

Back To Chiropractic Continuing Education Seminars
Understanding & Utilizing Blood Labs ~ 6 Hours

Welcome:

This course is approved for 6 Hours of CE for Blood Labs Part 1 for the Chiropractic Board of Examiners for the state of California and is also accepted in Colorado, Iowa, Michigan, Oregon and Washington.

There is no time element to this course, take it at your leisure. If you read slow or fast or if you read it all at once or a little at a time it does not matter.

How it works:

- 1. Helpful Hint: Print exam only and read through notes on computer screen and answer as you read.**
- 2. Printing notes will use a ton of printer ink, so not advised.**
- 3. Read thru course materials.**
- 4. Take exam; e-mail letter answers in a NUMBERED vertical column to marcusstrutzdc@gmail.com.**
- 5. If you pass exam (70%), I will email you a certificate, **within 24 hrs**, if you do not pass, you must repeat the exam. If you do not pass the second time then you must retake and pay again.**
- 6. If you are taking the course for DC license renewal you must complete the course by the end of your birthday month for it to count towards renewing your license. I strongly advise to take it well before the end of your birthday month so you can send in your renewal form early.**
- 7. Upon passing, your Certificate will be e-mailed to you for your records.**
- 8. DO NOT send the state board this certificate.**
- 9. I will retain a record of all your CE courses. If you get audited and lost your records, I have a copy.**

The Board of Chiropractic Examiners requires that you complete all of your required CE hours BEFORE you submit your chiropractic license renewal form and fee.

NOTE: It is solely your responsibility to complete the course by then, no refunds will be given for lack of completion.

**Enjoy,
Marcus Strutz DC
CE Provider
Back To Chiropractic CE Seminars**

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UNDERSTANDING & UTILIZING STANDARD BLOOD LABS

A NUTRITIONAL PERSPECTIVE
Dr. Mark D. Emerson
DC, CCSP

Course Objectives

- Understand the importance, validity and reasoning for ordering many routine lab tests.
- Understand which tests correlate to which system or organ of the body to be assessed.
- Understand the values of each test and how it relates clinically to your patient's baseline health.
- Know when to order further tests or refer to specialist.
- Understand how to incorporate lab findings into daily chiropractic practice.

- Millions of “standard” blood labs are ordered each year as a general screen for pathology. (medical model)
- Understanding how to read them, interpret them and utilize their valuable information will help you, the clinician, offer conservative options to help your patients improve their health naturally. (holistic chiropractic model)
- Traditionally a medical procedure, the standard lab panels can assist you and your practice by giving the patient more information and help regarding their health.
- Lab assessment is not a routine procedure in chiropractic offices, however, nearly every patient you see will have had a lab analysis performed in the past 12 months. It is an opportunity to offer additional wellness oriented insight to your patients by simply utilizing a tool that in my opinion should be part of daily chiropractic practice.
- As I like to tell my patients; “*your blood does not lie!*”

Why Blood Lab Analysis?

- Accurate and Comprehensive
- Objective, Consistent and Reproducible
- The Gold Standard: Accepted Scientifically, Medically, Legally, Publicly
- Supports Your Treatment Plans
- One of the best ways to catch abnormal physiology before it progresses to the full-blown disease state.

- ‘What you know about...You see”

~ Goethe

Once you start seeing the patterns of what the blood tests tell you, I hope you will have that “aha” moment.

Standard, regular, general lab tests are a powerful tool to use in everyday practice. Particularly if your goal is to help your patients in the prevention of disease and increase their wellbeing.

- Lab results help clinicians (MD's) Rx & monitor medications. These same Labs help (DC's & ND's) to Rx & monitor Nutritional considerations.
- Remember, It takes 2 pts to determine a line; A-B.
- With a single point (blood or urine) you do not know if line is going up or down.
- However, looking at several consecutive labs you can help determine which direction the patient's health is going.

- As a general rule:
- Look for tendencies over a history of past lab reports.
- The human body is constantly changing, minute to minute, day to day, week to week and is capable of remarkable healing at any time.
- Repeating tests within 60-90 days is good idea.
- Today is always a good time to assist the patient in living a healthier life.

WHAT ARE WE EVALUATING WITH STANDARD BLOOD TEST?

