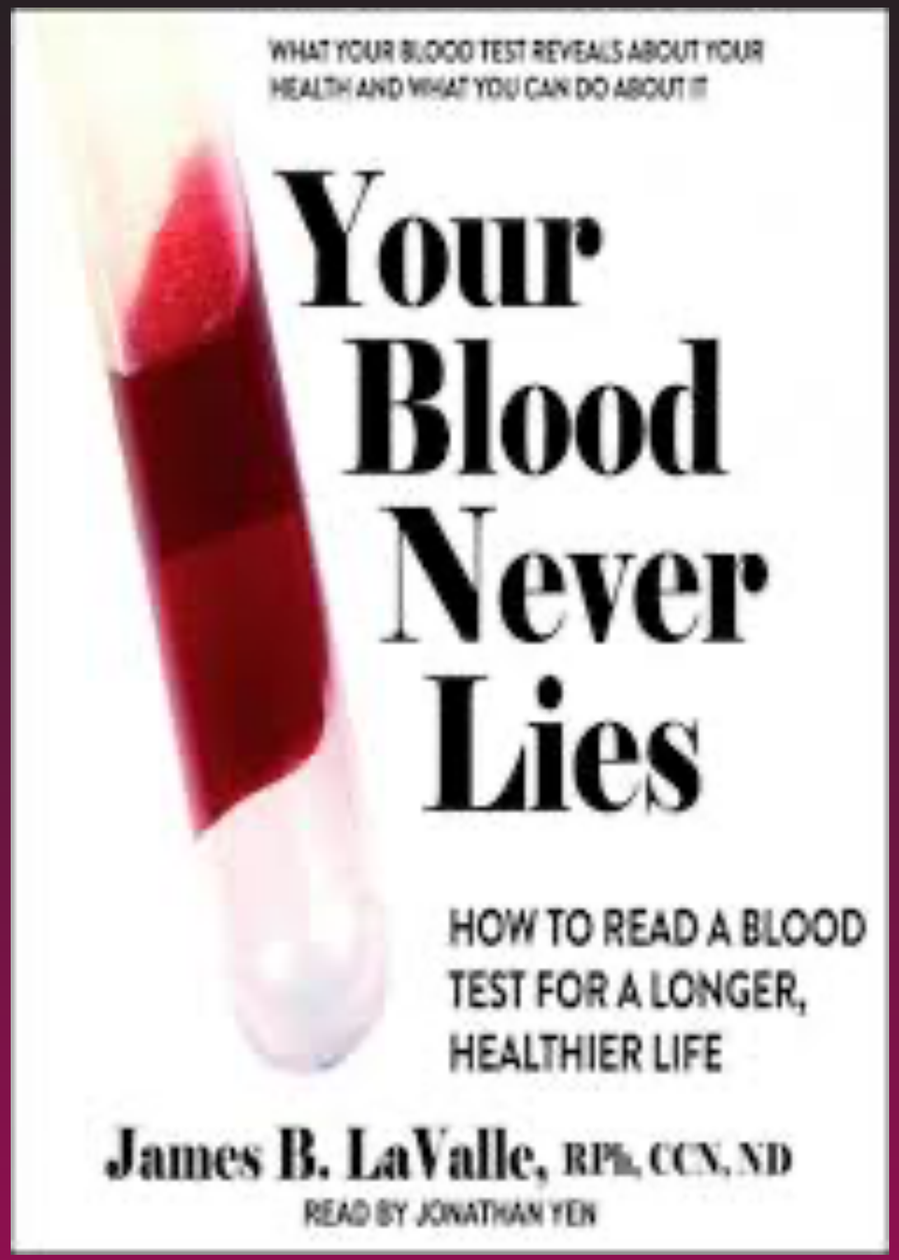


Understanding Your Bloodwork

How to read and interpret your own bloodwork and not need you Doctor to do it for you

A lecture by Peter Brodhead CN, ETMS
Given at the Ford Plantation
February 13, 2024


OGEECHEE
RIVERKEEPER®
In lieu of a lecture fee
please send a donation
To the Ogeechee River Keepers
OgeecheeRiverkeeper.org

Blood testing you can do on your own

Compare prices for example: apo-B is $29 from Life Extension vs $59 from Walk in Lab and $69 from Direct Labs

Life Extension Foundation www.lef.org *(often the best prices)*
Many tests are available for cardiovascular, thyroid, hormones, Vitamin D, magnesium and more.
Their Complete Blood Count (CBC) / Chemistry / Lipids Panel Blood Test is a bargain at $35.00
They send you to a local lab close to your home to get the blood drawn.

Walk in Lab www.walkinlab.com 800-539-6119
They use LabCorp or Quest Diagnostics in the local area - you just put in your zip code and they give you locations.
LabCorp at the Walgreens on Derenne Ave. Savannah

Direct Labs www.directlabs.com 800-908-0000
Quest Diagnostics - Wallmart Montgomery X-roads Savannah or Walmart in Brunswick GA

Prioritizing Bloodwork

Important tests not normally done

Full Cholesterol panel - **Cardio IQ from Quest** is the best !
Particle size, **apoB**, Lp(a), PLA2 are included

hsCRP

Homocysteine

Hemoglobin A1c

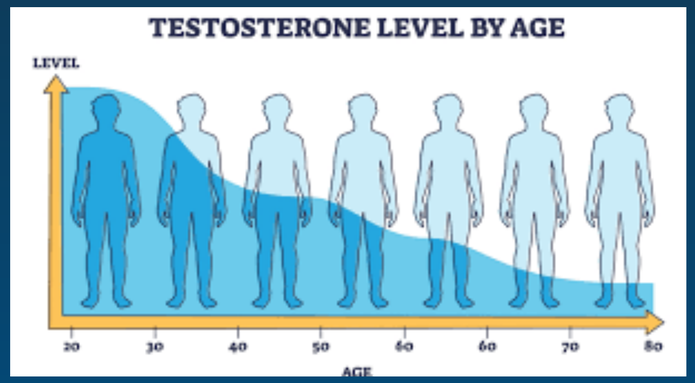
Fasting Insulin

Uric Acid

Vitamin D 25OH - *your Vitamin D bank account*

Full Thyroid Panel including
Free T3 and T4

Calcium Score - hard plaque
Cleerly - soft plaque score



For men - Free Testosterone

Omega - 3 Index

www.omegaquant.com

$ 49.00

hsCRP - the marker for inflammation

Vascular tissues and epithelial cells make CRP as do fat cells

CRP is a component of the immune system, and becomes elevated when inflammation is present in the body
due to infection, diabetes, cancer, atherosclerosis

CRP is not included in the standard lipid panel blood test.

Do not get this test run if you have had a recent acute illness such as a cold or flu or infection or you have had a physical injury or surgery.

You will get a false positive elevated marker

Reference Range for C-reactive protein mg/L:
> 2.9 high, 1.0 - 2.9 intermediate < 1 low risk
Target Range <1.0

Mediterranean diet - high polyphenol, colorful foods, cold water fish omega-3
turmeric, aged garlic, green tea, quercetin, magnesium, vitamin C & D

Vitamin D 25OH

Vitamin D is really not a vitamin but a regulatory hormone

There are 2,700 binding sites for Vitamin D in the body where it acts as a master regulator

Almost every metabolic function in the body is dependent on it in one way or the other

Bone health, immunity, inflammation, mood, cardiovascular system regulation, cancer inhibition and so much more……

Vitamin D3 is the preferred form and it is fat soluble
So take it with foods containing fat for best absorption

The more you weigh the more vitamin D is needed initially to get your blood levels to the optimum range

Target Levels for Vitamin D 40 - 80
< 25 is low

After getting tested the general rule is
for every 1,000 iu's (25mcgs)
Will raise your blood levels around 8 to 10 points

For example: if your bloodwork results are 30 and you want to bring it up to 50 - take an extra 2,000iu's a day

Testosterone Panel

Men and Women make testosterone but men make 10x more

Besides its function in sexuality it plays a role in cardiac health
the heart is a muscle, general muscle mass, fat distribution
brain function and energy levels for both sexes

The key thing to know is that it is attached to a protein in the bloodstream known as bound testoserone the sex hormone binding globulin binds it up.

When it becomes unattached, it is known as free testosterone which is the form that is available to the body.

Make sure your blood test has total and free testosterone

apoB test

apoB is a biomarker which may be the most important number to know on your lipid panel

It is the most standardized and accurate predictor of CVD risk
It is a direct measurement not an estimate

Each cholesterol particle carries 1 apoB in a 1:1 ratio
and cholesterol can only enter the arterial wall with an apoB attached

Lowering apoB levels can prevent the depositing of oxidiized cholesterol on to the artery wall

Reference range for apoB: > 120 at risk, 90 - 120 normal (but not good), < 90 optimal

Target Level < 80

Oxidized LDL is the big bad guy

Homocysteine

A genetic factor when the amino acid methionine is metabolized

Excess homocysteine can damage the arteries
and increase the risk of stroke

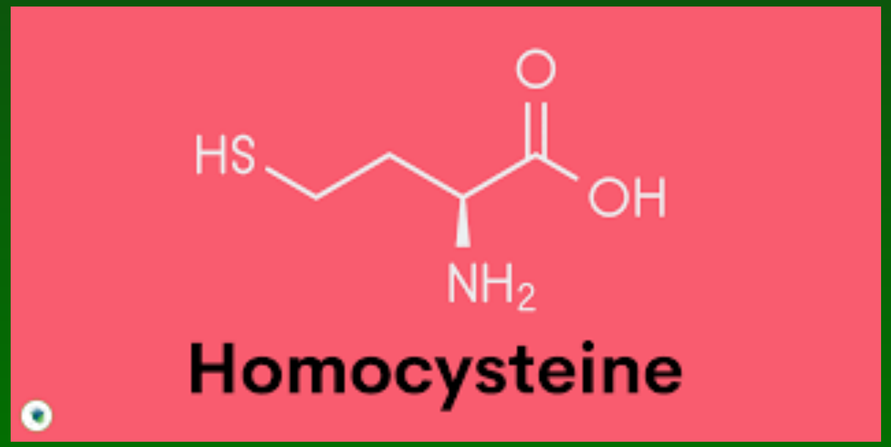
Increased risk of Alzheimers Disease and Dementia

Increased risk of depression in families with this genetic defect

Liver detoxification pathways can be less efficient

Consider getting the **MTHFR** genetic test if your levels are elevated

Target Range
6 - 8 mol/L



Supplement support for lowering Homocysteine

B-Complex Vitamins - containing methyl forms of B-12, B-6 and Folate

Aged Garlic Extract

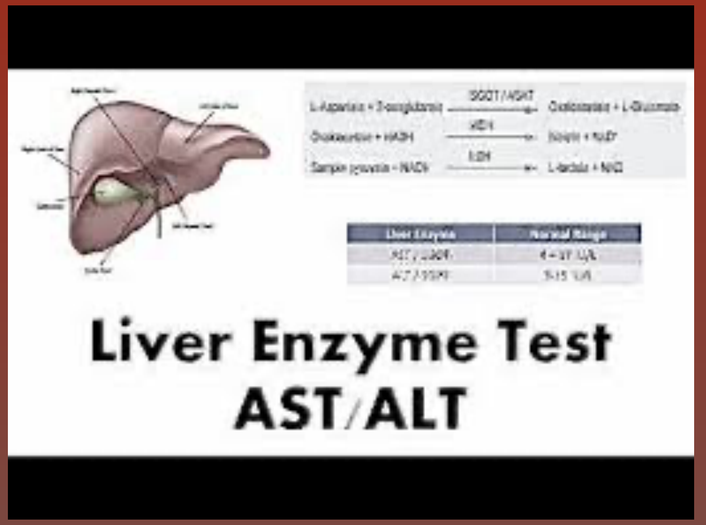
SAM-E taken with B-Complex Vitamins

Alanine Aminotransferase (ALT)

The ALT reading is one of the most important tests used to determine liver damage or disease

Normally, blood levels of ALT are low - when the liver is diseased or damaged,
it relases ALT into the bloodstream, causing levels of this enzyme to rise

Levels fluctuate during the day afternoon readings are highest
nighttime they are the lowest



If ALT levels are high it could indicate fatty liver

Reference Ranges for ALT IU/L: Men 0 - 55, Women 0-40

Target Range: upper limit 25 for whites, 20 for blacks

Causes of elevated ALT: alcohol abuse, cirrhosis, pancreatic dysfunction, strenuous exercise,
Hepatitis, chemical intoxication by heavy metals or pesticides, influenza, mononucleosis, Vitamin B6 deficiency,
Many prescription drugs including: Tylenol, anti-fungals, statin drugs, antibiotics, heparin, methotrexate, NDAIDs aspirin.

