

Frequently carried out blood tests

The following are blood tests that are frequently carried out within the children's outpatient department. There are lots of other tests that are done and these can be seen in a box in the clean utility. This is just a breakdown of what the test looks at in the blood and some of the things that they help to diagnose. The tests may also be used to help diagnose other things.

Ammonia

This test is done to check how well the liver is working. In children it can help to diagnose Reye syndrome (this can damage the liver and brain). This test is also done on patients that are on high – calorie intravenous (IV) nutrition.

Amylase

This is a protein (enzyme) produced by the pancreas. If too much or too little is produced then this could show there is a problem with the pancreas.

ACTH

ACTH is also done with a cortisol test and this is used to help diagnose Cushing's syndrome, Addison's syndrome and tumours of the pituitary and adrenal gland. The balances between the two levels are looked at.

Amino Acids

Amino acids are the building blocks for proteins in the body. This test is used to diagnose metabolic and nutritional disorders such as food and chemical sensitivities and behavioural disorders including autism and ADHD.

B12

The body needs this B vitamin to make blood cells and to maintain a healthy nervous system. B12 is often measured at the same time as folic acid. If there is a lack of either of these in the blood then this can lead to megaloblastic anaemia.

Bilirubin/MSB

(Conjugated/unconjugated)

Bilirubin is a yellow pigment that is in everyone's blood and stool. A blood test helps to diagnose why a patient has jaundice (yellowing of the skin and the whites of the eyes).

Bilirubin is conjugated in the liver by being mixed with glucuronic acid. This gives a direct result to the test.

Unconjugated bilirubin has not been mixed in the liver and this gives an indirect result to the test.

Blood glucose

A blood glucose test measures the amount of a sugar called glucose in your blood. This test helps to diagnose diabetes.

Coagulation screen

This test measures the ability and time it takes the blood to clot. This test can help diagnose haemophilia; this is where the blood doesn't clot.

Clotting

Clotting (Prothrombin Time PT or PT-INR) test measures how long it takes the blood to clot. Deep vein thrombosis can be diagnosed or to check if the level of medication a person is taking is at the right level to help the blood clot.

CK

Creatinine kinase;

CK is an enzyme in the body. The muscle cells in your body require this enzyme to function properly. This test can show up if there has been a skeletal muscle injury.

Celiac screen

TTG

This test looks at the antibodies that the body makes in response to eating gluten. This antibody is called Tissue Transglutamase antibody.

ESR

Erythrocyte Sedimentation

This test measures the rate in which the red blood cells falls to the bottom of the tube. This can show if there is inflammation somewhere within the body.

FBC

Full blood count

This test checks a person's general health; this test looks at the cells in the blood.

Red cells transport oxygen around the body

Haemoglobin is part of the red blood cells – Low haemoglobin could indicate anaemia. High haemoglobin could indicate a problem with the bone marrow.

White cells fight infections

Low white cells can also mean there may be a problem with the bone marrow. It could also indicate a virus or genetic issue.

High white cells can indicate the body is fighting an infection.

Platelets stop bleeding by starting the clotting process

Low platelets can be an indicator of an autoimmune condition or an indicator of a viral infection

High platelet can mean inflammation, infections or conditions relating to the bone marrow

Ferritin/Folate

Ferritin is a protein in the body that stores iron. If there are low levels of ferritin in the body, this is an indicator of anaemia.

Folate levels are monitored at the same time as B12 and ferritin for anaemia.

Gamma GT

This test is also measured at the same time as another enzyme (ALP) alkaline phosphatase. This test will be done if it is suspected that there is a problem with the liver or bile ducts.

Hepatitis A (HAV), B (HBV), C (HCV)

This test looks to see if any of the antibodies are present in the blood.

HIV

The test looks for antibodies (the body fighting), antigens (a protein found in the HIV cell), or both.

HBA1C

This test measures how controlled a person's diabetes has been over a 2-3 month period

Immunoglobulin subclasses

IGE/IGG/IGA/IGM

Immunoglobulin's are a circulating protein (these are produced by plasma cells) and contains protective antibodies against many infections. This blood test gives information regarding the health of the patient's immune system. Immunoglobulins are produced when the body is exposed to bacteria, viruses and microorganisms.

Immunoglobulin's disorders can be classified as:

- Immunoglobulin excess
Polyclonal, immunoglobulin's from different plasma cells (an increase of these can be seen with a variety of conditions).
Monoclonal, immunoglobulin's from the same plasma cell (these are seen in blood cell tumours that involve lymphocytes or plasma cells).
- Immunoglobulin deficiency
Secondary (acquired) caused by a contributing factor or an underlying condition.
Primary (inherited) where the body cannot be produced one or more class of immunoglobulin
Because the immunoglobulin's that are produced are abnormal then the patient is actually immunocompromised.

Some conditions that cause an increase are:

- Infections
- Rheumatoid arthritis
- Lupus
- Cirrhosis
- In a new born baby (infections during pregnancy) congenital – syphilis, toxoplasmosis, rubella, CMV

Some conditions that cause a decrease are:

- Immunosuppressant drugs
- Complications following a diagnosis of diabetes/kidney failure

- Nephrotic syndrome
- Burns

Insulin

Insulin is a metabolic hormone. Insulin transports glucose (the main source of energy for the body) from blood to cells. It is produced and stored within the beta cells which are in the pancreas. If the body does not produce enough insulin then the cells are starved.

Low levels of insulin can occur in;

- Diabetes
- Hypopituitarism
- Pancreatitis

Low levels of insulin with high levels of glucose indicate an inability to produce insulin in diabetes or pancreatitis.

