Blood Chemistry Software

Functional Health Report

Practitioner's Copy

PATIENT
JONATHAN ORCHARD

LAB TEST DATE
Oct 27, 2016

PRACTITIONER
Mr. Jonathan Orchard

PRACTICE
Wimbledon Acupuncture

CONTACT

Functional Dx
Functional Blood Chemistry Analysis
"Identifying Hidden Health Trends"

Powered By BloodChemistry SOFTWARE

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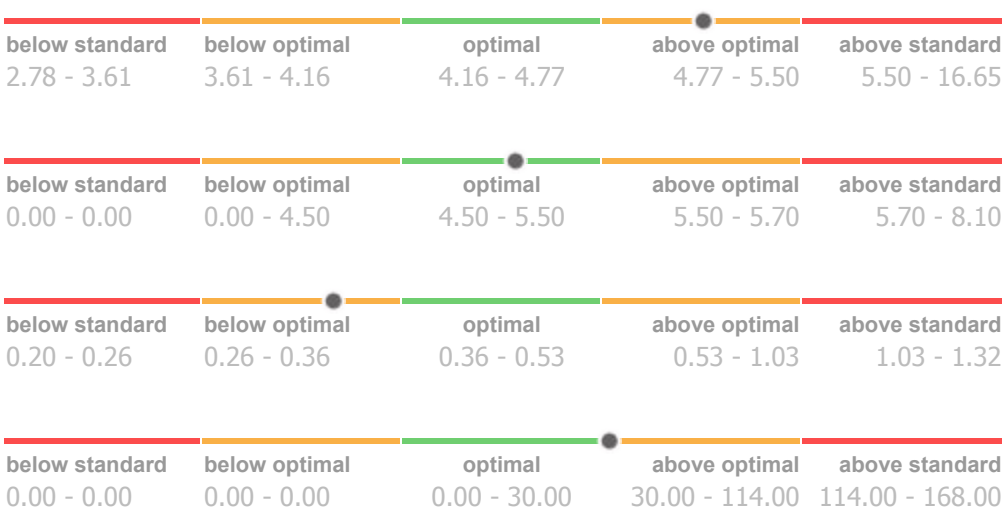
Mr. Orchard's Notes

Blood Test Results Report

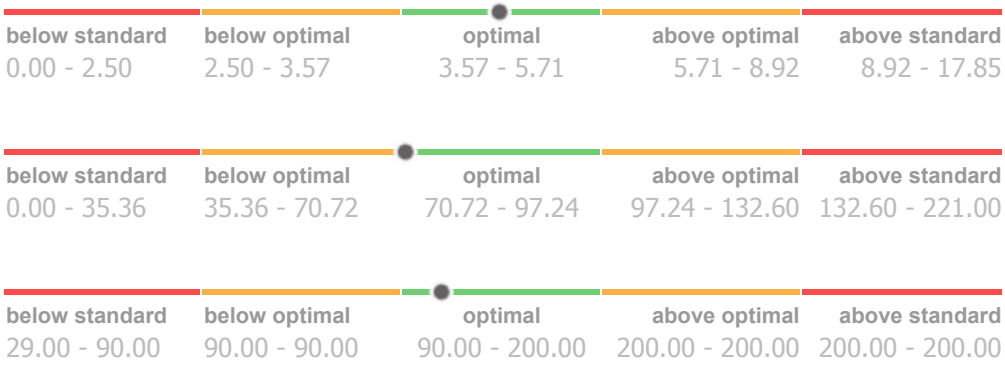
The Blood Test Results Summary Report lists the results of the patient's Chemistry Screen and CBC and shows you whether or not an individual biomarker is outside of the optimal range and/or outside of the clinical lab range. The biomarkers appear in the order in which they appear on the lab test form.

Above Optimal Range 9 Current ↑	Above Standard Range 9 Current ↑↑	Alarm High 4 Current
Below Optimal Range 8 Current ↓	Below Standard Range 2 Current ↓↓	Alarm Low 1 Current