Supplement Support for elevated ALT: B-Complex vitamins, milk thistle extract,
magnesium, probiotics, aged garlic extract

Hemoglobin A1c (HbA1c)

This test reflects the average blood sugar level over the past 120 days
(the average life of a red blood cell.)

Reference Range for HbA1c:

Normal 4.8 - 5.6, Prediabetes 5.7 - 6.4, Diabetes >6.4, Glycemic Control (needing insulin) >7

Target < 5.7

Fasting Insulin

Insulin resistance is where insulin does not bind to cells, so blood sugar is not lowered

Typically insulin resistance precedes type 2 diabetes for a decade before diabetes develops

Reference Ranges for Insulin (mg/dL) 2.6 - 24.9
> 50 High Alert, 25 - 49 High - trending toward insulin resistance
17 - 25 Average range.

Ideal target range: 5 - 10 with a blood glucose of < 90 mg/dL

Metabolic Syndrome = high cholesterol, high insulin, high blood sugar, + high uric acid
Excess belly fat usually means the person has issues with insulin

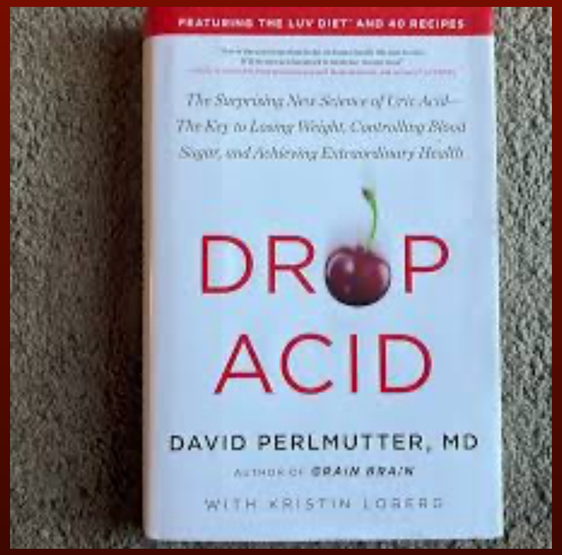
High Fructose Corn Syrup dramatically raises insulin levels - Insulin is a storage hormone - the higher the insulin the more fat you store

Uric Acid

In bloodwork 5.5 should be the upper limit

Gout usually forms at 7+

Drop acid book David Perlmutter

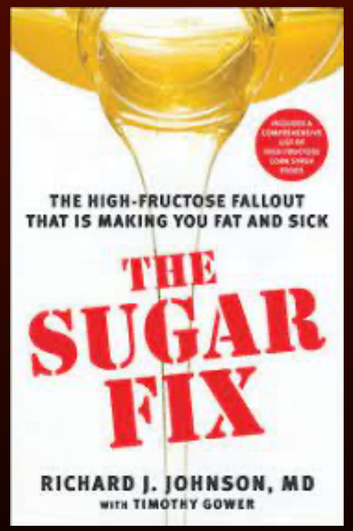


As uric acid levels rise so does body weight
Elevated uric acid tells the body to prepare for scarcity and to cling to fat

90% of people who are overweight and have hypertension
have elevated uric acid levels.

Uric Acid acts as a catalyst for weight gain,
elevated triglycerides, LDL and diabetes

Refined fructose is the big “smoking gun”
It is a metabolic poison. It hijacks our hunger cues



Dr Richard J. Johnson MD
The sugar fix

Follow the rules of the Mediterranean diet
Tart Cherries, Celery, Broccoli sprouts and Coffee 16oz a day (lowers the risk by 24%)

Hormone Testing

Thyroid Hormones

TSH - Thyroid stimulating hormone

Is produced and sereted by the pituitary gland

It tells the thyroid gland how much T4 (Thyoxine) to secrete

T4 is inactive and has to be converted to T3 (triodothyronine)

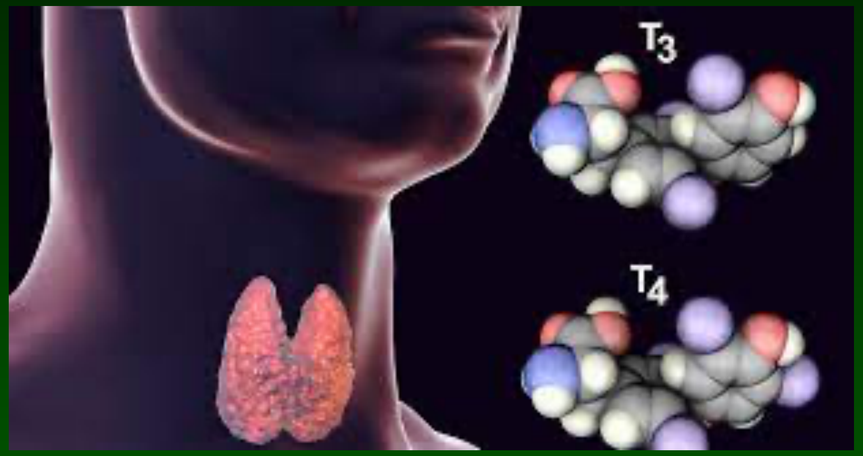
Free T3 is the active form which tightly controls the metabolic rate of every cell in the body

Thyroid Hormones continued

If a person is experiencing chronic stress or grief RT3 - (reverse T3)
puts the brakes on the metabolic rate and slows everything down

Tests can be run on thyroid anti-bodies to check for Hashimoto's or Graves disease
and auto-immune disorders.

The Thyroid is very sensitive to environmental toxins and chlorine and floride



Gluten can be a big problem for Thyroid antibidies

Selenium helps lower anti-bodies

Ordering a complete Thyroid Panel is the best way to find out whats going on with the Thyrodi

In Thyroid Cancer the Thyroid Globulin test is the most important marker to track

Reference Ranges for Thyroid Hormones:

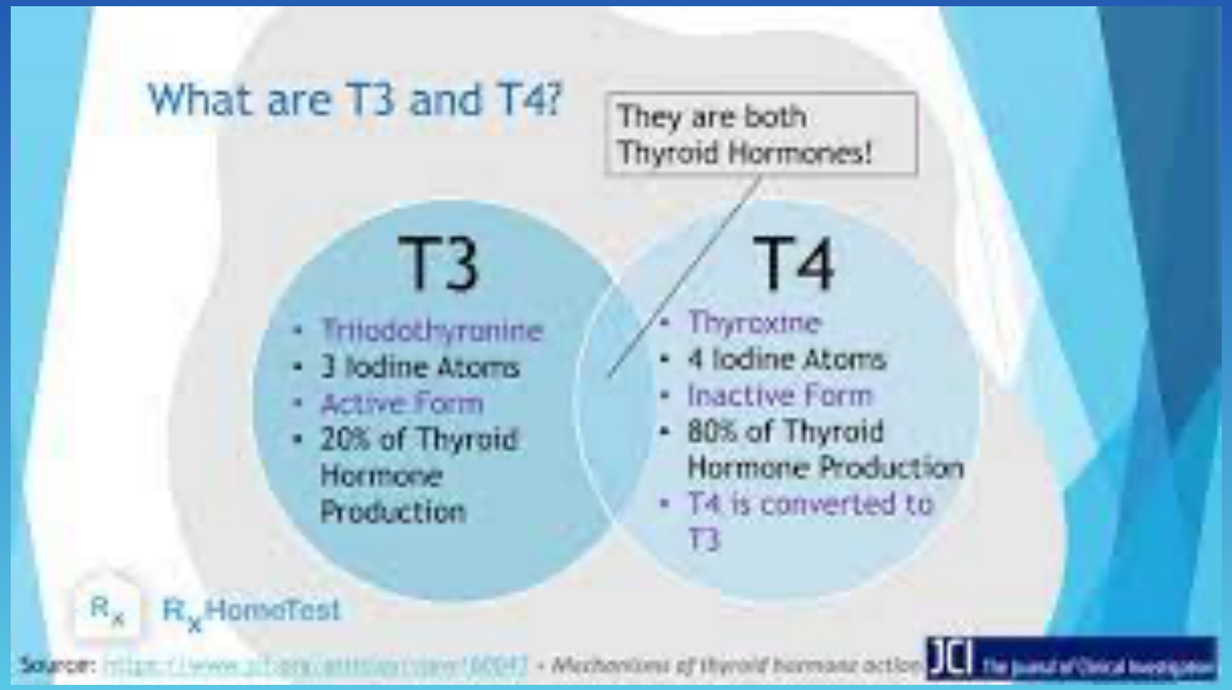
TSH (Thyroid Stimulating Hormone) 0.45 - 4.5 mcIU/ml - ideal level is 2 or below

Total T3 71 - 180 ng/dL

Free T3 200 - 400 pg/dL

T4 4.5 - 12 mcg/dL

Free T4 0.82 - 1.77 ng/dL



Thyroid peroxidase (TPO) anti-bodies 0 - 34 IU/mL

Supplements to support thryoid:

Low Thyroid (Hypothyroid) : Fucus, Bladderwrack (seaweeds), **selenium**, iodine, guggul, ashwagandha , 7-Keto DHEA.