High levels of insulin can occur in;

- Obesity
- Cushing syndrome

High level of insulin with high or normal levels of glucose indicate hypoglycaemia

LFT

Liver function test

LFT's measure various chemicals in the blood made by the liver.

These include;

- ALT (Alanine transaminase), large amounts of this in the liver occurs when it is inflamed or injured (hepatitis)
- AST (Aspartate aminotransferase), high levels of this in the liver indicates an injury or this can also be released if the heart or skeletal muscle is damaged.
- ALP (Alkaline phosphatase), this is raised if there is liver and bone disease

- Albumin, a low level of this can be indicated in people that are malnourished as well as some liver disorders
- Total protein, this measures albumin and other proteins in the blood
- Bilirubin (see previous)

Lactate

Lactate is produced when the body hasn't got enough oxygen to support its energy production. It is formed from glycogen in muscle cells.

When lactate levels are high this could be an indication that the patient has had a heart attack or there is a severe infection (sepsis) within the body.

Lipid profile (fasting)

Lipid profile testing looks at the substances that the body uses for energy, fats and fatty substances.

This includes;

Cholesterol

Triglycerides – high triglycerides often mean lower LDL levels. There are genetic factors that contribute to this such as diabetes. Also being overweight can contribute to lower LDL.

High – density lipoprotein (HDL) – This is the good cholesterol. HDL removes LDL from the places in the body that it shouldn't be reducing the risks of heart attacks.

Low – density lipoprotein (LDL) – This is classed as bad cholesterol. Too much of this can lead to a heart attack, stroke or atherosclerosis.

Lyme's disease

This blood test looks for the antibodies for Lyme's disease. If they are detected then the blood test is then sent to a specialist reference laboratory for confirmatory testing.

Nucleated RBC (Red Blood Cells)

This blood test can be done with a Full Blood Count (FBC). In children the RBC levels can also help to diagnose Iron deficiency anaemia (this means that there is less RBC's than normal). A low level of RBC can also indicate deficiencies in vitamin B6 and B12 and malnutrition. A high RBC count can be an indicator of dehydration (this can be from severe diarrhoea in children).

PTH (parathyroid Hormone) levels

PTH within the blood controls calcium, vitamin D and phosphorus levels. If the level of hormone is elevated then a diagnosis of hyperparathyroidism may be given to the patient.

Quantiferon

The blood test is used to diagnose Mycobacterium tuberculosis, which includes (LBTI) latent tuberculosis infection and tuberculosis (TB). If the result of the blood test is positive this does not necessarily mean that the infection is active, it could mean that it is being treated and therefore is latent. A blood test is more reliable than the skin testing that used to be used (TST). A blood test alone will not diagnose TB, the patient will also need an X-ray, sputum sample, smear and blood cultures.

Rast (radioallergosorbent) test

This blood test is to determine what a person is allergic to. The blood test works on a specific IgE (IgE is one of the 5 subclasses of antibodies made in the immune system, these are antibodies that attack antigens such as allergens) antibodies by using radioimmunoassay tests.

TFT

Thyroid Function Test

A TFT test is to check the function of the thyroid gland. The results of this test diagnoses whether it is over active or under active. With TFT test they may request a T3 and T4.

T3 and T4 – secreted into the blood stream from the thyroid are two hormones, thyroxin (this has 4 atoms of iodine) this is called T4, this then

converts into tri – iodothyronine T3 (this has 3 atoms of iodine) this regulates your metabolism.

Also with TFT blood test a TSH (thyroid – stimulating hormone) result may be required.

TSH – is stimulated when the level of T3 and T4 have dropped then it is secreted; this is to activate the T4 to produce more.

Under – active thyroid – this is when the TSH level is high and the FT4 is low (treatment is requirement).

Over – active thyroid – is when the TSH level is low and the FT4 is high (treatment is required)

A low level result of the TSH and FT4 could mean failure of the pituitary gland.

U+E

Urea and Electrolytes

This is a blood test that measures the urea + electrolytes in the kidneys.

Urea nitrogen – This is a waste product of proteins and this is normally broken down in the kidneys and then secreted out through the urine.

Electrolytes – For our cells and organs to function properly then the electrolytes in our bodies need to be in balance. The most common ones (that are tested for) are bicarbonate, chloride, potassium and sodium.

There are a number of conditions that can be diagnosed using a U+E blood test.

- Hyponatremia (low sodium)
- Hypernatremia (high sodium)
- Hypokalaemia (low potassium)
- Hyperkalaemia (high potassium)
- Metabolic Acidosis (low bicarbonate)
- Metabolic Alkalosis (high bicarbonate)
- Dehydration (high urea and/or creatinine)
- Renal (kidney) impairment or failure (high urea and/or creatinine)

- Gastrointestinal bleeding (high urea)
- Hypoglycaemia (low glucose)
- Hyperglycaemia (high glucose)

Vitamin D

The body requires vitamin D to help with bone growth; by absorbing calcium this promotes it. If children don't get enough vitamin D then this could lead to soft bones and also rickets and this can then lead to abnormal bones in adults.

Some symptoms of vitamin deficiency are;

- Difficulty thinking clearly
- Bone pain
- Frequent bone fractures
- Muscle weakness
- Soft bones that may result in deformities
- Unexplained fatigue

Zinc

Zinc is a mineral that is required by the body for development, immune function and hormone balance. Any deficiencies in the levels and all these functions will suffer, but the body does not store it. Low levels of zinc can be found in patients with fever, sepsis or stress.