It is a major organ function evaluation of:

- Bone marrow
- Kidney
- Liver
- Thyroid gland
- Parathyroid gland
- Pancreas
- Arteries – Vascular system
- Immune system

- If all the tests are looking good, then we know as clinicians, we are looking at a pretty healthy patient.
- However, if there are high/low/border line values on the results report, then we have a patient that needs assistance in improving their health.

- The absence of pathology on routine blood tests does not indicate good health or well being.
- It is simply absent of advanced pathology.
- For every pathological positive test, that number was at one time a slow moving “normal” indicator.
- It is important for the doctor to recognize the slow moving numbers and implement healthy recommendations to the patient while the patient is still in NORMAL ranges. Do not wait for the patient to have abnormal findings.

- The lab tests report will have 3 main column headings:
 1. Results Column – The actual value the patient scored on that particular test
 2. Flag or “abnormal” – The value of if the score if the number fell below or above the reference range
 3. Reference range – the established high and low ends of the particular test which verify a “normal” score

ASSESSING LAB VALUES

CMP12+LP+TP+TSH+7AC+CBC/D/P...;Homocyst(e)ine, Plasma;Vitamin D, 25-Hydroxy				
General Comments				
PID: 70204407				
TESTS	RESULT	FLAG	UNITS	REFERENCE INTERVAL
CMP12+LP+TP+TSH+7AC+CBC/D/P...				
Glucose, Serum	104	High	mg/dL	65-99
Hemoglobin Alc	5.8	High	%	4.8-5.6
<p>Increased risk for diabetes: 5.7 - 6.4</p> <p>Diabetes: >6.4</p> <p>Glycemic control for adults with diabetes: <7.0</p>				
Uric Acid, Serum	5.3		mg/dL	2.5-7.1
Therapeutic target for gout patients: <6.0				
BUN	15		mg/dL	6-24
Creatinine, Serum	0.78		mg/dL	0.57-1.00
eGFR If NonAfricn Am	84		mL/min/1.73	>59
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BUN/Creatinine Ratio	19			9-23
Sodium, Serum	140		mmol/L	134-144
Potassium, Serum	4.4		mmol/L	3.5-5.2
Chloride, Serum	104		mmol/L	97-108
Calcium, Serum	9.4		mg/dL	8.7-10.2
Phosphorus, Serum	3.5		mg/dL	2.5-4.5
Magnesium, Serum	2.1		mg/dL	1.6-2.6
Protein, Total, Serum	6.6		g/dL	6.0-8.5
Albumin, Serum	4.2		g/dL	3.5-5.5

Pt Values

ABNORMAL

Range of Normal Values

Lower Limit

Upper Limit

- Do not make the mistake of having the lab determine your plan of care via “Red Flags” or “an absence of “Red Flags” for you.
- The patient’s lab result contains valuable information about their organ function even if the results are reported as “normal”.
- Blood values are established by taking an average of the blood draws across the U.S. The majority of blood labs are from patients following the Standard American Diet (SAD). They are not draws from well conditioned individuals following a healthy diet.

- The lab will base results on “Normal Values” which are established by a reference set of values the “Normal” population falls within 95% of the time.
- Consider the source; “Normal” does not necessarily mean healthy. Normal means your value is just like every other American’s blood draw.....yikes!
- i.e.: If everyone, including you got a C in the class, then your grade would be “normal”. Yippie!!, however, that C does not mean you are getting into the college of your choice.
- Therefore, relaying on the lab to suggest the level of health of your patient via “Flags” or “normal” nullifies your need to be part of the process.

- Allopathic medicine's standard of care is to intervene when there is an advanced, abnormality present.
- Conservative management standard of care is to keep the patient from progressing to abnormality.
- Example: Lets look at how "normal" can be overlooked. If a patient has 5 consecutive yearly labs and the normal range is 0-10, the first lab in year one is a 2, second year = 4, third year = 7, fourth year = 9, and fifth year = 10. This patient will be considered normal to laboratories and conventional medicine.

