

FUNCTIONAL BLOOD CHEMISTRY ANALYSIS

Biomarkers and Their Conditions

Introduction

There are few diagnostic tests that are truly diagnostic all on their own. It is important to see the trends and patterns that exist between various tests. This guide is organized to provide that information by listing the individual biomarkers of the blood chemistry screen and complete blood count. Beside each BIOMARKER, organized by high or low values, is a list of the most common conditions seen with deviations from normal.

BIOMARKER	HIGH	LOW
Glucose	<ul style="list-style-type: none"> • Insulin resistance • Early stage hyperglycemia/Diabetes • Metabolic Syndrome • Thiamine Need • Cortisol resistance • Fatty liver • Liver congestion 	<ul style="list-style-type: none"> • Hypoglycemia- reactive • Hypoglycemia- Liver glycogen problem • Hyperinsulinism • Adrenal hypofunction
Hemoglobin A1C	<ul style="list-style-type: none"> • Diabetes mellitus • Insulin resistance 	<ul style="list-style-type: none"> • Hypoglycemia
Triglycerides	<ul style="list-style-type: none"> • Metabolic Syndrome • Fatty liver • Liver congestion • Insulin resistance • Cardiovascular disease • Atherosclerosis • Poor metabolism and utilization of fats • Early stage hyperglycemia/Diabetes • Hyperlipidemia/ Hyperlipoproteinemia • Primary hypothyroidism • Adrenal cortical dysfunction • Secondary hypothyroidism- anterior pituitary dysfunction • Alcoholism 	<ul style="list-style-type: none"> • Liver/biliary dysfunction • Thyroid hyperfunction • Autoimmune processes • Adrenal hyperfunction

BIOMARKER	HIGH	LOW
Cholesterol	<ul style="list-style-type: none"> • Primary hypothyroidism • Adrenal cortical dysfunction • Cardiovascular disease • Atherosclerosis • Biliary stasis • Insulin resistance • Poor metabolism and utilization of fats • Fatty liver • Early stage hyperglycemia/Diabetes • Metabolic Syndrome • Hyperlipoproteinemia • Multiple sclerosis 	<ul style="list-style-type: none"> • Oxidative stress • Heavy metal body burden • Liver/biliary dysfunction • Diet- malnutrition • Thyroid hyperfunction • Autoimmune processes • Adrenal hyperfunction
LDL	<ul style="list-style-type: none"> • Diet- high in refined carbohydrates • Metabolic Syndrome • Atherosclerosis • Fatty liver/Hyperlipidemia • Oxidative stress 	
HDL	<ul style="list-style-type: none"> • Autoimmune processes 	<ul style="list-style-type: none"> • Hyperlipidemia/Fatty Liver • Atherosclerosis • Metabolic Syndrome • Oxidative stress • Heavy metals • Hyperthyroidism • Lack of exercise/sedentary lifestyle
BUN	<ul style="list-style-type: none"> • Renal disease • Renal insufficiency • Dehydration • Hypochlorhydria • Diet- excessive protein intake • Adrenal hyperfunction • Dysbiosis • Edema • Anterior pituitary dysfunction 	<ul style="list-style-type: none"> • Diet- low protein • Malabsorption • Pancreatic insufficiency • Liver dysfunction

BIOMARKER	HIGH	LOW
Creatinine	<ul style="list-style-type: none"> • BPH • Urinary tract congestion • Renal disease • Renal insufficiency • Uterine hypertrophy 	<ul style="list-style-type: none"> • Muscle atrophy • Protein insufficiency or impaired digestion
Bun/Creatinine ratio	<ul style="list-style-type: none"> • Renal disease 	<ul style="list-style-type: none"> • Diet- low protein • Posterior pituitary dysfunction
Uric Acid	<ul style="list-style-type: none"> • Gout • Atherosclerosis/Oxidative stress • Arthralgias • Renal insufficiency/Renal disease • Circulatory disorders • Leaky gut syndrome 	<ul style="list-style-type: none"> • Molybdenum deficiency • Anemia- B12/folate deficiency • Copper deficiency
Potassium	<ul style="list-style-type: none"> • Adrenal hypofunction • Dehydration • Tissue destruction • Metabolic acidosis 	<ul style="list-style-type: none"> • Adrenal hyperfunction • Drug diuretics • Benign essential hypertension
Sodium	<ul style="list-style-type: none"> • Adrenal hyperfunction • Cushing's disease • Dehydration 	<ul style="list-style-type: none"> • Adrenal hypofunction • Addison's disease • Edema • Drug diuretics
Chloride	<ul style="list-style-type: none"> • Metabolic acidosis • Adrenal hyperfunction 	<ul style="list-style-type: none"> • Hypochlorhydria • Metabolic alkalosis • Adrenal hypofunction
CO2	<ul style="list-style-type: none"> • Metabolic alkalosis • Adrenal hyperfunction • Hypochlorhydria • Respiratory acidosis 	<ul style="list-style-type: none"> • Metabolic acidosis • Thiamine need • Respiratory alkalosis
Anion Gap	<ul style="list-style-type: none"> • Thiamine need • Metabolic acidosis 	
Total Protein	<ul style="list-style-type: none"> • Dehydration 	<ul style="list-style-type: none"> • Hypochlorhydria • Digestive dysfunction and/or inflammation • Liver dysfunction

