DIAGNOSTIC TESTS
STANDARD CHEMISTRY & BASIC HAEMATOLOGY

Test Profile	Range RR	Interpretation of Results	
		↑ Increased ↑	↓ Decreased ↓
Albumin	34-50 g/l	Dehydration	Chronic liver disease (decreased synthesis), nephrotic syndrome, protein-losing enteropathy or extensive burns. Malabsorption or malnutrition may also cause hypo-albuminaemia.
Alkaline Phosphatase		Obstructive liver disease and bone disease.	
ALT (alanine transaminase)	0-45 U/l	Liver disease, particularly hepatocellular damage. High levels in toxic and viral hepatitis and acute circulatory failure. Moderately increased in cirrhosis, cholestasis and infectious mononucleosis. Also increased in myopathy. Isolated slightly raised ALT may be found with obesity and chronic hepatitis.	
AST (aspartate transaminase)	0-41 U/l	Following myocardial infarction and in viral or toxic hepatitis, modest elevation is found with cholestasis, alcoholism, hepatic malignancy, chronic hepatitis, some skeletal muscle diseases and after muscle trauma.	
Bilirubin	Less than 20 μmol/l	Hepatic dysfunction, biliary obstruction or excessive red cell turnover. Mildly elevated in Gilbert's syndrome. Also markedly elevated in the first few days of life but should fall rapidly within 5 days. Premature infants may show a more persistent elevation.	
Calcium	2.1-2.6 mmol/l (slightly higher in children under 5 years)	Hyperparathyroidism, myeloma, bone metastases, parathormone or parathormone related peptide producing neoplasms, Vit D excess and sarcoidosis.	Hypoparathyroidism, Vit D deficiency and hypomagnesaemia. Low values also found from hypo-albuminaemia.
Creatinine	45-120 μmol/l values vary greatly for infants and children.	Raised in renal failure. More sensitive indicator of early failure than blood urea. Value for monitoring after renal transplant.	Reduced muscle mass or low protein diet.
ESR Erythrocyte Sedimentation Rate	0-10mm/hour (Westergren method)	Pyrexial conditions, inflammatory diseases (including collagen diseases) and malignancies. Early indicator of disease. Normal values increase over 50 years (females more than males) and during pregnancy.	Falls more slowly during recovery than the C-Reactive Protein (CRP).
GGT (Gamma GT)	Male: 0-60 U/l Female: 0-40 U/l	Very sensitive indicator of liver damage, and of alcohol abuse. Also obesity, cardiac failure, diabetes, pancreatitis and malignancies. Levels may be raised by drugs which are enzyme inducers.	
Globulin	16-37 g/l	Chronic liver disease, chronic inflammatory and auto-immune disease and paraproteinaemias.	Nephrotic syndrome, malnutrition and hypogammaglobulinaeamia.
Glucose	Fasting: 2.8-5.8 mmol/l Random: 2.8-8.9 mmol/l (See note) ➔	Diabetes mellitus and some adrenal, thyroid and pituitary disorders. NB: AT 2 HOURS AFTER FOOD THE BLOOD GLUCOSE SHOULD NOT EXCEED 8.0 mmol/l	Insulin excess (iatrogenic or insulinoma) and in some inherited metabolic disorders, particularly glycogen storage disease.