- However, this patient is clearly moving toward abnormal results each and every year.
- The patient has been slowly progressing toward pathology each year but being told he/she was “normal” after each yearly lab test.
- Year 6 hits with an abnormal finding and it comes as a complete surprise to the patient. You may hear the patient say, “just last year I was normal on my test and everything was “fine”Really?? Does a progression toward abnormality year after year suggest being fine? Sadly, the patient was lead to think it was.
- You will see this time and time again.

ONCE AGAIN:
WHAT ARE WE EVALUATING WITH STANDARD BLOOD
TEST? Remember, it is a Major Organ Evaluation

It is a major organ function evaluation of:

- Bone marrow
- Kidney
- Liver
- Thyroid gland
- Parathyroid gland
- Pancreas
- Arteries – Vascular system
- Immune system

The Routine Tests

A Wealth of Knowledge

1. Complete Blood Count (CBC) – Hematology
2. Comprehensive Metabolic Panel (CMP) – Blood Chemistry
3. Renal Function
4. Parathyroid
5. Liver Function
6. Thyroid
7. Pancreas
8. Inflammation
9. Lipids

1. Hematology (CBC)

- Blood is a living tissue and there is a lot to learn by studying the blood.
- This hematology study reflects the health of the bone marrow via the Complete Blood Count (CBC).
- The bone marrow is where all the magic happens relating to the production, maturity and health of blood cells.
- Oxygen and Nutrient needs – **Red blood cells**
- Clotting needs – **Platelets**
- Immunity needs – **White Blood Cells**

