

Pathology Analysis and Reporting Tool

v1.2.2

Clinic Details

Clinic name Down to Earth Naturopathy
 Practitioner Mado Paulsen
 Clinic address ONLINE (downtoearthnaturopathy.com)
 Clinic phone 0479 073 273



Client Details

Client name Kerry Lewis
 Age

Date of report	30.09.24	Date of test (1)	07.11.23	Fasted?*	N	Date (2)	23.09.24	Fasted?*	N	(Y/N)
Allergies/Autoimmune?	N	(Y/N)	Upper GIT Sx?	Y	(Y/N)	Lower GIT Sx?	Y	(Y/N)		
Reason for these tests	Recurrent GIT Symptoms									

* some test results cannot be interpreted accurately if not done in a fasted state

Pathology analysis information

Interpretation of the results: The "reference range" given in pathology tests is a statistical average of people who get blood tests at that lab. As healthy people generally don't get blood tests, the reference range is really just an average of previous test results **of many sick people**. The reference range used by doctors is generally **not** a healthy range. The optimum ranges used in this report are based on research and pathology texts for the best range for healthy people. This analysis report looks at a combination of test results for a holistic view of specific risk factors. Further testing may be required to investigate issues to find the causes of some abnormal results.

Testing may be recommended to be repeated, say every 1-3-6 months, depending on the test, to check for progress, and to adjust treatment plans as needed.

Please note that this analysis report is NOT attempting to diagnose conditions, but to highlight nutritional deficiencies or excesses, or poor organ function which may or may not have previously been known.

Results interpretation

24 If your result is within the optimum range, it is coloured green. Hence green results are GOOD!

7.6 If your result is outside of the optimum range, it is coloured red. Red results are not ideal.

125 If your result is particularly significant, severe or abnormal, it has been highlighted in yellow too.

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Test	Optimum Range		Your Results		Reference range	Unit of measure	Test information and meanings
	Min	Max	07.11.23	23.09.24			
FBC/FBE/CBC - RED CELLS							
RCC (male)	4.2	4.9			3.6-5.2	x10 ¹² /L	Red Blood Cell count. Low levels suggest one of more nutrient deficiencies needed to make them, or blood loss or low thyroid function. Low level is associated with low energy/fatigue. High levels can be from dehydration if only a minor high, testosterone injections, or a Thalassaemia genetic condition especially if of Greek or Italian descent if consistently higher.
RCC (female)	3.9	4.5	4.60	4.60			
HAEMOGLOBIN (male)	140	150			115-175	g/L	Reflects true available iron by measuring the amount of haemoglobin (a protein in red blood cells) in your blood. If your haemoglobin levels are low, you have anaemia, a condition in which your body is not getting enough oxygen to the cells, causing muscle pain, fatigue & weakness. High levels indicate heart or lung disease, dehydration, emphysema, polycythaemia vera, some cancers, living in high altitudes, smoking or COPD, testosterone injections, or other causes.
HAEMOGLOBIN (female)	135	145	132.00	139.00			
HAEMATOCRIT (male)	0.40	0.48			0.33-0.46		The proportion of blood that is made up of red blood cells, and depends on the size of the red blood cells. Low levels can be due to anaemia, blood loss, decreased production of red blood cells or increased destruction of red blood cells. Pregnancy may cause decreased levels due to extra fluid in the blood. High levels when the number of red blood cells increases or when the blood volume is reduced, as in dehydration, polycythaemia or testosterone injections.
HAEMATOCRIT (female)	0.37	0.44	0.39	0.42			
MCV	80	90	83.00	90.00	80-98	fL	Mean corpuscular volume (MCV) is a measurement of the average volume of RBCs. Low levels indicate smaller than normal (microcytic) as is seen in iron deficiency anaemia, blood loss, vitamin B6 deficiency or thalassaemia (if iron deficiency is ruled out). High levels indicate larger than normal (macrocytic) red cells, for example in anaemia caused by vitamin B12 or folate deficiency, liver disease, alcohol or drugs/medications.
MCH	28	32			27-35	pg	Mean Cell Haemoglobin (MCH) is the average amount of haemoglobin in the red blood cells. Low levels indicate low haemoglobin, which can be a result of Thalassaemia minor (genetic blood disorder), especially alpha thal minor that results in smaller RBC with less haemoglobin. High MCH can indicate macrocytic anaemia (low B12/folate), liver conditions, overactive thyroid, alcohol, high oestrogen levels, complications from infections, or other causes. High MCH tends to be associated with and related to high MCV.
MCHC					320-360	g/L	Mean Corpuscular Haemoglobin Concentration (MCHC), or the average amount of haemoglobin in a given volume of blood. This is a calculated result based on Haemoglobin and Haematocrit results. Low results indicate hypochromic red cells which suggests iron deficiency anaemia or Thalassaemia. Red cells cannot be hyperchromic, therefore no hyperchromic anaemias or symptoms.
RDW	11.5	14.5			11-16	%	Red blood cell Distribution Width (RDW) measures the variation in volume and size of the red blood cells.
Haemolysis Index	0	5			<40		How quickly red blood cells are destroyed in the blood sample, indicating a bad sample taken. Damaged red blood cells during sample collection will cause high ALP, reduced RCC and Hct, or higher potassium, ammonia, magnesium, phosphorus, AST, ALT, LD/LDH. Haemolysed blood samples should be redone.
MCV/RCC (Mentzer Index for Thalassaemia risk) (Male)	13	21			<13		The Mentzer Index is a calculation of the MCV result divided by the RCC, as a possible marker of identifying a Thalassaemia condition from iron deficiency anaemia, and more specifically only Beta Thalassaemia if the result is less than 13. If the result is above 13 this can possibly confirm iron deficiency anaemia. Use other results to confirm either condition.