Test Profile	Range RR	Interpretation of Results	
		↑ Increased ↑	↓ Decreased ↓
Haemoglobin	Adults: Male: 13.2-17.0 g/dl Female: 11.5-15.5 g/dl Children: <1 yr.: 10.5-13.5 g/dl 2-6 yrs: 11.5-14.0 g/dl 7-12 yrs: 11.5-14.5 g/dl	Hydration, tourniquet left on too long or clots in the sample may influence accuracy of result and in particular serial assessment.	
Haemoglobin	Adults: Male: 13.2-17.0 g/dl Female: 11.5-15.5 g/dl Children: <1 yr.: 10.5-13.5 g/dl 2-6 yrs: 11.5-14.0 g/dl 7-12 yrs: 11.5-14.5 g/dl	Accuracy of result and in particular serial assessment may be influenced by hydration, tourniquet left on too long or clots in the sample.	
HCT (PCV) Haematocrit	Male: 0.4-0.54 Female: 0.37-0.47	Polycythaemia and in haemoconcentration due to dehydration.	Anaemia and overhydration.
HCT (PCV)	Male: 0.4-0.54 Female: 0.37-0.47	Polycythaemia and in haemoconcentration due to dehydration.	Anaemia and overhydration.
MCH Mean Cell Haemoglobin	27-33 pg		Iron deficiency anaemia and the thalassaemias.
MCH	27-33 pg		Iron deficiency anaemia and the thalassaemias.
MCHC Mean Cell Haemoglobin Vol.	32-36 g/dl	Increased values may be seen in the presence of spherocytes and sickle cells.	Iron deficiency anaemia, slightly reduced in some thalassaemias.
MCHC	32-36 g/dl	Increased values may be seen in the presence of spherocytes and sickle cells.	Iron deficiency anaemia, slightly reduced in some thalassaemias.
MCV Mean Cell Volume	80-98 fl	Macrocytic anaemias. Haemolytic anaemias, post-haemorrhage and in liver disease - especially associated with increased alcohol intake.	Thalassaemias and mycrocytic anaemia.
MCV	80-98 fl	Macrocytic anaemias. Haemolytic anaemias, post-haemorrhage and in liver disease - especially associated with increased alcohol intake.	Thalassaemias and mycrocytic anaemia.
Phosphate	0.8-1.4 mmol/l (higher values in children under 15 years: 1.29-1.78 mmol/l)	May be low in primary and secondary hyperparathyroidism and Vit D deficiency. Raised in renal failure and hypoparathyroidism. NB: results best interpreted together with calcium, albumin, alkaline phosphatase and creatinine levels.	
Platelet Count	150-400x10^9/l	Chronic haemorrhage, essential thrombocythaemia, vasculitides and post-splenectomy.	Malignancies, cytotoxic chemotherapy, auto-immune thrombocytopenia, DIC, splenomegaly and multi-transfused patients.

Test Profile	Range RR	Interpretation of Results	
		↑ Increased ↑	↓ Decreased ↓
RBC Red blood cells	Male: 4.2-5.8x10^12/l Female: 3.8-5.4x10^12/l	Reduced after haemorrhage (not immediately), haemolysis and in various anaemias. Polycythaemia and also in the thalassaemia traits, helping to distinguish these from iron deficiency.	
Triglycerides	<2.0 mmol/l	Familial pre-beta hyperlipidaemia, familial combined hyperlipidaemia, familial lipoprotein lipase deficiency, familial type V hyperlipidaemia, familial dyslipidaemia and secondary hyperlipidaemia (e.g. diabetes, obesity alcoholism etc.)	
Urate	Male: 180-450 μmol/l Female: 165 -350 μmol/l	Raised in gout. Renal failure, alcohol excess, high purine dietary intake, acute leukaemias, polycythaemia vera and in cytotoxic chemotherapy or radiotherapy.	
Urea	2.5-7.0 mmol/l (age up to 54) 2.5-8.4 (age over 54 years)	Increases with age. Renal dysfunction, dehydration, high protein diet and excess protein catabolism.	Pregnancy, starvation and hepatocellular failure.
WBC. White Blood Cell and differential	3.8-11.0x10^9/l	Bacterial infection, leukaemias, polycythaemia, exercise (including an epileptic seizure), later stages of pregnancy and trauma.	Some viral infections, drug therapy, aplastic anaemias and in idiopathic neutropenias.
LIPID SCREEN			
HDL-cholesterol High Density Lipoprotein	0.8-1.9 mmol/l Female 0.9-2.2 mmol/l More than 20% of total cholesterol is optimal		Low levels of HDL cholesterol predispose to coronary and peripheral arterial disease.
HDL/ ratio			
LDL- Low Density calculated	<4.0 mmol/l Borderline area: 4.0-4.9 mmol/l	Increased risk of atherosclerosis. Calculated from HDL and measured total cholesterol.	
COAGULATION SCREEN			
Activated partial prothrombin time (APTT)	26-38 secs	APTT prolonged in liver disease, coagulation factor deficiencies, especially haemophilia and Christmas disease (and sometimes in von Willebrand's disease), with circulating anticoagulants (such as Lupus Anticoagulant) and in anticoagulant therapy (especially i.v. heparin).	
Fibrinogen (if indicated)	2.0-4.0 g/l	Increased in inflammatory conditions. Risk factor in coronary artery disease.	Assayed in acute haemorrhagic episode in which DIC is suspected, when the level may be markedly decreased. Also reduced in congenital abnormalities of fibrinogen.
Prothrombin time (PT)	12-16 secs.	PT is prolonged by oral anticoagulant therapy, liver disease, malabsorption, DIC and congenital Factor deficiencies.	
Thrombin time	10-15 secs.	Prolonged in heparin therapy, fibrinogen deficiency, disseminated intravascular coagulation (DIC), liver disease and in the presence of FDPs (XDPs).	