Overactive Thyroid (Hyperthyrod): Vitamin D, L-carnitine, bugleweed, motherwort, lemon balm, lithium

Lipid Panel / Cholesterol / Cardiovascular

Triglycerides

Ideal level 1:1 ratio with HDL

The main lipid constituents in the blood and a source of energy for the body

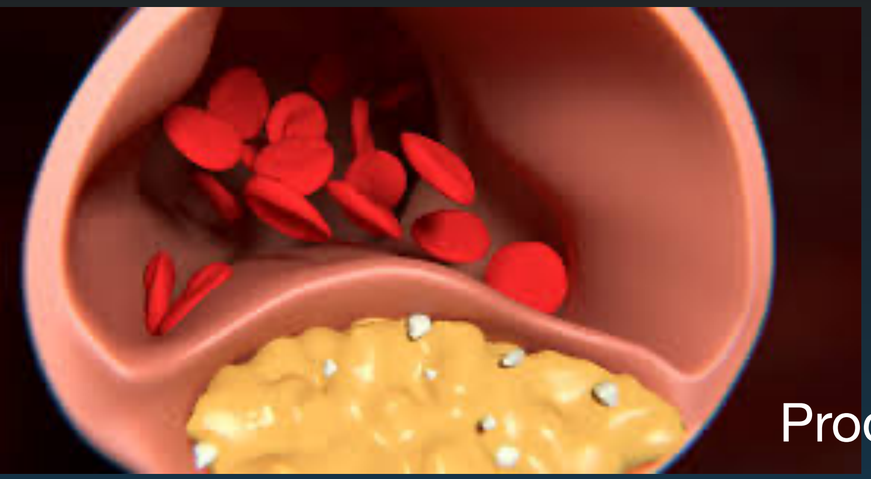
Excess calories - sugar and refined carbohydrates
are converted and stored in the fat cells

High Fructose Corn Syrup super charges the production of Triglycerides

They circulate through the body with the help of VLDL cholesterol

They are a major risk factor for fatty liver, metabolic syndrome, insulin resistance, diabetes, heart disease

Dietary Support: Fish Oils, very low sugar diet, low or no alcohol, high fiber unprocessed whole foods
Cinnamon, Garlic, Olive Oil, Green Tea



Cholesterol

An essential fat that contributes to normal biological functioning

Produced in the liver, cholesterol is required to create cell membranes

It is the principle building block for hormone production
Estrogen, Progesterone, Testosterone, Vitamin D, DHEA, Cortisol ect.

It is carried through the body by lipoproteins

Total Cholesterol is the sum of HDL + LDL + VLDL

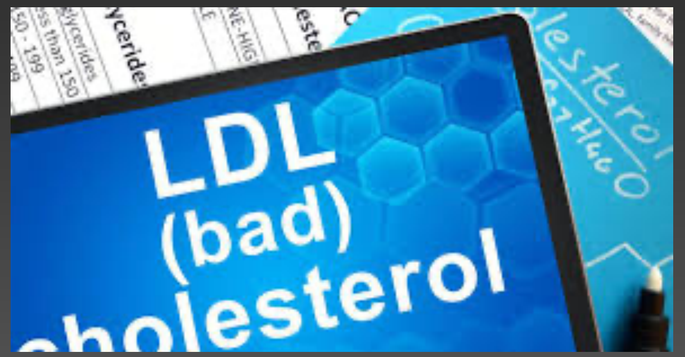
Target Range 150 - 200 mg/dl

LDL - Low Density Lipoproteins

Carries the majority 70% of cholesterol throughout the body and distributes it to the cells and tissues.

The bad part about LDL is that it becomes “oxidized” and is made more toxic

Oxidized LDL becomes lodged in the arteries,
Slowing or completely blocking the flow of blood
To the heart and other parts of the body.



This sets the stage for coronary artery and peripheral artery disease

There are 2 sizes of LDL - large particle Pattern A “Light Fluffy” LDL
That brings anti-oxidants to the cell membrane and is less problematic

Small particle LDL Pattern B when it becomes oxidized is the big problem

LDL Target Range is 80mg /dL or lower

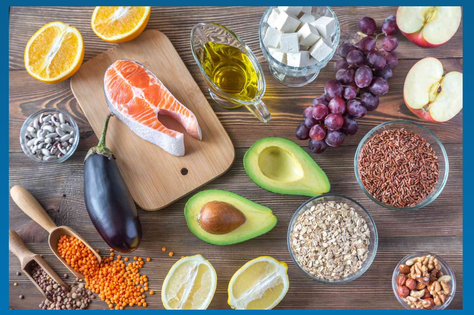
Causes of high LDL

Family History , genetic sensitivity to saturated fats, obesity, chronic stress, hypothyroidism
Insulin resistance, excessive refined carbohydrates - sugar - alcohol. High fructose corn syrup

Diet and Supplements to support hgh LDL

Low sugar high fiber diet with lots of soluble fibersfocus on plant foods, high in polyphenols
- ie. Colorful vegetables berries and fruits. Monosaturated fats Olive Oil and Avocado Oils.
Eliminate sugar whenever possible. Soda is liquid candy ! No High Fructose Corn Syrup !

Vitamin E complex with Tocotrienols (oxidized LDL protection) , Red Yeast Rice,
Pantetheine, Plant sterols, Aged Garlic extract, Fish Oils , Probiotics



HDL - High Density Lipoprotein

Carries LDL back to the liver where it is removed from the system

Like LDL there are 2 types of HDL -

Small Particle HDL carries a smaller amount of LDL back to the liver

Large Particle HDL carries a larger amount of LDL back to the liver

Men frequently have lower HDL than Women

Causes of low HDL: Obesity, chronic stress, low exercise, low magnesium, low testosterone levels in Men, smoking. High refined carbohydrates and high sugar processed foods diet, ultra low fats

The ideal ratio of HDL to Triglycerides is 1:1

Exercise raises HDL

Target Range >60

Liver Function Tests

The liver contains a pint of blood 13% of your body's total.

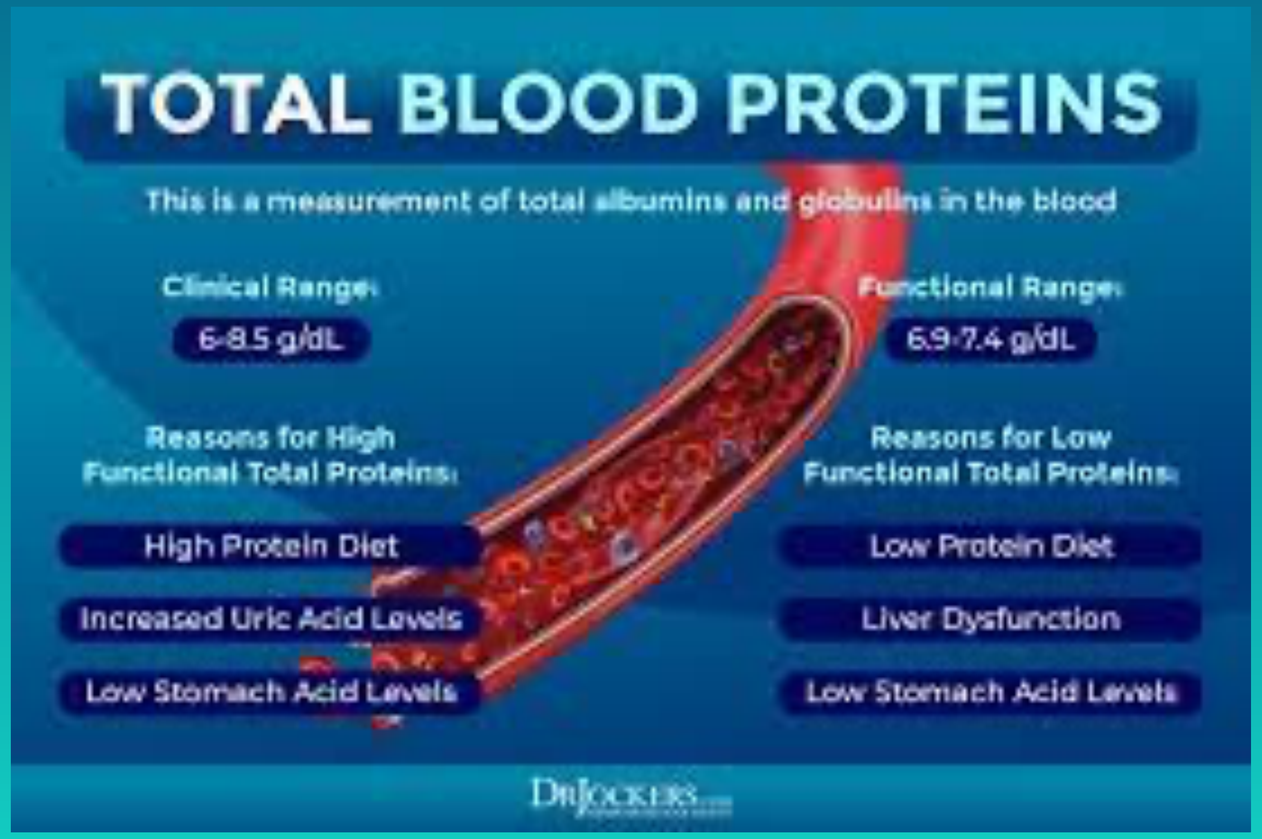
It filters more than a liter a minute - 22 gallons per hour and more than 250 gallons every 24 hours.

It does more than 500 functions

It is the only organ that can generate itself up to 50%

60% of the liver is made of hepatocytes. It processes food from the intestines. Controls fats, amino acids, and glucose in the blood. Combats infections. Clears the blood of infections and bacteria. Nutralizes toxins and drugs from the system. Manufactures bile. Stores iron and vitamins. Breaks down food, makes energy from it. Makes enzymes and protein responsible for most chemical reactions in the body including factors that help the blood clot and repair of damaged tissues.

1. Total Protein = is the sum of Albumin + Globulin



2 Proteins in the blood

Range 6.0 - 8.5 g/dl
Ideal Range 6.9 - 7.4 g/dl

<u>Reasons for High</u>
High Protein Diet
Increased Uric Acid Levels
Low Stomach Acid Levels

<u>Reasons for Low</u>
Low Protein Diet
Liver Dysfunction
Low Stomach Acid Levels

Albumin:

Using amino acids derived from protein,
the liver produces about 9 - 12 grams of albumin a day.

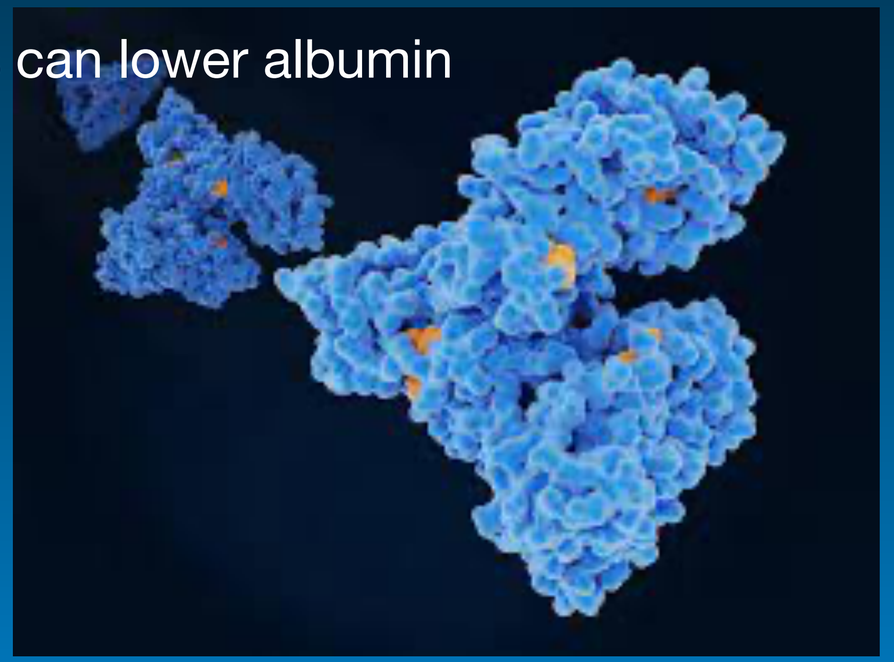
It binds with hormones, nutrients and drugs,
allowing them to travel through the body via the blood stream.