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MCV/RCC (Mentzer Index for Thalassemia risk) (Female)	13	21	18.04	19.57	<13		Commoner condition.
FBC/FBE/CBC - WHITE CELLS	Min	Max	07.11.23	23.09.24	Reference range	Unit	
WCC	5	7.5	7.40	7.20	4.0-11.0	x10 ⁹ /L	The white blood cell (WBC) count indicates the number of white blood cells in a given amount of blood. Raised levels are an indicator that a fight or immune response is occurring. Low levels (Leukopenia) are indicative of chronic inflammation or chronic infection, depressed immune system, bone marrow conditions, or nutrient deficiencies needed to make WBC (zinc, protein, B12 and folate). High levels indicate an active or acute infection or inflammation.
Neutrophils (%)	40	60	5	5		x10 ⁹ /L	A type of immune system WBC. Low levels are indicative of severe or chronic bacterial infections, or medication side effects, or autoimmune conditions, or low zinc. High levels can be a short-term response to an infection (most likely bacterial) or trauma, or in chronic cases due to infections, obesity or inflammatory conditions.
Lymphocytes (%)	24	44	2	2	1.1-4.0	x10 ⁹ /L	There are 3 types of lymphocytes, called T-cells, B-cells & Natural Killer cells. T-cells develop in the thymus gland, and B-cells mature in the bone marrow. Both are important to immune function because they recognize antigens & bind to antigens. Natural killer cells have the ability to kill virus-infected cells or cancer cells. Low lymphocytes (Lymphocytopenia) can occur from chronic infections, autoimmune conditions, cancers, or cancer treatments, or nutrient deficiencies (zinc, protein, B12, folate, vitamin D). High levels (Lymphocytosis) can occur from an imbalance in other WBC, acute infections, or cancers.
Monocytes (%)	0	7	1	1	0.2-1.0	x10 ⁹ /L	Monocytes are a type of white blood cells that fight bacteria, viruses and fungi. They are the biggest in the immune system. Formed in the bone marrow, and released in infections. Low monocytes (Monocytopenia) can result from imbalance in other WBC types, infections, cancer treatments, bone marrow disorders, inflammation, nutrient deficiencies or other causes. High if current 'fight', bacterial infection or chronic inflammation or autoimmune conditions.
Eosinophils (%)	0	2	0	0	0.04-.40	x10 ⁹ /L	Eosinophils are a type of white blood cell associated with allergies, atopic conditions and/or intestinal parasites. Hence when elevated is indicating an allergic reaction, in response to parasites or toxic agents. 2-6% indicative of autoimmune disease. Higher levels (12-20%) can indicate cancers.
Basophils (%)	0	1	0	0	<.21	x10 ⁹ /L	Basophils are a particular type of immune cell known as a granulocyte, and are part of the innate or cell-mediated immune system. These are mostly found in the skin and mucosa tissues and typically respond to allergies. Low levels (Basopenia) can indicate allergies, nutrient deficiencies (zinc, B12, folate and protein), infections, acute inflammation or infections or overactive thyroid. High levels (Basophilia) can occur with chronic inflammation, underactive thyroid, or bone marrow disorders producing more basophils, myeloproliferative conditions, and autoimmune conditions. Basophils can release histamine, to cause allergy symptoms.
Platelets	200	400	312	279	150-450	x10 ⁹ /L	Can be low in chronic or post-viral infections, autoimmune conditions, medications and malignancies, or nutrient deficiencies in zinc, protein, vitamin B12 and/or folate. High levels from acute infections and/or inflammatory conditions, or myeloproliferative conditions.
Neutrophil/ Lymphocyte Ratio	2	3	2.68	3.08			Low ratio is likely indicating a viral infection, or neutropenia, autoimmune, medications, or leukaemias. High can indicate a bacterial infection, high chronic stress (and high cortisol levels) worsening disease progression and higher morbidity/mortality risk.

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INFLAMMATION	Min	Max	07.11.23	23.09.24	Reference range	Unit	
CRP	1	4	9.00		0-6	mg/L	C-reactive protein (CRP) is the first evidence of inflammation or an infection. Concentration increases in the blood within a few hours after the start of infection or inflammatory injury. Inflammation is the response of the tissues to irritation or injury, characterised by pain, swelling, redness & heat. The severity, characteristics, & duration of the inflammation depend on the cause, the particular area of the body affected, & overall health. Level of CRP can increase many hundred-fold in response to inflammation, then drop quickly as soon as the inflammation passes.
ESR (male)	1	15			1-30		A non-specific marker of chronic inflammation. ESR increases as short-term illness progresses, and drops as it clears. Can be elevated with menstruation.
ESR (female)	0	20					
IRON STUDIES	Min	Max	07.11.23	23.09.24	Reference range	Unit	
IRON	8.96	17.91		17.00	10-33	umol/L	Serum iron levels are quickly changeable due to recent food intake and other factors, and therefore is not good indication of true iron levels.
TIBC	44.8	62.7		57.00	45-70	umol/L	This test measures amount of all proteins in the blood available to transport iron, including transferrin, but not ferritin, which only binds to stored iron. TIBC tests the amount of iron that can be transported in your blood, and related to transferrin protein result. Low results can be from Thalassaemia, haemochromatosis, inflammation, anaemia of chronic disease, liver or kidney conditions, haemolysis or malnutrition. High result can indicate iron deficiency, OCP use, and fluoride.
TRANSFERRIN	2	3.6		2.30	1.9-3.1	g/L	Transferrin transports iron ions in the blood. Transferrin is a negative acute phase reactant, with reduced levels being due to increased inflammation, or from excess alcohol, or nephrotic syndrome. High levels can indicate iron deficiency, hypothyroid, B12 deficiency, acute liver disease, pregnancy or OCP use.
	25	45			32-48	umol/L	
TRANSFERRIN SATURATION	28	35		30	male: 20-50% female: 15-50%	%	This result is a calculation dependent on serum iron and transferrin, not an actual measurement. 70% of iron is stored in RBC haemoglobin, the rest found as ferritin and haemosiderin. Iron is bound to transferrin proteins. Low levels of transferrin saturation indicate iron deficiency anaemia, acute infection or inflammation (with iron being redistributed to ferritin). High levels indicate haemolytic or other anaemias, or iron overload or poisoning, or increased absorption (as in haemochromatosis). Chronic illness can see a low serum iron, decreased TIBC and normal TS.
FERRITIN (male)	50	236			20-290	ug/L	Ferritin is the best indicator of iron status, being the iron storage protein. Low results can be from low protein intake, low stomach acid, poor protein metabolism, low thyroid function, or blood loss. Ferritin levels may rise in acute phase reactions such as infections, inflammation, cancer etc to give a false optimal or a high result. Low levels can also be related to low iron or zinc or protein intake and metabolism, regular alcohol consumption, obesity, diabetes, or liver disease.
FERRITIN (female)	50	150		53			
VITAMIN B12 and FOLATE	Min	Max	07.11.23	23.09.24	Reference range	Unit	