Test Profile	Range RR	Interpretation of Results	
		↑ Increased ↑	↓ Decreased ↓
HAEMATINIC PROFILE **NB: A reticulocyte count is recommended 5-7 days after the start of treatment, to detect early response.**			
DC4/CD8 ratio			
Red cell folate			
Saturation (%)	20-50		
Serum B12	200-11--ng/l	B12 therapy, myeloproliferative syndromes and (rarely) in primary hepatic carcinoma.	Pernicious anaemia and certain malnutrition/malabsorption states.
Serum ferritin	Male: 30-250 ng/ml Female: 30-80 ng/ml Post-menopausal: 30-175 ng/ml	Iron overload from any cause and in many malignant and inflammatory conditions.	Iron deficiency.
Serum iron (preferably fasting)	10-30 µmol/l	Excessive iron intake, haemolytic anaemias and haemochromatosis.	Iron deficiency anaemia, infections and malignancy.
TIBC Total Iron Binding Capacity	45-70µmol/l	Liver damage, haemolytic anaemias, excessive iron intake, haemochromatosis and in iron deficiency.	Acute and chronic infections and nephrotic syndrome.
BIOCHEMISTRY - STANDARD CHEMISTRY			
Albumin	34-50 g/l	Dehydration	Chronic liver disease (decreased synthesis), nephrotic syndrome, protein-losing enteropathy or extensive burns. Malabsorption or malnutrition may also cause hypo-albuminaemia.
Alkaline Phosphatase		Obstructive liver disease and bone disease.	
ALT (alanine transaminase)	0-45 U/l	Liver disease, particularly hepatocellular damage. High levels in toxic and viral hepatitis and acute circulatory failure. Moderately increased in cirrhosis, cholestasis and infectious mononucleosis. Also increased in myopathy. Isolated slightly raised ALT may be found with obesity and chronic hepatitis.	
AST (aspartate transaminase)	0-41 U/l	Following myocardial infarction and in viral or toxic hepatitis, modest elevation is found with cholestasis, alcoholism, hepatic malignancy, chronic hepatitis, some skeletal muscle diseases and after muscle trauma.	
Bilirubin	Less than 20 µmol/l	Hepatic dysfunction, biliary obstruction or excessive red cell turnover. Mildly elevated in Gilbert's syndrome. Also markedly elevated in the first few days of life but should fall rapidly within 5 days. Premature infants may show a more persistent elevation.	
Calcium	2.1-2.6 mmol/l (slightly higher in children under 5 years)	Hyperparathyroidism, myeloma, bone metastases, parathormone or parathormone related peptide producing neoplasms, Vit D excess and sarcoidosis.	Hypoparathyroidism, Vit D deficiency and hypomagnesaemia. Low values also found from hypo-albuminaemia.