BIOMARKER	HIGH	LOW
Albumin	<ul style="list-style-type: none"> • Dehydration 	<ul style="list-style-type: none"> • Hypochlorhydria • Liver dysfunction • Oxidative stress • Vitamin C need
Globulin	<ul style="list-style-type: none"> • Hypochlorhydria • Liver cell damage • Oxidative stress • Heavy metal toxicity 	<ul style="list-style-type: none"> • Digestive dysfunction and/or inflammation • Immune insufficiency
Albumin/ Globulin ratio		<ul style="list-style-type: none"> • Liver dysfunction • Immune activation
Calcium	<ul style="list-style-type: none"> • Parathyroid hyperfunction • Thyroid hypofunction • Impaired membrane health 	<ul style="list-style-type: none"> • Parathyroid hypofunction • Calcium need • Hypochlorhydria
Phosphorous	<ul style="list-style-type: none"> • Parathyroid hypofunction • Bone growth and/or repair • Diet- excessive phosphorous consumption • Renal insufficiency 	<ul style="list-style-type: none"> • Parathyroid hyperfunction • Hypochlorhydria • Hyperinsulinism • Diet- high in refined carbohydrates
Magnesium	<ul style="list-style-type: none"> • Renal dysfunction • Thyroid hypofunction 	<ul style="list-style-type: none"> • Epilepsy • Muscle spasm
Alkaline phosphatase	<ul style="list-style-type: none"> • Biliary obstruction • Liver cell damage • Bone: loss/increased turnover or bone growth and/or repair • Leaky gut syndrome • Herpes zoster • Metastatic carcinoma of the bone 	<ul style="list-style-type: none"> • Zinc deficiency
LDH	<ul style="list-style-type: none"> • Liver/biliary dysfunction • Cardiovascular disease • Anemia- B12/folate deficiency, hemolytic • Non-specific tissue inflammation • Tissue destruction • Viral infection 	<ul style="list-style-type: none"> • Reactive hypoglycemia

BIOMARKER	HIGH	LOW
SGOT/AST	<ul style="list-style-type: none"> • Dysfunction located outside of the liver and Biliary tree • Developing Congestive Heart Failure • Acute MI • Cardiovascular dysfunction: Coronary artery insufficiency • Liver cell damage • Liver dysfunction • Excess muscle breakdown or turnover • Infectious mononucleosis, EBV, CMV 	<ul style="list-style-type: none"> • B6 deficiency • Alcoholism
SGPT/ALT	<ul style="list-style-type: none"> • Dysfunction located in the liver • Fatty liver • Liver dysfunction • Biliary tract obstruction • Excessive muscle breakdown or turnover • Cirrhosis of the liver • Liver cell damage 	<ul style="list-style-type: none"> • B6 deficiency • Fatty liver (early development) • Liver congestion • Alcoholism
GGTP	<ul style="list-style-type: none"> • Dysfunction located outside the liver and inside the biliary tree • Biliary obstruction • Biliary stasis/insufficiency • Liver cell damage • Alcoholism • Acute/chronic Pancreatitis • Pancreatic insufficiency 	<ul style="list-style-type: none"> • B6 deficiency • Magnesium need
Total Bilirubin	<ul style="list-style-type: none"> • Biliary stasis • Oxidative stress • Thymus dysfunction • Biliary tract obstruction or calculi • Liver dysfunction • RBC hemolysis • Gilbert's syndrome 	<ul style="list-style-type: none"> • Spleen insufficiency

BIOMARKER	HIGH	LOW
Direct Bilirubin	<ul style="list-style-type: none"> • Biliary tract obstruction • Biliary calculi/obstruction (usually extra hepatic) 	
Indirect Bilirubin	<ul style="list-style-type: none"> • RBC hemolysis • Gilbert's syndrome 	
Serum Iron	<ul style="list-style-type: none"> • Liver dysfunction • Hemochromatosis/hemosiderosis/iron overload • Iron conversion problem • Viral infection • Excess iron consumption 	<ul style="list-style-type: none"> • Anemia- iron deficiency • Hypochlorhydria • Internal/microscopic bleeding
Ferritin	<ul style="list-style-type: none"> • Hemochromatosis/hemosiderosis/iron overload • Excess iron consumption • Inflammation/liver dysfunction/oxidative stress 	<ul style="list-style-type: none"> • Anemia- iron deficiency
TIBC	<ul style="list-style-type: none"> • Anemia- iron deficiency • Internal bleeding 	<ul style="list-style-type: none"> • Hemochromatosis/hemosiderosis/iron overload • Microscopic bleeding • Diet- protein malnutrition
% Transferrin Saturation	<ul style="list-style-type: none"> • Hemochromatosis/hemosiderosis/iron overload 	<ul style="list-style-type: none"> • Anemia- iron deficiency
TSH	<ul style="list-style-type: none"> • Primary hypothyroidism 	<ul style="list-style-type: none"> • Hyperthyroidism • Secondary hypothyroidism- anterior pituitary dysfunction • Tertiary hypothyroidism- hypothalamic dysfunction • Heavy metal body burden
Total & FreeT-3	<ul style="list-style-type: none"> • Hyperthyroidism • Iodine deficiency 	<ul style="list-style-type: none"> • Primary hypothyroidism • Selenium deficiency
Total & FreeT-4	<ul style="list-style-type: none"> • Hyperthyroidism • Thyroid hormone replacement 	<ul style="list-style-type: none"> • Primary hypothyroidism • Iodine deficiency
T-3 Uptake	<ul style="list-style-type: none"> • Hyperthyroidism • Thyroid hormone replacement 	<ul style="list-style-type: none"> • Primary hypothyroidism • Secondary hypothyroidism- anterior pituitary dysfunction • Selenium deficiency • Iodine deficiency
ESR	<ul style="list-style-type: none"> • Non-specific tissue inflammation or destruction 	