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FOLATE (red cells)					>450		Measures the concentration of folate in the serum. The amount inside the red blood cell will normally be a higher concentration inside the cell than in the serum& reflect levels over a longer period. Vitamin B12 & folate are part of the B complex. Folate is found in leafy green vegetables, citrus fruits, dry beans & peas, liver & yeast. Both B12 & folate are necessary for normal red cell formation, tissue & cellular repair & DNA synthesis. A deficiency in either vitamin B12 or folate can lead to a form of anaemia characterised by the production of fewer, but larger, red cells (macrocytic anaemia). A deficiency in folate can cause neural tube defects such as spina bifida in a growing foetus. Low is indicative of deficiency, coeliac, crohns or thyroid disease. High found in small bowel disease, vegetarian diet or B12 deficiency
FOLATE (serum)	36	42	20.00	29.00	8.4-55.0	nmol/L	Measures the concentration of folate in the serum. The amount inside the red blood cell will normally be a higher concentration inside the cell than in the serum& reflect levels over a longer period. Vitamin B12 & folate are part of the B complex. Folate is found in leafy green vegetables, citrus fruits, dry beans & peas, liver & yeast. Both B12 & folate are necessary for normal red cell formation, tissue & cellular repair & DNA synthesis. A deficiency in either vitamin B12 or folate can lead to a form of anaemia characterised by the production of fewer, but larger, red cells (macrocytic anaemia). A deficiency in folate can cause neural tube defects such as spina bifida in a growing foetus. Low is indicative of deficiency, coeliac, crohns or thyroid disease. High found in small bowel disease, vegetarian diet or B12 deficiency, or MTHFR defects.
Vitamin B12 (active)	128	150			>40	pmol/L	A deficiency in vitamin B12 can result in neuropathy- nerve damage that can cause tingling & numbness in the patient's hands & feet. Needed for cell formation & cellular replication, DNA synthesis, nerve function, and metabolism of fats and proteins. If low, symptoms of soreness of tongue, diarrhoea, depression, lethargy, shortness of breath, poor concentration & memory. B12 is found in animal products such as red meat, fish, poultry, milk and eggs. Increased levels may be from liver disease, alcohol, kidney disease, autoimmune or infections, or very rarely from leukaemia, polycythaemia vera, liver disease or other chronic conditions.
Vitamin B12 (serum)	600	1100	776	659	162-811	pmol/L	
CHOLESTEROL & LIPID PANEL	Min	Max	07.11.23	23.09.24	Reference range	Unit	
TOTAL CHOLESTEROL	4.66	7	7.50	6.70	Below 4.0	mmol/L	Cholesterol is essential for life & forms the membranes for cells in all organs & tissues is needed for many hormones essential for development, growth & reproduction, & forms bile acids that are needed to absorb nutrients from food. Total Cholesterol comprises various lipoproteins such as HDL, which takes excess cholesterol away for disposal, LDL which takes cholesterol TO cells so they can use it , and other subtypes of lipoproteins. Only small amount of cholesterol comes from diet, and most is made in your liver. Required to maintain artery flexibility. Low levels are indicative of increased risk of degenerative diseases as fewer antioxidants available for scavenging free radicals. Cholesterol is needed to remove fat soluble toxins from the brain. Levels below 4.5 cannot manufacture any hormones.
TRIGLYCERIDES	0.79	1.24		0.70	Below 2.0	mmol/L	Triglycerides are the body's storage form of fat & indicates fats absorbed from the gut & fat stores. Most triglycerides are found in adipose (fat) tissue. Some triglycerides circulate in the blood to provide fuel for muscles. Extra triglycerides are found in the blood after eating a meal — when fat is being sent from the gut to storage. Ideally, the test for triglycerides should be done when you are fasting & no extra triglycerides from a recent meal are present. Very high in pancreatitis. High in under active thyroid, diabetes, kidney or pancreatic problems & seen in the use of OCP. If high when fasting, this indicates insulin resistance. Low in malabsorption, overactive thyroid & liver disease