High Albumin is almost always linked tto dehydration.

Low albumin can arise when the body is fighting infection

Chemotherapy treatments can lower albumin

Reference Ranges for Albumin 3.8 - 4.8 gd/L
Target Range 4.0 - 4.5



Supplemental Support :

Low Albumin: Whey Protein, Chlorella, L-Glutainine

High Albumin: Milk Thistle Extracts, NAC - N-Acetyl Cysteine

Reference Ranges for Albumin 3.8 - 4.8 gd/L
Target Range 2.8 - 3.2

Globulin

Is catagorized into 3 main groups:
alpha, beta and gamma

Alpha and Beta primarily transport proteins

Gamma are comprised of immunoglobulins
Known as anti-bodies. They account for the majority of the globulin level.

High gobulin can be caused by infection, allergic reaction, allergy, auto - immune disease, leukemia and liver disease.

Rule out infection or allergy first.

Supplements to support:

High Globulin: Probiotics and gut health, in inflammation - fish oils and curcumin (turmeric)

Low Globulin: Reishi Mushroom, Whey Protein, Probiotics, NAC N-acetyl cysteine

Albumin / Globulin
ratio: 1.2 - 2.2

Normally your body will have a little more albumin than globulin.

High Globulin may point to a type of cancer such as myeloma
or auto-immune such as lupus.

Albumin levels that are low may be due to liver problems

Bilirubin

When red blood cells are broken down by the spleen,
The normal byproduct is the orange-yellow pigment called bilirubin

Before it reaches the liver it is called direct or unconjugated bilirubin.

In the liver it becomes conjugated.

It is stored in the gallbladder and excreted in the stool

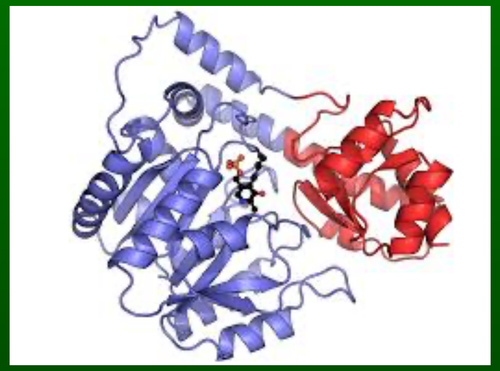
Reference Ranges for Bilirubin: 0.0 - 1.2 Range for Direct Bilirubin 0.0 - 0.4

High Bilirubin often indicates liver infection or failure, gallbladder infection, biliary dysfunction or cancer

Elevated direct bilirubin can suggest gallbladder dysfunction or cancer

Elevated indirect bilirubin may be the result of cirrhosis or viral hepatitis.

Supplements to support Bilirubin:
Milk Thistle extract, Alpha Lipoic Acid, Sulforaphane 0 Broccoli seed extract,
Schizandra, Turmeric (Curcumin), AHCC (specialiized mushroom extract)



AST: Aspartate Aminotransferase (SGOT):

AST is an enzyme mainly found in the liver,
but it can be found in the muscles, kidneys, heart and pancreas.

Low levels are found to be generally a sign of good health.
If it becomes elevated it can indicate damage to one of these organs.

The combination of ALT and AST are used to idenfity liver damage and disease.

They fluctuate during the day like ALT

They are generally higher in African American Men

Moderate exercise can increase AST 3x the normal limit for up to 24 hours

What causes high AST: Alcohol abuse, biliary obstruction, chemical and pesticide exposure, mononucleosis,, cirrhosis, pancreatic dysfunction, B-6 deficiency,
Medications: Tylenol, antibiotics, anti-fungal drugs, NSAIDS aspirin, statin drugs methotrexate

Reference Ranges:for AST: 0 - 40, low < 5, normal 5 - 40.

Supplement Support for elevated AST: B-complex vitamins, milk thistle extract, magnesium, AHCC mushroom extract, aged garlic extract, andrographis

ALP: Alkaline Phosphatase

An enzyme produced mainly in the liver and bone.

Elevated ALP values are used extensively as tumor markers and to diagnose liver disease

They can also be seen in bone injury.

What causes elevated ALP: Bone cancer,
chemical exposure to heavy metals or pesticides, cirrhosis, autoimmune disorders,
biliary obstruction, excess vitamin D, pancreatic cancer, parasites,
shingles and viruses such as CMV, hepatitis and mono.

What causes low ALP: scurvy, pernicious anemia, zinc deficiency,
hypothyroidism, magnesium deficiency

Reference ranges for Alkaline Phosphatase (ALP) IU/L: 44 - 121

Supplementa Support for High ALP: Milk Thistle extract, magnesium, aged garlic extract,
AHCC Mushroom extract.
Low ALP: Magnesium, Milk Thistle extract, Vitamin B-12, Zinc, Carnosine

GGT: Gamma-Glutamyl Transferease:

Found throughout the body but most significantly in the liver.

While elevated GGT suggests liver damage, it cannot reveal the cause of that damage on its own.
GGT levels are used in conjunction with ALP readings to help determine the illness of the patient

If both ALP and GGT are high, bile duct disease or liver disease is suspected

GGT is very sensitive to alcohol use - its elevation may simply be caused by alcohol consumption

They can be higher in obese persons

Alcohol abuse, autoimmune and viral hepatitis, biliary obstruction, COPD, hyperthyroidism,
liver disease, influenza, pancreatic dysfunction, strenuous exercise, kidney disease, heart attack
Numerous prescription drugs, tylenol, steroids, antibiotics, anti-fungal drugs, statins, NAIDS.

Reference range for GGT: Men 0 - 65, Women 0 - 45, Target Range 22.5

Supplement Supportfor high GGT: PC Phosphatidyl-choline,
GTF Chromium, Probiotics, Aged Garlic Extract, Magnesium
Low GGT: Magnesium

Comprehensive Metabolic Panel

Glucose - Blood Sugar

In diabetes for every 1 point rise in fasting blood sugar over 84mg/dL an individuals risk of diabetes increases by about 6%.
By the time a persons blood sugar goes to 94 their risk increases to 49% if it goes to 100 the risk goes to 84%

Reference Ranges for Blood Glucose - fasting mg/dL:

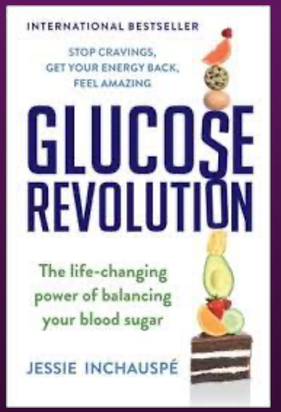
> 125 Diabetes, 100 - 125 Prediabetes (impaired fasting glucose)
65 - 99 Normal, < 65 Hypoglycemic

Target Range: 70 - 84

Nutritional support for blood sugar management:
GTF Chromium, vanadium, magnesium, zinc.
Ceylon cinnamon 1/4 tsp. daily, alpha lipoic acid

PGX Fiber, Apple Cider Vinegar before or during meals

Start all meals with salads with vinegar or proteins
Eat the carbohydrates last - such as bread

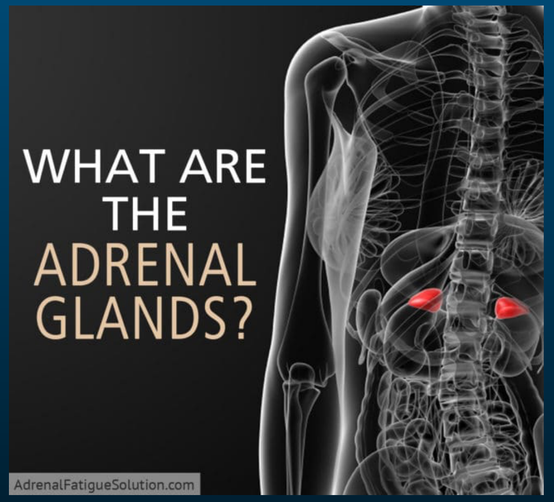


Other botanical support: Gymnena Sylvestre, Bitter Melon, Nopal

Diet: Eliminate processed foods and fast digesting carbohydrates - white flour, white rice
all sugars as much as possible. Eliminate high fructose corn syrup “soda is liquid candy”
High fiber complex carbohydrates such as beans that digest slowly.

Sodium

Works with potassium to balance fluids in the body



It influences blood pressure regulation, heart rhythm
muscle contraction, and nerve impulse transmiission

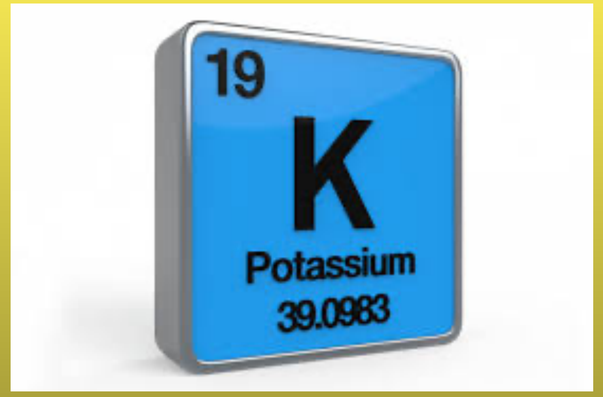
Abnormal levels may indicate issues with the adrenal glands.

Reference Ranges for Sodium mmol/L 133 - 144

Elevated sodium: Drink more water, dramatically eliminate processed foods, they are usually loaded with sodium.

Low sodium levels: can be caused by drug interactions,
Congestive heart failure, kidney disease, or over hydration

Potassium



Controls fluid balance in the body

It is required for nerve impulse transmission and muscle contraction

It can affect your risk of hypertension and stroke

Chronically low levels can increase the likelyhood of developing diabetes.