Blood Glucose Regulation

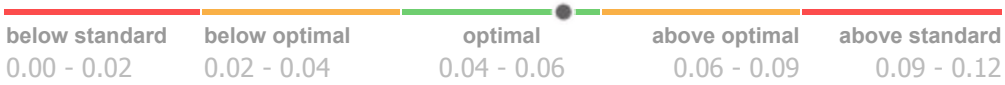


Renal



BUN/Creatinine Ratio

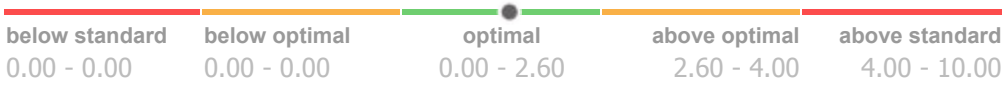
0.06 Ratio



Prostate

PSA

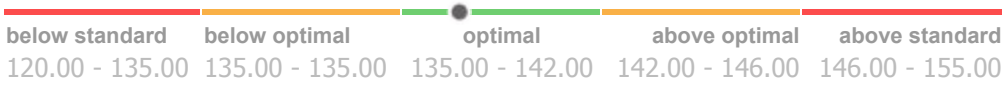
1.40 ng/ml



Electrolytes

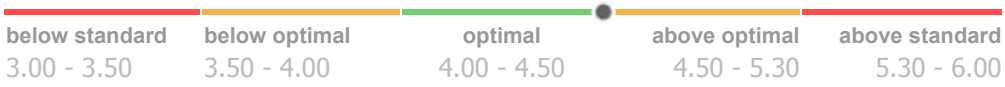
Sodium

137.00 mmol/L



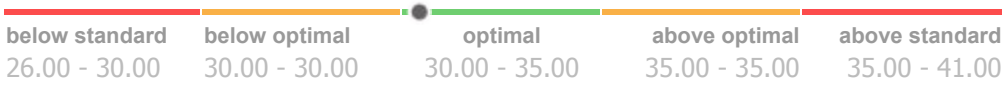
Potassium

4.50 mmol/L



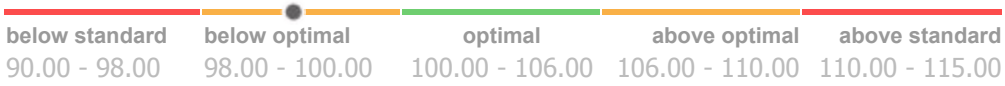
Sodium/Potassium Ratio

30.44 ratio



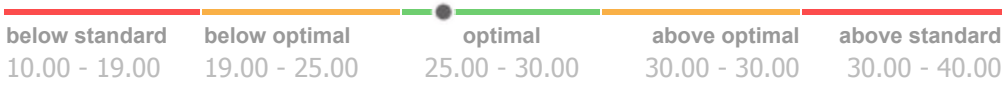
Chloride

98.90 mmol/L



CO2

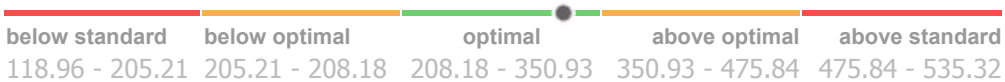
26.00 mmol/L



Metabolic

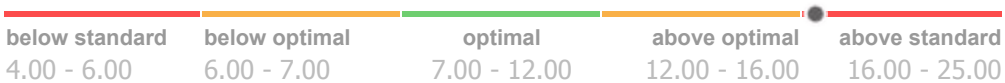
Uric Acid, male

323.00 umol/L



Anion gap

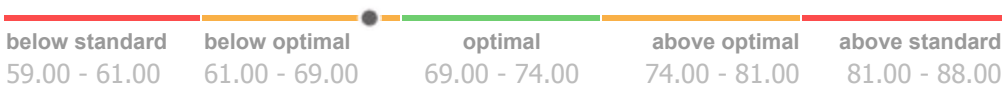
16.60 mmol/L



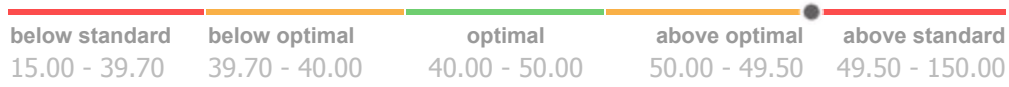
Proteins

Protein, total

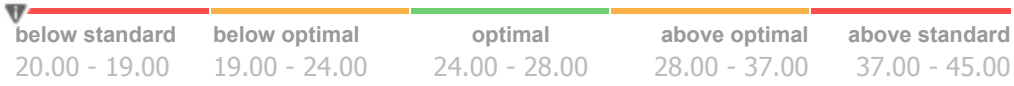
67.70 g/L



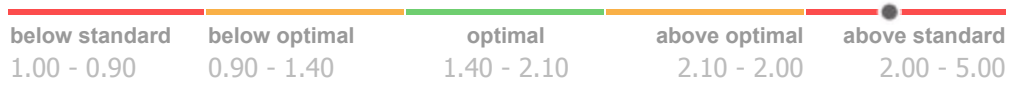
Albumin
51.70 g/L



Globulin, total
16.00 g/L

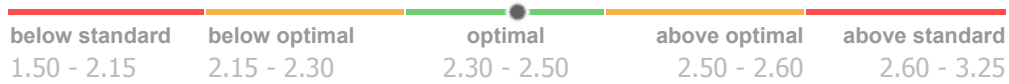


Albumin/Globulin Ratio
3.23 ratio

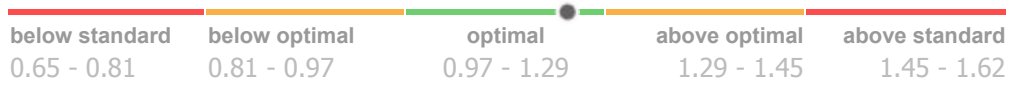


Minerals

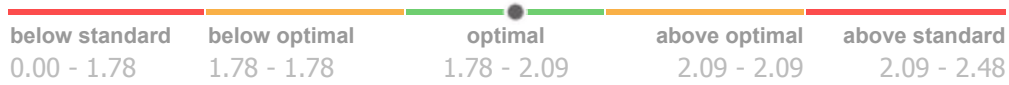
Calcium
2.41 mmol/L



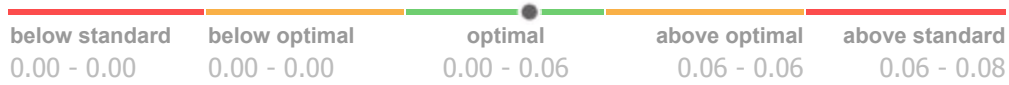
Phosphorus
1.23 mmol/L



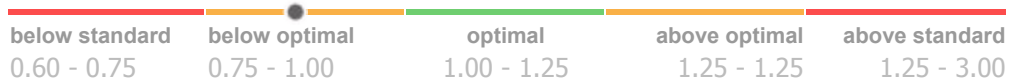
Calcium/Phosphorous Ratio
1.95 ratio



Calcium/Albumin Ratio
0.04 ratio

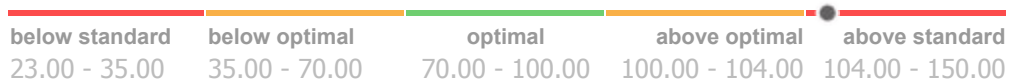


Magnesium
0.86 mmol/L

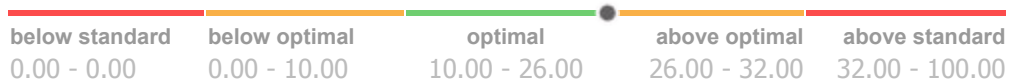


Liver and Gallbladder

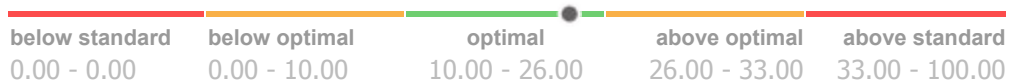
Alk Phos
109.00 U/L



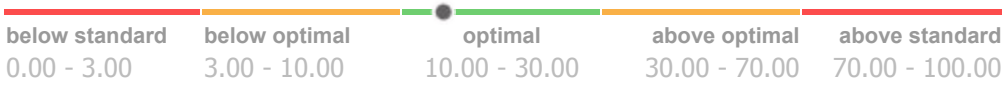
AST (SGOT)
26.00 IU/L



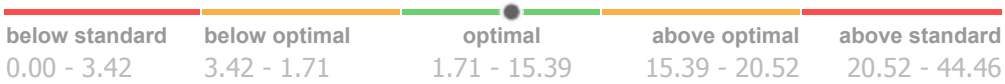
ALT (SGPT)
23.00 U/L



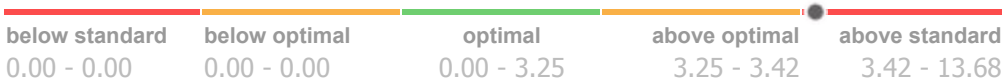
GGT
14.00 U/L



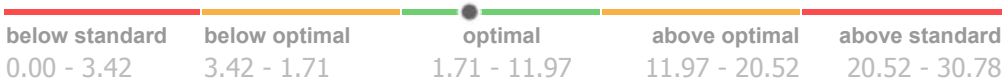
Bilirubin - Total
9.20 µmol/L



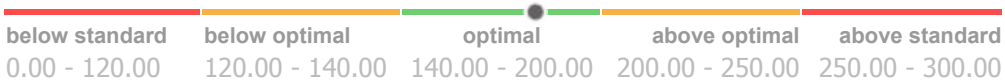
Bilirubin - Direct
4.10 Umol/L



Bilirubin - Indirect
5.10 Umol/L

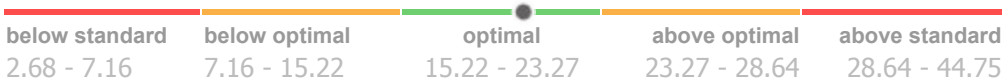


LDH
180.00 U/L

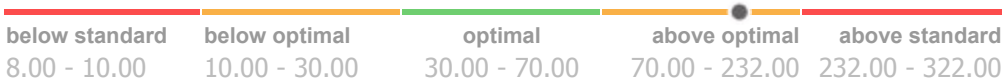


Iron Markers

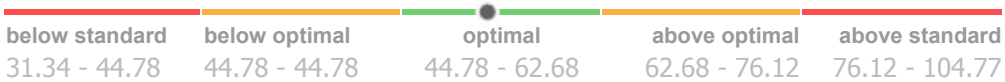
Iron - Serum
20.10 µmol/L



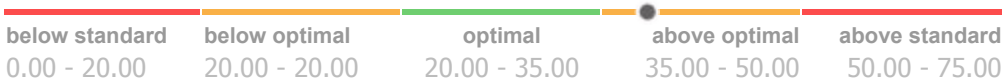
Ferritin
180.40 ng/ml



TIBC
52.40 umol/L

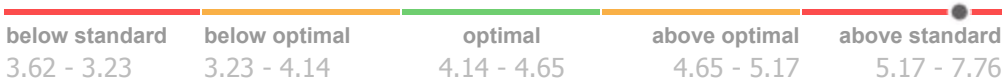


% Transferrin saturation
38.40 %

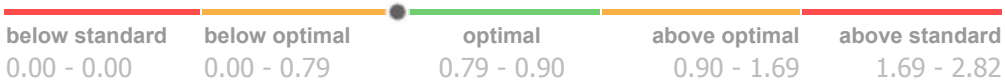


Lipids

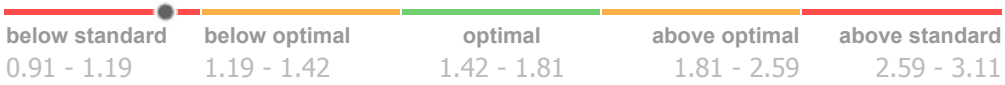
Cholesterol - Total
7.21 mmol/L



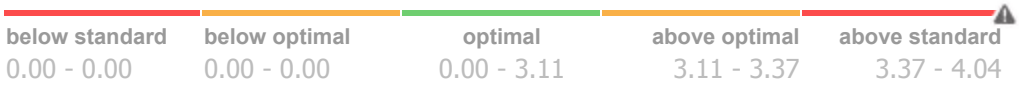
Triglycerides
0.77 mmol/L



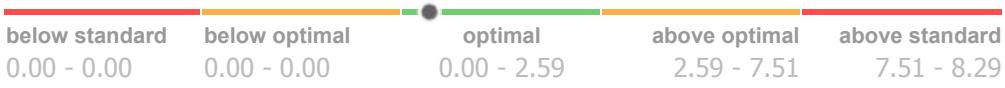
HDL Cholesterol
1.14 mmol/L



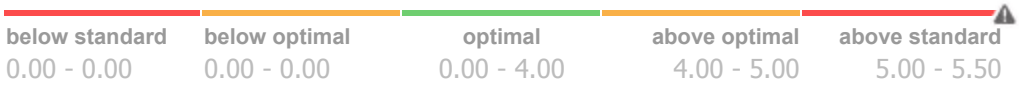
LDL Cholesterol
5.72 mmol/L



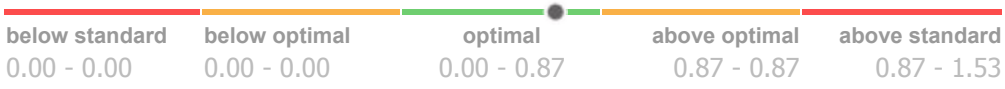
VLDL Cholesterol
0.35 mmol/L



Cholesterol/HDL Ratio
6.32 Ratio

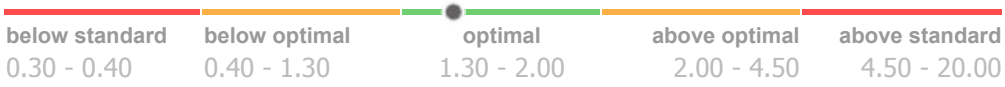


Triglyceride/HDL Ratio
0.67 ratio

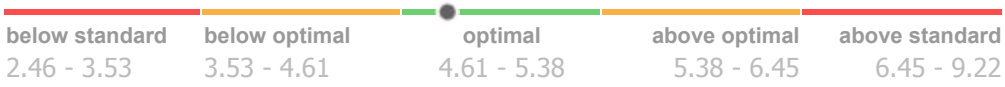


Thyroid

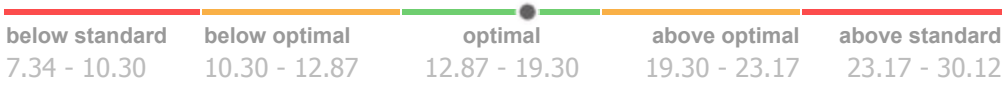
TSH
1.48 mIU/L



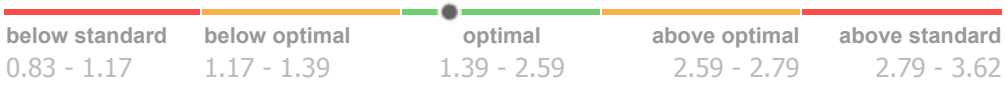
Free T3
4.78 pmol/L



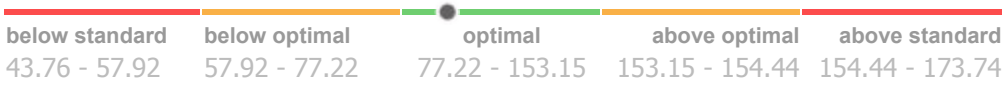
Free T4
16.90 pmol/L



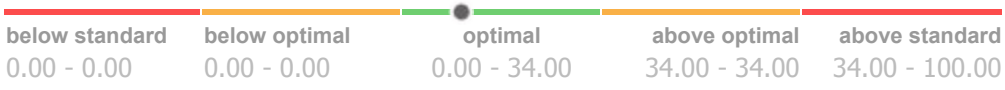
Total T3
1.67 nmol/L



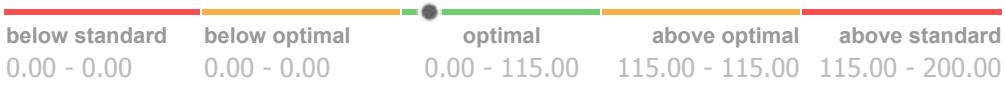
Total T4
94.30 nmol/L



Thyroid Peroxidase (TPO) Abs
10.00 iU/L

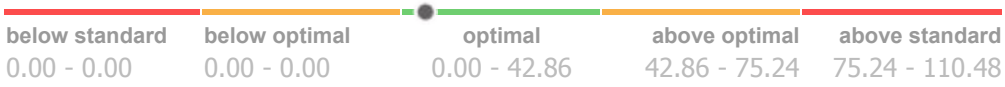


Thyroglobulin Abs
15.00 iIU/L

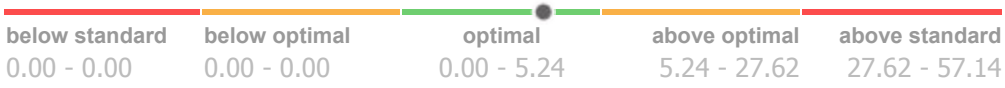


Inflammation/Oxidation

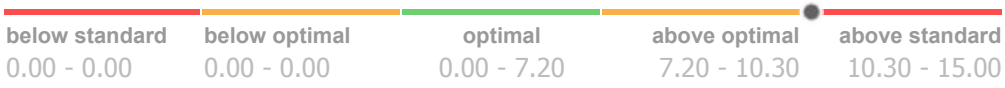
C-Reactive Protein
4.76 nmol/L



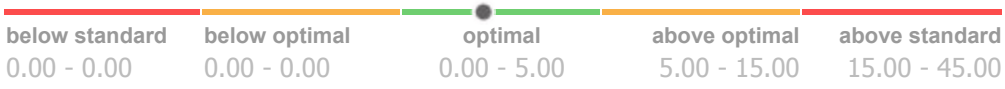
Hs CRP, Male
3.71 nmol/L



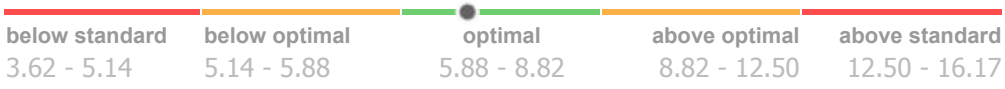
Homocysteine
10.50 µmol/L



ESR, Male
2.00 mm/hr

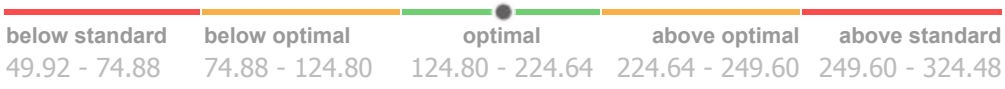


Fibrinogen
6.85 umol/L

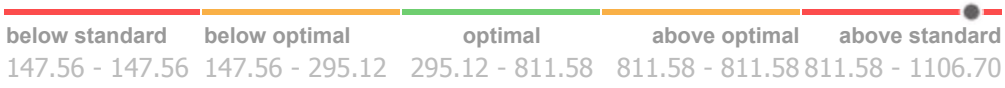


Vitamins

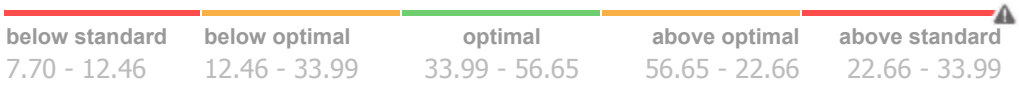
Vitamin D (25-OH)
174.74 nmol/L



Vitamin B12
1060.96 pmol/L

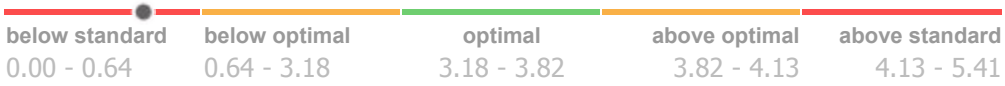


Folate
36.24 nmol/L

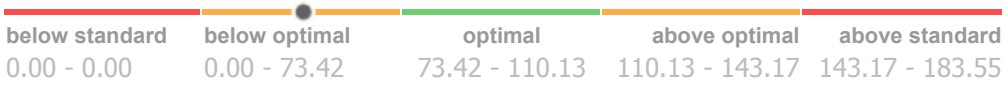


Hormones

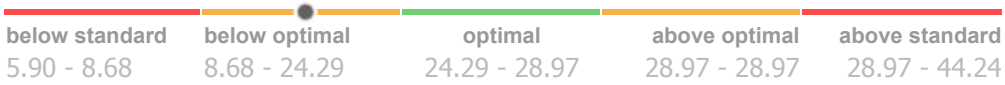
Progesterone, Male
0.45 nmol/L



Estradiol, Male
37.44 pmol/L

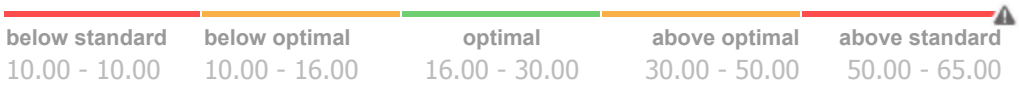


Testosterone, Total Male
16.75 nmol/L



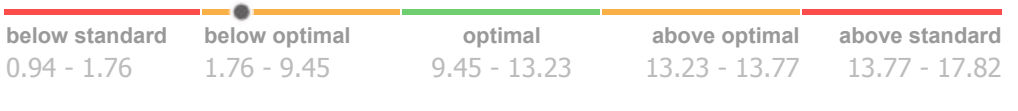
Sex Hormone Binding Globulin, male

73.90 nmol/L



DHEA-S, Male

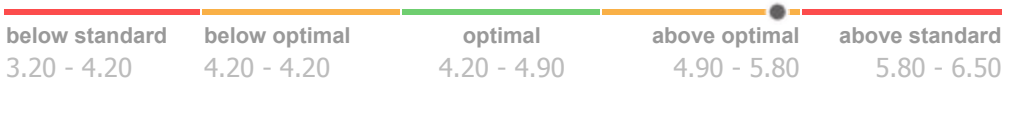
3.25 umol/L



CBC/Hemotology

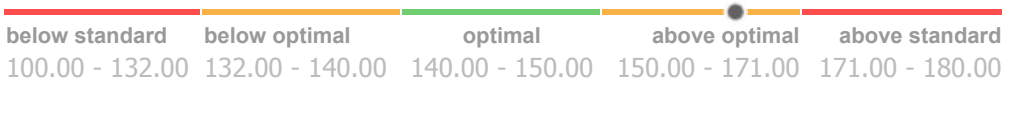
RBC, Male

5.69 x10*12/L



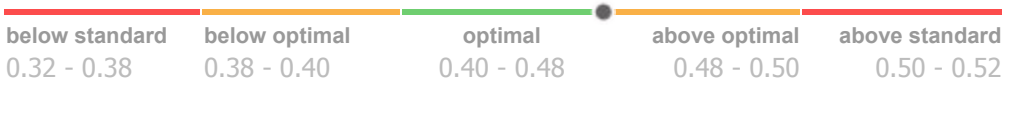
Haemoglobin, Male

164.00 g/L



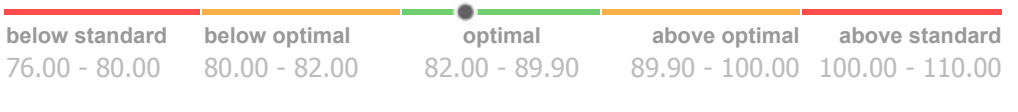
Haematocrit, Male

0.48 Prop. of 1.0



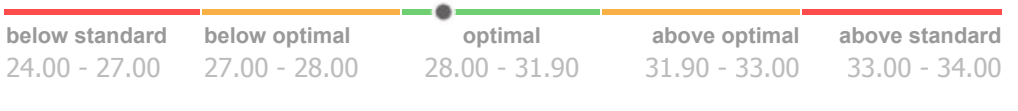
MCV

84.50 fL



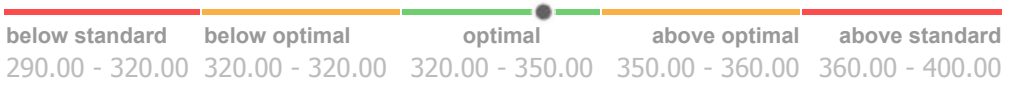
MCH

28.80 pg



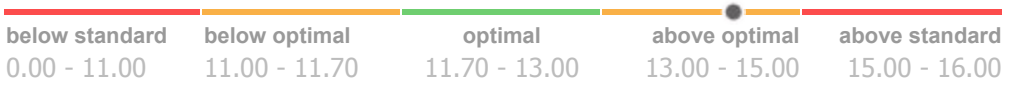
MCHC

341.00 g/L



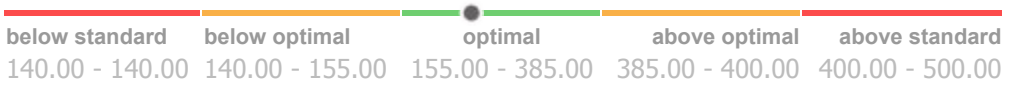
RDW

14.30 %



Platelets

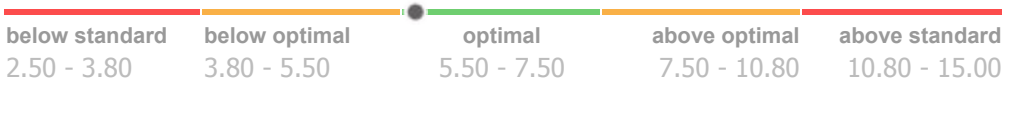
235.00 x10*9/l



White Blood Cells

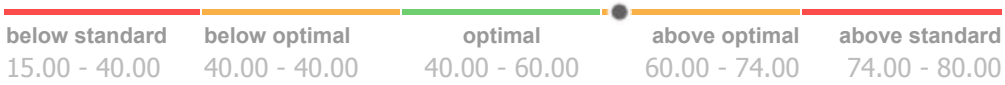
Total WBCs

5.63 x10*9/l



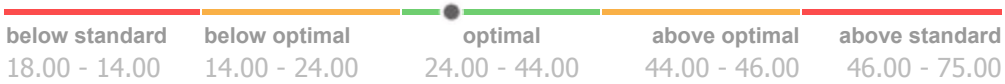
Neutrophils

61.20 %



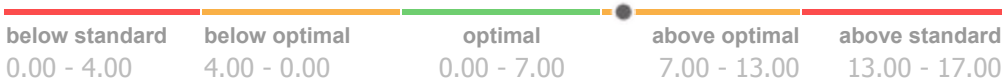
Lymphocytes

28.80 %



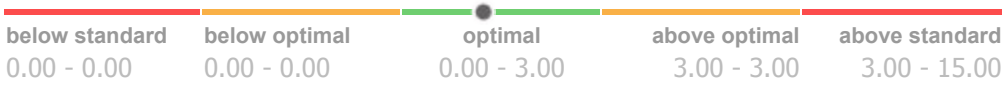
Monocytes

7.60 %



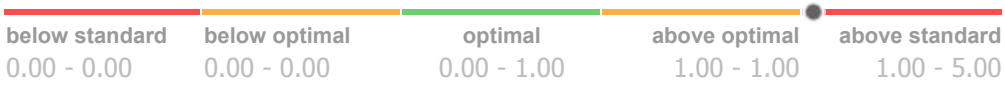
Eosinophils

1.20 %



Basophils

1.20 %



Blood Test Results Comparative Report

The Blood Test Results Comparative Report lists the results of the patient's latest and previous Chemistry Screen and CBC and shows you whether or not an individual biomarker is outside of the optimal range and/or outside of the clinical lab range. The biomarkers appear in the order in which they appear on the lab test form.

Above Optimal Range ↑ 9 Current 0 Previous	**Above Standard Range** ↑↑ 9 Current 0 Previous	**Alarm High** 3 Current 0 Previous
Below Optimal Range ↓ 8 Current 0 Previous	**Below Standard Range** ↓↓ 2 Current 0 Previous	**Alarm Low** 1 Current 0 Previous

Biomarker	Current Oct 27 2016	Optimal Range	Standard Range	Units
RBC, Male	5.69 ↑	4.20 - 4.90	4.20 - 5.80	x10*12/L
Haemoglobin, Male	164.00 ↑	140.00 - 150.00	132.00 - 171.00	g/L
Haematocrit, Male	0.48	0.40 - 0.48	0.38 - 0.50	Prop. of 1.0
MCV	84.50	82.00 - 89.90	80.00 - 100.00	fL
MCH	28.80	28.00 - 31.90	27.00 - 33.00	pg
MCHC	341.00	320.00 - 350.00	320.00 - 360.00	g/L
RDW	14.30 ↑	11.70 - 13.00	11.00 - 15.00	%
Total WBCs	5.63	5.50 - 7.50	3.80 - 10.80	x10*9/l
Neutrophils	61.20 ↑	40.00 - 60.00	40.00 - 74.00	%
Lymphocytes	28.80	24.00 - 44.00	14.00 - 46.00	%
Monocytes	7.60 ↑	0.00 - 7.00	4.00 - 13.00	%
Eosinophils	1.20	0.00 - 3.00	0.00 - 3.00	%
Basophils	1.20 ↑↑	0.00 - 1.00	0.00 - 1.00	%
Platelets	235.00	155.00 - 385.00	140.00 - 400.00	x10*9/l
Glucose	5.14 ↑	4.16 - 4.77	3.61 - 5.50	mmol/L
Haemoglobin A1C	5.06	4.50 - 5.50	0.00 - 5.70	%
Iron - Serum	20.10	15.22 - 23.27	7.16 - 28.64	µmol/L
Cholesterol - Total	7.21 ↑↑	4.14 - 4.65	3.23 - 5.17	mmol/L
Triglycerides	0.77 ↓	0.79 - 0.90	0.00 - 1.69	mmol/L
HDL Cholesterol	1.14 ↓↓	1.42 - 1.81	1.19 - 2.59	mmol/L
LDL Cholesterol	5.72 ⚠	0.00 - 3.11	0.00 - 3.37	mmol/L
VLDL Cholesterol	0.35	0.00 - 2.59	0.00 - 7.51	mmol/L
Cholesterol/HDL Ratio	6.32 ⚠	0.00 - 4.00	0.00 - 5.00	Ratio
Triglyceride/HDL Ratio	0.67	0.00 - 0.87	0.00 - 0.87	ratio
Alk Phos	109.00 ↑↑	70.00 - 100.00	35.00 - 104.00	U/L
AST (SGOT)	26.00	10.00 - 26.00	0.00 - 32.00	IU/L
ALT (SGPT)	23.00	10.00 - 26.00	0.00 - 33.00	U/L
GGT	14.00	10.00 - 30.00	3.00 - 70.00	U/L
Protein, total	67.70 ↓	69.00 - 74.00	61.00 - 81.00	g/L