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HDL	1.42	5		2.41	Above 0.9	mmol/L	HDL is a type of lipoprotein that carries cholesterol in the blood. HDL test measures the amount of cholesterol carried by HDL (high density lipoprotein) particles. HDL particles remove excess cholesterol from the body. Hence, having a high level of cholesterol carried by HDL particles is good. Has antioxidant capacity for scavenging free radicals. HDL needed to remove fat soluble toxins from the brain.
LDL	0.5	3.37		4.00	Below 2.0	mmol/L	LDL is a type of lipoprotein that carries cholesterol in the blood. LDL is considered undesirable because it increases risk of atherosclerosis & heart disease. LDL is termed 'bad' cholesterol, but this isn't entirely true as LDL is just carrying cholesterol TO cells so they can use it! The LDL result is a CALCULATED or estimated result, and not a true amount which the Total Cholesterol or HDL are. A high result is Indicative of high processed carbohydrates in the diet, which causes glycation and oxidation of the LDL. Increasing healthy fats will reduce LDL! Fasting (such as prior to blood tests) can increase LDL!
Triglyceride : HDL ratio. <0.8 (good) <1.8 (average) >1.8 (bad)	0	0.8		0.29			Should be done after fasting. This is a better marker of heart health than Total Cholesterol!
E/LFT (Biochemistry)	Min	Max	07.11.23	23.09.24	Reference range	Unit	
SODIUM	135	142	134	139	137-147	mmol/L	Sodium helps regulate water balance into and out of the body and cells. Low levels due to stress, adrenal insufficiency or kidney health. High levels from too much table salt, or high water intake, or fluid loss from sweating, vomiting or diarrhoea, or medications (corticosteroids).
POTASSIUM	4	4.5	4.90	4.20	3.5-5.0	mmol/L	Potassium is needed for heart rhythm and contraction. Potassium removes fluid wastes from the cells & the body including buffering uric acid, reduces blood pressure, for muscle energy and nerves and for making stomach acid. Low symptoms are floppy muscles with poor coordination & exhaustion, high urate levels and gout, high blood pressure. Low levels from malnutrition, severe vomiting or diarrhoea or dehydration. High levels from cellular or tissue damage, severe dehydration, medications, adrenal insufficiency (low cortisol) or acidosis.
CHLORIDE	100	106	96	101	96-109	mmol/L	Needed to maintain proper fluid balance. Often mirrors the movement and levels of sodium. Low levels are found in cystic fibrosis, eating disorders or malnutrition. High levels from severe dehydration, kidney failure or dialysis.
BICARBONATE	23	27	29	31	25-33	mmol/L	As part of an electrolyte panel to identify or monitor an electrolyte imbalance or acid-base (pH) imbalance. The main job of bicarbonate, which is excreted & reabsorbed by the kidneys, is to help maintain a stable pH level & to help maintain electrical neutrality. Low levels indicate metabolic acidosis, diabetic ketoacidosis, respiratory alkalosis, Addison's or kidney disease. High levels indicate severe vomiting or diarrhoea, COPD, Cushing's or Conn Syndrome, or metabolic alkalosis. Unless this test is done in a fasted state, the result is useless.
MAGNESIUM	0.8	1			0.7-1.1		Needed for muscle contraction, heart rhythm and nerve function. Serum magnesium does not reflect tissue magnesium, and not an accurate test.
ANION GAP	10	12	9	7	4-17	mmol/L	The anion gap is an indicator of overall inflammation, and is actually a calculated value: sodium + potassium - chloride + bicarbonate and other minerals. An abnormal anion gap can suggest metabolic abnormalities, such as starvation or diabetes, or the presence of a toxic substance such as alcohol. High number indicates acidity, while low number means alkalinity. To be accurate, test must have been done after a 8-10 hour fast. A high anion gap can affect insulin, cortisol and TSH by raising them, while lowering free cholesterol.

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UREA	4.64	6.07	6.90	5.70	2.0-7.0	mmol/L	Urea is produced when protein is broken down by the body. Healthy kidneys eliminate more than 90% of the urea the body produces, so blood levels indicate how well your kidneys are working. High results from a high protein diet, kidney disease or dehydration, bleeding in the gastrointestinal tract, aging, severe infections, tissue damage, major surgery or starvation.
CREATININE	70.7	97.2	62.00	47.00	40-110	umol/L	Creatinine is produced in your muscles when muscle breaks down. Creatinine is used in body cells to produce the energy needed to contract muscles & produces creatinine at a fairly constant rate. Almost all creatinine is excreted by the kidneys, so blood levels are a good measure of health of your kidneys. A high result can cause a false high eGFR result.
URIC ACID (Urate)	0.2	0.32	0.286	0.281	0.14-0.35	mmol/L	There is a belief that uric acid is produced by the breakdown of purines in some foods. If too much is produced or not enough is excreted, it accumulates especially in the joints and can cause gout. Most uric acid is removed by the kidneys; the remainder excreted in the faeces. Uric acid is a very potent antioxidant and free radical scavenger. High indicates poor kidney function, stress, alcohol, medications, some cancers, hypothyroidism, and poor antioxidant intake. Low levels can be normal or indicate good kidney function or low molybdenum levels (and sulphur intolerance).
eGFR	90	100	86	90	>59	mL/min	An estimate of the Glomerular Filtration Rate, measuring the amount of fluid the kidneys filter and excrete. Hence this is a test of kidney function, and the higher the % the better.
GLUCOSE	4.44	5.55	6.20	4.70	3.0-7.7	mmol/L	Glucose is the main source of energy & carbohydrates consumed are broken down into glucose, absorbed by the small intestine & circulated throughout the body. Use of glucose depends on insulin, a hormone produced by the pancreas. Insulin acts to control the transport of glucose into the cells to be used for energy. It also directs the liver to store excess glucose as glycogen (for short term energy storage) or as fats, which are a longer term energy store. We cannot live without a balance of glucose & insulin. BGL's rise after a meal & insulin is released to lower them. If the glucose/insulin system is working properly the amount of glucose in the blood remains fairly stable. Long-term high blood glucose levels can cause progressive damage to body organs such as the kidneys, eyes, blood vessels, heart and nerves. Low levels are indicative of hypoglycaemia, missed meals or poor carbohydrate utilization & protein ratio. Long-term hypoglycaemia can lead to brain and nerve damage. High indicates poor diet or insulin resistance. B complex, herbs & diet modification are needed.
BILIRUBIN	8.5	13.7	5.00	5.00	<25	umol/L	Bilirubin is a metabolic byproduct of haemoglobin breakdown from damaged or old red blood cells. High bilirubin levels can cause jaundice (yellowing skin and/or eyes). High levels can indicate use of antibiotics, codeine, many medications, gallstones and bile duct blockages, prolonged fasting, haemolytic anaemia, pernicious anaemia, Gilbert syndrome, allergies (high histamine), genetic factors (COMT or PEMT), alcohol. This can cause mental health symptoms and mood issues, predisposition to gall stones, dysbiosis and gut issues, medication intolerances, oestrogen dominance symptoms, impaired dopamine from high glutamate levels, leaky gut and leaky brain. Low in anaemia, vitamin C (false negative), high caffeine, salicylates.
ALP	70	100	103	77		U/L	Used as a marker for liver and bone disorders. Elevated in obstructed liver/bile conditions, cirrhosis, bone growth (common in children and adolescents), tumours, RA, fluoride, vit B3, various medications, or a recent meal. Low levels can result from hypothyroid, malnutrition, pernicious anaemia, scurvy, coeliac disease, excess vitamin Bs, and low zinc.