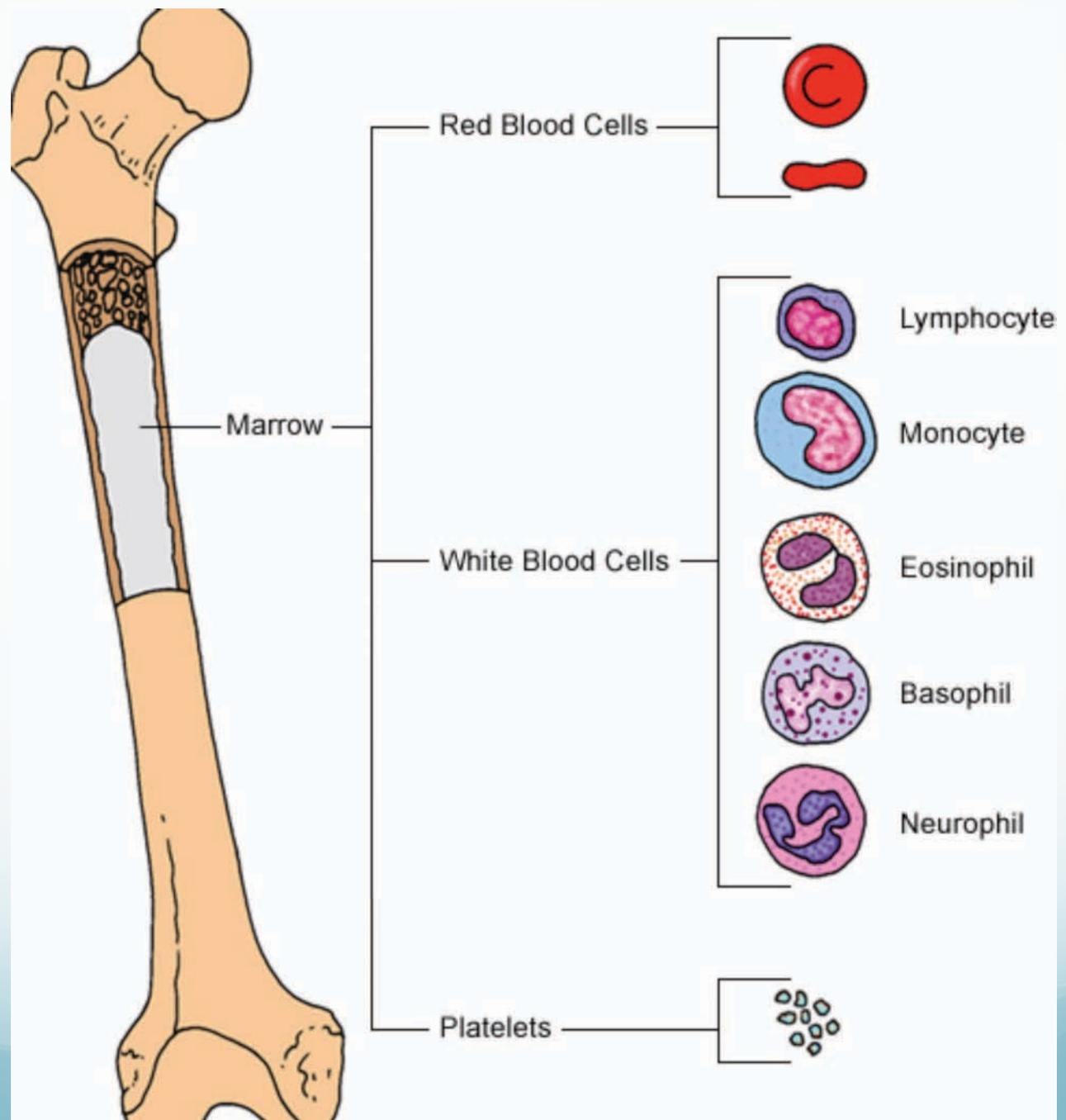
HEMATOLOGY

FILE: 70204407

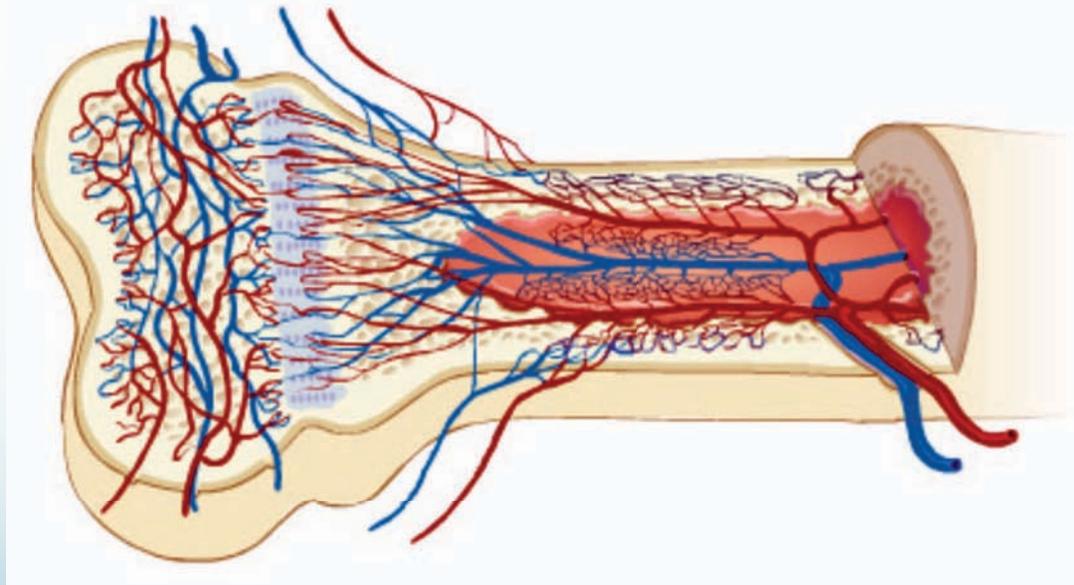
TESTS	RESULT	FLAG	UNITS	REFERENCE INTERVAL
Hemoglobin	13.2		g/dL	11.1-15.9
Hematocrit	40.3		%	34.0-46.6
MCV	94		fL	79-97
MCH	30.8		pg	26.6-33.0
MCHC	32.8		g/dL	31.5-35.7
RDW	13.2		%	12.3-15.4
Platelets	105		x10E3/uL	155-379
Neutrophils	58		%	40-74
Lymphs	33		%	14-46
Monocytes	6		%	4-12
Eos	2		%	0-5
Basos	1		%	0-3
Immature Cells				
Neutrophils (Absolute)	3.8		x10E3/uL	1.4-7.0
Lymphs (Absolute)	2.2		x10E3/uL	0.7-3.1
Monocytes (Absolute)	0.4		x10E3/uL	0.1-0.9
Eos (Absolute)	0.1		x10E3/uL	0.0-0.4
Baso (Absolute)	0.0		x10E3/uL	0.0-0.2
Immature Granulocytes	0		%	0-2
Immature Grans (Abs)	0.0		x10E3/uL	0.0-0.1
NRBC				
Hematology Comments:				
Sedimentation Rate-Westergren	5		mm/hr	0-40
Vitamin D, 25-Hydroxy				
Vitamin D, 25-Hydroxy	27.4	Low	ng/mL	30.0-100.0