Albumin	51.70 ↑↑	40.00 - 50.00	39.70 - 49.50	g/L
Globulin, total	16.00 !	24.00 - 28.00	19.00 - 37.00	g/L
Albumin/Globulin Ratio	3.23 ↑↑	1.40 - 2.10	0.90 - 2.00	ratio
Bilirubin - Total	9.20	1.71 - 15.39	3.42 - 20.52	µmol/L
Bilirubin - Direct	4.10 ↑↑	0.00 - 3.25	0.00 - 3.42	Umol/L
Bilirubin - Indirect	5.10	1.71 - 11.97	3.42 - 20.52	Umol/L
Sodium	137.00	135.00 - 142.00	135.00 - 146.00	mmol/L
Potassium	4.50	4.00 - 4.50	3.50 - 5.30	mmol/L
Sodium/Potassium Ratio	30.44	30.00 - 35.00	30.00 - 35.00	ratio
Chloride	98.90 ↓	100.00 - 106.00	98.00 - 110.00	mmol/L
Urea	4.60	3.57 - 5.71	2.50 - 8.92	mmol/L
Creatinine	71.00	70.72 - 97.24	35.36 - 132.60	umol/L
eGFR	111.00	90.00 - 200.00	90.00 - 200.00	mL/min
Uric Acid, male	323.00	208.18 - 350.93	205.21 - 475.84	umol/L
Calcium	2.41	2.30 - 2.50	2.15 - 2.60	mmol/L
Phosphorus	1.23	0.97 - 1.29	0.81 - 1.45	mmol/L
Calcium/Phosphorous Ratio	1.95	1.78 - 2.09	1.78 - 2.09	ratio
Calcium/Albumin Ratio	0.04	0.00 - 0.06	0.00 - 0.06	ratio
Magnesium	0.86 ↓	1.00 - 1.25	0.75 - 1.25	mmol/L
LDH	180.00	140.00 - 200.00	120.00 - 250.00	U/L
C-Reactive Protein	4.76	0.00 - 42.86	0.00 - 75.24	nmol/L
Hs CRP, Male	3.71	0.00 - 5.24	0.00 - 27.62	nmol/L
BUN/Creatinine Ratio	0.06	0.04 - 0.06	0.02 - 0.09	Ratio
CO2	26.00	25.00 - 30.00	19.00 - 30.00	mmol/L
Anion gap	16.60 ↑↑	7.00 - 12.00	6.00 - 16.00	mmol/L
TSH	1.48	1.30 - 2.00	0.40 - 4.50	mIU/L
Free T3	4.78	4.61 - 5.38	3.53 - 6.45	pmol/L
Free T4	16.90	12.87 - 19.30	10.30 - 23.17	pmol/L
Total T3	1.67	1.39 - 2.59	1.17 - 2.79	nmol/L
Total T4	94.30	77.22 - 153.15	57.92 - 154.44	nmol/L
Thyroid Peroxidase (TPO) Abs	10.00	0.00 - 34.00	0.00 - 34.00	iU/L
Thyroglobulin Abs	15.00	0.00 - 115.00	0.00 - 115.00	iIU/L
Progesterone, Male	0.45 ↓↓	3.18 - 3.82	0.64 - 4.13	nmol/L
Estradiol, Male	37.44 ↓	73.42 - 110.13	0.00 - 143.17	pmol/L
Testosterone, Total Male	16.75 ↓	24.29 - 28.97	8.68 - 28.97	nmol/L
Sex Hormone Binding Globulin, male	73.90 !	16.00 - 30.00	10.00 - 50.00	nmol/L
DHEA-S, Male	3.25 ↓	9.45 - 13.23	1.76 - 13.77	umol/L
Homocysteine	10.50 ↑↑	0.00 - 7.20	0.00 - 10.30	µmol/L
C-Peptide	0.33 ↓	0.36 - 0.53	0.26 - 1.03	nmol/L
Insulin - Fasting	33.34 ↑	0.00 - 30.00	0.00 - 114.00	pmol/L
Vitamin D (25-OH)	174.74	124.80 - 224.64	74.88 - 249.60	nmol/L
PSA	1.40	0.00 - 2.60	0.00 - 4.00	ng/ml
ESR, Male	2.00	0.00 - 5.00	0.00 - 15.00	mm/hr
Ferritin	180.40 ↑	30.00 - 70.00	10.00 - 232.00	ng/ml

Fibrinogen	6.85	5.88 - 8.82	5.14 - 12.50	umol/L
TIBC	52.40	44.78 - 62.68	44.78 - 76.12	umol/L
% Transferrin saturation	38.40 ↑	20.00 - 35.00	20.00 - 50.00	%
Vitamin B12	1060.96 ↑↑	295.12 - 811.58	147.56 - 811.58	pmol/L
Folate	36.24	33.99 - 56.65	12.46 - 22.66	nmol/L

% Deviation from Optimal Report

This report shows the biomarkers on the blood test that are farthest from optimal expressed as a %. The biomarkers that appear closest to the top and the bottom are those biomarkers that are farthest from optimal and should be carefully reviewed.

Biomarker	% from Median	Lab Result	Low	High	Optimal Reference Ranges Low High
Cholesterol - Total	544	**7.21**	4.14	4.65	
Sex Hormone Binding Globulin, male	364	**73.90**	16.00	30.00	
Ferritin	326	**180.40**	30.00	70.00	
Albumin/Globulin Ratio	211	**3.23**	1.40	2.10	
Haemoglobin, Male	190	**164.00**	140.00	150.00	
RBC, Male	163	**5.69**	4.20	4.90	
RDW	150	**14.30**	11.70	13.00	
Anion gap	142	**16.60**	7.00	12.00	
LDL Cholesterol	134	**5.72**	0.00	3.11	
Glucose	110	**5.14**	4.16	4.77	
Cholesterol/HDL Ratio	108	**6.32**	0.00	4.00	
Vitamin B12	98	**1060.96**	295.12	811.58	
Homocysteine	96	**10.50**	0.00	7.20	
Alk Phos	80	**109.00**	70.00	100.00	
Bilirubin - Direct	76	**4.10**	0.00	3.25	
% Transferrin saturation	73	**38.40**	20.00	35.00	
Basophils	70	**1.20**	0.00	1.00	
Albumin	67	**51.70**	40.00	50.00	
Insulin - Fasting	61	**33.34**	0.00	30.00	
Monocytes	59	**7.60**	0.00	7.00	
Neutrophils	56	**61.20**	40.00	60.00	
Haematocrit, Male	50	**0.48**	0.40	0.48	
AST (SGOT)	50	**26.00**	10.00	26.00	
Potassium	50	**4.50**	4.00	4.50	
ALT (SGPT)	31	**23.00**	10.00	26.00	
BUN/Creatinine Ratio	31	**0.06**	0.04	0.06	
Phosphorus	31	**1.23**	0.97	1.29	
Uric Acid, male	30	**323.00**	208.18	350.93	
Triglyceride/HDL Ratio	27	**0.67**	0.00	0.87	
Hs CRP, Male	21	**3.71**	0.00	5.24	
MCHC	20	**341.00**	320.00	350.00	
LDH	17	**180.00**	140.00	200.00	
Free T4	13	**16.90**	12.87	19.30	
Calcium/Albumin Ratio	12	**0.04**	0.00	0.06	
Iron - Serum	11	**20.10**	15.22	23.27	

Haemoglobin A1C	6	**5.06**	4.50	5.50	
Calcium	5	**2.41**	2.30	2.50	
Calcium/Phosphorous Ratio	5	**1.95**	1.78	2.09	
Bilirubin - Total	5	**9.20**	1.71	15.39	
PSA	4	**1.40**	0.00	2.60	
Vitamin D (25-OH)	0	**174.74**	124.80	224.64	
Urea	-2	**4.60**	3.57	5.71	
TIBC	-7	**52.40**	44.78	62.68	
ESR, Male	-10	**2.00**	0.00	5.00	
Eosinophils	-10	**1.20**	0.00	3.00	
Platelets	-15	**235.00**	155.00	385.00	
Bilirubin - Indirect	-17	**5.10**	1.71	11.97	
Fibrinogen	-17	**6.85**	5.88	8.82	
MCV	-18	**84.50**	82.00	89.90	
Thyroid Peroxidase (TPO) Abs	-21	**10.00**	0.00	34.00	
Sodium	-21	**137.00**	135.00	142.00	
TSH	-24	**1.48**	1.30	2.00	
Lymphocytes	-26	**28.80**	24.00	44.00	
Total T3	-26	**1.67**	1.39	2.59	
Total T4	-28	**94.30**	77.22	153.15	
Free T3	-28	**4.78**	4.61	5.38	
MCH	-29	**28.80**	28.00	31.90	
CO2	-30	**26.00**	25.00	30.00	
GGT	-30	**14.00**	10.00	30.00	
eGFR	-31	**111.00**	90.00	200.00	
VLDL Cholesterol	-36	**0.35**	0.00	2.59	
Thyroglobulin Abs	-37	**15.00**	0.00	115.00	
C-Reactive Protein	-39	**4.76**	0.00	42.86	
Folate	-40	**36.24**	33.99	56.65	
Sodium/Potassium Ratio	-41	**30.44**	30.00	35.00	
Total WBCs	-44	**5.63**	5.50	7.50	
Creatinine	-49	**71.00**	70.72	97.24	
Triglycerides	-68	**0.77**	0.79	0.90	
Chloride	-68	**98.90**	100.00	106.00	
C-Peptide	-71	**0.33**	0.36	0.53	
Protein, total	-76	**67.70**	69.00	74.00	
Magnesium	-106	**0.86**	1.00	1.25	
HDL Cholesterol	-123	**1.14**	1.42	1.81	
Estradiol, Male	-148	**37.44**	73.42	110.13	
Testosterone, Total Male	-211	**16.75**	24.29	28.97	
DHEA-S, Male	-214	**3.25**	9.45	13.23	
Globulin, total	-250	**16.00**	24.00	28.00	
Progesterone, Male	-479	**0.45**	3.18	3.82	

Out of Optimal Range Report

The following results show all of the biomarkers that are out of the optimal reference range. The biomarkers that appear closest to the top of each section are those biomarkers that are farthest from optimal and should be carefully reviewed.

Above Optimal Range 9 Current ↑	Above Standard Range 9 Current ↑↑	Alarm High 3 Current ⚠
Below Optimal Range 8 Current ↓	Below Standard Range 2 Current ↓↓	Alarm Low 1 Current ⚠

Above Optimal

Cholesterol - Total ↑↑ 7.21 mmol/L (+ 544 %)

Cholesterol is a steroid found in every cell of the body and in the plasma. It is an essential component in the structure of the cell membrane where it controls membrane fluidity. It provides the structural backbone for every steroid hormone in the body, which includes adrenal and sex hormones and vitamin D. The myelin sheaths of nerve fibers are derived from cholesterol and the bile salts that emulsify fats are composed of cholesterol. Cholesterol is made in the body by the liver and other organs, and from dietary sources. The liver, the intestines, and the skin produce between 60-80% of the body's cholesterol. The remainder comes from the diet. An increased cholesterol is just one of many independent risk factors for cardiovascular disease. It is also associated with metabolic syndrome, hypothyroidism, biliary stasis, and fatty liver. Decreased cholesterol levels are a strong indicator of gallbladder dysfunction, oxidative stress, inflammatory process, low fat diets and an increased heavy metal burden.

Sex Hormone Binding Globulin, male ⚠ 73.90 nmol/L (+ 364 %)

Sex Hormone Binding Globulin (SHBG) is a protein produced primarily in the liver and to some extent the testes, uterus, brain, and placenta. SHBG acts as a transport molecule for carrying estrogen and testosterone around the body and delivering them to receptors on the cells.

Ferritin ↑ 180.40 ng/ml (+ 326 %)

Ferritin is the main storage form of iron in the body. Decreased levels are strongly associated with iron deficiency where it is the most sensitive test to detect iron deficiency. Increased levels are associated with iron overload, an increasing risk of cardiovascular disease, inflammation and oxidative stress.

Albumin/Globulin Ratio ↑↑ 3.23 ratio (+ 211 %)

The albumin/globulin ratio is the ratio between the albumin and total globulin levels. An increased Albumin/Globulin ratio is fairly uncommon and is usually due to dehydration.

Haemoglobin, Male ↑ 164.00 g/L (+ 190 %)

Hemoglobin is the oxygen carrying molecule in red blood cells. Measuring hemoglobin is useful to determine the cause and type of anemia and for evaluating the efficacy of anemia treatment. Hemoglobin levels may be increased in cases of dehydration.

RBC, Male ↑ 5.69 x10*12/L (+ 163 %)

The red blood cell functions to carry oxygen from the lungs to the body tissues and to transfer carbon dioxide from the tissues to the lungs where it is expelled. The RBC Count determines the total number of cells or erythrocytes found in a cubic millimeter of blood. Increased levels are associated with dehydration, stress, a need for vitamin C and respiratory distress such as asthma. Decreased levels are primarily associated with anemia.

RDW ↑ 14.30 % (+ 150 %)

The Red Cell Distribution Width (RDW) is essentially an indication of the degree of abnormal variation in size of red blood cells (called anisocytosis). Although the RDW will increase with vitamin BI2 deficiency, folic acid, and iron anemia, it is increased most frequently with vitamin B12 deficiency anemia.

Anion gap ↑↑ 16.60 mmol/L (+ 142 %)

The anion gap is the measurement of the difference between the sum of the sodium and potassium levels and the sum of the serum CO_2/bicarbonate and chloride levels. Increased levels are associated with thiamine deficiency and metabolic acidosis.

LDL Cholesterol ⚠ 5.72 mmol/L (+ 134 %)

LDL functions to transport cholesterol and other fatty acids from the liver to the peripheral tissues for uptake and metabolism by the cells. It is known as “bad cholesterol” because it is thought that this process of bringing cholesterol from the liver to the peripheral tissue increases the risk for atherosclerosis. An increased LDL cholesterol is just one of many independent risk factors for cardiovascular disease. It is also associated with metabolic syndrome, oxidative stress and fatty liver.

Glucose ↑ 5.14 mmol/L (+ 110 %)

Blood glucose levels are regulated by a number of important hormones including insulin and glucagon. Glucose is also directly formed in the body from carbohydrate digestion and from the conversion in the liver of other sugars, such as fructose, into glucose. Increased blood glucose is associated with type 1 & 2 diabetes, metabolic syndrome and insulin resistance. Decreased levels of blood glucose are associated with hypoglycemia.

Cholesterol/HDL Ratio ⚠ 6.32 Ratio (+ 108 %)

The ratio of total cholesterol to HDL is a far better predictor of cardiovascular disease than cholesterol by itself. A lower ratio is ideal because you want to lower cholesterol (but not too low) and raise HDL. A level below 3.0 would be ideal. Every increase of 1.0, i.e. 3.0 to 4.0 increases the risk of heart attack by 60%.

Vitamin B12 ↑↑ 1060.96 pmol/L (+ 98 %)

Vitamin B12 is an essential nutrient for DNA synthesis and red blood cell maturation, and is also necessary for myelin sheath formation and maintenance in our nerves.

Homocysteine ↑↑ 10.50 µmol/L (+ 96 %)

Homocysteine is a molecule formed from the incomplete metabolism of the amino acid methionine. Deficiencies in Vitamins B6, B12 and folate cause methionine to be converted into homocysteine. Homocysteine increases the risk of cardiovascular disease by causing damage to the endothelial lining of the arteries, especially in the heart. Increased levels of homocysteine are associated with an increased risk of cardiovascular disease and stroke, as well as cancer, depression and inflammatory bowel disease.

Alk Phos ↑↑ 109.00 U/L (+ 80 %)

Alkaline phosphatase (ALP) is a group of isoenzymes that originate in the bone, liver, intestines, skin, and placenta. It has a maximal activity at a pH of 9.0-10.0, hence the term alkaline phosphatase. Elevated levels of ALP in the serum can occur with any liver dysfunction, it is especially sensitive to any type of obstruction in the biliary tract, both intra and extra-hepatic, both severe and mild. The degree of ALP elevation is in direct correlation to the severity of the obstruction. Elevated levels not of liver origin are seen in normal bone growth in children and healing fractures.

Bilirubin - Direct ↑↑ 4.10 Umol/L (+ 76 %)

Direct or conjugated bilirubin is the form of bilirubin that has been made water soluble in the liver so it can be excreted in the bile. An increase in direct or conjugated bilirubin is usually associated with a dysfunction or blockage in the liver, gallbladder, or biliary tree.

% Transferrin saturation ↑ 38.40 % (+ 73 %)

The % transferrin saturation index is a calculated value that tells how much serum iron is actually bound to the iron carrying protein transferrin. A % transferrin saturation value of 15% means that 15% of iron-binding sites of transferrin is being occupied by iron. It is a sign of iron overload or too much iron in the blood if it is above the optimal range.