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ALT	10	30	14	23	0-45	U/L	ALT is an enzyme found in the liver, smaller amounts also found in the kidneys, heart & muscles. Under normal conditions, ALT levels in the blood are low. When the liver is damaged, ALT is released into the blood stream before more obvious symptoms of liver damage, such as jaundice or nausea. Major causes of liver disease are infection by viruses that target the liver or drinking too much alcohol. Some medicines & some inherited diseases can also damage the liver. CBS defects can raise ALT levels due to low antioxidants or reduced detoxing. Isolated elevated ALT can be linked to Coeliac Disease
AST	10	30	16	26	0-41	U/L	AST is an enzyme found mostly in the liver, red blood cells, heart & other muscles. When these cells are injured, they release AST into the blood.
GGT	10	30	82	75	0-45	U/L	GGT is an enzyme found mainly in the liver & is normally present in low levels in blood. When liver is injured or the flow of bile is obstructed, the GGT level rises. It is therefore a useful marker for detecting bile duct problems before obvious symptoms. Can also be high in chronic alcohol abuse.
LD/LDH	140	200	168	219	80-250	U/L	Lactate Dehydrogenase - when cells are damaged from injury or disease, they lyse or split open, and LD/LDH spills out into the tissues and blood. A non-specific indicator of tissue/cell damage. Low levels can be from vitamin C use.
CALCIUM (Corrected)	2.3	2.5	2.53	2.49	2.25-2.65	mmol/L	Calcium is essential for the proper functioning of blood pressure, muscle contraction, nerves & heart. It is required for blood clotting & in formation of bones. 99% of calcium is found in the bones, the rest in the blood. Roughly half of the calcium is referred to as 'free' or active. The remaining half is 'bound' calcium & is attached to albumin & other compounds & is inactive. Low levels from low intake, low vitamin D, low magnesium, or other factors. High levels from hyperparathyroid activity, or cancers.
PHOSPHATE	1.2	1.4	1.25	1.19	0.8-1.5	mmol/L	Phosphorus is combined with oxygen to form ATP or energy production, muscle & nerve function & bone growth. It also acts as a buffer, helping to maintain pH. About 70% to 80% of the phosphates are combined with calcium to help form bones & teeth, about 10% are found in muscle, & about 1% is in nerve tissue. The rest is found within cells where it is mainly used to store energy ATP; about 1% of total body phosphate is found within plasma. The body maintains phosphate levels in the blood by regulating how much it absorbs from the intestines & how much it excretes or conserves in the kidneys. Low levels from nutrient deficiencies or diet too high in fructose, which increases phosphate excretion. High levels can be from kidney disease, or mineral imbalance, and cause calcium to be taken from bones to balance this. Can cause itchy skin and red eyes. Interacts closely with calcium.
Chloride:Phosphate Ratio	1	102	76.80	84.87	<102		Higher than 102 result can indicate primary hyperparathyroidism.
TOTAL PROTEIN	69	74	67	69	60-82	g/L	Is a measure of all of the proteins in the serum of your blood which are important building blocks of all cells and tissues; they are important for body growth and health. Total protein measures the combined amount of two classes of proteins, albumin & globulin. Albumin is a carrier of many small molecules, but its main purpose is to keep fluid from leaking out of blood vessels, while globulin proteins include enzymes, antibodies & more than 500 other proteins. If low, diet & gut absorption must be addressed
ALBUMIN	40	50	37	39	35-50	g/L	This test is for identifying liver or kidney disease or protein status. Albumin is the most abundant protein in the blood plasma. It keeps fluid from leaking out of blood vessels; nourishes tissues, carries hormones, vitamins, drugs, & ions like calcium throughout the body. Made in the liver & is sensitive to liver damage. Albumin is a negative acute phase reactant, with low results from inflammation, or low protein intake, or low stomach acid levels, shock, liver or kidney disease. High levels can occur when a person is chronically dehydrated, or vitamin A deficiency, high protein diet, or kidney dysfunction.