Test Profile	Range RR	Interpretation of Results	
		↑ Increased ↑	↓ Decreased ↓
Cholesterol	5.2 mmol/l	Hyperlipidaemia, esp types IIa, IIb, III, (IV) Obstructive Jaundice, Alcoholic hepatitis, Nephrotic syndrome, myxoedema	Hyperthyroidism, pernicious anaemia, Malnutrition, abetalipoproteinaemia
Creatinine	45-120 μmol/l values vary greatly for infants and children.	Raised in renal failure. More sensitive indicator of early failure than blood urea. Value for monitoring after renal transplant.	Reduced muscle mass or low protein diet.
GGT Gamma-Glutamyl transpeptidase	Male: 0-60 U/l Female: 0-40 U/l	Very sensitive indicator of liver damage, and of alcohol abuse. Also obesity, cardiac failure, diabetes, pancreatitis and malignancies. Levels may be raised by drugs which are enzyme inducers.	
Globulin	16-37 g/l	Chronic liver disease, chronic inflammatory and auto-immune disease and paraproteinaemias.	Nephrotic syndrome, malnutrition and hypogammaglobulinaeamia.
Glucose	Fasting: 2.8-5.8 mmol/l Random: 2.8-8.9 mmol/l NB: AT 2 HOURS AFTER FOOD THE BLOOD GLUCOSE SHOULD NOT EXCEED 8.0 mmol/l	Diabetes mellitus and some adrenal, thyroid and pituitary disorders.	Insulin excess (iatrogenic or insulinoma) and in some inherited metabolic disorders, particularly glycogen storage disease.
Phosphate	0.8-1.4 mmol/l (higher values in children under 15 years: 1.29-1.78 mmol/l)	May be low in primary and secondary hyperparathyroidism and Vit D deficiency. Raised in renal failure and hypoparathyroidism. NB: results best interpreted together with calcium, albumin, alkaline phosphatase and creatinine levels.	
Total protein			
Triglycerides	<2.0 mmol/l	Familial pre-beta hyperlipidaemia, familial combined hyperlipidaemia, familial lipoprotein lipase deficiency, familial type V hyperlipideaemia, familial dyslipidaemia and secondary hyperlipidaemia (e.g. diabetes, obesity alcoholism etc.)	-
Urate	Male: 180-450 μmol/l Female: 165 -350 μmol/l	Raised in gout. Renal failure, alcohol excess, high purine dietary intake, acute leukaemias, polycythaemia vera and in cytotoxic chemotherapy or radiotherapy.	
Urea	2.5-7.0 mmol/l (age up to 54) 2.5-8.4 (age over 54 years)	Increases with age. Renal dysfunction, dehydration, high protein diet and excess protein catabolism.	Pregnancy, starvation and hepatocellular failure.

LIVER FUNCTION TESTS			
Test Profile	**Range RR**	**Interpretation of Results**	
		↑ Increased ↑	**↓ Decreased ↓**
Albumin	34-50 g/l	Dehydration	Chronic liver disease (decreased synthesis), nephrotic syndrome, protein-losing enteropathy or extensive burns. Malabsorption or malnutrition may also cause hypo-albuminaemia.
Alkaline Phosphatase		Obstructive liver disease and bone disease.	
ALT (alanine transaminase)	0-45 U/l	Liver disease, particularly hepatocellular damage. High levels in toxic and viral hepatitis and acute circulatory failure. Moderately increased in cirrhosis, cholestasis and infectious mononucleosis. Also increased in myopathy. Isolated slightly raised ALT may be found with obesity and chronic hepatitis.	
AST (aspartate transaminase)	0-41 U/l	Following myocardial infarction and in viral or toxic hepatitis, modest elevation is found with cholestasis, alcoholism, hepatic malignancy, chronic hepatitis, some skeletal muscle diseases and after muscle trauma.	
Bilirubin	Less than 20 μmol/l	Hepatic dysfunction, biliary obstruction or excessive red cell turnover. Mildly elevated in Gilbert's syndrome. Also markedly elevated in the first few days of life but should fall rapidly within 5 days. Premature infants may show a more persistent elevation.	
Globulin	16-37 g/l	Chronic liver disease, chronic inflammatory and auto-immune disease and paraproteinaemias.	Nephrotic syndrome, malnutrition and hypogammaglobulinaeamia.
Total protein			