Basophils ↑↑ 1.20 % (+ 70 %)

Basophils are one of the circulating white blood cells. They constitute a small percentage of the total white blood cell count. Basophils play an important role in the inflammatory process by releasing important substances, such as heparin, to prevent clotting in the inflamed tissue. Basophils will often be increased with tissue inflammation and is often seen with cases of intestinal parasites.

Albumin ↑↑ 51.70 g/L (+ 67 %)

Albumin is one of the major blood proteins. Produced primarily in the liver, Albumin plays a major role in water distribution and serves as a transport protein for hormones and various drugs. Increased albumin is a strong indicator of dehydration.

Insulin - Fasting ↑ 33.34 pmol/L (+ 61 %)

insulin is the hormone released in response to rising blood glucose levels and decreases blood glucose by transporting glucose into the cells. Often people lose their ability to utilize insulin to effectively drive blood glucose into energy-producing cells. This is commonly known as “insulin resistance” and is associated with increasing levels of insulin in the blood. Excess insulin is associated with greater risks of heart attack, stroke, metabolic syndrome and diabetes.

Monocytes ↑ 7.60 % (+ 59 %)

Monocytes are white blood cells that are the body’s second line of defense against infection. They are phagocytic cells that are capable of movement and remove dead cells, microorganisms, and particulate matter from circulating blood. Levels tend to rise at the recovery phase of an infection or with chronic infection.

Neutrophils ↑ 61.20 % (+ 56 %)

Neutrophils are the white blood cells used by the body to combat bacterial infections. They are the most numerous and important white cell in the body’s reaction to inflammation. Levels will be raised in bacterial infections. Decreased levels are often see in chronic viral infections.

Below Optimal

Progesterone, Male ↓↓ 0.45 nmol/L (- 479 %)

Progesterone is often considered to be a female hormone but men produce progesterone too. In the body it's converted into testosterone and also serves to oppose and balance estrogen. As men age, their progesterone levels drop, which may cause the testosterone levels to fall.

Globulin, total ! 16.00 g/L (- 250 %)

Total serum globulin is a measurement of all the individual globulin fractions in the blood. Globulins constitute the body's antibody system. A raised globulin level is associated with hypochlorhydria, liver dysfunction, immune activation, oxidative stress and inflammation. Decreased levels are associated with inflammation in the digestive system and immune insufficiency.

DHEA-S, Male ↓ 3.25 umol/L (- 214 %)

DHEA is produced primarily from the adrenals and is the most abundant circulating steroid in the human body and influences more than 150 known anabolic (repair) functions throughout the body and brain. It is the precursor for the sex hormones: testosterone, progesterone and estrogen. Decreased levels are associated with many common age-related conditions, including diseases of the nervous, cardiovascular, and immune systems such as metabolic syndrome, coronary artery disease, osteoporosis, mood disorders and sexual dysfunction. Ideally DHEA levels should be maintained at the level of a healthy 30-year-old in order to maximize the anti-aging effects.

Testosterone, Total Male ↓ 16.75 nmol/L (- 211 %)

Testosterone is the primary sex hormone for men. The total testosterone test measures both the testosterone that is bound to serum proteins and the unbound form (free testosterone). In men, total testosterone is useful for assessing gonadal, adrenal, and pituitary function.

Estradiol, Male ↓ 37.44 pmol/L (- 148 %)

Estradiol is a minor hormone in men. Estradiol is synthesized from testosterone and androstenedione in men and plays a role in male sex hormone physiology. Low levels of estradiol in men affect bone density and risk of fractures if too low.

HDL Cholesterol ↓↓ 1.14 mmol/L (- 123 %)

HDL functions to transport cholesterol from the peripheral tissues and vessel walls to the liver for processing and metabolism into bile salts. It is known as “good cholesterol” because it is thought that this process of bringing cholesterol from the peripheral tissue to the liver is protective against atherosclerosis. Decreased HDL is considered atherogenic, increased HDL is considered protective.

Magnesium ↓ 0.86 mmol/L (- 106 %)

The majority of magnesium is found inside the cell so measuring magnesium levels in the serum may not be the best way to assess for magnesium deficiency. That being said, an increased serum magnesium is associated with kidney dyfunction and thyroid hypofunction. A decreased magnesium is a common finding with muscle cramps.

Protein, total ↓ 67.70 g/L (- 76 %)

Total serum protein is composed of albumin and total globulin. Conditions that affect albumin and total globulin readings will impact the total protein value. A decreased total protein can be an indication of malnutrition, digestive dysfunction due to HCl need, or liver dysfunction. Malnutrition leads to a decreased total protein level in the serum primarily from lack of available essential amino acids. An increased total protein is most often due to dehydration.

C-Peptide ↓ 0.33 nmol/L (- 71 %)

C-Peptide is used as an indicator for insulin production from the pancreas. It can help assess whether a high blood glucose is due to reduced insulin output from the pancreas or due to reduced glucose uptake by the cells, a condition called insulin resistance.

Chloride ↓ 98.90 mmol/L (- 68 %)

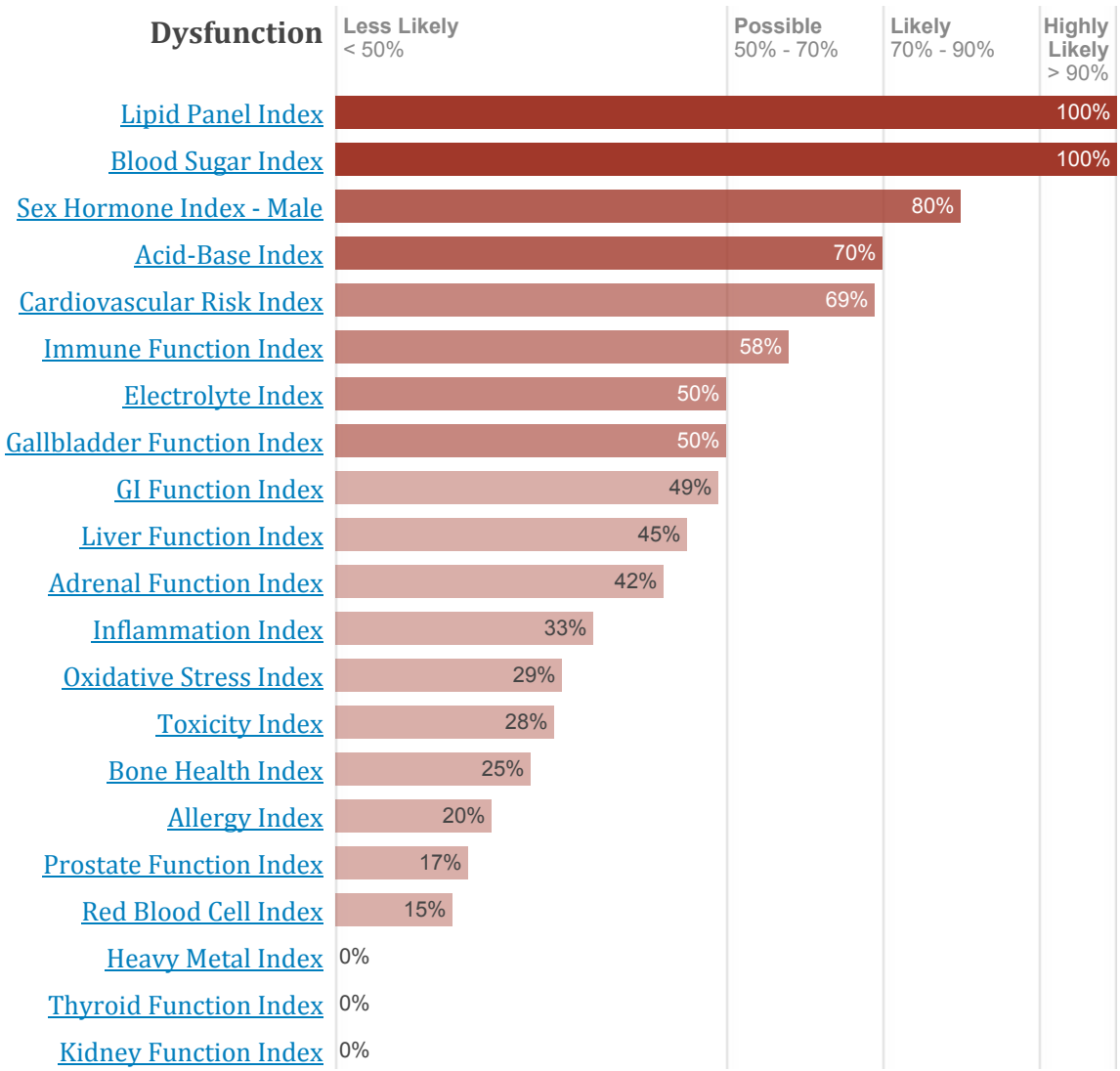
Chloride plays an important role in human physiology. The amount of serum chloride is carefully regulated by the kidneys. Chloride is involved in regulating acid-base balane in the body. Increased levels are associated with metabolic acidosis and decreased levels are associated with metabolic alkalosis. Chloride is an important molecule in the production of hydrochloric acid in the stomach so decreased levels are associated with hypochlorhydria.

Triglycerides ↓ 0.77 mmol/L (- 68 %)

Serum triglycerides are composed of fatty acid molecules that enter the blood stream either from the liver or from the diet. Patients that are optimally metabolizing their fats and carbohydrates tend to have a triglyceride level about one-half of the total cholesterol level. Levels will be elevated in metabolic syndrome, fatty liver, in patients with an increased risk of cardiovascular disease, hypothyroidism and adrenal dysfunction. Levels will be decreased in liver dysfunction, a diet deficient in fat, and inflammatory processes.

Functional Index Report

The indices shown below represent an analysis of this blood test. These results have been converted into your patient's individual Functional Index Report based on our latest research. This report gives you an indication of the level of dysfunction that exists in the various physiological systems in the body. Please use this report in conjunction with the " Practitioner's Only Clinical Dysfunctions Report" to identify which dysfunctions and conditions are causing changes in the Functional Index and to put together a unique treatment plan designed to bring their body back into a state of functional health, wellness and energy.



Lipid Panel Index

A high Lipid Panel Index indicates that there is a strong clinical indication of hyperlipidemia, which has been shown to indicate a potential risk of developing atherosclerotic coronary artery disease. Although hyperlipidemia is a cause, it's important to look at many other risks for this disease including smoking, blood sugar dysregulation, hypertension, elevated homocysteine and other diet and lifestyle considerations. Based on this blood test, your patient's Lipid Panel is:

[100%] - Dysfunction Highly Likely. Much improvement required.

Rationale:
Cholesterol - Total ↑, LDL Cholesterol ↑, Cholesterol/HDL Ratio ↑, HDL Cholesterol ↓

Biomarkers Considered:
Cholesterol - Total, Triglycerides, LDL Cholesterol, Cholesterol/HDL Ratio, HDL Cholesterol

Blood Sugar Index

A high Blood Sugar Index indicates that there is dysfunction in this patient's blood sugar regulation. Blood sugar dysregulation is affected by genetics, diet, lifestyle, nutrition and environment. Some factors to consider include hypoglycemia, metabolic syndrome, insulin resistance, hyperinsulinemia, and type 2 Diabetes. Based on this blood test, your patient's Blood Sugar Index is:

[100%] - Dysfunction Highly Likely. Much improvement required.

Rationale:
Glucose ↑, Insulin - Fasting ↑, Cholesterol - Total ↑, LDL Cholesterol ↑, HDL Cholesterol ↓, DHEA-S, Male ↓

Biomarkers Considered:
Glucose, LDH, Haemoglobin A1C, Insulin - Fasting, Cholesterol - Total, Triglycerides, LDL Cholesterol, HDL Cholesterol, DHEA-S, Male

Sex Hormone Index - Male

The Male Sex Hormone Index indicates an increasing level of sex hormone deficiencies in your patient. Review the individual levels of hormones to identify which hormones are causing the high index: testosterone, DHEA and estradiol. Based on this blood test, your patient's Male Sex Hormone Index is:

[80%] - Dysfunction Likely. Improvement required.

Rationale:
DHEA-S, Male ↓, Testosterone, Total Male ↓, Progesterone, Male ↓

Biomarkers Considered:
DHEA-S, Male, Estradiol, Male, Testosterone, Total Male, PSA, Progesterone, Male

Patient Result Not Available - Consider Running In Future Tests:
Testosterone, Free Male LABCORP, Testosterone, Free Male

Acid-Base Index

A high Acid-Base Index indicates a functional imbalance in the body's pH system. Consider metabolic acidosis or metabolic alkalosis as a cause for this imbalance. Based on this blood test, your patient's Acid-Base Index is:

[70%] - Dysfunction Likely. Improvement required.

Rationale:
Anion gap ↑, Chloride ↓

Biomarkers Considered:
Anion gap, Potassium, Chloride, CO2, Calcium

Cardiovascular Risk Index

The Cardiovascular Risk Index is based on the measurement of 15 elements in a blood test that indicate an increase risk of this patient developing cardiovascular disease (heart attack, coronary artery disease and stroke). A high Cardiovascular Risk Index indicates that your patient may have an increased risk of cardiovascular disease, atherosclerosis, endothelial dysfunction, and inflammation. Based on this blood test, your patient's Cardiovascular Risk Index is:

[69%] - Dysfunction Possible. There may be improvement needed in certain areas.

Rationale:
Glucose ↑, Cholesterol - Total ↑, LDL Cholesterol ↑, HDL Cholesterol ↓, Ferritin ↑, Homocysteine ↑, Testosterone, Total Male ↓, Insulin - Fasting ↑

Biomarkers Considered:
Glucose, AST (SGOT), LDH, Cholesterol - Total, Triglycerides, LDL Cholesterol, HDL Cholesterol, Ferritin, Fibrinogen, Hs CRP, Male, Homocysteine, Haemoglobin A1C, Estradiol, Male, Testosterone, Total Male, Insulin - Fasting, Vitamin D (25-OH)

Patient Result Not Available - Consider Running In Future Tests:
Testosterone, Free Male LABCORP, Testosterone, Free Male

Immune Function Index

A high reading in the Immune Function Index indicates that there is dysfunction within your patient's immune system and further assessment is needed to pinpoint exactly what that dysfunction is. Some of the factors to consider include immune insufficiency, bacterial or viral infections or GI dysfunction associated with immune function: abnormal mucosal barrier function, secretory IgA dysfunction or dysbiosis. Based on this blood test, your patient's Immune Function Index is:

[58%] - Dysfunction Possible. There may be improvement needed in certain areas.

Rationale:
Globulin, total ↓, Neutrophils ↑, Monocytes ↑, Ferritin ↑

Biomarkers Considered:
Total WBCs, Globulin, total, Neutrophils, Lymphocytes, Monocytes, Albumin, Alk Phos, Iron - Serum, Ferritin

Electrolyte Index

A high Electrolyte Index indicates that there's a degree of dysfunction in the body's electrolytes: potassium, sodium, chloride, potassium and magnesium. View the Nutrient Index report to identify which electrolytes might be deficient. Based on this blood test, your patient's Electrolyte Index is:

[50%] - Dysfunction Possible. There may be improvement needed in certain areas.

Rationale:
Chloride ↓, Magnesium ↓

Biomarkers Considered:
Sodium, Potassium, Chloride, Calcium, Phosphorus, Magnesium

Gallbladder Function Index

A high Gallbladder Function Index indicates that that there is dysfunction within your patient's hepato-biliary system and further assessment is needed to find out what the dysfunction is. Some factors to consider include problems in the liver that compromises the production of bile (biliary insufficiency), the progressive thickening of the bile itself within the gallbladder (biliary stasis) or biliary obstruction that causes cholestasis, a condition of impaired bile flow. Biliary obstruction can occur in the liver but more often occurs outside the liver where it is most often due to a common calculi and usually occurs on a spectrum of mild to severe. Biliary obstruction usually has a genesis in biliary stasis. Based on this blood test, your patient's Gallbladder Function Index is:

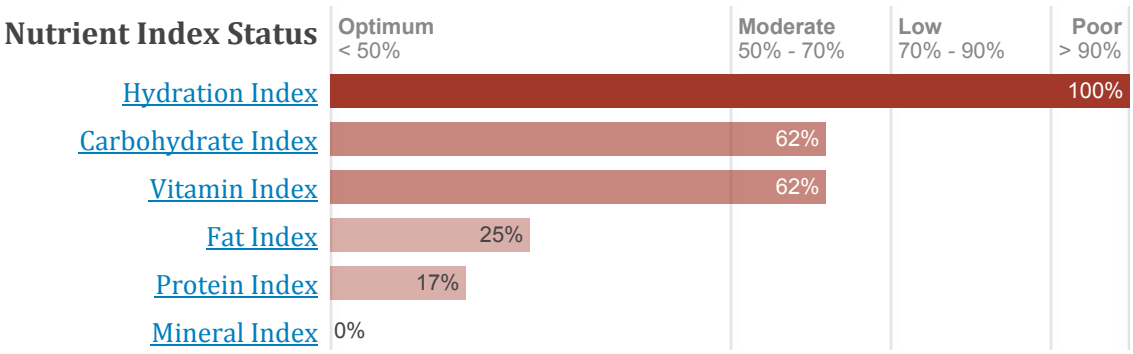
[50%] - Dysfunction Possible. There may be improvement needed in certain areas.