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GLOBULIN	24	28	30	30	20-40	g/L	Globulins are circulating immune proteins or immunoglobulins. Large amounts in the blood, can cause symptoms such as bruising, rashes, joint pain, weakness or Raynaud's. They can activate the immune system, leading to the deposit of immune complexes in tissues, cause inflammation, bleeding, & clotting that can affect circulation. High in infections such as glandular fever, hepatitis C and reduced liver function, HIV/AIDS, kidney, autoimmune, lymphoproliferative diseases & disorders associated with inflammation of blood vessels (vasculitis).
THYROID PANEL	Min	Max	07.11.23	23.09.24	Reference range	Unit	
TSH	0.8	1.5	0.60	0.50	.04-4.0	mU/L	Thyroid-stimulating hormone is made by the pituitary gland & is the stimulating hormone to the thyroid to make thyroid hormones T4 and T3. The thyroid gland is your major metabolic controller, managing the metabolic rate, or how fast you produce energy, or how fast or well all body systems and cells work! Higher TSH results result from and suggest a low functioning thyroid (ie hypothyroidism), and low functioning cells and body systems. This also contributes to weight gain, low moods and other low states. A low TSH causes hyper body states, such as anxiety, high energy production, weight loss and more, known as hyperthyroidism.
free T4 thyroxine	14	19.7	10.30		10-20	pmol/L	T4 is one of two major hormones produced by the thyroid gland (the other is called triiodothyronine, or T3). Thyroid hormones help regulate the body's metabolism. Most T4 in blood is attached to a protein; less than 1% is unattached. The blood test measures the amount of free (unattached) T4 hormone in your blood since this is the biologically relevant fraction.
free T3	4	6.56			2.8-6.8	pmol/L	T3 is one of two major hormones produced by the thyroid gland, of which this one is the biologically active form. The blood test measures the amount of free (unattached) T3 hormone in your blood. If there are any issues converting from T4 to T3, the reverse T3 test can indicate this. Nutrients needs for this include selenium, zinc, and vitamin D. Stress, dysbiosis of gut bacteria and pathogenic bacteria and parasites can affect the conversion of T4 to T3.
T4/T3 ratio	3	4					How well the body is converting the inactive T4 hormone to T3. Dependent on zinc, vitamin D and selenium. A high result indicates poor conversion, which confirms nutrient deficiencies of one or more of these nutrients.
Reverse T3 (rT3)	100	300			170-450		If there are any issues converting from the inactive T4 to active T3, reverse T3 is produced instead. Hence this is a marker of poor conversion from T4 to T3. Nutrients needs for this include selenium, zinc and vitamin D. Low levels are normal. High results if very low T4, hyperthyroidism, chronic stress, malnutrition or starvation or low calorie diets, chronic inflammation, insulin resistance or diabetes, medications such as steroids and beta-blockers or others, or leptin resistance or obesity. A higher rT3 could be seen as an evolutionary adaptation to reduce the body's metabolic rate in times of stress or starvation, or in Winter times.
T3/rT3 ratio	0.2	0.2			1.2-2.2	pmol/L	The T3:rT3 ratio can be used as a potential marker of rT3 dominance or Cellular/Tissue Hypothyroidism. This suggests that the thyroid function may be ok in producing T4 and T3, but these hormones are not able to get into the cells for a metabolic effect, thus causing similar symptoms to hypothyroid. A result below 0.2 is suggestive of cellular hypothyroidism.
Anti-thyroglobulin antibodies	0	30			<60	IU/mL	High results indicate an autoimmune immune system response to thyroglobulin proteins in thyroid cells. This shows there is inflammation and destruction of the thyroid gland.
Anti-thyroid Peroxidase antibodies	0	30			<60	IU/mL	High results indicate an autoimmune immune system response against the thyroid cells.
TrAb (Thyroid Receptor Antibodies)							Thyroid receptor antibodies

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TSH Immunoglobulin		0.55			<0.10		
Thyroglobulin					1.6-50	ug/L	Is a protein produced only by the thyroid, and is a marker of thyroid function or dysfunction, and sometimes used as an indicator of progress during treatment for thyroid cancer. High levels can be an indicator of a change in thyroid size, which can be from thyroid cancer or nodules or autoimmune activity in the thyroid.
FEMALE HORMONES	Min	Max	07.11.23	23.09.24	Reference range	Unit	
Day # in cycle when tested?							What day in your cycle was the test done on? If not known, then it can be difficult to determine what your female hormone levels should be at, as they vary from day to day.
Prolactin							A hormone which helps with milk production. It is also a stress hormone, and short-term spikes in this test are common. Prolactin is regulated by dopamine, so medications which interfere with dopamine can cause higher levels. Can be raised from stress, some medications, low functioning thyroid, pregnancy and/or lactation, excessive exercise, kidney disease, liver disease, PCOS, autoimmune condition, or a pituitary or hypothalamus tumour. This can lead to depression and mood changes, anxiety, headaches, menopausal symptoms, weight gain, infertility and vision problems.
LH						IU/mL	Luteinising Hormone
FSH						IU/mL	Follicle Stimulating Hormone
Oestrone							A type of oestrogen, a female hormone, sometimes called E1
Oestradiol						pmol/L	A type of oestrogen, a female hormone, sometimes called E2
Oestriol							A type of oestrogen, a female hormone, sometimes called E3
Progesterone						nmol/L	A female hormone, responsible for maintaining balance with oestrogen, and the growth of an embryo. An imbalance with oestrogen (E2) can cause all PMS, menstrual cycle symptoms, infertility and other symptoms. Low in times of stress, low thyroid function, low fat diets, nutrient deficiencies, peri- and menopause and more.
DHEAS							DHEA is the body's natural cortisol antagonist, and prevents many of the negative effects of cortisol. Secreted by the adrenals (as is cortisol) and is a precursor to oestrogen. Also needed for immune system function and reducing the inflammatory response. Low levels (with a high cortisol) will affect immune system, increased inflammation and histamine intolerance in some. Also when low, testosterone and what little DHEA there is will be converted into oestrogen.
Testosterone					<3.2	nmol/L	The male hormone, present in low amounts in women. Higher levels can result in loss of hair from the head, increased hair on other parts of the body, imbalance to female cycles, infertility, period symptoms, pains and PCOS.
SHBG					20-110	nmol/L	SHBG is a protein made by the liver and attaches itself to sex hormones found in both men and women. Low SHBG is a sign of hypothyroid, T2 diabetes, steroid medications, Cushing's, adrenal issues, and PCOS. High SHBG is associated with high testosterone. High SHBG can also be linked to hyperthyroidism, liver disease, eating disorders, and in women, pituitary issues or Addisons disease.
MALE HORMONES	Min	Max	07.11.23	23.09.24	Reference range	Unit	