Elevated potassium levels may indicate kidney issues

Reference Ranges for Potassium mmol/L: 3.5 - 5.2

Target Range 3.5 - 4.5

Chloride

An electrolyte that helps to balance fluids inside and outside your body’s cells

It maintains proper blood volume, blood pressure and pH

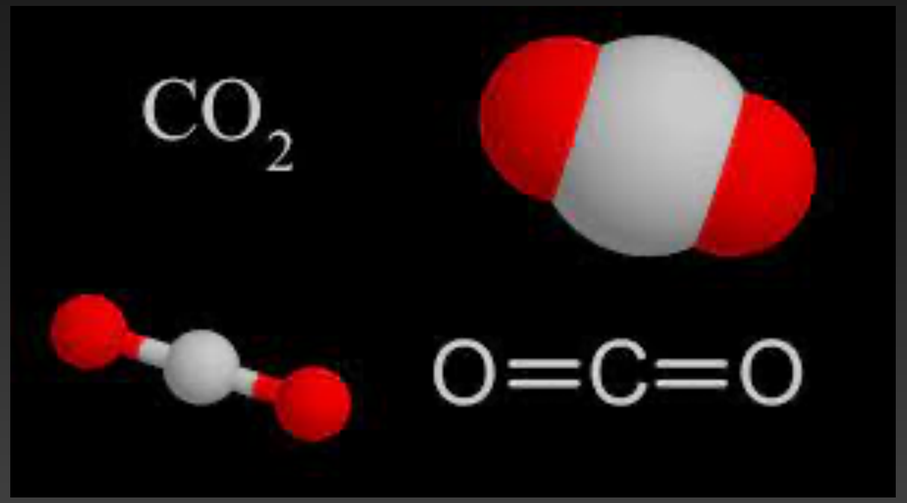
A disturbance in chloride levels ofen signal a problem with kidney function

Reference Ranges for Chloride mmol/L: 96 - 106

Carbon Dioxide

Elevated levels think sleep apnea , COPD, alcoholism

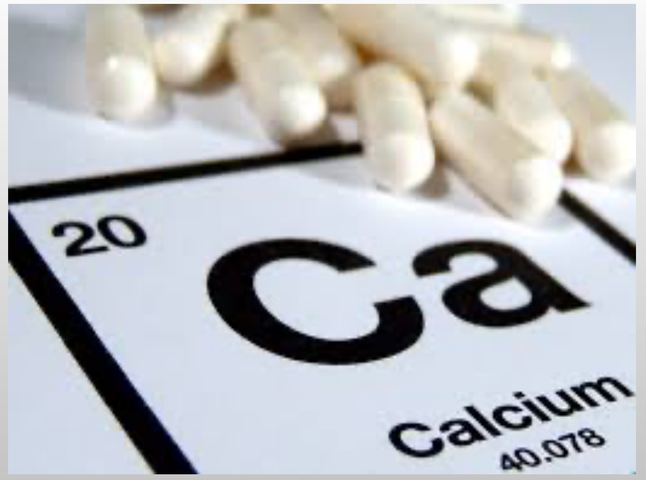
Certain auto-immune and motor neuron diseases are also some of the causes of low carbon dioxide



Reference Ranges for Carbon Dioxide mmol/L 20 - 29

Target Range 23 - 29

Calcium



Blood calcium levels are regulated by a complex feedback loop
Involving the parathyroid hormone - calcitonin, and vitamin D

Magnesium and Phosphorus levels in the body also affect calcium levels

Hypercalcemia (too much calcium) can put you at risk for kidney stones

Hypocalcemia (too low calcium) can typically lead to osteoporosis

Reference Ranges for Calcium mg/dL 8.6 - 10.2
> 12 moderate to severe hypercalcemia
< 8.6 low - hypocalcemia

Nutritional Supplement Support:
Hypercalcemia - Green Tea, Magnesium, Vitamin K2
Hypocalcemia - Calcium, Magnesium, Boron, Vitamin D

Kidney Panel - Kidney function tests

BUN - Blood Urea Nitrogen

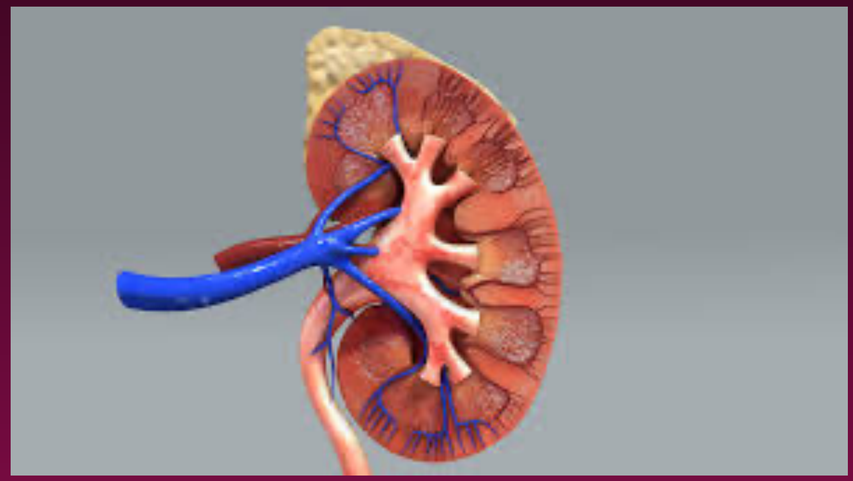
A form of nitrogen in the urea, a waste product
produced during protein metabolism

Urea is then transported to the kidneys which filter it out

If BUN levels are higher than normal, the problem has to do with the kidneys

Older men typically have higher BUN

Tylenol, aspirin and arthritis drugs can elevate BUN



Reference Ranges for BUN mg/dL: 8 - 27
< 6 low, > 20 high

Supplemental Support for elevated BUN:
Stinging Nettle Seed extract, Milk Thistle extract, Cordyceps mushroom
CoQ10, asparagus is very supportive to the kidneys

Support for low BUN: Whey Protein, creatine, probiotics

Creatinine

A chemical waste product of muscle metabolism

It is generated by a compound manufactured by the liver and serves as a source of energy to the muscles.

The blood creatinine test along with BUN serves as a reliable measure of kidney function

Men usually have higher numbers because of greater muscle mass

Elevated levels because of long term diabetes, poorly managed hypertension increase the risk of kidney failure

Severe bacterial infections, heavy metal toxiciy can damage the kidneys too

Reference Range for Creatinine mg/dL: 0.76 - 1.27
Men 0.6 - 1.2, Women 0.5 - 1.1

Supplemental Support: NAC N-acetyl cysteine, stinging nettle seed extract, goldenrod extract, cordyceps

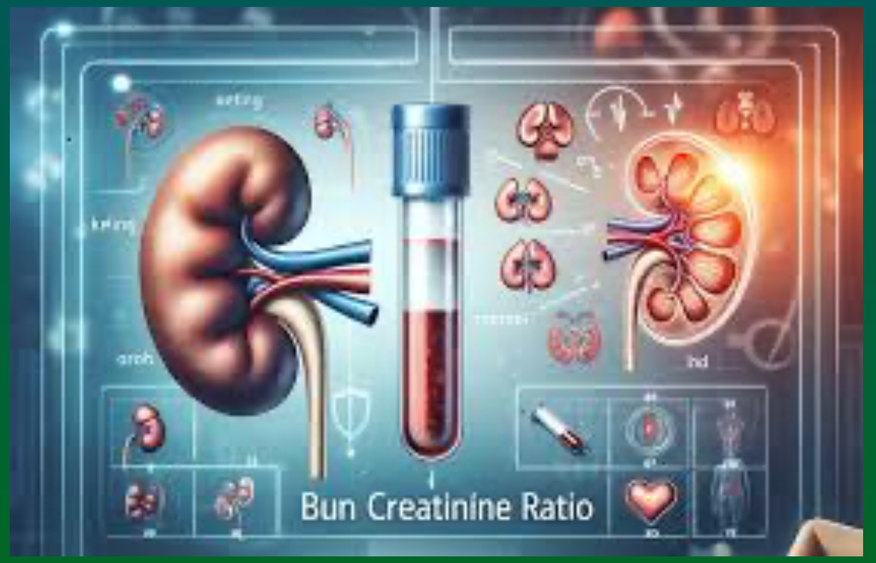
BUN / Creatine Ratio

The ratio of these markers provides a more accurate picture of kidney health

High and Low ratios can be indicative of kidney dysfunction.

The most common cause of a high ratio is
Dehydration, kidney stones and urinary tract obstruction

Low ratios look for liver disease such as cirhosis
or a low protein diet, malnutrition



A normal BUN / Creatine ratio is between 10:1 - 24:1
Target Range 12:1 - 16:1

Supplemental Support: CoQ10, Cordyceps, Goldenrod extract, Green Tea extract
Stinging Nettle seed extract, selenium, Sustained Release L-Arginine

eGFR (Glomerular Filtration Rate)

Reflects the amount of blood that is filtered per minute and generally correlates with urinary output

When GFR falls below a certain level, it indicates kidney dysfunction.

Race is taken into consideration,
since the genetics of African Americans affect how their kidneys process and filter wastes.

References for eGFR: ml/min. 1.73 > 59.
The higher the number the better your kidney function

< 15 kidney failure
15 - 29 Stage 4 severe kidney damage
30 - 59 Stage 3 moderate kidney damage
60 - 89 Stage 2 mild kidney damage
> 90 Stage 1 beginin of kidney damage
20 year old 116
A person in their 60’s - 85

Cystatin C test

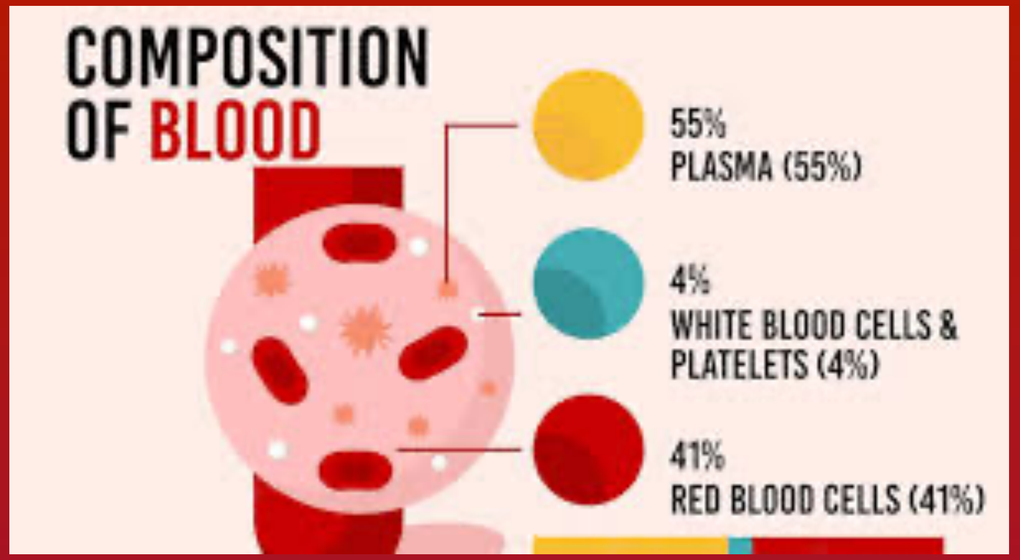
This is a blood test that also indicates how well your kidneys are working

It can be used to calculate your glomerular filtration rate (GFR)