Handwritten Annotations:

- + RBC] - Anemia** (next to Hemoglobin)
- RBC size + shape** (bracketed next to MCV, MCH, MCHC, RDW)
- Bone Marrow** (written next to MCV)
- Clotting** (written next to Platelets)
- Immune Cells** (bracketed next to Neutrophils, Lymphs, Monocytes, Eos, Basos, Immature Cells, Neutrophils (Absolute), Lymphs (Absolute), Monocytes (Absolute), Eos (Absolute), Baso (Absolute), Immature Granulocytes, Immature Grans (Abs))



- Bones have a rich blood supply. Vascular system picks up newly formed blood cells to travel thru the circulatory system.



WHAT DOES THE CBC TELL US?

- The health and the quantity of the:
- RBC's (Red Blood Cells)
- WBC's (White Blood Cells)
- Platelets (Clotting)

RED BLOOD CELLS (RBC's)

- RBC's, hemoglobin and hematocrit
- RBC: measures how many “packets” of hemoglobin.
- RBC's are little envelopes of hemoglobin that carry oxygen and are made in the bone marrow.
- Normal count should be 3.8-5.3 mil

- Hemoglobin is the actual amount of pigment in a 100 mL of blood, should be about 12 gr of hemoglobin. A good color reflects healthy cells.
- Hematocrit is the number of solid RBC's when spun down in a centrifuge, compared to the liquid plasma.

WHAT DOES THE RBC, HEMOGLOBIN AND HEMATOCRIT TELL US?

Clinically, Is there an anemia present?

- If RBC is below 3.8mil = Anemia
- If Hemoglobin is below 12gr = Anemia
- If Hematocrit is below 34% = Anemia

ANEMIA

PID: 70204407

General Comments

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Platelets	305		x10E3/uL	155-379
Neutrophils	58		%	40-74
Lymphs	33		%	14-46
Monocytes	6		%	4-12
Eos	2		%	0-5
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NRBC				
Hematology Comments:				
Sedimentation Rate-Westergren	5		mm/hr	0-40
Vitamin D, 25-Hydroxy				

+ ABC] - Anemia

- Pearls:
- Mean Corpuscular Volume (MCV) is RBC size (average volume) should be around 99fL.
- Decrease MCV = Iron deficiency.
- Increase MCV = B12 deficiency.
- Mean Corpuscular Hemoglobin (MCH) is how much hemoglobin is in each RBC.
- Mean Corpuscular Hemoglobin Concentration (MCHC) determines if RBC's are pigmented correctly.

- Red Cell Distribution Width (RDW): A mathematical equation: If all RBC's are similar in size = Healthy cells.
- If large width, some RBC's too big, some too small = Pathological condition ie: sickle cell anemia.
- Platelets = clotting.
- Total platelet count should be 155-380uL.
- Below 50uL = significant bruising and capillary fragility (need to increase vitamin C intake).

HEMATOLOGY

FILE: 70204407

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WHITE BLOOD CELLS (WBC's)

THE IMMUNE SYSTEM CELLS

- 5 Different types of White Blood Cells:
 - Lymphocytes
 - Monocytes
 - Eosinophils
 - Basophils
 - Neutrophils
- WBC Count reflects the total count of all types of WBC's