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Total Testosterone	18	25			10-33	nmol/L	The main male hormone, associated with fertility, growth, healthy weight, bone density, and other health aspects. Can give misleading results and poor correlation to symptoms and conditions in both men and women.
DHEAS					3.0-10.5	umol/L	DHEA is the body's natural cortisol antagonist, and prevents many of the negative effects of cortisol. Secreted by the adrenals (as is cortisol) and is a precursor to oestrogen. Also needed for immune system function and reducing the inflammatory response. Low levels (with a high cortisol) will affect immune system, increased inflammation and histamine intolerance in some. Also when low, testosterone and what little DHEA there is will be converted into oestrogen.
Androstenedione					1.7-12.2	nmol/L	A metabolite of DHEA and precursor to Testosterone (and Oestrogen).
SHBG					13-71	nmol/L	Sex Hormone Binding Globulin. SHBG is a protein made by the liver and attaches itself to sex hormones found in both men and women. Low SHBG is a sign of hypothyroid, T2 diabetes, steroid medications, Cushing's, adrenal issues, and PCOS. High SHBG is associated with high testosterone.. High SHBG can also be linked to hyperthyroidism, liver disease, eating disorders, and in women, pituitary issues or Addisons disease.
Free Androgen Index (FAI)							The free androgen index can be used to estimate physiologically active testosterone. This index is calculated as the ratio of total testosterone divided by SHBG (both expressed in the same units) and multiplied by 100.
Calculated Free Testosterone					225-725	pmol/L	A much better marker of testosterone level for detecting androgen deficiency or excess. A calculated result which takes into account the albumin level.
PSA					<4.5		Prostate Specific Antigen for a measure of prostate inflammation, hyperplasia, urinary tract infection, or prostate cancer, but high levels don't necessarily mean prostate cancer. Some medications can cause an increase in levels. Test is not completely accurate.
Oestrogen					<150	pmol/L	Female hormone level. Should not be high in men!
OTHER TESTS	Min	Max	07.11.23	23.09.24	Reference range	Unit	
Vitamin D	100	150	92	75	>50	nmol/L	Vitamin D is actually an anti-inflammatory hormone! Hence it reduces inflammation of chronic disease conditions. Having good levels is also a huge immune system booster!
Homocysteine	6	9			0-15	umol/L	An inflammatory marker, associated with inflammation and heart disease risk if elevated. If elevated can indicate a vitamin B12 deficiency or issues with folate metabolism (ie, MTHFR genetic defects) and folate deficiency, or B6 deficiency, in the elderly. Low levels (<6) result from CBS defects affecting liver function. Low homocysteine can impair production of glutathione, leading to high levels of oxidating stress and tissue and cell damage.
Urine WBC					<10		
Cortisol	300	400			100-535 (am) 80-480 (pm)	nmol/L	Cortisol is the stress hormone. Best tested in early morning
ACTH					1.1-11.1	pmol/L	Adrenocorticotrophic Hormone, produced and secreted by the anterior pituitary gland. It is an important part of the Hypothalamic-Pituitary-Adrenal (HPA) axis, and is produced in response to stress.
Zinc (plasma)	15	17			10-25		Zinc levels in blood plasma, in the RBC.
Zinc (serum)	15	17			10-25	umol/L	Zinc levels in blood serum, reflecting dietary or supplemental zinc.

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Copper (serum)	15	17			10-25	umol/L	High levels of copper can indicate candida or other rparasites or CBS defects, which can affect iron to cause anaemia, Wilson's disease, affect the thyroid, nervous system, adrenals, musculoskeletal issues, high cholesterol and gallstones
Caeruloplasmin					0.15-0.45	g/L	A protein which carries copper around the body, and prevents the copper from oxidising and damaging the body.
Unbound copper	1	15			5-15%		
Selenium	1.6	1.9			0.8-1.9		
MTHFR C677T	negative	negative					
MTHFR A1298C	negative	negative					
HbA1c %					<6.1	%	Diabetes marker, looking at the average of 120 days of blood sugar levels (in the red blood cells)
HbA1c SI					<43	mmol/mol	Diabetes marker, looking at the average of 120 days of blood sugar levels (in the red blood cells)
urinary HPL (adjusted)	0	20					Pyrrole marker of HPL compound found in the urine. Result may not correlate with symptoms, and can return a negative or low result if exposed to light, heat or too long a time to get the sample to the lab to be tested.
Insulin	1	5					Pancreatic hormone needed for getting blood glucose into the cells, and a marker of diabetes or insulin resistance and pancreas function
	0	0					
	0	0					
	0	0					
	0	0					
	0	0					
	0	0					
	0	0					
	0	0					
	0	0					
	0	0					
	0	0					
	0	0					
HEALTH RISK FACTORS							
Anaemia Risk	Min	Max	07.11.23	23.09.24			
Haemoglobin (male)	140	150	0	0			The more green vs. red results in this section indicate whether a low or high risk of anaemia issues, of which there are many types, depending on the deficiency (iron, B12, folate etc)
Haemoglobin (female)	135	145	132	139			
RBC (male)	4.2	4.9	0	0			
RBC (female)	3.9	4.5	4.6	4.6			
Hct (male)	0.40	0.48	0.00	0.00			
Hct (female)	0.37	0.44	0.39	0.42			