Used with very obese, malnourished adults, and older adults

Reference Range 0.50 - 1.25

CBC - Complete Blood Count



One of the most commonly administered blood lab tests

Usually done as a routine test

It is used to evaluate the effectiveness of medical treatments

Identifies the cause of symptoms like weakness, fatigue and bruising

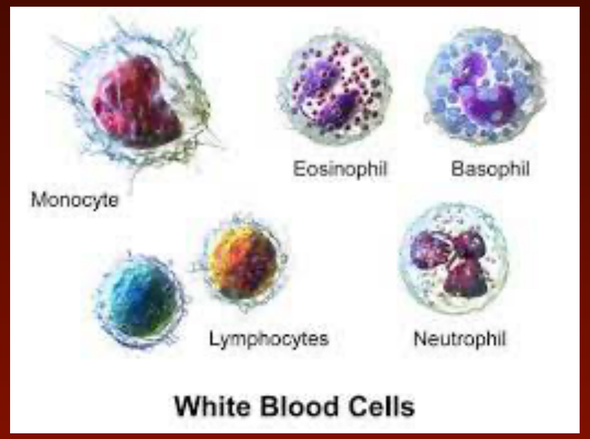
Helps diagnose conditions such as anemia, bone marrow disorders,
types of infections and nutritional deficiencies such as iron B-12, and folate

WBC - White Blood Cells

Known as leukocytes are an essential component of the immune system

Their number quickly increases when there is infection in the body viral or bacterial

Reference Range 3.4 - 10.8 x10E3/ul (3,400 - 10,800)



To raise WBC’s Vitamin C, (Zinc and Mushroom extracts modulate WBC’s)
Raising them when low and lowering them when high

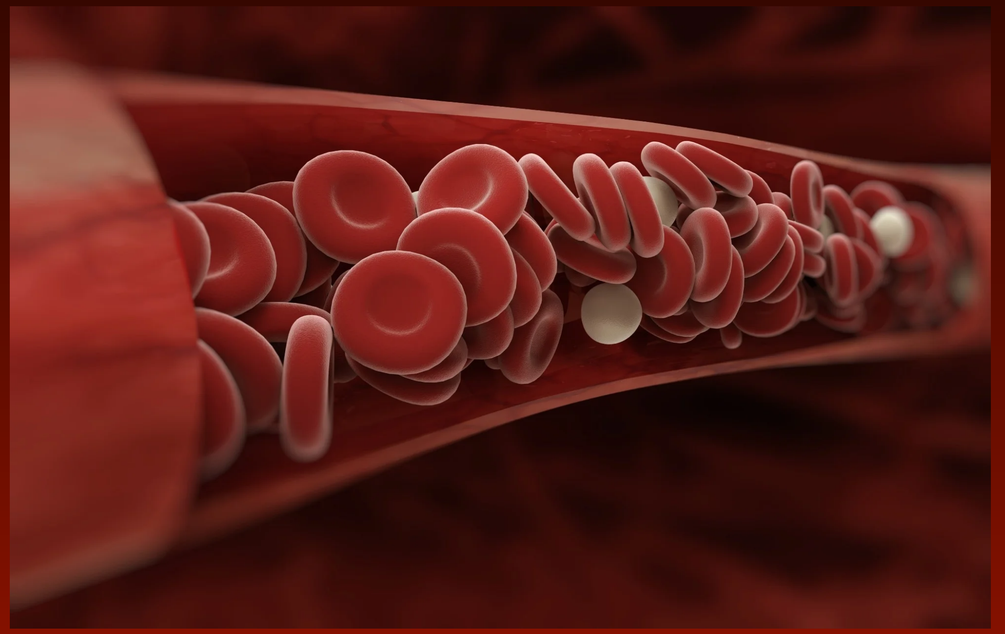
To lower WBC’s - Probiotics, Zinc and Mushroom extracts

RBC - Red Blood Cells

The most plentiful type of cell in the blood

Responsible for carrying oxygen to the tissues and organs
and carbon dioxide back to the lungs

The brighter the red blood the more oxygen



Low RBC is called anemia

High RBC is called polycythemia

Reference Range 4.14 - 5.80 x 10E3/ul (4,140 - 5,800)

To raise low RBC’s - supplement iron (bisglycinate is the easiest form for the GI tract)
Folate, B-12, Vitamin C helps iron absorption

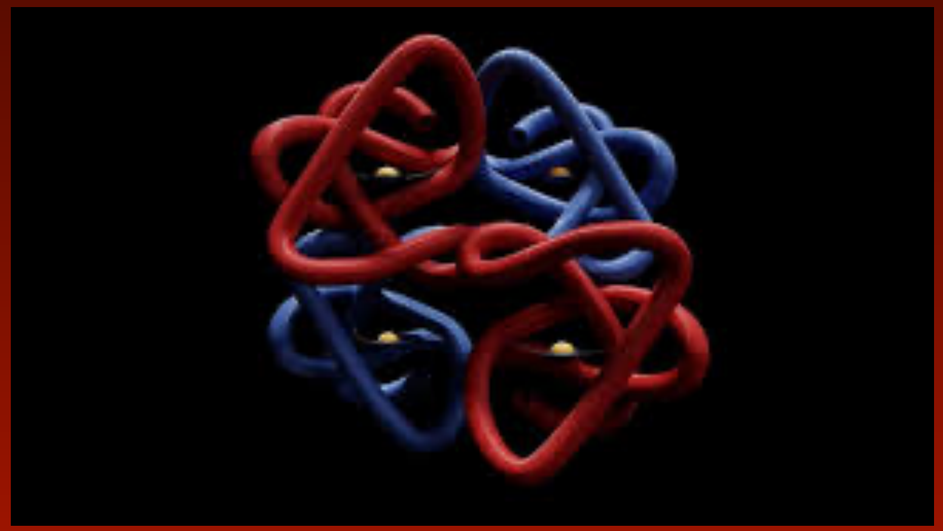
Hemoglobin

Is a. Protein molecule that transports oxygenated carbon dioxide through the body

Red blood cells are interconnected but not always directly proportional
They may contain unequal amounts of hemoglobin

Reference Range: Men 14 - 18, Women 12 - 16 g/dL

To raise low Hemoglobin: Iron, B-complex, Vitamin C



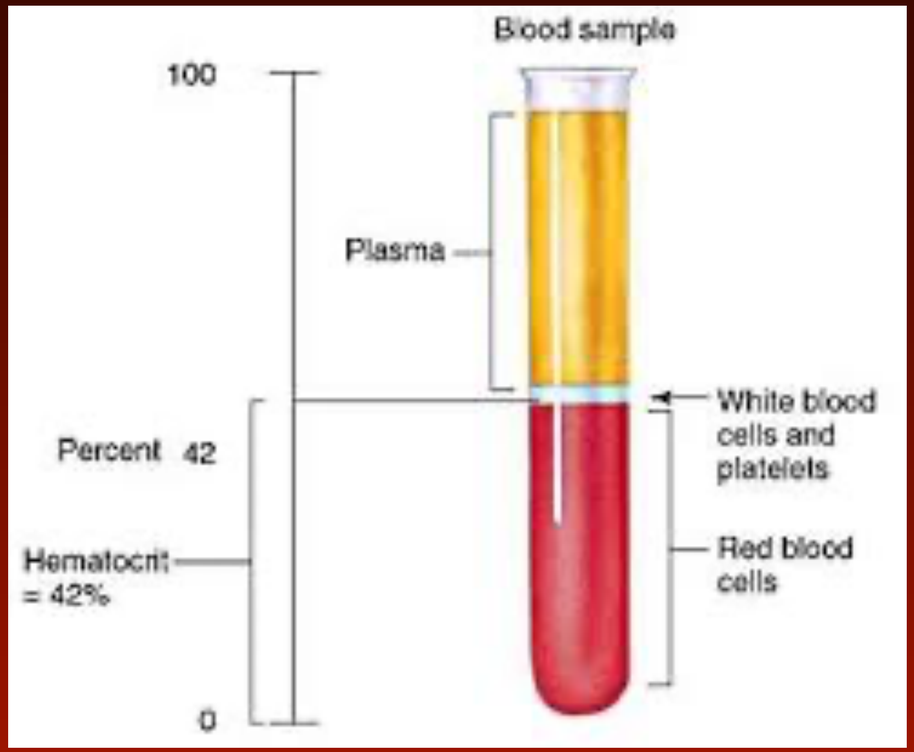
Hematocrit

The proportion of your total blood volume that contains red blood cells.

It indicates if you have too many or too few red blood cells

Reference Range: Men 36 - 50 %, Women 34 - 44 %

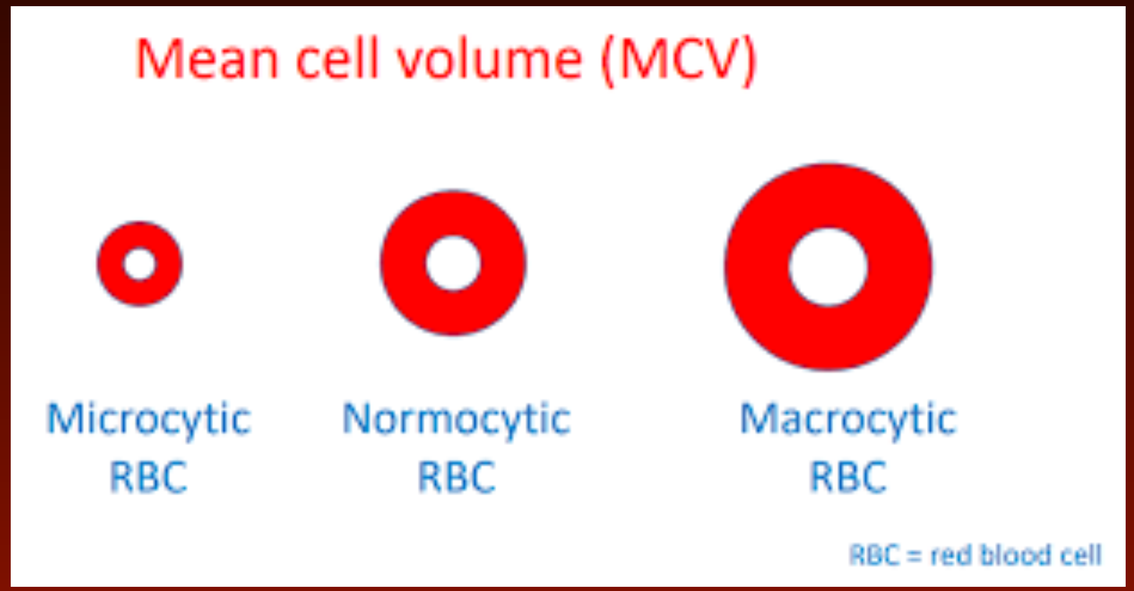
Low levels usually are due to blood loss.
High levels can happen at high altitudes,
endurance athletes or genetic disorders



MCV - Mean Corpuscular Volume

Is the measurement of of the average volume or size of your red blood cells.