HEMATOLOGY

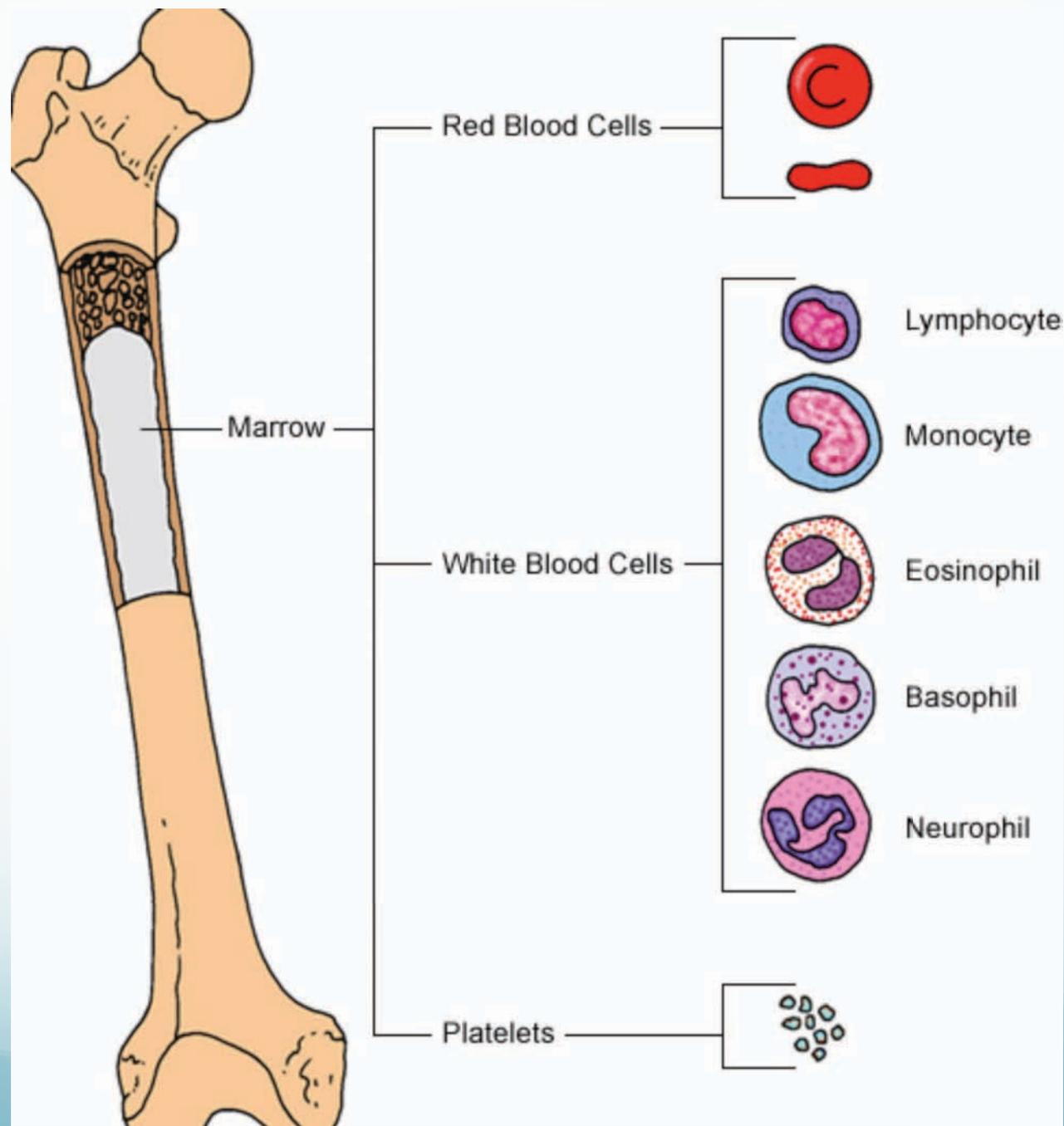
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- Neutrophils increase with bacterial infections (Pneumonia, tonsillitis, appendicitis) They increase to combat the bacteria.
- Lymphocytes increase with viral infections (mumps, measles, chicken pox) Small cells with big nucleus.
- Monocytes are the all purpose immune cells that increase with various immune reactions. Increase with the Epstein Barr virus = Mononucleosis
- Eosinophils take up a red dye called eosin and increase with parasites and allergies.
- Basophils pick up an intense blue dye and increase with allergies (Hay fever).



- Summary: The complete blood count tells us what is going on in the bone marrow with the Red Cells, White Cells and Platelets.
- It is an indicator of the health of the bone marrow and the immune cells.
- What is the best recommendation for blood cell production issues? NUTRIENT RICH DIET
- Nutrient rich foods and possible supplementation especially if there is anemia present.