MCH	28	32	0	0		
MCV	80	90	83	90		
Iron	8.96	17.91	0	17		
Ferritin (male)	50	236	0	0		
Ferritin (female)	50	150	0	53		
Total Protein	69	74	67	69		
Vitamin B12 (active)	128	150	0	0		
Vitamin B12 (serum)	600	1100	776	659		
Folate	36	42	20	29		
Thyroid Disease Risk	Min	Max	07.11.23	23.09.24		
Cholesterol	4.66	7	7.5	6.7		The more green vs. red results in this section indicate whether a low or high risk of thyroid issues
Zinc	15	17	0.00	0.00		
Vitamin D	100	150	92	75		
Total Protein	69	74	67	69		
TSH	0.8	1.5	0.60	0.50		
T4	14	19.7	10.30	0.00		
T3	4	6.56	0.00	0.00		
Reverse T3 (rT3)	100	300	0.00	0.00		
Anti-thyroglobulin antibodies	0	30	0	0		
Anti-thyroid Peroxidase (TPO) antibodies	0	30	0	0		
TSH Immunoglobulin	0	0.55	0.00	0.00		
LD/LDH	140	200	168	219		
Oxidative Stress	Min	Max	07.11.23	23.09.24		
Total Bilirubin	8.5	13.7	5.00	5.00		The more green vs. red results in this section indicate whether a low or high risk of oxidative stress (or "free radical") damage to cells
Ferritin (male)	50	236	0	0		
Ferritin (female)	50	150	0	53		
Haemoglobin (male)	140	150	0	0		
Haemoglobin (female)	135	145	132	139		
MCH	28	32	0	0		

MCV	80	90	83	90		
Cholesterol	4.66	7	7.50	6.70		
LDL	0.5	3.37	0.00	4.00		
Triglycerides	0.79	1.24	0.00	0.70		
Eosinophils %	0	2	0	0		
Chloride	100	106	96	101		
Sodium	135	142	134	139		
Homocysteine	6	9	0.00	0.00		
Uric acid (urate)	0.2	0.32	0.286	0.281		
Unbound copper	1	15	0.00	0.00		
Heart Disease Risk	Min	Max	07.11.23	23.09.24		
Triglycerides	0.79	1.24	0.00	0.70		The more green vs. red results in this section indicate whether a low or high risk of heart related issues
Triglyceride : HDL	0	0.8		0.29		
Albumin	40	50	37	39		
eGFR	90	100	86	90		
Homocysteine	6	9	0.00	0.00		
Immune System Strength/Risk	Min	Max	07.11.23	23.09.24		
TSH	0.8	1.5	0.60	0.50		The more green vs. red results in this section indicate whether a low or high risk of immune system issues
Vitamin D	100	150	92	75		
WCC	5	7.5	7.40	7.20		
Zinc (plasma)	15	17	0.00	0.00		
Zinc (serum)	15	17	0.00	0.00		
CRP	1	4	9.0	0.0		
ESR (male)	1	15	0.00	0.00		
ESR (female)	0	20	0.00	0.00		
Stomach Function	Min	Max	07.11.23	23.09.24		
Zinc (serum)	15	17	0.0	0.0		These test results summarise stomach function, as iron levels, B12, folate and proteins are dependent on good stomach acid and enzyme production. Low results here can indicate low stomach production and function.
Vitamin B12 (active)	128	150	0	0		
Vitamin B12 (serum)	600	1100	776	659		
Folate (Serum)	36	42	20.00	29.00		
Total Protein	69	74	67.00	69.00		

Transferrin Sat %	28	35	0.00	30.00		
Energy	Min	Max	07.11.23	23.09.24		
TSH	0.8	1.5	0.60	0.50		These results summarise the tests relevant to energy production, with the relevant nutrients or organ functions needed for energy. Low results here (or high TSH) indicates low energy production. High Transferrin Saturation or low TSH can also contribute to low energy.
Cholesterol	4.66	7	7.50	6.70		
Vitamin B12 (active)	128	150	0	0		
Vitamin B12 (serum)	600	1100	776	659		
Folate	36	42	20.00	29.00		
Haemoglobin (male)	140	150	0.00	0.00		
Haemoglobin (female)	135	145	132.00	139.00		
Transferrin Sat %	28	35	0.00	30.00		
Phosphate	1.2	1.4	1.25	1.19		
Mental Health	Min	Max	07.11.23	23.09.24		
TSH	0.8	1.5	0.60	0.50		These results summarise the tests relevant to having good mental health balance, with the relevant nutrients or organ functions needed for neurotransmitter production and balance. Low results here (or a high TSH) would indicate a low production of neurotransmitters and therefore possible poor mental health symptoms. Some high results (ie, folate) or very low TSH could still result in poor mental health symptoms.
Cholesterol	4.66	7	7.50	6.70		
Vitamin B12 (active)	128	150	0	0		
Vitamin B12 (serum)	600	1100	776	659		
Folate	36	42	20.00	29.00		
Zinc (serum)	15	17	0.00	0.00		
Vitamin D	100	150	92.00	75.00		

Analysis Summary

Treatment Objectives

The results of the pathology tests shows some issues require treatment. The following are the priority for treatment:

- 1 anaemia - Improve production of RBC, increased nutrients
- 2 Improve thyroid function
- 3 Improve adrenal function
- 4 Improve stomach function (improve stomach acid and enzymes)
- 5 Improve immune system function (for possible chronic infection)
- 6 Reduce inflammation.
- 7

Further pathology tests may be required:

- 1 MTHFR - to check suspected effects of this genetic defect on high folate levels, poor detoxing, poor thyroid and other symptoms
- 2 HTMA (hair tissue mineral analysis) - for nutrition levels in hair plus heavy metals that can contribute to pyrroles
- 3
- 4
- 5
- 6