Rationale:
Alk Phos ↑, Cholesterol - Total ↑, Bilirubin - Direct ↑, Triglycerides ↓

Biomarkers Considered:
GGT, Alk Phos, Cholesterol - Total, ALT (SGPT), LDH, Bilirubin - Total, Bilirubin - Direct, Triglycerides

Nutrient Index Report

The indices shown below represent an analysis of your patient's blood test results. These results have been converted into their individual Nutrient Assessment Report based on our latest research. This report gives you an indication of their general nutritional status. Nutritional status is influenced by actual dietary intake, digestion, absorption, assimilation and cellular uptake of the nutrients themselves. You can use this information, along with information about individual nutrient deficiencies, to put together a unique treatment plan designed to bring their body back into a state of functional health, wellness and energy.



Hydration Index

The Hydration index gives us a good indication of how well hydrated your patient was at the time their blood was drawn. Dehydration is a very common problem and often shows up on a standard blood chemistry and CBC test. Insufficient water intake and/or excessive use of diuretics such as over the counter and prescription drugs, botanical medicines, caffeine etc. are the most common cause of dehydration and may be a cause of an increased Hydration Index. An increased albumin is a sign of dehydration along with increased and BUN, Sodium, Potassium, RBC count, Hemoglobin and Hematocrit. Based on this blood test, your patient's Hydration Index is:

[100%] - Nutrient Status is Poor. Much improvement required.

Rationale:
Albumin ↑, RBC, Male ↑, Haemoglobin, Male ↑

Biomarkers Considered:
Albumin, Urea, Sodium, Potassium, Protein, total, RBC, Male, Haemoglobin, Male, Haematocrit, Male

Carbohydrate Index

The Carbohydrate Index gives us an assessment of your patient's dietary intake of carbohydrates, especially refined carbohydrates and sugars. A diet high in refined carbohydrates and sugars will deplete phosphorus stores and other important co-factors for carbohydrate metabolism. It may also increase serum glucose and serum triglyceride levels. Follow up a high Carbohydrate Index with a thorough assessment of blood sugar regulation and also an investigation into this patient's dietary consumption of sugars and refined carbohydrates. Based on this blood test, your patient's Carbohydrate Index is:

[62%] - Moderate Nutrient Status. There may be improvement needed in certain areas.

Rationale:
Glucose ↑, Cholesterol - Total ↑, LDL Cholesterol ↑, HDL Cholesterol ↓

Biomarkers Considered:

Glucose, Phosphorus, LDH, Cholesterol - Total, Triglycerides, LDL Cholesterol, HDL Cholesterol, Total WBCs

Vitamin Index

The Vitamin Index gives us a general indication of the balance of certain vitamins in the body based on the results of this blood test. A high Vitamin Index indicates a level of deficiency or need in one or more of the vitamins reflected in this index, which includes vitamin B12, vitamin B6, folate, thiamin, vitamin D and vitamin C. Factors to consider are the amount in the diet, the ability to digest and breakdown individual vitamins from the food or supplements consumed, and the ability of those vitamins to be absorbed, transported and ultimately taken up into the cells themselves. Please use the information at the bottom of this report to identify which vitamin or vitamins may be in need. Based on this blood test, your patient's Vitamin Index is:

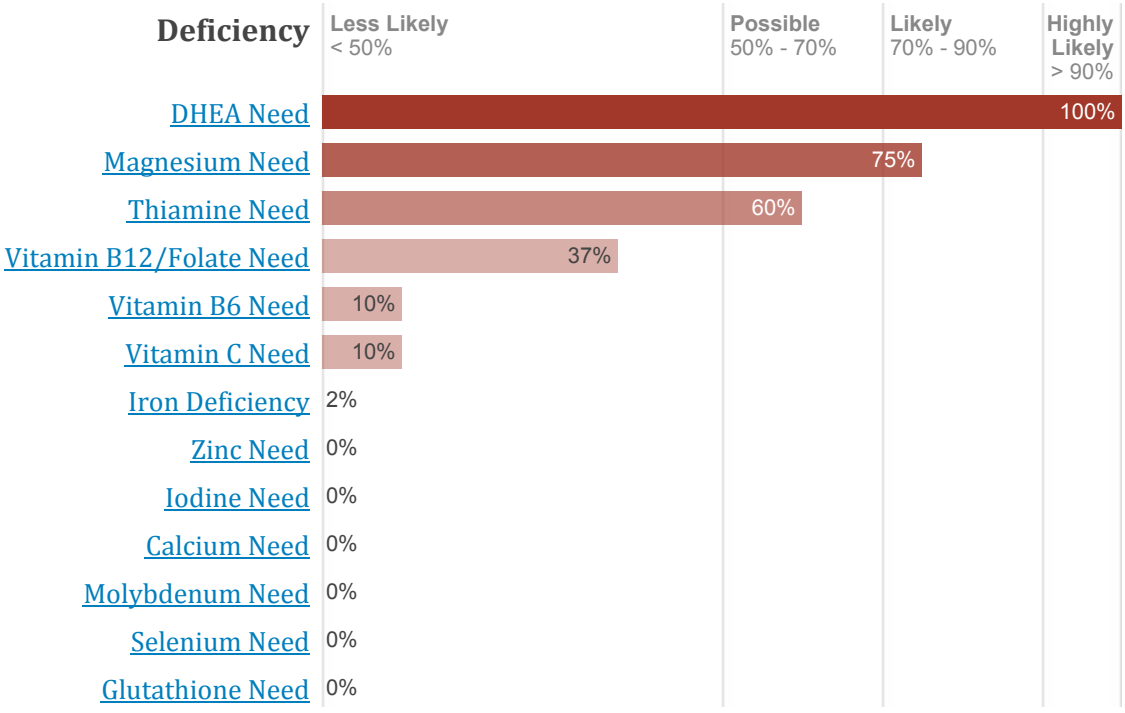
[62%] - Moderate Nutrient Status. There may be improvement needed in certain areas.

Rationale:
Anion gap ↑, Homocysteine ↑

Biomarkers Considered:
Anion gap, Albumin, AST (SGOT), ALT (SGPT), GGT, Homocysteine, Vitamin D (25-OH), MCV

Individual Nutrient Deficiencies

The values below represent the degree of deficiency for individual nutrients based on your patient's blood results. The status of an individual nutrient is based on a number of factors such as actual dietary intake, digestion, absorption, assimilation and cellular uptake of the nutrients themselves. All of these factors must be taken into consideration before determining whether or not your patient/client actually needs an individual nutrient. Use the information in this section to put together an individualized treatment plan to bring your patient back into a state of optimal nutritional function.



DHEA Need

The results of this blood test indicate that this patient's DHEA levels might be lower than optimal.

[100%] - Dysfunction Highly Likely. Much improvement required.

Rationale:
DHEA-S, Male ↓

Biomarkers Considered:
DHEA-S, Male

Magnesium Need

A magnesium need is associated with a **decreased serum magnesium,** a **decreased GGTP** and a **decreased serum potassium.**

[75%] - Dysfunction Likely. Improvement required.

Rationale:
Magnesium ↓

Biomarkers Considered:
Magnesium, GGT, Potassium

Thiamine Need

Consider Thiamine deficiency with an **increased anion gap** along with a **decreased CO_2**. **Hemoglobin** and **hematocrit** levels may be normal or decreased. Due to thiamine's role in glycolysis, **LDH** levels may be decreased and **glucose** levels may be normal to increased.

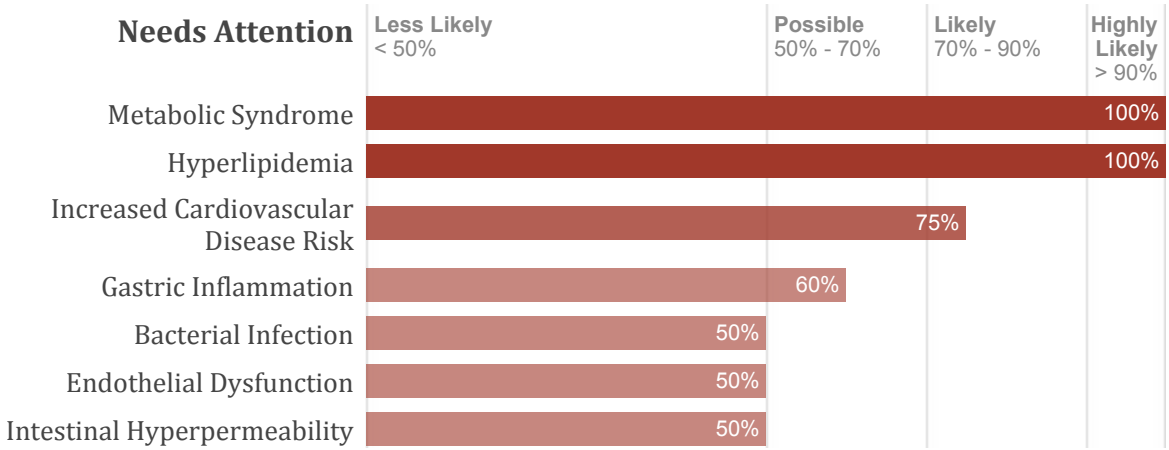
[60%] - Dysfunction Possible. There may be improvement needed in certain areas.

Rationale:
Anion gap ↑, Glucose ↑

Biomarkers Considered:
Anion gap, CO2, Glucose, LDH, Haemoglobin, Male, Haematocrit, Male

Health Improvement Plan

The Health Improvement Plan takes all the information on this report and focuses on the top areas that need the most attention.



Metabolic Syndrome

The results of this blood test indicate a tendency towards metabolic syndrome and a need for blood sugar support.

Rationale:
Glucose ↑, Insulin - Fasting ↑, Cholesterol - Total ↑, LDL Cholesterol ↑, HDL Cholesterol ↓, DHEA-S, Male ↓

Hyperlipidemia

The results of this blood test indicate a tendency towards hyperlipidemia, which has been shown to increase the risk of developing atherosclerotic coronary artery disease. There is a need for cardiovascular support, especially support to help lower excessive blood fats.

Rationale:
Cholesterol - Total ↑, LDL Cholesterol ↑, Cholesterol/HDL Ratio ↑, HDL Cholesterol ↓

Increased Cardiovascular Disease Risk

The results of this blood test indicate a higher than optimal risk of this patient developing cardiovascular disease and shows a need for cardiovascular support.*

Rationale:
Glucose ↑, Cholesterol - Total ↑, LDL Cholesterol ↑, HDL Cholesterol ↓, Ferritin ↑, Homocysteine ↑, Testosterone, Total Male ↓, Insulin - Fasting ↑

* These statements have not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure or prevent any disease.

Gastric Inflammation

The results of this blood test indicate a tendency towards gastric inflammation and a need for support for the stomach lining.

Rationale:
Globulin, total ↓, Protein, total ↓, Basophils ↑

Bacterial Infection

The results of this blood test indicate a tendency towards a bacterial infection and a need for immune support.

Rationale:
Neutrophils ↑, Monocytes ↑

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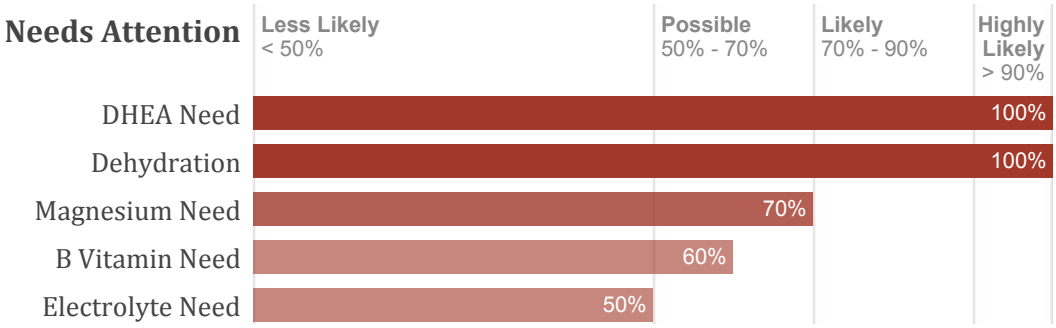
This Health Improvement Plan has been prepared for your patient based upon current algorithms. Additional personalized recommendations for nutritional support may be applicable based on this laboratory evaluation, your patient's history and your clinical practice experience.

Suggested Individual Nutrient Recommendations

The Health Improvement Plan takes all the information on this report and focuses on the top areas that need the most attention.



DHEA Need

The results of this blood test indicate that this patient's DHEA levels might be lower than optimal and shows a need for DHEA supplementation.

Rationale:
DHEA-S, Male ↓

Dehydration

The results of this blood test indicate that this patient may be dealing with dehydration, which is a very common problem. Dehydration often shows up on a standard blood chemistry and CBC test causing the elements listed below to be outside the optimal range. Insufficient water intake and/or excessive use of diuretics such as over the counter and prescription drugs, botanical medicines, caffeine etc. are the most common cause of dehydration.

Rationale:
Albumin ↑, RBC, Male ↑, Haemoglobin, Male ↑

Magnesium Need

The results of this blood test indicate that this patient's magnesium levels might be lower than optimal and shows a need for magnesium supplementation.

Rationale:
Magnesium ↓

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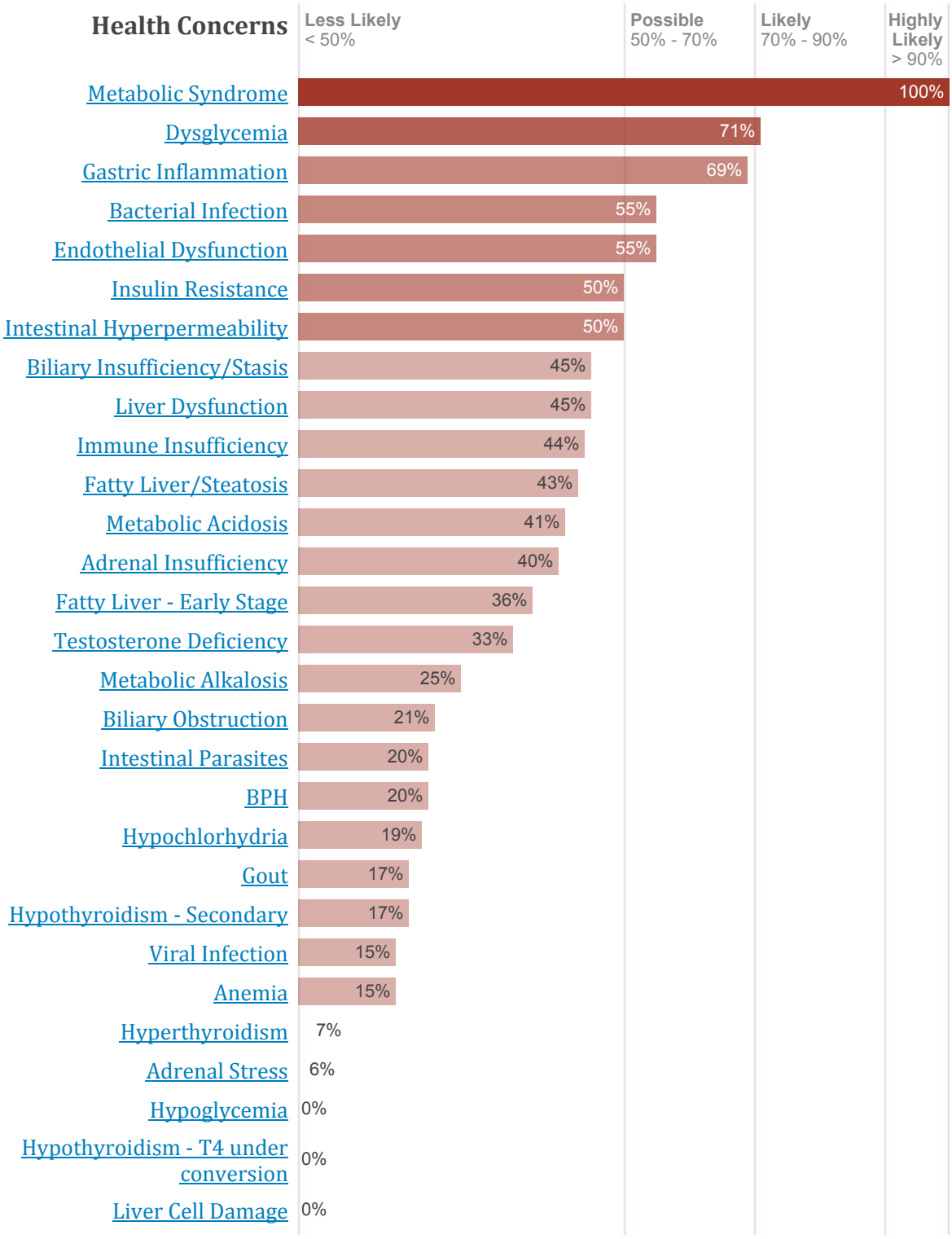
This Health Improvement Plan has been prepared for your patient based upon current algorithms. Additional

personalized recommendations for nutritional support may be applicable based on this laboratory evaluation, your patient's history and your clinical practice experience.

Clinical Dysfunctions Report

Advanced Practitioner Only Report

The Clinical Dysfunctions Report shows a list of likely Health Concerns and Nutrient Deficiencies that your patient may be suffering from based on an analysis of their Chemistry Screen and CBC results. Health Concerns that are most likely are listed at the top of the report and the least likely at the bottom.



