in the vein), or arterial puncture (collecting blood through a syringe inserted in an artery). Following is a list of some of the more common blood tests:

■ AIDS TEST

This tests for the presence of the AIDS virus.

■ ARTERIAL BLOOD GASES

This test measures the acidity (pH), oxygen, and carbon dioxide dissolved in the blood. This study requires the drawing of blood from a peripheral artery rather than a vein.

■ BLOOD CHEMISTRY GROUP (CHEMISTRY PANEL)

This is a common blood test that can examine the blood for signs of diabetes, kidney problems, electrolyte imbalances, liver problems, cholesterol levels, and minerals and chemicals; all with one single sampling of blood. The number of tests included in a chemistry panel will vary depending on the laboratory.

■ BLOOD TYPE AND RH

This test identifies a person's blood type.

■ COAGULATION STUDIES

This test measures the speed at which the blood clots.

■ COMPLETE BLOOD COUNT (CBC)

This is the most common and frequently performed blood test, and is usually done as part of a routine physical examination. The CBC measures the hemoglobin, the hematocrit (the percentage of the volume of a sample which is occupied by cells), and the kinds of cells which including white blood cells and platelets.

■ CROSS MATCH (COMPATIBILITY TEST):

This test determines if a unit of blood is compatible for use in a transfusion.

■ DRUG TESTING

This test determines the level of a particular drug circulating within the bloodstream. This is done to seek a proper therapeutic level or to avoid toxicity. Drug testing for "recreational drugs", including alcohol, can also be done.

■ ELECTROLYTES

Measures the levels of sodium, potassium, chloride and carbon dioxide; the substances that assist in the maintenance of body fluids, blood pressure, and other important body functions.

■ ENZYMES AND HORMONES

Hormone tests can check the ovaries, testes, pituitary gland, adrenal gland, pancreas, and the thyroid. Enzyme tests determine if there is a presence of heart damage after a heart attack or measure the function of other organs.

■ LIPIDS

Lipids measures the level of total cholesterol, low density lipoprotein (LDL), and high density lipoprotein (HDL).

■ PREGNANCY TEST

This confirms the diagnosis of pregnancy.

■ REC BLOOD COUNT (RBC)

This test determines the number of red blood cells for evaluation of possible anemia.

■ RUBELLA TEST

Rubella testing confirms the diagnosis of measles.

■ STOOL OCCULT BLOOD

Cancers and polyps of the gastrointestinal tract and colon will sometimes bleed. This blood test can detect blood and blood byproducts in the feces. It should not, however, be used as the sole diagnosis tool in determining the presence of cancer as it is not fully reliable in accuracy.

■ UREA NITROGEN

This test determines kidney function.

■ URIC ACID

This test determines the presence of gout.

URINALYSIS

A urinalysis study is obtained through a sample of the urine where many individual tests are performed to evaluate glucose, blood, and bacteria levels in the body. The health care provider gets much information from this test, particularly on the liver and kidneys.

BIOPSIES

A biopsy is the removal of a sample of tissue for pathological study, most often under a microscope. The biopsy can be obtained with a needle, a scalpel, or a special instrument (biopsy forceps) that is inserted through a fibro-optic endoscope.

■ BONE MARROW ASPIRATION AND BIOPSY

A needle and a suction syringe are used to obtain material from the bone marrow for study. The sites most often used are the sternum and the pelvis. Bone marrow biopsy is used to diagnosis a wide variety of blood disorders (and blood-forming organs) including anemia, leukemia, and lymphoma. This procedure requires a local anesthetic.

■ LIVER BIOPSY

This biopsy tests for conditions such as cirrhosis, hepatitis and cancer. Special preparation is necessary and is performed under local anesthesia.

■ ENDOSCOPY

An endoscope is an instrument used to examine the interior of a hollow organ or cavity. It consists of either a rigid or flexible hollow tube connected to an optical system to allow for the viewing of tissues. This is most often used in the gastrointestinal system (upper and lower gastrointestinal tract).

In the respiratory tract endoscopy is used to view the nose, sinuses, larynx, and bronchi.

Obstetricians and gynecologists use the endoscope to view reproductive organs and a fetus inside a pregnant uterus.

BODY SCANS

The three types of scans that are most commonly used to “look inside the body” are computerized tomography or computer assisted tomography (CT or CAT scans), magnetic resonance imaging (MRI) and ultrasonography. These studies are performed under the direction of radiologists.