ENDOCRINOLOGY

THYROID PROFILE

Test Profile	Range RR	Interpretation of Results	
		↑ Increased ↑	↓ Decreased ↓
Free T_4	9.4-24 pmol/l	Hyperthyroidism. NB: Useful in determining thyroid status in patients with an abnormal TBG levels e.g. pregnancy, oestrogen or androgen therapy, on the contraceptive pill or a congenitally abnormal TBG level.	Hypothyroidism
TSH	0.3-3.5 mU/l	Hypothyroidism (due to primary thyroid failure). A sensitive index of hypothyroidism and may be raised before thyroxine is abnormally low.	
HIRSUITISM PROFILE			
Free androgen index (FAI)			
Sex-hormone binding globulin (SHBG)	Male: 10-50 nmol/l Female: 30-90 nmol/l	Pregnancy, hyperthyroidism and in subjects on oral contraceptives.	Found in hirsute women and is a valuable investigation in this condition.
Testosterone	Male: 10-35 nmol/l Female: Pre-menopausal: 0.7-2.8 nmol/l Post-menopausal: 0.3-1.2 nmol/l	High levels in females may indicate an adrenorcortical tumour, androgen-secreting ovarian tumour or pituitary overproduction of ACTH.	Male infertility due to hypogonadism.
FERTILITY PROFILE (MALE)			
Follicle stimulating hormone (FSH) (Blood)	Male: 1.0-9.0 U/l Female: Follicular phase: 1.1-9.6 U/l Mid-cycle peak: 2.3-21 U/l Luteal phase: 0.8-7.5 U/l Post-menopausal: 20-96 U/l	Very high levels found after puberty in primary gonadal failure and in the menopause. Useful, with the luteinising hormone, in the investigation of infertility or hypogonadism in both sexes and amenorrhoea in women.	
Free androgen index (FAI)			
Luteinising hormone (LH) (Blood)	Male: 85-858 mU/hour Female: 85-1500 mU/hour (excluding mid-cycle peak	Raised in primary gonadal failure. Used in evaluation of infertility, amenorrhoea, hypogonadism and failure to ovulate.	

Test Profile	Range RR	Interpretation of Results	
		↑ Increased ↑	↓ Decreased ↓
Prolactin	Male: less than 250 mU/l Female: less than 400 mU/l	Most usual cause of a raised prolactin level (apart from pregnancy, lactation, hypothyroidism and phenothiazine drugs) is a pituitary (micro-) adenoma. NB: the stress of venepuncture may induce mild hyperprolactinaemia.	
Sex-hormone binding globulin (SHBG)	Male: 10-50 nmol/l Female: 30-90 nmol/l	Pregnancy, hyperthyroidism and in subjects on oral contraceptives.	Found in hirsute women and is a valuable investigation in this condition.
Testosterone	Male: 10-35 nmol/l Female: Pre-menopausal: 0.7-2.8 nmol/l Post-menopausal: 0.3-1.2 nmol/l	High levels in females may indicate an adrenorcortical tumour, androgen-secreting ovarian tumour or pituitary overproduction of ACTH.	Male infertility due to hypogonadism.
IMPOTENCE PROFILE			
Free androgen index (FAI)			
Luteinising hormone (LH) (Blood)	Male: 85-858 mU/hour Female: 85-1500 mU/hour (excluding mid-cycle peak	Raised in primary gonadal failure. Used in evaluation of infertility, amenorrhoea, hypogonadism and failure to ovulate.	
Prolactin	Male: less than 250 mU/l Female: less than 400 mU/l	Most usual cause of a raised prolactin level (apart from pregnancy, lactation, hypothyroidism and phenothiazine drugs) is a pituitary (micro-) adenoma. NB: the stress of venepuncture may induce mild hyperprolactinaemia.	
Sex-hormone binding globulin (SHBG)	Male: 10-50 nmol/l Female: 30-90 nmol/l	Pregnancy, hyperthoidism and in subjects on oral contraceptives.	Found in hirsute women and is a valuable investigation in this condition.
Testosterone	Male: 10-35 nmol/l Female: Pre-menopausal: 0.7-2.8 nmol/l Post-menopausal: 0.3-1.2 nmol/l	High levels in females may indicate an adrenorcortical tumour, androgen-secreting ovarian tumour or pituitary overproduction of ACTH.	Male infertility due to hypogonadism.