COMPLETE BLOOD COUNT

BIOMARKER	HIGH/LOW	CONDITION
White Blood Cell Count	<ul style="list-style-type: none"> • Childhood diseases (Measles, Mumps, Rubella, Chicken pox etc.) • Acute bacterial infection • Acute viral infection • Stress • Diet- High in refined carbohydrates 	<ul style="list-style-type: none"> • Chronic viral infections • Chronic bacterial infections • Leukocytic auto-digestion • Systemic Lupus Erythematosus (SLE) • Decreased production from bone marrow • Diet- raw food diet
Red Blood Cell Count	<ul style="list-style-type: none"> • Respiratory distress: Asthma or emphysema • Polycythemia (relative or absolute) • Dehydration 	<ul style="list-style-type: none"> • Anemia- Iron deficiency • Anemia- B12/folate deficiency • Anemia- Copper deficiency • Internal bleeding • Vitamin C need
Hemoglobin	<ul style="list-style-type: none"> • Respiratory distress: Asthma or emphysema • Polycythemia (relative or primary) • Dehydration 	<ul style="list-style-type: none"> • Anemia- iron deficiency • Anemia- B12/folate deficiency • Anemia- B6 deficiency anemia • Anemia- Copper deficiency • Internal bleeding • Digestive inflammation • Vitamin C need
Hematocrit	<ul style="list-style-type: none"> • Respiratory distress: Asthma or emphysema • Polycythemia (relative or primary) • Spleen hyperfunction • Dehydration 	<ul style="list-style-type: none"> • Anemia • Anemia- Iron deficiency • Anemia- B12/folate deficiency • Anemia- B6 deficiency • Anemia- Copper deficiency • Internal bleeding • Digestive inflammation • Thymus hypofunction • Vitamin C need
MCV	<ul style="list-style-type: none"> • Anemia- B12/folate deficiency • Vitamin C need 	<ul style="list-style-type: none"> • Anemia- Iron deficiency • Anemia- B6 deficiency • Internal bleeding

BIOMARKER	HIGH	LOW
MCH	<ul style="list-style-type: none"> Anemia- B12/folate deficiency Hypochlorhydria 	<ul style="list-style-type: none"> Anemia- Iron deficiency Anemia- B6 deficiency Internal bleeding Heavy metal body burden Vitamin C need
MCHC	<ul style="list-style-type: none"> Anemia- B12/folate deficiency Hypochlorhydria 	<ul style="list-style-type: none"> Anemia- Iron deficiency Anemia- B6 deficiency Heavy metal body burden Vitamin C need
RDW	<ul style="list-style-type: none"> Anemia- Iron deficiency Anemia- B12/folate deficiency Pernicious anemia 	<ul style="list-style-type: none"> Childhood diseases (Measles, Mumps, Rubella, Chicken pox) Acute or chronic bacterial infection Inflammation
Neutrophils	<ul style="list-style-type: none"> Childhood disease (Measles, Mumps, Rubella, Chicken Pox) Acute or chronic bacterial infection Inflammation 	<ul style="list-style-type: none"> Blood diseases (aplastic anemia, pernicious anemia etc.) Chronic viral infection
Monocytes	<ul style="list-style-type: none"> Recovery phase of infection Liver dysfunction Intestinal parasites Benign Prostatic Hypertrophy (BPH) 	
Lymphocytes	<ul style="list-style-type: none"> Childhood diseases Acute and chronic viral infection Infectious mononucleosis Inflammation Systemic toxicity 	<ul style="list-style-type: none"> Chronic viral or bacterial infections Free radical activity Active bacterial infection Suppressed bone marrow function
Eosinophils	<ul style="list-style-type: none"> Intestinal parasites Food and environmental allergies/sensitivities Asthma 	<ul style="list-style-type: none"> Increased adrenal steroid production
Basophils	<ul style="list-style-type: none"> Tissue inflammation Intestinal parasites 	
Platelet count	<ul style="list-style-type: none"> Atherosclerosis 	<ul style="list-style-type: none"> Idiopathic thrombocytopenia Heavy metal body burden Free radical pathology