Reference Range: 79 - 97 fL

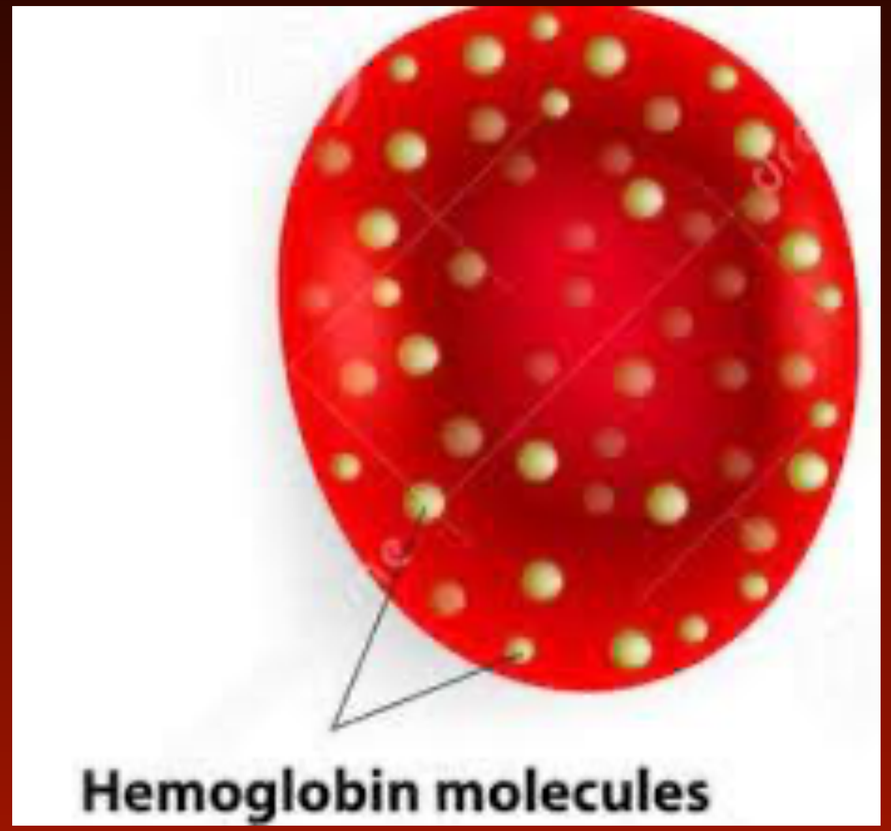


High MCV may be due to a deficiency of B-12 or Folate.
High MCV can accompany elevated liver enzymes AST & ALT.

Low MCV is usually caused by an iron deficiency

MCH - Mean Corpuscular Hemoglobin

Measures the amount of hemoglobin contained in a single red blood cell.



Reference Range: 26.6 - 33.0 pg

High MCH may be due to a deficiency of B-12 or Folate
High MCH can accompany elevated liver enzymes AST & ALT

Low MCH is usually caused by an iron deficiency

MCHC - Mean Corpuscular Hemoglobin Concentration

Reflects the hemoglobin concentration in a given unit of packed red blood cells.

High MCHC is associated with elevated liver enzymes AST & ALT

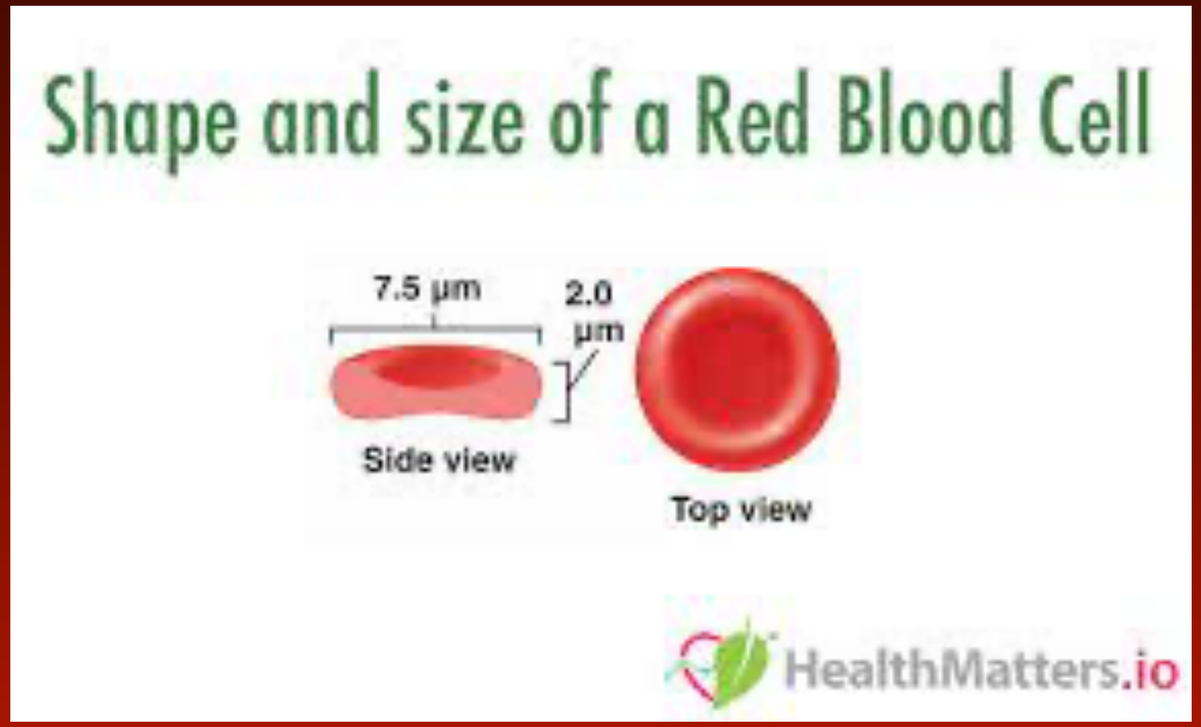
Reference Range: > 37 high, 31 - 37 normal, < 31 low

Supplemental support: B-complex vitamins help if it is elevated

RDW - Red cell distribution width

Reflects the amount of variation in RBC (Red blood cell) size

Reference range 11.6 - 15.4



Platelets

Their main function is to stop bleeding

They transport inflammatory compounds such as cytokines and neurotransmitters.

Abnormal platelets are linked to many conditions such as auto-immune,
Cancer, chronic inflammation and iron deficiency

Thrombocythemia - is when the bone marrow produces too many platelets.

Too many platelets can produce symptoms including headache, numbness of of the hands and feet abnormal bleeding, and bruising easily

Low platelets can be caused by an enlarged spleen, chemotherapy,
Excessive alcohol consumption, leukemia, toxic chemical & heavy metal exposure

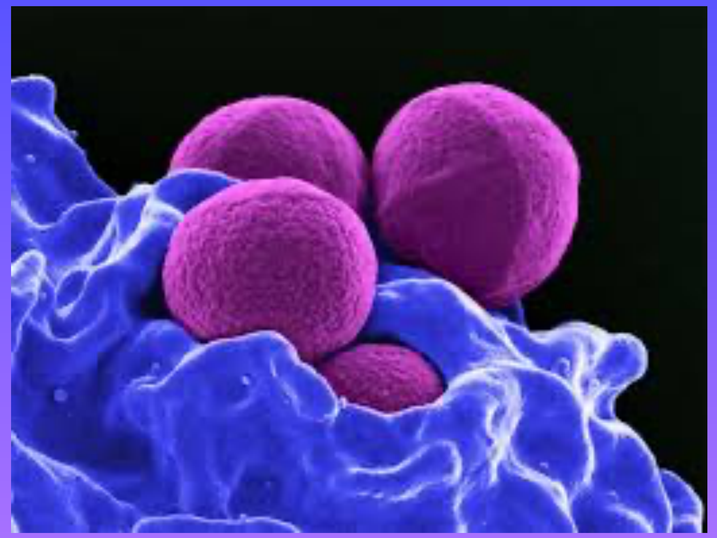
Reference Range 150 - 450 x10E3/ul (150,000 - 450,000)

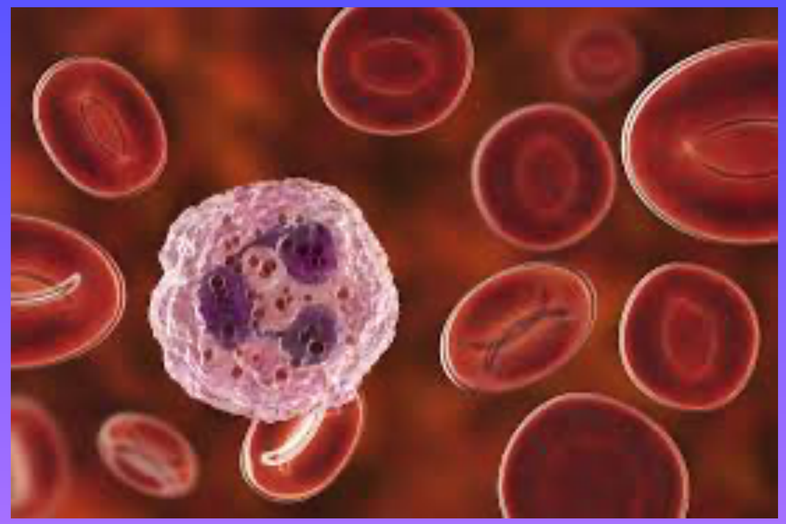
Supplemental support: Whey protein as been reported to minimize platelet aggregation.
Green Tea and Resveratrol help support high platelet counts.

Neutrophils

The most common type of white blood cell accounting for 50% of the total white blood cells

Immature white blood cells are called bland cells and fully developed are called polys.



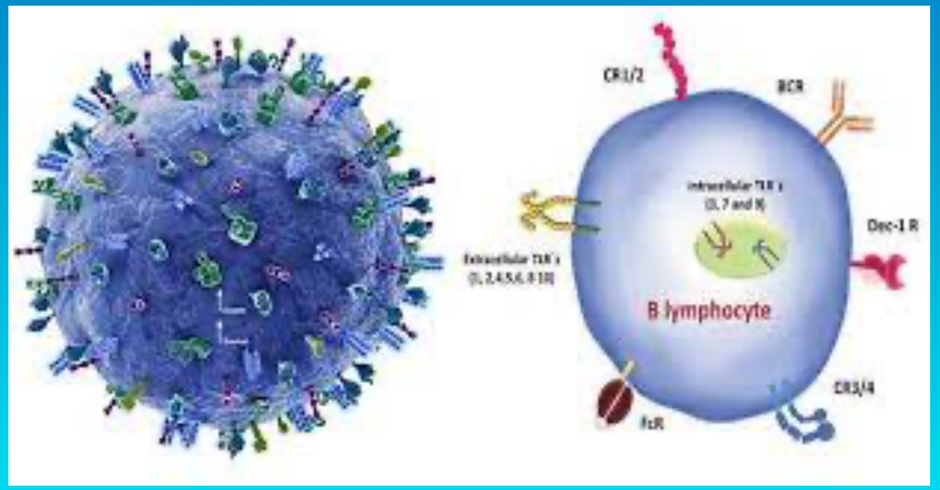


Neutrophils Reference Range (Absolute) 1.4 - 7.0 x 10E3/ul (1,400 - 7,000)