Health Concerns	Less Likely < 50%	Possible 50% - 70%	Likely 70% - 90%	Highly Likely > 90%
Muscle Atrophy/Breakdown	0%			
Pancreatic Insufficiency	0%			
Renal Disease	0%			
Renal Insufficiency	0%			
Liver Cirrhosis	0%			

Metabolic Syndrome

Consider metabolic syndrome with an increased **triglyceride**, an increased **total cholesterol**, an increased **LDL** cholesterol, a decreased **HDL**, an increased fasting **blood glucose** and an increased **hemoglobin A1C**. Additional elements that may be out of range with metabolic syndrome include an increased fasting **insulin**, an increased **uric acid** and decreased **DHEA**.

[100%] - Dysfunction Highly Likely. Much improvement required.

Rationale:
Glucose ↑, Insulin - Fasting ↑, Cholesterol - Total ↑, LDL Cholesterol ↑, HDL Cholesterol ↓, DHEA-S, Male ↓

Biomarkers Considered:
Glucose, Triglycerides, Haemoglobin A1C, Insulin - Fasting, Uric Acid, male, Cholesterol - Total, LDL Cholesterol, HDL Cholesterol, DHEA-S, Male

Dysglycemia

Dysglycemia is an imbalance in the ability of the body to regulate blood glucose levels causing unhealthy blood glucose levels that can lead to Diabetes, Metabolic Syndrome, Obesity, Insulin Resistance and Hyperinsulinemia. Consider dysglycemia with an **elevated blood glucose level** and an **elevated hemoglobin A1C level**.

[71%] - Dysfunction Likely. Improvement required.

Rationale:
Glucose ↑

Biomarkers Considered:
Glucose, Haemoglobin A1C

Gastric Inflammation

Gastric inflammation or gastritis is often secondary to hypochlorhydria where the pattern is similar but the total globulin level may be decreased unless inflammation is severe, which may lead to an increased **globulin** level due to the increased production of inflammatory immunoglobulins. Consider gastric inflammation or gastritis with a decreased **total globulin**, a decreased serum **protein**, a decreased **phosphorous**, a decreased **hemoglobin** and an increased **BUN**. Additional elements that may be out of range with gastric inflammation include an increased **basophil** count, an increased **ESR**, a decreased **albumin** and a decreased **creatinine**.

[69%] - Dysfunction Possible. There may be improvement needed in certain areas.

Rationale:
Globulin, total ↓, Protein, total ↓, Basophils ↑

Biomarkers Considered:
Globulin, total, Protein, total, Haemoglobin, Male, Urea, Creatinine, Albumin, Phosphorus, ESR, Male, Basophils

Patient Result Not Available - Consider Running In Future Tests:
Gastrin

Bacterial Infection

Consider a bacterial infection if theres an **increased total WBC count** along with an **increased Neutrophil count**, a **normal or decreased Lymphocyte count**. **Increased Monocytes** indicate the recovery period of the infection. Additional elements that may be out of range with a bacterial infection include an **increased bands** and an **increased serum iron**. Expect to see increased Band cells in the acute phase as the body is pumping out immature neutrophils to cope with the infection.

[55%] - Dysfunction Possible. There may be improvement needed in certain areas.

Rationale:
Neutrophils ↑, Monocytes ↑

Biomarkers Considered:
Neutrophils, Total WBCs, Monocytes, Iron - Serum, Lymphocytes

Endothelial Dysfunction

Consider endothelial dysfunction with an increased **homocysteine**, an increased **blood glucose**, an increased **fibrinogen**, an increased **HS-CRP**, a decreased **free serum testosterone**, and an increased **iron**. Some of the other causes of endothelial dysfunction include smoking, hypertension, nutrient deficiencies, a standard Western diet, and a lack of exercise.

[55%] - Dysfunction Possible. There may be improvement needed in certain areas.

Rationale:
Homocysteine ↑, Glucose ↑

Biomarkers Considered:
Fibrinogen, Hs CRP, Male, Homocysteine, Glucose, Iron - Serum

Patient Result Not Available - Consider Running In Future Tests:
Testosterone, Free Male LABCORP, Testosterone, Free Male

Insulin Resistance

Insulin resistance is the condition in which people lose sensitivity to the hormone insulin. As the cells become resistant to insulin, levels of insulin and blood glucose will rise. Consider insulin resistance with an increased **fasting insulin** and an increased **fasting blood glucose**, an increased **Hemoglobin A1C**, an increased **triglyceride** and an increased **Triglyceride/HDL ratio.** You may also see an increased **total cholesterol**, an increased **C-Peptide**, a decreased **HDL** and a decreased **phosphorous**.

[50%] - Dysfunction Possible. There may be improvement needed in certain areas.

Rationale:
Glucose ↑, Cholesterol - Total ↑, HDL Cholesterol ↓, Insulin - Fasting ↑

Biomarkers Considered:
Glucose, Phosphorus, Cholesterol - Total, Triglycerides, HDL Cholesterol, Insulin - Fasting, Triglyceride/HDL Ratio, C-Peptide

Intestinal Hyperpermeability

Although there are no tests specifically for intestinal hyperpermeability on a blood chemistry screen, it is associated with an increased **uric acid** and an increased **alkaline phosphatase**.

[50%] - Dysfunction Possible. There may be improvement needed in certain areas.

Rationale:
Alk Phos ↑

Biomarkers Considered:
Uric Acid, male, Alk Phos

Blood Test History Report

The Blood Test History Report lists the results of your patient's Chemistry Screen and CBC tests side by side with the latest test listed on the left hand side. This report allows you to compare results over time and see where improvement has been made and allows you to track progress.

Biomarker		Latest Test Result Oct 27 2016
Glucose		5.14 ↑
Haemoglobin A1C		5.06
Insulin - Fasting		33.34 ↑
Fructosamine		
C-Peptide		0.33 ↓
Urea		4.60
Creatinine		71.00
BUN/Creatinine Ratio		0.06
eGFR		111.00
Sodium		137.00
Potassium		4.50
Sodium/Potassium Ratio		30.44
Chloride		98.90 ↓
CO2		26.00
Anion gap		16.60 ↑↑
Uric Acid, male		323.00
Protein, total		67.70 ↓
Albumin		51.70 ↑↑
Globulin, total		16.00 !

Biomarker		Latest Test Result Oct 27 2016
Albumin/Globulin Ratio		3.23 ↑↑
Calcium		2.41
Calcium/Albumin Ratio		0.04
Phosphorus		1.23
Calcium/Phosphorous Ratio		1.95
Magnesium		0.86 ↓
Alk Phos		109.00 ↑↑
LDH		180.00
AST (SGOT)		26.00
ALT (SGPT)		23.00
GGT		14.00
Bilirubin - Total		9.20
Bilirubin - Direct		4.10 ↑↑
Bilirubin - Indirect		5.10
Iron - Serum		20.10
Ferritin		180.40 ↑
TIBC		52.40
% Transferrin saturation		38.40 ↑
Cholesterol - Total		7.21 ↑↑
Triglycerides		0.77 ↓
HDL Cholesterol		1.14 ↓↓
LDL Cholesterol		5.72 ⚠

Biomarker		Latest Test Result Oct 27 2016
VLDL Cholesterol		0.35
Cholesterol/HDL Ratio		6.32 ⚠
Triglyceride/HDL Ratio		0.67
Leptin, Male		
TSH		1.48
Total T4		94.30
Total T3		1.67
Free T4		16.90
Free T3		4.78
T3 Uptake		
Free Thyroxine Index (T7)		
Thyroid Peroxidase (TPO) Abs		10.00
Thyroglobulin Abs		15.00
Reverse T3		
Hs CRP, Male		3.71
C-Reactive Protein		4.76
ESR, Male		2.00
Homocysteine		10.50 ↑↑
Fibrinogen		6.85
Creatine Kinase		
Vitamin D (25-OH)		174.74
Vitamin B12		1060.96 ↑↑

Biomarker		Latest Test Result Oct 27 2016
Folate		36.24
DHEA-S, Male		3.25 ↓
Testosterone, Free Male		
Testosterone, Total Male		16.75 ↓
Sex Hormone Binding Globulin, male		73.90 ⚠
Estradiol, Male		37.44 ↓
Progesterone, Male		0.45 ↓↓
PSA		1.40
Total WBCs		5.63
RBC, Male		5.69 ↑
Reticulocyte count		
Haemoglobin, Male		164.00 ↑
Haematocrit, Male		0.48
MCV		84.50
MCH		28.80
MCHC		341.00
Platelets		235.00
RDW		14.30 ↑
Neutrophils		61.20 ↑
Bands		
Lymphocytes		28.80
Monocytes		7.60 ↑

Biomarker		Latest Test Result Oct 27 2016
Basophils		1.20 ↑↑
Eosinophils		1.20

Recommended Further Testing

Advanced Practitioner Only Report

Based on the results of the analysis of this blood test, the following areas may require further investigation. The suggestions for further testing are merely examples and do not attempt to provide you with an exhaustive list of further evaluation methods.

Additional Lipid Testing

The results of this blood test indicate that this patient may dealing with hyperlipidemia, which may be causing the elements listed below to be outside the optimal range. If you haven't done so already, you may want to consider running additional lipid tests such as a VAP test to get more information on the nature of the hyperlipidemia and it's associated cardiovascular disease risk. The VAP Test is an expanded lipid panel that directly measures LDL, HDL, VLDL, Total cholesterol and triglyceride levels.The test also measures the following: The LDL particle density (clusters of small, dense LDL greatly increase the risk of cardiovascular disease). It also measure all the important lipoprotein subclasses: HDL2 (the most protective form of HDL), HDL3 (not as protective as HDL2), Intermediate Density Lipoproteins IDLs (these are often elevated in people with a family history of diabetes) and Very Low Density Lipoproteins (VLDL1, VLDL2, VLDL3). Knowing the different fractions of VLDL is important because high levels of VLDL3 put your patients at a greater risk of cardiovascular disease. Finally the test measures Lipoprotein (a) (Lp(a)), high levels of which are a very strong risk factor for heart attacks and strokes.

Rationale:
Cholesterol - Total ↑, LDL Cholesterol ↑, Cholesterol/HDL Ratio ↑, HDL Cholesterol ↓

Male Hormone Dysfunction

The results of this blood test indicate that this patient may dealing with an imbalance in male hormone regulation because a number of the elements below are out of the optimal range. A blood test can tell us about trends towards male hormone dysfunction but you may want to do a Male Hormone Salivary test to give you more information on the type and severity of the issue.

Rationale:
DHEA-S, Male ↓, Testosterone, Total Male ↓, Progesterone, Male ↓

What to Look For When Values Are Out of Range Report

Advanced Practitioner Only Report

This report shows what you need to look for when the blood tests results are out of the optimal reference range. The report lists all the biomarkers that are above or below the optimal reference range and lists all the possible associated health concerns with a short description.

RBC, Male ↑ (5.69 x10*12/L)

Relative increases in RBC count

Whenever there is a decrease in blood volume, you will see a relative increase in the RBC count (>4.5 in women and >4.9 in men) usually with an increased HCT (>44 or 0.44 in women and >48 or 0.48 in men), and HGB (>14.5 or 145 in women or 15 or 150 in men). Common causes of a relative increase in RBC count include: Dehydration (decreased fluid intake, vomiting, diarrhea), Stress, Tobacco use, Overuse of diuretics

Dehydration

If the RBC count is increased suspect dehydration. Suspect a short-term (acute) dehydration if there is an increased HGB (>14.5 or 145 in women or 15 or 150 in men) and/or HCT (>44 or 0.44 in women and >48 or 0.48 in men) along with an increased RBC count (>4.5 in women and >4.9 in men). A relative increase in Sodium (>142) and Potassium (>4.5) can be noted as well. Suspect a long-term (chronic) dehydration if any of the above findings are accompanied by an increased Albumin (>5.0 or 50 g/L), increased BUN (>16 or 5.71 mmol/L), and/or serum Protein (7.4 or 74 g/L).

Respiratory distress

In severe cases of asthma and emphysema you can expect an increased red cell count with decreased HGB (<13.5 or 135 g/L in women and <14 or 140 in men) and HCT (<37 or 0.37 in women and 40 or 0.4 in men) . The body responds to an inability to fully oxygenate the blood with an increase in red blood cells.

Vitamin C need

An increased RBC level is associated with vitamin C need. Albumin will frequently be decreased (<4.0 or 40g/L) along a decreased HCT (<37 or 0.37 in women and 40 or 0.4 in men), HGB (<13.5 or 135 g/L in women and <14 or 140 in men), MCH (<28), MCHC (<32), serum iron (< 85 or 15.22 mmol/dL). There will also be an increased MCV (>90), alkaline phosphatase (>100), and fibrinogen.

Polycythemia vera

A myeloproliferative disease that causes an increase in all blood cell lines. This disease will cause an increased HCT (>44 or 0.44 in women and >48 or 0.48 in men), and HGB (>14.5 or 145 in women or 15 or 150 in men), total bilirubin (>1.2 or 20.5 mmol/dL), uric acid (>5.9 or > 351 mmol/dL), basophils (>1), and ALP (>100). Further testing with blood coagulation studies is needed.

Haemoglobin, Male ↑ (164.00 g/L)

Asthma and emphysema

An increased hemoglobin (>14.5 or 145 in women or 15 or 150 in men) is by no means a definitive diagnostic marker for asthma or emphysema. Due to the lack of optimum oxygenation of the blood, the body will increase the red blood cell count to increase the number of cells that can be oxygenated. The hemoglobin will go up accordingly.

Polycythemia (relative or primary)

Relative: a polycythemia that is relative to the degree of hemoconcentration, i.e. **dehydration.**

Primary: Polycythemia vera- a myeloproliferative disease marked by an increase in all blood cells. The hemoglobin will go up according to the increase in cell volume.

Dehydration

If the hemoglobin is increased suspect dehydration. Suspect a short-term (acute) dehydration if there is an increased HGB (>14.5 or 145 in women or 15 or 150 in men) and/or HCT (>44 or 0.44 in women and >48 or 0.48 in men) along with an increased RBC count (>4.5 in women and >4.9 in men). A relative increase in Sodium (>142) and Potassium (>4.5) can be noted as well. Suspect a long-term (chronic) dehydration if any of the above findings are accompanied by an increased Albumin (>5.0 or 50 g/L), increased BUN (>16 or 5.71 mmol/L), and/or serum Protein (> 7.4 or 74 g/L).

RDW ↑ (14.30 %)

Conditions Associated with an Increased RDW

- Iron Deficiency
- Vitamin B12/folate Deficiency
- Pernicious Anemia
- Thalassemia
- Inflammation

Neutrophils ↑ (61.20 %)

Childhood diseases (Measles, Mumps, Chicken-pox, Rubella, etc.)

The pattern seen in the Neutrophil count is as follows: **Neutrophils**: increased early (>60), decreased later (<40)

Acute, localized, and general bacterial infections

Neutrophils will be increased (>60). They are the primary cell type for fighting bacterial infections.

Acute viral infection

Neutrophils will tend to be normal

Chronic viral or bacterial infection

Frequently an increased neutrophil count (>60) is seen with a decreased total WBC count (<5.0) in chronic infection.

Inflammation

An increased neutrophil count (>60) will often be seen in acute and chronic inflammation (RA, SLE, Rheumatic fever and acute gout)

Monocytes ↑ (7.60 %)

Recovery phase of acute infection

Due to their phagocytic function monocytes are often the white blood cell that removes the bacterial, viral, and cellular residue of infection. It is a positive sign to see an increase in Monocytes (>7) towards the end of an infection.

Liver dysfunction

Not a primary marker but if an increased monocyte count (>7) is seen it is a good idea to rule out liver dysfunction. Functionally oriented liver problems, such as detoxification issues, liver congestion and conjugation problems are extremely common and should be evaluated based upon early prognostic indicators. The liver should always be viewed in the context of the hepato-biliary tree.

Intestinal parasites

If the monocyte count is elevated (>7) with increased eosinophils (>3) and increased basophils (>1), then intestinal parasites are **possible**. Further investigation is warranted, i.e. a digestive stool analysis with ova and parasite, especially if the subjective indicators are present. In some cases the stool tests may be normal especially with amoebic parasites or if the lab sample was not collected or analyzed appropriately by a qualified lab. Multiple and/or purged samples are sometimes necessary.

Males

Urinary Tract Congestion: Benign Prostatic Hypertrophy (BPH)

An increased monocyte count (>7) may be associated with prostatic hypertrophy, especially If the serum creatinine is elevated (>1.1 or 97.2 mmol/dL) in a male over 40 years old. Often the creatinine will increase long before the PSA increases. Suspect BPH if there is an increased creatinine level (>1.1 or 97.2 mmol/dL, along with a normal BUN and electrolytes. The likelihood of BPH increases when there is an increased creatinine level (>1.1 or 97.2 mmol/dL, along with a normal BUN and electrolytes, and an increased monocyte count (>7) and LDH isoenzyme #4, which has a prostatic origin. **If BPH is suspected the following may be indicated:** a microscopic examination of the urine for prostate cells, a urinalysis indicating infection, and a manual examination of the prostate

Basophils ↑ (1.20 %)

Inflammation: non-specific

You may see an increased basophil level (>1.0) with any non-specific type of histamine, heparin, or serotonin-mediated inflammation or tissue destruction (bursitis, tendinitis, fibromyalgia, phlebitis, etc.) With severe inflammation and subsequent tissue damage expect to see an increase in Alpha 1 globulin. If the inflammation is located in the digestive tract, bone, or liver expect to see increased Alkaline phosphatase levels (>100).