■ CT SCANS

The CT scan is many times more sensitive than an ordinary x-ray. It is produced by an x-ray beam that goes through the body. The resulting picture can reveal soft tissue structures that are not identifiable on a standard x-ray. This scan requires the patient to lie on a table, which is then positioned under the scanner. Often, an iodine-based dye is injected to further enhance the images.

■ MAGNETIC RESONANCE IMAGING

The MRI utilizes magnetism and radio waves rather than x-rays or contrast dyes to produce its image. This picture is clearer than ordinary x-rays and no ionizing radiation is used. The patient must lie still in a circular tunnel (surrounded by the magnet) while the imaging unit is functioning.

■ ULTRASONOGRAPHY (ULTRASOUND)

A visual image of tissue inside the body can be produced with sound waves. Ultrasound uses a transducer that sends and receives inaudible (unheard by the human ear) high-frequency sound waves. The reflected sound waves are displayed on a video screen and photographed for study. Ultrasound is now widely used to examine a growing fetus inside a mother’s uterus.

■ RADIONUCLIDE (NUCLEAR) SCANS

This imaging process uses small amounts of radioactive material (radioisotopes). The isotopes are introduced into the body by injection, inhalation, or swallowing. Special detectors are then used to determine the size, shape, and function of the organ being studied. Since the radioactive material is distributed throughout the body, this type of scanning is not advised for a pregnant woman or nursing mother.

■ BONE SCAN

In this type of scan, the isotope is injected. Following the injection, a three hour period of waiting is necessary. Special pictures are taken using a gamma camera that isolates bone problems (such as fractures) by the indication of a “hot spot” on the image.

■ LUNG SCAN

This scan is used to determine if a pulmonary embolus (blood clot in the lung) is present. The isotope is inhaled, and while holding the breath, images are recorded. The procedure is completed by the injection of radioactive material into a vein for recording further studies.

■ LIVER SCAN

A radioactive dye is injected into a vein. The dye forms specifically in the liver and can then detect the presence of cysts, abscesses, tumors, or cancer. A special gamma camera is used to record the imaging.

■ RADIOACTIVE IODINE UPTAKE TEST/THYROID SCAN

A radioactive substance is swallowed in a capsule or liquid form. Approximately 6 - 24 hours later, the ingested radioactive iodine can be measured. A gamma camera is used to record the images for interpretation.

■ HEART SCANS

Two procedures can be performed: A thallium stress test or radio nuclide angiography. The thallium stress test is done with an exercise stress test on a treadmill or bicycle. The radioactive substance (thallium) is injected into the bloodstream at the maximum level of exercise.

Photographs are taken immediately following the heavy exercise, as well as several hours after, which measures the heart both at a state of stress and a state of rest. The scan can reveal areas of actual heart damage (myocardial infarction) or areas that are not receiving enough blood (ischemic myocardium). Radio nuclide angiography reveals how effectively the heart is functioning. The scanning procedure is technically intricate and may take one to three hours. A gamma camera is used for recording the imaging.

HEART AND LUNG CATHETERIZATION

The heart or lung catheterization procedure enables cardiologists to view and evaluate the shape and function of the heart chambers, heart valves, and pulmonary circulation. A catheter is a tubular shaped instrument that is inserted through a vein in the arm, groin, or leg and is gently guided into the heart or lung. When the catheter is in place, dye is delivered through the catheter. The catheterization process is monitored on a video screen and may be recorded for future reference.

SPECIAL X-RAY PROCEDURES

A radiologist can perform a variety of procedures using standard or specialized x-ray equipment. Types of these procedures are arthrograms (joint x-rays), cerebral arteriography (brain x-rays), as well as views of the kidneys and the bile and pancreatic ducts.

NEUROLOGICAL PROCEDURES

Electroencephalography (EEG) measures the waves of electrical activity produced by the brain. It is used most often used in managing seizure disorders. The electromyography (EMG) measures the tiny electrical discharges produced in muscles and assists in the diagnosis of muscle or nerve disorders, such as muscular dystrophy and amyotrophic lateral sclerosis.

MICROBIOLOGICAL TESTS

Any body fluid or tissue can be cultured to check for the presence of microorganisms, malignancies, and abnormal conditions. Common cultures used today are throat cultures, and pap smears.