Glucose: This is the chief source of energy for all living organisms. A level greater than 105 in someone who has fasted for 12 hours suggests a diabetic tendency. If this level is elevated even in a non-fasting setting one must be concerned that there is a risk for developing diabetes. This is an incredibly powerful test and can predict diabetes ten years or more before one develops the strict definition of diabetes which is levels greater than 120.

Sodium: This element plays an important role in salt and water balance in your body. A low level in the blood can be caused by too much water intake, heart failure, or kidney failure. A low level can also be caused by loss of sodium in diarrhoea, fluid or vomiting. A high level can be caused by too much intake of salt or by not enough intake of water.

Potassium and Magnesium: These elements are found primarily inside the cells of the body. Low levels in the blood may indicate severe diarrhoea, alcoholism, or excessive use of water pills. A very low level of magnesium in the blood can cause your muscles to tremble. Low potassium levels can cause muscle weakness and heart problems.

Chloride: Is an electrolyte controlled by the kidneys and can sometimes be affected by diet. An electrolyte is involved in maintaining acid-base balance and helps to regulate blood volume and artery pressure. Elevated levels are related to acidosis as well as too much water crossing the cell membrane.

BUN (Blood Urea Nitrogen): BUN is a waste product derived from protein breakdown in the liver. Increases can be caused by excessive protein intake, kidney damage, certain drugs, low fluid intake, intestinal bleeding, exercise, heart failure or decreased digestive enzyme production by the pancreas. Decreased levels are most commonly due to inadequate protein intake, malabsorption, or liver damage.

Creatinine: Creatinine is also a protein breakdown product. Its level is a reflection of the bodies muscle mass. Low levels are commonly seen in inadequate protein intake, liver disease, kidney damage or pregnancy. Elevated levels are generally reflective of kidney damage and need to be monitored very carefully.

Uric Acid: Uric acid is the end product purine metabolism. High levels are seen in gout, infections, high protein diets, and kidney disease. Low levels generally indicate protein and molybdenum (trace mineral) deficiency, liver damage or an overly acid kidney.

Phosphate: Phosphate is closely associated with calcium in bone development. Therefore most of the phosphate in the body is found in the bones. But the phosphate level in the blood is very important for muscle and nerve function. Very low levels of phosphate in the blood can be associated with starvation or malnutrition and this can lead to muscle weakness. High levels in the blood are usually associated with kidney disease. However the blood must be drawn carefully as improper handling may falsely increase the reading.

Calcium: Calcium is the most abundant mineral in the body. It is involved in bone metabolism, protein absorption, fat transfer, muscular contraction, transmission of nerve impulses, blood clotting, and heart function. It is highly sensitive to elements such as magnesium, iron, and phosphorous as well as hormonal activity, vitamin D levels, CO2 levels and many drugs. Diet, or even the

presence of calcium in the diet has a lot to do with "calcium balance" - how much calcium you take in and how much you lose from your body.

Albumin: The most abundant protein in the blood, it is made in the liver and is an antioxidant that protects your tissues from free radicals. It binds waste products, toxins and dangerous drugs that might damage the body. Is also is a major buffer in the body and plays a role in controlling the precise amount of water in our tissues. It serves to transport vitamins, minerals and hormones. The higher this number is, the better. The highest one can reasonably expect would be 5.5.