Intestinal parasites

Consider intestinal parasites if there's an increased basophil count (>1), increased eosinophils (>3), and increased monocytes (>7). Although not as indicative as an increased eosinophil count (>3), an increased basophil count (>1) is often seen with intestinal parasites, especially if inflammation is ruled-out as a cause of a basophil increase. If you suspect intestinal parasites you may want to rule it out with stool analysis. Eosinophils may be normal with an intestinal amoebic problem; however, the basophil count may be increased.

Glucose ↑ (5.14 mmol/L)

Insulin resistance (Early stage) and glucose intolerance

Research has shown that individuals progress through several stages of insulin resistance and glucose intolerance before becoming a classic type II diabetic. The stages include: Normal glucose tolerance hypoglycemia (often due to hyperinsulinemia) insulin insensitivity/resistance eventually overt type II diabetes. An increased fasting blood glucose level is a sign that this individual is possibly in an insulin resistant phase, also known as a pre-diabetic state.

Early stage of Hyperglycemia/Diabetes

If serum glucose (> 86 mg/dL or 4.77 mmol/L) and Hemoglobin A1C (> 5.5% or 0.055) are both elevated, diabetes is probable. Serum triglycerides are often higher than the total cholesterol level in patients with diabetes. Urinary glucose may be increased, HDL levels decreased (< 55 or < 1.42 mmol/L), BUN (> 16 or 5.71 mmol/L) and creatinine (>1.1 or >97.2 mmol/dL) frequently increased with the renal damage associated with diabetes. Follow-up with appropriate testing to confirm the diagnosis, e.g. oral Glucose Insulin Tolerance Testing (GITT).

Metabolic Syndrome / insulin resistance

Metabolic Syndrome or hyperinsulinemia is a cluster of related symptoms: Increased triglycerides (>80 or >0.90 mmol/L), increased total cholesterol (>180 or 4.66 mmol/L), decreased HDL cholesterol (< 55 or < 1.42 mmol/L), obesity, increased blood insulin levels (>5 or 35.88), increased glucose (> 86 mg/dL or 4.77 mmol/L) and increased blood pressure. The hallmark of this syndrome is the insulin resistance that leads to high glucose levels and an imbalance in blood fats. The overall effect is an increased risk for cardiovascular disease and diabetes.

Thiamine (Vitamin B1) need

An increased glucose (> 86 mg/dL or 4.77 mmol/L) is associated with a thiamine need. Thiamine transports glucose across the blood brain barrier and is an essential component in the enzymatic conversion of pyruvate into acetyl CoA that allows pyruvate to enter the Kreb's cycle. If glucose is increased (> 86 mg/dL or 4.77 mmol/L) and the hemoglobin A1C is normal, thiamine need is possible. If CO_2 is decreased (<25) and the anion gap is increased (>12) along with moderately high serum glucose (>86 or 4.77 mmol/L), thiamine need is probable. Due to thiamine's role in glycolysis, LDH levels may be decreased (<140).

Anterior Pituitary resistance to cortisol

During the decompensated/maladapted phase of the chronic stress response, the hypothalamus and pituitary become less and less sensitive to cortisol, causing increased cortisol resistance. The net result is an increase in cortisol levels in the body because the negative feedback loop that shuts cortisol production down is not activated. Increased levels of circulating cortisol will cause increased blood glucose levels through increased gluconeogenesis. Excess cortisol will also reduce the utilization and uptake of glucose by the cell.

Acute stress

Increasing levels of stress cause the body to move into the chronic stress response. This is marked by an increased Cortisol to DHEA ratio, which causes an increase in gluconeogenic activity and a concomitant rise in blood glucose levels. Excess cortisol will also reduce the utilization and uptake of glucose by the cell.

Fatty liver (early development) and Liver congestion

High blood glucose (>86 or 4.77 mmol/L) levels have been associated with increased levels of blood fats, e.g. high total cholesterol (>180 or 4.66 mmol/L), LDL (>100 or 2.59 mmol/L) and triglycerides (>80 or >0.90 mmol/L), low HDL (< 55 or < 1.42 mmol/L). In individuals with liver congestion, this may lead to the deposition of fat in the liver and the development of fatty liver.

Cholesterol - Total ↑ (7.21 mmol/L)

Increased cardiovascular disease risk

Increased cholesterol levels are associated with an increased risk of developing cardiovascular disease, atherosclerosis, coronary artery disease and stroke. Although this may be true, it is important to look at many of the other risks for this disease before jumping to conclusion that elevated cholesterol levels are the culprit. Other risks for atherosclerosis, cardiovascular disease and stroke include: smoking, elevated homocysteine levels, elevated fasting glucose, elevated fasting insulin, elevated Hs-CRP, elevated fibrinogen, B6, B12 and folate deficiency, ingestion of chlorine, blood sugar dysregulation, and hypertension. Consider an increased risk of cardiovascular disease with an increased triglyceride level (>80 or 0.90 mmol/L) in relation to an increased total cholesterol (>180 or 4.66 mmol/L) with an increased uric acid level (>5.9 or > 351 mmol/dL), a decreased HDL (< 45 or < 1.16 mmol/L) and an increased LDL (>100 or 2.59 mmol/L). Platelet levels may also be increased (>385). Homocysteine levels are frequently increased > 7.2, Hs-CRP are frequently >0.55 in men and >1.5 in women, and fibrinogen levels are frequently increased above 300.

Primary hypothyroidism

Primary hypothyroidism is **possible** if the total cholesterol is increased (>180 or 4.66 mmol/L) along with an increased triglyceride (>80 or >0.90 mmol/L) and TSH (>2.0).

Adrenal insufficiency

Consider adrenal insufficiency if the total cholesterol is elevated (>180 or 4.66 mmol/L) with an increased triglyceride level (>80 or >0.90 mmol/L) and a decreased serum potassium (<4.0). Confirm with salivary adrenal studies or other functional adrenal tests.

Secondary Hypothyroidism (Anterior pituitary dysfunction)

Increased cholesterol levels are associated with thyroid hypofunction that is secondary to an anterior pituitary dysfunction. If cholesterol levels are increased (>180 or 4.66 mmol/L) with a decreased TSH (<1.3), and an elevated serum triglyceride (>80 or >0.90 mmol/L), then consider that anterior pituitary hypofunction is **probable**.

Gallbladder dysfunction - Biliary stasis

Thickened bile is the hallmark of biliary stasis. It may occur if the total cholesterol is increased (>180 or 4.66 mmol/L). GGTP levels will frequently be increased (>30) but not necessarily. Bilirubin levels may also be elevated (>1.2 or 20.5 mmol/dL). There may also be an increased alkaline phosphatase (>100) and SGOT/AST and SGPT/ALT may be normal or increased (>30). However, many cases of biliary stasis will show normal

lab values.

Metabolic Syndrome

If triglycerides are increased above the total cholesterol level with increased LDL cholesterol (>100 or 2.59 mmol/L), a decreased HDL (< 55 or < 1.42 mmol/L), an increased fasting blood glucose (> 86 mg/dL or 4.77 mmol/L) and an increased fasting insulin (>5), then metabolic syndrome and hyperinsulinemia is **probable**.

Fatty liver (early development) and Liver congestion

If total cholesterol (>180 or 4.66 mmol/L), LDL (>100 or 2.59 mmol/L) and triglyceride levels (>80 or >0.90 mmol/L) are increased, and HDL levels are decreased (< 55 or < 1.42 mmol/L), then fatty liver is **possible**. Liver congestion, due to the early development of fatty liver, should be considered if total cholesterol is above 180 or 4.66 mmol/L, triglycerides are increased (>80 or >0.90 mmol/L), and the SGPT/ALT is below 10.

Early stage of insulin resistance

Elevated cholesterol and other lipids often accompany the elevated glucose levels that are seen in insulin resistance.

Poor metabolism and utilization of fats

This is often the case in patients that are eating an optimal diet and have elevated cholesterol and triglyceride levels.

Early stage Diabetes

Elevated blood lipids are seen in patients with diabetes. The triglycerides are often higher than the total cholesterol level. Lipid metabolism problems are a hallmark of the early stages of diabetes.

Triglycerides ↓ (0.77 mmol/L)

Liver/biliary dysfunction

Biliary congestion/stasis can impact on the emulsification and digestion of fats, which may lead to a decreased level of triglycerides <70 or <0.79 mmol/l. Liver dysfunction, such as fatty liver, can also prevent the synthesis of endogenous triglycerides and other lipids and lipoproteins. Biliary congestion/stasis can often be caused by a mild obstruction in the extra-hepatic biliary duct. Here are the findings on a blood test for biliary congestion/stasis: GGTP levels will frequently be increased (>30) but not necessarily, Bilirubin levels will also be elevated (>1.2 or 20.5 mmol/dL),Increased alkaline phosphatase (>100), Increased total cholesterol (>180 or 4.66 mmol/L), SGOT/AST and SGPT/ALT may be normal or increased (>30). Also, many cases of biliary congestion/stasis will show normal lab values.

Diet- Nutrient deficient, insufficient fat intake, vegetarian diet

Dietary intake of healthy fats maybe low, a pattern that is commonly seen in vegetarians.

Thyroid hyperfunction

Hyperthyroidism is probable if there are low triglycerides (<70 or <0.79 mmol/L) with a low TSH (<1.3) and a high total T-3 (>168 or 2.6 nmol/L), elevated free T3 (>3.25 or 5.0) and an elevated total T4 (>11.9 or 154 nmol/L). The low triglyceride levels are probably due to the excessive utilization of fatty acids by a metabolism that is excessively

fast.

Autoimmune processes

If triglycerides are decreased (<40 or 0.45 mmol/L) with low or normal cholesterol (160 – 180 or 4.14 – 4.66 mmol/L) and an increased HDL (>70 or 1.81 mmol/L), then some kind of autoimmune process in the body is possible. The problem may be inflammatory or destructive in nature. Consider further testing to rule-out tissue inflammation or destruction (C-reactive protein, ANA, rheumatoid factor etc.). If tissue destruction is present, LDH, Alpha 1 or Alpha 2 globulin (seen with serum protein electrophoresis) will frequently be increased. This may also be a sign of endocrine dysfunction due to endocrine hypo or hyper function. Consider further endocrine testing to locate cause of the disturbance.

HDL Cholesterol ↓ (1.14 mmol/L)

Hyperlipidemia and atherosclerosis

If HDL is less than 25% of the total cholesterol, then there is a strong clinical indication that hyperlipidemia is present. If the serum triglycerides (>80 or >0.90 mmol/L) and LDL (>100 or 2.59 mmol/L) are also increased, hyperlipidemia is likely present and atherosclerosis should be ruled-out.

Diets high in refined carbohydrates

The Standard American Diet (SAD), which is very high in refined carbohydrates, can contribute to decreased HDL levels (< 55 or < 1.42 mmol/L)

Metabolic Syndrome /hyperinsulinemia

If HDL levels are decreased (< 55 or < 1.42 mmol/L), triglycerides are increased above the total cholesterol level with increased LDL cholesterol (>100 or 2.59 mmol/L) and increased fasting blood glucose (> 86 mg/dL or 4.77 mmol/L), then metabolic syndrome and hyperinsulinemia are **probable**. Metabolic Syndrome can lead to adrenal dysregulation, so adrenal hyperfunctioning should be ruled out.

Oxidative stress

Unoxidized cholesterol, including HDL cholesterol, acts as an antioxidant and a free radical scavenger in the body, so decreased levels put the body at risk for developing oxidative stress, especially lipid peroxidation, and increases the chance of free radical induced diseases.

Heavy metal/Chemical overload

Patients with historically low HDL and total cholesterol levels may be more prone to heavy metal and chemical toxins due to poor cell membrane integrity. This is irrespective of level of exposure, but related more to susceptibility of the individual patient. This may also leave patients at an increased risk for developing neoplasm.

Fatty liver (early development) and Liver congestion

If HDL levels are decreased (< 55 or < 1.42 mmol/L), and LDL (>100 or 2.59 mmol/L), triglyceride (>80 or >0.90 mmol/L) and total cholesterol levels (>180 or 4.66 mmol/L) are increased, then the early development of fatty liver is **possible**. Liver congestion, due to the fatty liver, should be considered if total cholesterol is above 220 or 5.69 mmol/L, triglycerides are increased (>80 or >0.90 mmol/L), and the SGPT/ALT is below 10. Fatty liver is caused by obesity, excessive alcohol consumption, prescription drugs (e.g. steroids), iron overload, solvent exposure, and rapid

weight loss. Fatty changes to the liver tissue can impair the liver's detoxification ability. The degree of fatty liver changes is directly related to the amount of obesity. Fatty liver and liver congestion increases the risk of insulin resistance, hypertension, Metabolic Syndrome, and type II diabetes mellitus.

Hyperthyroidism

The increased metabolic activity found in hyperthyroidism can lead to decreased HDL levels. The body preferentially uses fatty acids, which are transported via lipoproteins, for energy in this heightened metabolic state.

Lack of exercise/ sedentary lifestyle

A sedentary lifestyle has been shown to decrease HDL levels. Increasing cardiovascular and resistance exercise is a very good way to elevate HDL levels.

LDL Cholesterol ↑ (5.72 mmol/L)

Metabolic Syndrome /hyperinsulinemia

If LDL levels are increased (>100 or 2.59 mmol/L), triglycerides are increased (> 80 or 0.90 mmol/L) with decreased HDL cholesterol (< 55 or < 1.42 mmol/L), and increased fasting blood glucose (> 86 mg/dL or 4.77 mmol/L), then metabolic syndrome and hyperinsulinemia is **probable**. Metabolic Syndrome can lead to adrenal dysregulation, so adrenal hyperfunctioning should be ruled out.

Increased risk of atherosclerosis, cardiovascular risk and stroke

An increased LDL level is associated with the development of atherosclerosis and an increased risk for cardiovascular disease and stroke. If there is an increased triglyceride level (>80 or 0.90 mmol/L) in relation to total cholesterol (>180 or 4.66 mmol/L) with an increased uric acid level (>5.9 or > 351 mmol/dL), a decreased HDL (< 45 or < 1.16 mmol/L) and an increased LDL (>100 or 2.59 mmol/L), atherosclerosis is **probable**. Platelet levels may also be increased (>385). Homocysteine levels are frequently increased > 7.2 with atherosclerosis. Hs-CRP are frequently >0.55 in men and >1.5 in women, and fibrinogen levels are frequently increased above 300. Diabetes and thyroid hypofunction should also be considered with this pattern.

Hyperlipidemia

Increased LDL cholesterol and total cholesterol levels are associated with hyperlipidemia, which has been shown to indicate a potential risk of developing atherosclerotic coronary artery disease. If LDL is increased (>100 or 2.59 mmol/L) with an increased total cholesterol (>180 or 4.66 mmol/L) and an increased LDL/HDL ratio and an increased level of triglycerides (>80 or >0.90 mmol/L) with HDL less than 25% of the total cholesterol, hyperlipidemia is **probable.**

Oxidative stress

Increased LDL levels are associated with increasing free radical activity and oxidative stress. The peroxidation of LDL may promote the accumulation of cholesterol in the macrophages and smooth muscle cells, which can lead to atherosclerotic plaque formation.

Fatty liver (early development) and Liver congestion

If LDL levels are increased, along with increased triglyceride and total cholesterol levels, and HDL levels are decreased, the early development of fatty liver is **possible**. Liver congestion, due to the fatty liver, should be

considered if total cholesterol is above 180 or 4.99 mmol/L, triglycerides are increased (>80 or >0.90 mmol/L), and the SGPT/ALT is below 10.

Diet- high in refined carbohydrates

The Standard American Diet (SAD), which is very high in refined carbohydrates, can contribute to increased LDL.

Cholesterol/HDL Ratio ↑ (6.32 Ratio)

A high cholesterol/HDL ratio is associated with an increased risk of cardiovascular disease.

Alk Phos ↑ (109.00 U/L)

Biliary Obstruction

Increased alkaline phosphatase (>100) along with an increased GGTP (>30) is seen with biliary tree involvement. If the problem involves a biliary/common bile duct obstruction, the alkaline phosphatase and the GGTP will generally be increased significantly above the SGPT/ALT. If there is an actual stone or calculi the total bilirubin level will also be elevated (>1.2 or 20.5mmol/dL).

Liver cell damage

If alkaline phosphatase levels are increased (>100) with increased total bilirubin (>1.2 or 20.5 mmol/dL), direct bilirubin (>0.2 or 3.4 mmol/dL), SGOT/AST (>30), GGTP (>30), and/or LDH (>200) liver dysfunction is **probable**. This may be caused by cellular damage, such as liver infection (hepatitis, infectious mononucleosis, EBV, CMV, etc.), which should be ruled out.

Liver dysfunction due to drug toxicities and carcinoma of the liver

An increase in Alkaline phosphatase can be an indicator of liver dysfunction due to drug toxicities. Ask your patients about their prescription and non-prescription drug use. Elevated levels of ALP are often seen in patients with metastatic carcinoma of the liver, which will cause an increase in the liver fraction of ALP.