2. Comprehensive Metabolic Profile (CMP)

- Blood Chemistry: Blood from a chemical point of view.
- A profile of 3 major organs:
 - Kidney
 - Liver
 - Parathyroid

Therapeutic target for gout patients: <6.0

BUN	15	mg/dL	6-24
Creatinine, Serum	0.78	mg/dL	0.57-1.00
eGFR If NonAfrican Am	84	mL/min/1.73	>59
eGFR If African Am	97	mL/min/1.73	>59
BUN/Creatinine Ratio	19		9-23
Sodium, Serum	140	mmol/L	134-144
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Chloride, Serum	104	mmol/L	97-108
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Phosphorus, Serum	3.5	mg/dL	2.5-4.5
Magnesium, Serum	2.1	mg/dL	1.6-2.6
Protein, Total, Serum	6.6	g/dL	6.0-8.5
Albumin, Serum	4.3	g/dL	3.5-5.5
Globulin, Total	2.3	g/dL	1.5-4.5
A/G Ratio	1.9		1.1-2.5
Bilirubin, Total	0.8	mg/dL	0.0-1.2
Alkaline Phosphatase, S	94	IU/L	39-117
Creatine Kinase, Total, Serum	67	U/L	24-173
LDH	144	IU/L	0-214
AST (SGOT)	29	IU/L	0-40
ALT (SGPT)	40	High IU/L	0-32
GGT	17	IU/L	0-60
Iron, Serum	103	ug/dL	35-155

- Kidney Function (CMP)

Parathyroid

Liver Function

3. Renal Function (Kidney)

- Sodium
- Potassium
- Chloride
- BUN (Blood Urea Nitrogen)
- BUN/Creatinine Ratio
- Creatinine

- Blood comes in from the Renal artery- 25% of all blood volume goes thru kidney with each heartbeat.
- The blood is “dismantled”, waste products are eliminated via urine, the blood is “reassembled” and pushed thru the renal vein into circulation.
- The Kidney’s job (one of many) is to maintain a balance of minerals within the blood stream using the electrolyte elements – Sodium, Potassium, Chloride, and also carbon dioxide.

- Sodium = water balancing
- Increase in Sodium = Dehydration. Decrease = too much water
- Chloride & CO2 = element balancing
- If the body reduces Sodium, it will also reduce, Calcium, Chloride, Potassium as well
- Processed food and industrial salts/preservatives are high in sodium which lead to a loss of electrolytes putting a load on the kidneys and bloating.

- The kidney is constantly monitoring and adjusting the alkaline/acid balance of the blood PH to normal values. They will never let the blood go too acidic or too alkaline. The only way for that to happen is if the patient is in kidney failure, then dialysis is used to buffer the blood for the patient.
- Note: “alkaline water” does not contribute to proper PH balance in the body or the blood. The body will regulate proper balance regardless via kidney function.

- Excretion of Waste:
- Blood Urea Nitrogen (BUN) is a waste product from protein metabolism. It is the ammonia off amino acids. (Example: Burning of amino acids during fasting removes the ammonia from amino acids and the kidneys must remove this toxic ammonia from the blood as urea)
- Urea = Ammonia + CO₂ to excrete
- BUN should be low. The lower the BUN the better
- Increased BUN = Increased Kidney load = decreased kidney function.
- Bun/Creatinine Ration – 10-20 times BUN to Creatinine

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- Kidney Function (CMP)

Parathyroid

Liver Function

4. Parathyroid

- The calcium level found on the CMP is NOT a calcium level of the body (bone).
- It is a parathyroid check!
- Calcium has hundreds of functions in the body, not just bone health. Without calcium, we cannot clot blood, contract muscles or have normal heart function.
- The body will always guard Calcium levels and the range is a very small window as to how much it will release or store.

- Too much calcium in the blood and the body will store it in the bones – Savings account
- Not enough calcium in the blood and the body will leech it from the bones. (caused by SAD, caffeine, high intake of sodium) – withdraw of savings
- The Parathyroid glands are responsible for the deposit or withdraws of calcium from storage by making Parathormone which regulates the serum calcium levels
- Consistent increase of Calcium levels warrants a referral to an Endocrine specialist for a parathyroid workup.
- Low Calcium levels reflect a leeching effect. Must improve patients diet to negate the acidic environment created by poor dietary choices. Adding Calcium supplements for low Calcium levels is not the answer. Its an acid/alkaline balance that the Parathyroid glands are responsible for, it is not low Calcium intake.