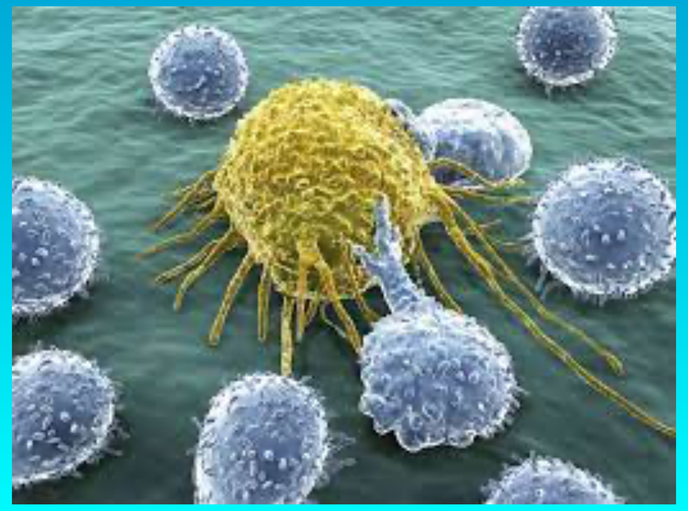
Lymphocytes

2 types of lymphocytes are B cells and T cells
produced in the lymphoid tissues,
the spleen, lymph nodes, and thymus gland

B cells make antibodies that attack bacteria and toxins



T-cells target once-healthy cells
that have become cancerous or overtaken by a virus

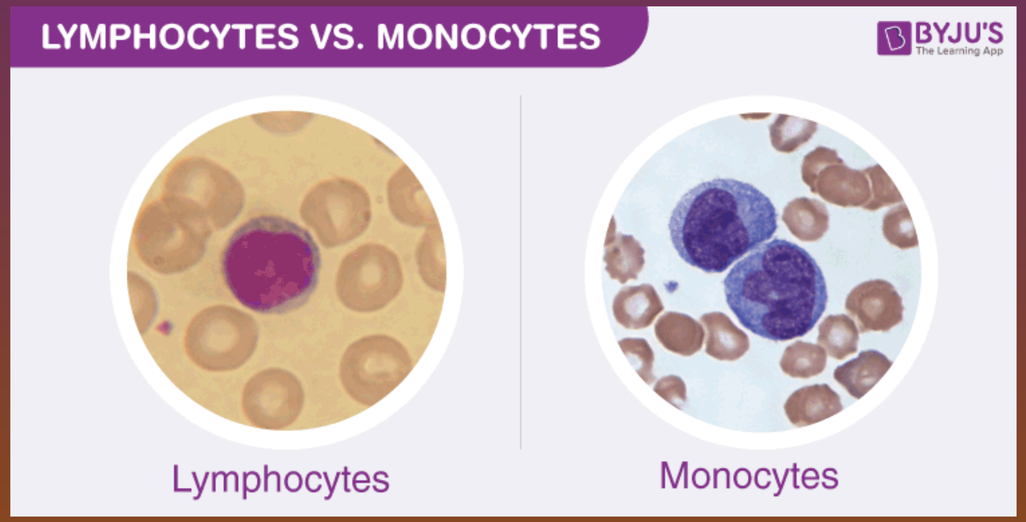


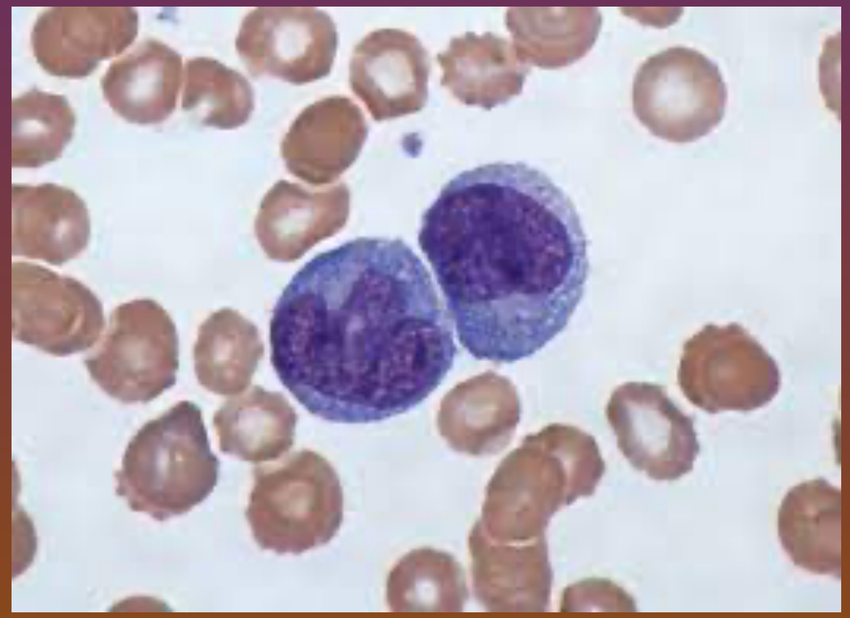
Reference Range (Absolute) 0.7 - 3.1 x10E3/ul (700 - 3,100)

Monocytes

Are distinguished by their large nucleus that develop into either macrophages or dendritic cells.

Macrophages ingest microbes while dendritic cells acquire antigens that trigger antibody production so that T cells are able to identify them.





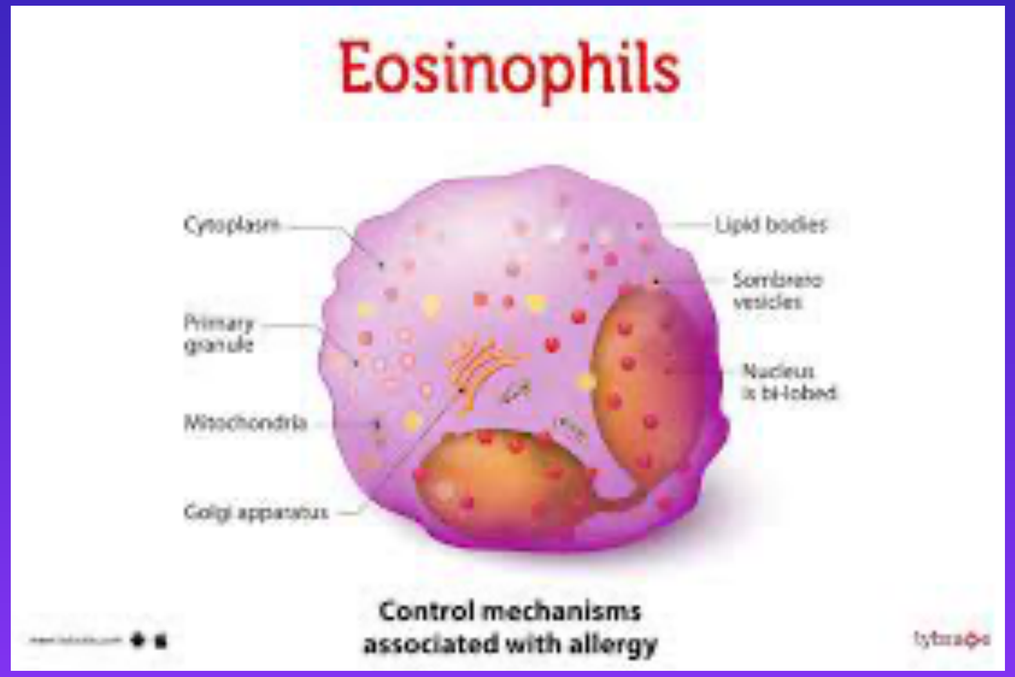
Reference Range (Absolute) 0.1 - 0.9 x10E3/ul (100 - 900)

Eosinophils

Aid in the body in fighting parasitic infection.

When they accumulate they can contribute to allergic inflammation such as asthma.

Eosinophilia is considered to be a reaction to certain diseases, parasites, or allergens.



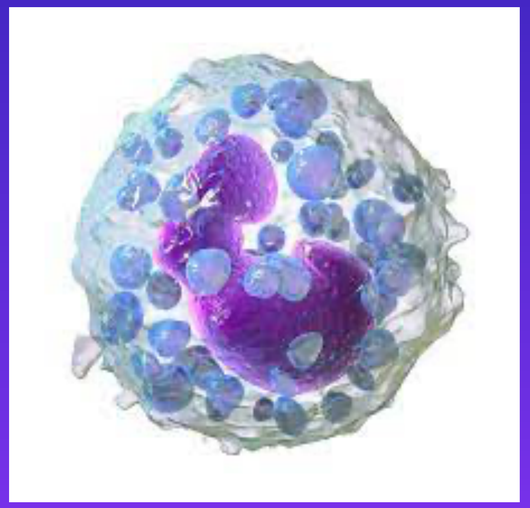
Reference Range (Absolute) 0.0 - 0.4 x 10E3/ul (0 - 200)

Basophils

Are less than 1% of the total WBC count

They are unique in their ability to kill parasites that are external to the body including ticks

When their number climbs too high they contribute to allergies

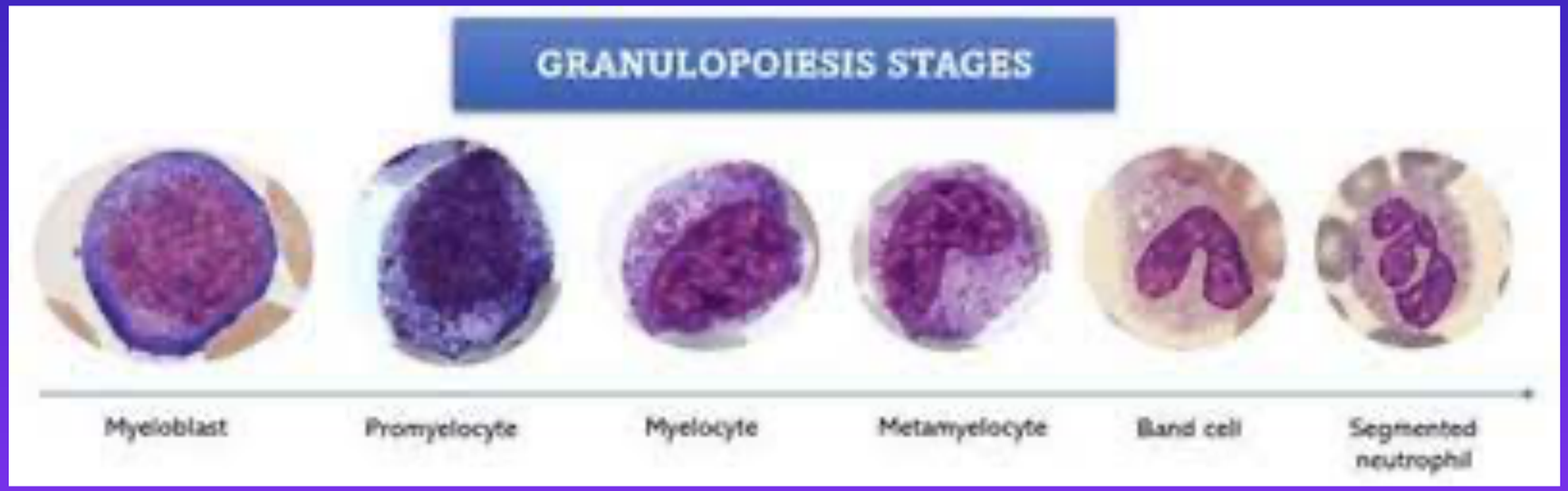


Reference Range (Absolute) 0.0 - 0.1x10E3/ul (0 - 100)

Immature Granulocytes

Granulocytes fully develop in your bone marrow before traveling to your bloodstream

Immature granulocytes could mean there is a problem with your bone marrow
or it could simply indicate an early stage respone to infection



Reference Range (Absolute) 0.0 - 0.1x10E3/ul (0 - 100)