Vitamin C need

An increased Alkaline phosphatase level is associated with vitamin C need. Albumin will frequently be decreased (<4.0 or 40g/L) along a decreased HCT (<37 or 0.37 in women and 40 or 0.4 in men), HGB (<13.5 or 135 g/L in women and <14 or 140 in men), MCH (<28), MCHC (<32), serum iron (< 85 or 15.22 mmol/dL). There will also be an increased MCV (>90), alkaline phosphatase (>100), and increased fibrinogen >300.

Bone disease causing bone loss or increased bone turnover

Alkaline phosphatase enzyme levels will often be increased in bone diseases, such as Osteomalacia / Rickets / Paget's disease / Rheumatoid arthritis / Hodgkin's lymphoma.

Bone growth and repair (fracture healing)

Alkaline phosphatase enzyme levels will often be increased in situations of normal bone growth and repair. Increased osteoblastic activity, along with calcium deposition in the bones will cause this increase.

Herpes Zoster (shingles)

Although best determined from a physical examination of the lesions, shingles will often result in an elevated ALP. With the inflammation of shingles, the sedimentation rate, C-reactive protein, and basophil count will often be increased, while the total WBC levels, viral titers and SGPT/ALT will often be normal.

Metastatic carcinoma of the bone

Due to the elevated bone destruction and attempts by the body to repair, elevated levels of ALP significantly above the reference range can occur in metastatic carcinoma of the bone from carcinomas of the prostate (70-90% of patients), breast (50% of patients), and about 30% of patients with metastatic carcinoma of the lung, kidney or thyroid.

Protein, total ↓ (67.70 g/L)

Hypochlorhydria

A decreased or normal total protein level is often associated with a decreased production of hydrochloric acid in the stomach (Hypochlorhydria). Hypochlorhydria is **possible** with an increased globulin level (>2.8 or 28 g/L) and a normal or decreased total protein (6.9 or 69 g/L) and/or albumin (< 4.0 or 40 g/L). Hypochlorhydria is **probable** if globulin levels are increased (>2.8 or 28 g/L) along with an increased BUN (>16 or 5.71 mmol/L), a decreased or normal total protein (6.9 or 69 g/L) and/or albumin (<4.0 or 40 g/L), and/or decreased serum phosphorous (<3.0 or <0.97 mmol/L). Other values that may be reflective of a developing or chronic hypochlorhydria include increased or decreased gastrin (<50 or >100), an increased MCV (>90) and MCH (>31.9), a decreased or normal calcium (<9.2 or 2.30 mmol/L) and a decreased iron (<85 or 15.22 mmol/dL), a decreased CO_2 (<25), an increased anion gap (>12) and a decreased alkaline phosphatase (<70)

Digestive dysfunction/ inflammation

Suspect primary digestive inflammation or inflammation secondary to HCL insufficiency with a low total protein (6.9 or 69 g/L). This pattern will be similar to that of Hypochlorhydria but the globulin may be decreased (< 2.4 or 24 g/L) unless inflammation is severe.Decreased total globulin (<2.4 or 24 g/L), decreased serum phosphorous (<3.0 or 0.97 mmol/L) , increased BUN (>16 or 5.71 mmol/L) , basophils (>1) and ESR.

Liver dysfunction

Dysfunction in the liver will have a great impact on protein production and synthesis, which will affect total serum protein levels. Therefore, a decreased total serum protein level (<6.9 or 69 g/L) may be indicative of a liver dysfunction. Functionally oriented liver problems, such as detoxification issues, liver congestion, and conjugation problems are extremely common and should be evaluated based upon early prognostic indicators. The liver should always be viewed in the context of the hepato-biliary tree. Some of the key clinical indicators include:

Diet- Low Protein/ Protein Deficiency/ Malnutrition/ Amino Acid Need

Protein digestion is dependent on an optimal pH in the stomach. A decreased total protein (<6.9 or 69 g/L) can be an indicator for digestive dysfunction, which will greatly compromise protein digestion and absorption. Protein malnutrition is due primarily to the lack of available essential amino acids from the diet.

Albumin ↑ (51.70 g/L)

Dehydration

If albumin is increased (>5.0 or 50 g/L) suspect dehydration. Dehydration is a very common problem and should be factored into your blood chemistry and CBC analysis. **Suspect a short-term (acute) dehydration** if there is an increased HGB (>14.5 or 145 in women or 15 or 150 in men) and/or HCT (>44 or 0.44 in women and >48 or 0.48 in men) along with an increased RBC count (>4.5 in women and >4.9 in men). A relative increase in sodium (>142) and potassium (>4.5) can be noted as well. **Suspect a long-term (chronic) dehydration** if any of the above findings are accompanied by an increased albumin (>5.0 or 50 g/L) , increased BUN (>16 or 5.71 mmol/L)and/or serum protein (>7.4 or 74 g/L).

Globulin, total ↓ (16.00 g/L)

Digestive Inflammation/Gastritis

Suspect primary digestive inflammation or inflammation secondary to HCL insufficiency. The pattern will be similar to that of hypochlorhydria but the globulin may be decreased (< 2.4 or 24 g/L) unless inflammation is severe. Many patients with the subjective and laboratory indications of HCI need experience an aggravation of their symptoms when taking HCL supplementation. Patients with this type of reaction probably have gastric inflammation due to a long-term HCL need. If inflammation is suspected or present, support the digestive terrain to heal the inflammation appropriately for 3 to 4 weeks prior to initiating HCl therapy. Acute digestive inflammation may lead to an increased globulin level (>2.8 or 28 g/L) due to the increased production of inflammatory immunoglobulins. Chronic digestive inflammation due to colitis, enteritis, Crohn's etc., will compromise protein breakdown and absorption, leading to a widespread protein deficiency in the body and a decreased level of the inflammatory immunoglobulins, hence the decreased total globulin level (<2.4 or 24 g/L). Decreased total globulin (<2.4 or 24 g/L), decreased serum phosphorous (<3.0 or <0.97 mmol/L), increased BUN (>16 or 5.71 mmol/L), basophils (> 1) and ESR.

Immune insufficiency

A decreased total globulin (< 2.0 or 20 g/L) suggests immune insufficiency. Suspect an increased use of globulin by the liver, spleen, thymus, kidneys, or heart. Apart from known kidney or heart dysfunction, rule out a chronic immune disruptor (virus, xenobiotics, toxicity etc.) and consider a serum protein electrophoresis test (look for a decreased gamma fraction) in the investigation of immune insufficiency.

Albumin/Globulin Ratio ↑ (3.23 ratio)

An increased Albumin/Globulin ratio is fairly uncommon and is usually due to dehydration.

Bilirubin - Direct ↑ (4.10 Umol/L)

Biliary tract obstruction

Bile tract obstruction/biliary calculi should be ruled out when the total bilirubin is increased (>1.2 or 20.5 mmol/dL) along with an increase in both the direct (>0.2 or 3.4 mmol/dL) and indirect bilirubin (>1.0 or 17.1 mmol/dL). You will likely see an increased GGTP (>30), a normal to increased SGPT/ALT (>30), an elevated alkaline phosphatase (>100), and/or LDH (>200).

Chloride ↓ (98.90 mmol/L)

Hypochlorhydria

A decreased chloride level (<100) is associated with hypochlorhydria. Chloride is one of the main elements necessary for the production of hydrochloric acid by the parietal cells of the stomach. Consider hypochlorhydria with a decreased chloride level (<100), an increased or decreased globulin level (< 2.4 / 24 g/L or >2.8 / 28 g/L) and a normal or decreased total protein (<6.9 or 69 g/L) along with an increased BUN (>16 or 5.71 mmol/L), a decreased albumin (<4.0 or 40g/L) and a decreased serum phosphorous (<3.0 or <0.97 mmol/L). The more elements outside the optimal range, the greater the likelihood of hypochlorhydria. Other values that may be reflective of a developing or chronic hypochlorhydria include increased or decreased gastrin (<50 or >100), an increased MCV (>90) and MCH (>31.9), a decreased iron (< 85 or 15.22 mmol/dL), a decreased CO_2 (<25), decreased serum calcium (<9.2 or 2.30 mmol/L), an increased anion gap (>12), and a decreased alkaline phosphatase (<70).

Metabolic Alkalosis

Decreased chloride levels are associated with metabolic alkalosis. Consider metabolic alkalosis if the CO_2 is increased (>30), along with a decreased chloride (<100), calcium (<9.2 or 2.30 mmol/L), and serum potassium (<4.0).

Adrenal Insufficiency

Adrenal insufficiency is associated with a decreased serum chloride level. Consider adrenal insufficiency if the chloride levels are decreased (<100) along with a decreased sodium (<135) and an increased potassium (>4.5).

Magnesium ↓ (0.86 mmol/L)

Muscle Spasm

The laboratory results with muscle spasm are variable; however, decreased serum or RBC magnesium is a common finding.

Anion gap ↑ (16.60 mmol/L)

Thiamine (vitamin B1) need

An increased anion gap (>12) is associated with thiamine deficiency. If the anion gap is increased (>12) along with a decreased CO_2 (<25), thiamine deficiency is possible. Hemoglobin and hematocrit levels may be normal or decreased (<37 or 0.37 in women and 40 or 0.4 in men). Due to thiamine's role in glycolysis, LDH levels may be decreased and glucose levels may be normal to increased (> 86 mg/dL or 4.77 mmol/L).

Metabolic Acidosis

Consider metabolic acidosis if the anion gap is increased (>12) along with a decreased CO_2 (<25) and an increased chloride (>106).

Progesterone, Male ↓ (0.45 nmol/L)

Estrogen Dominance

A low serum progesterone may be an indication of estrogen dominance. Suspect this if you see a low progesterone and an increased estradiol level in your male patients.

Estradiol, Male ↓ (37.44 pmol/L)

Osteoporosis

Low levels of estradiol in men affect bone density and risk of fractures if too low. Research has shown that estradiol and not any other hormone increases the risk of vertebral fracture in older men.

Testosterone, Total Male ↓ (16.75 nmol/L)

Low Total Testosterone levels in men are associated with the following:

- Metabolic Syndrome
- Diabetes
- Alzheimer's disease
- Increased risk of stroke
- Increased cardiovascualr disease risk
- Diminshed libido
- Erectile dysfunction
- Loss of muscle tone
- Increased abdominal fat
- Low bone density
- Depression

Sex Hormone Binding Globulin, male ↑ (73.90 nmol/L)

Elevated SHBG levels in the blood cause too much testosterone to be bound thus it becomes less available to do its functional work in the body. What's the net result of this?

Some men with too much SHBG think they have normal total testosterone levels because much of the testosterone in the body is bound up and thus functionally unavailable to healthy tissues. Only about 0.55-2% of all testosterone is in the free form the rest is bound to albumin or SHBG. This improper assessment of the real testosterone picture leads to men walking around with deficient testosterone that is not diagnosed. Many of these men also have high estradiol levels that are unopposed by the testosterone leading to feminization symptoms: gynecomastia (the development of fatty breast tissue in men), diminished libido and poor sexual performance, cognitive decline, and chronic fatigue.

DHEA-S, Male ↓ (3.25 umol/L)

Adrenal Insufficiency

Physiological stress raises cortisol output from the adrenal glands, which causes a decrease in DHEA-S levels in the serum and an increased cortisol to DHEA ratio, a hallmark sign for stage 2 and 3 adrenal insufficiency.

Hyperinsulinemia

High levels of insulin in the blood (hyperinsulinemia)increases cortisol and epinephrine output and decreases the DHEA levels in the serum. Low DHEA-S levels are found in early and late-stage insulin resistance and Diabetes.

Immune Insufficiency & Low sIgA

Cortisol and DHEA systemically modulate the production and turnover of specialized immune cells called immunocytes (also known as plasmacytes) that produce the secretory antibodies that protect us. The primary antibody of defense is secretory IgA (sIgA). When cortisol is elevated and DHEA is low, suppression of these mucosal immune cells occurs, compromising our first-line immune defense, resulting in low sIgA output.

Low levels of DHEA are associated with many common age-related conditions

Low levels of DHEA are associated with many common age-related conditions, including diseases of the nervous, cardiovascular, and immune systems such as metabolic syndrome, coronary artery disease, osteoporosis, mood disorders and sexual dysfunction.

Homocysteine ↑ (10.50 µmol/L)

Increased Risk for Cardiovascular Disease

Hyperhomocysteinemia, a condition of increased homocysteine levels, is a risk factor for developing cardiovascular disease, arterial disease, stroke and venous thrombosis. Homocysteine levels are affected by nutritional and genetic factors. Consider genetic testing for MTHFR gene mutations with elevated levels of homocysteine.

Additional diseases and pathological processes associated with an increased homocysteine

- Colon cancer
- Cervical cancer
- Depression
- Alzheimer's disease
- Inflammatory bowel disease

C-Peptide ↓ (0.33 nmol/L)

Type I Diabetes

An increased C-Peptide is a finding in Type I Diabetes because the pancreas of people suffering from Type I Diabetes are unable to produce insulin, and, therefore, will usually have a decreased C-Peptide level.

Insulin - Fasting ↑ (33.34 pmol/L)

Elevated fasting insulin levels are associated with greater risks of heart attack, stroke, metabolic syndrome and diabetes.

Insulin resistance (Early stage) and glucose intolerance

Research has shown that individuals progress through several stages of insulin resistance and glucose intolerance before becoming a classic type II diabetic. The stages include: Normal glucose tolerance hypoglycemia (often due to hyperinsulinemia) insulin insensitivity/resistance eventually overt type II diabetes. An increased fasting blood glucose level is a sign that this individual is possibly in an insulin resistant phase, also known as a pre-diabetic state.

Early stage of Hyperglycemia/Diabetes

If fasting insulin is elevated along with an elevated serum glucose (> 86 mg/dL or 4.77 mmol/L) and Hemoglobin A1C (> 5.5% or 0.055) diabetes is probable. Serum triglycerides are often higher than the total cholesterol level in patients with diabetes. Urinary glucose may be increased, HDL levels decreased (< 55 or < 1.42 mmol/L), BUN (> 16 or 5.71 mmol/L) and creatinine (>1.1 or >97.2 mmol/dL) frequently increased with the renal damage associated with diabetes. Follow-up with appropriate testing to confirm the diagnosis, e.g. oral Glucose Insulin Tolerance Testing (GITT).

Metabolic Syndrome / insulin resistance

Metabolic Syndrome or hyperinsulinemia is a cluster of related symptoms: Increased triglycerides (>80 or >0.90 mmol/L), increased total cholesterol (>180 or 4.66 mmol/L), decreased HDL cholesterol (< 55 or < 1.42 mmol/L), obesity, increased blood insulin levels (>5 or 35.88), increased glucose (> 86 mg/dL or 4.77 mmol/L) and increased blood pressure. Fasting insulin may also be elevated. The hallmark of this syndrome is the insulin resistance that leads to high glucose levels, high insulin levels and an imbalance in blood fats. The overall effect is an increased risk for cardiovascular disease and diabetes.

Insulinoma (pancreatic islet tumor)

A pancreatic islet tumor can cause levels of insulin to rise high. If you see hyperinsulinemia with hypoglycemia (blood glucose levels lower than 30 mg/dL or lower than 1.66 mmol/L) then refer patient to an endocrinologist for further investigation.

Ferritin ↑ (180.40 ng/ml)

Hemochromatosis/ hemosiderosis/iron overload

Hemochromatosis is a disease produced by an excess absorption of iron, which leads to deposition of excess iron in the tissues, especially the liver. Laboratory changes include an increased serum iron (>130 or 23.27 mmol/dL), a decreased TIBC (<250 or 44.8 mmol/dL), an increased % transferrin saturation (usually > 60%), and **an increased ferritin level** (>200 ng/ml **and often >1000)**. SGOT/AST may be elevated (>40).

Excess consumption of iron

Excess consumption of iron can come from a number of different sources: Elevated levels of iron in the drinking water, Iron cookware, especially when used to cook acidic foods e.g. tomatoes, Consumption of iron containing supplements. All of the above are often the reason for an increased serum iron (>130 or 23.27 mmol/dL) and an increased ferritin (> 200 ng/ml)

Cardiovascular Risk

Low ferritin is the best measure of iron deficiency but most people do not know that elevated ferritin is an important maker of cardiovascular health. High levels are found in inflammation, ischemic heart disease, iron overload

(hemosiderosis), and hemochromatosis, the genetic disease that causes iron to be deposited into the tissue. When the transferrin saturation rate, transferrin iron binding capacity, and serum iron are all normal, then a high serum ferritin indicates inflammation, not hemochromatosis.

Inflammation/ liver dysfunction/ oxidative stress

Serum ferritin is one of a group of proteins that can become increased in response to inflammation, infection, or trauma. Elevations can last for weeks. An elevated ferritin (>200) along with normal serum iron is suggestive of inflammation, liver dysfunction, or oxidative stress.

% Transferrin saturation ↑ (38.40 %)

Hemochromatosis/ hemosiderosis/iron overload

Laboratory changes include an increased serum iron (>130 or 23.27 mmol/dL), a decreased TIBC (<250 or 44.8 mmol/dL), an increased % transferrin saturation (usually > 60%), and an increased ferritin level (>160 ng/ml in women, > 200 ng/ml in men and often >1000). SGOT/AST is often elevated (>40) because of the damage to the liver.

Vitamin B12 ↑ (1060.96 pmol/L)

High levels of B12 not usually clinically significant. However, if someone has a condition such as chronic myeloproliferative neoplasm, diabetes, heart failure, obesity, AIDS, or severe liver disease, then they may have an increased Vitamin B12 level.

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Functional DX

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