Alkaline Phosphatase: Alkaline phosphatase is an enzyme that is found in all body tissue, but the most important sites are bone, liver, bile ducts and the gut. A high level of alkaline phosphatase in your blood may indicate bone, liver or bile duct disease. Certain drugs may also cause high levels. Growing children, because of bone growth, normally have a higher level than adults do. Low levels indicate low functioning adrenal glands, protein deficiency, malnutrition or more commonly, a deficiency in zinc.

Transaminases (SGTP) & (SGOT): These are enzymes that are primarily found in the liver. Drinking too much alcohol, certain drugs, liver disease and bile duct disease can cause high levels in the blood. Hepatitis is another problem that can raise these levels. Low levels of GGTP may indicate a magnesium deficiency. Low levels of SGPT and SGOT may indicate deficiency of vitamin B6.

Gamma-Glutamyltranserase (GGTP): Believed to be involved in the transport of amino acids into cells as well as glutathione metabolism. Found in the liver and will rise with alcohol use, liver disease, or excess magnesium. Decreased levels can be found in hypothyroidism and more commonly decreased magnesium levels.

Lactate Dehydrogenase (LDH): LDH is an enzyme found in all tissues in the body. A high level in the blood can result from a number of different diseases. Also, slightly elevated levels in the blood are common and usually do not indicate disease. The most common sources of LDH are the heart, liver, muscles, and red blood cells.

Total Protein: This is a measure of the total amount of protein in your blood. A low or high total protein does not indicate a specific disease, but it does indicate that some additional tests may be required to determine if there is a problem.

Iron: The body must have iron to make hemoglobin and to help transfer oxygen to the muscle. If the body is low in iron, all body cells, particularly muscles in adults and brain cells in children, do not function up to par. If this test is low you should consider getting a Ferritin test, especially if you are a female who still has menstrual cycles.

Triglycerides: These are fats used as fuel by the body, and as an energy source for metabolism. Increased levels are almost always a sign of too much carbohydrate intake. Decreased levels are seen in hyperthyroidism, malnutrition and malabsorption.

Cholesterol: Group of fats vital to cell membranes, nerve fibres and bile salts, and a necessary precursor for the sex hormones. High levels indicate diet high in carbohydrates/sugars. Low levels indicate low fat diet, malabsorption, or carbohydrate sensitivity.

HDL/LDL: LDL is the "bad cholesterol", which carries cholesterol for cell building needs, but leaves behind any excess on artery walls and in tissues. HDL is the "good cholesterol" which helps to prevent narrowing of the artery walls by removing the excess cholesterol and transporting it to the liver for excretion. A low HDL percentage frequently indicates diets high in refined carbohydrates and/or carbohydrate sensitivity.

CO2: The CO2 level is related to the respiratory exchange of carbon dioxide in the lungs and is part of the bodies buffering system. Generally, when used with the other electrolytes, carbon dioxide levels indicate pH or acid/alkaline balance in the tissues. This is one of the most important tests that we measure. Most people have too much acid in their body. If you garden you will know that it is very difficult to grow plants in soil where the pH is incorrect. Our blood is similar to soil in many respects and it will be difficult to be healthy if our body's pH is not well balanced.

WBC: White blood count measures the total number of white blood cells in a given volume of blood. Since WBCs kill bacteria, this count is a measure of the body's response to infection.

Haemoglobin: Haemoglobin provides the main transport of oxygen and carbon in the blood. It is composed of "globin", a group of amino acids that form a protein and "heme", which contains iron. It is an important determinant of anemia (decreased haemoglobin) or poor diet/nutrition or malabsorption.

Haematocrit: Haematocrit is the measurement of the percentage of red blood cells in whole blood. It is an important determinant of anaemia (decreased), dehydration (elevated) or possible over-hydration (decreased).

MCV: This measures the average size of the red blood cells and their volume. These components together can indicate iron deficiency anemia (decreased), B12/folate deficiency anaemia (increased), or rheumatoid arthritis (decreased).