5. Liver Function

- The liver is the Master Chemist with hundreds of thousands of chemical reactions.
- The CMP tests shows how well the liver is **synthesizing** and **eliminating**. Also where the liver enzymes are located.
- Normally, liver enzymes should stay in the liver and not be in the blood at any significant amount.
- If the liver is inflamed/damaged the liver enzymes increase in the blood.

Therapeutic target for gout patients: <6.0

BUN	15	mg/dL	6-24
Creatinine, Serum	0.78	mg/dL	0.57-1.00
eGFR If NonAfrican Am	84	mL/min/1.73	>55
eGFR If African Am	97	mL/min/1.73	>59
BUN/Creatinine Ratio	19		9-23
Sodium, Serum	140	mmol/L	134-144
Potassium, Serum	4.4	mmol/L	3.5-5.2
Chloride, Serum	104	mmol/L	97-108
Calcium, Serum	9.4	mg/dL	8.7-10.2
Phosphorus, Serum	3.5	mg/dL	2.5-4.5
Magnesium, Serum	2.1	mg/dL	1.6-2.6
Protein, Total, Serum	6.6	g/dL	6.0-8.5
Albumin, Serum	4.3	g/dL	3.5-5.5
Globulin, Total	2.3	g/dL	1.5-4.5
A/G Ratio	1.9		1.1-2.5
Bilirubin, Total	0.8	mg/dL	0.0-1.2
Alkaline Phosphatase, S	94	IU/L	39-117
Creatine Kinase, Total, Serum	67	U/L	24-173
LDH	144	IU/L	0-214
AST (SGOT)	29	IU/L	0-40
ALT (SGPT)	40	High IU/L	0-32
GGT	17	IU/L	0-60
Iron, Serum	103	ug/dL	35-155

- Kidney Function (CMP)

Parathyroid

Liver Function

- Liver tests:
- Albumin and Globulins – **synthesizing** functionality of the liver
- Bilirubin – **Eliminating** functionality
- SGOT and SGPT – **liver enzymes**
- Alkaline Phosphatase – liver enzymes that suggest inflammation

- Total Protein – Albumin + Globulin
- Albumin – osmotic balance, decreased in alcoholics
- Globulin – increase with cancer and infection
- Albumin/Globulin ratio – decrease albumin + increased globulin suggests pathology, cancer
- Bilirubin – waste product with yellow pigment. Increased values suggest liver congestion. If levels become too high, pt can present with jaundice.

- SGOT (AST) + SGPT (ALT) are enzymes that belong in liver cells. They do not belong outside the liver.
- Elevated values suggest liver inflammation/injury that cause enzymes to spill into blood stream.
- Causes: Viral hepatitis, Trauma, Alcohol, Hydrocarbons, Tylenol, Statins

6. Thyroid Profile

- The thyroid gland makes and stores Thyroxine which is a hormone that determines the rate cells will burn energy – Metabolism (engine idle speed)
- Thyroxine (T4) – 4 atoms of iodine and is the storage form of iodine in the gland.
- When thyroxine is released into the blood stream it goes thru the liver and kidney where an iodine atom is pulled off making the active form Triiodothyronine (T3).
- T3 (active form) burns glucose (energy) and revs the engine.

- If there is a too much of Thyroxine (T4) released too often, it will increase the burn rate by making too much T3. These patients present with Hyperthyroid symptoms, rapid heart beat, sweating, higher body temp, etc. leading to systemic problems.
- If there is not enough T4 released then T3 is lacking and metabolism is sluggish. These patients present with hypothyroid symptoms, slow heart beat, cold, lethargic, retain fluid etc., also leading to systemic problems.

How does the body know how much Thyroxine to put out to avoid hyper/hypo thyroid function??

- The pituitary gland constantly measures thyroxine in the blood. If too little the gland releases a small protein (8 amino acids long) called Thyroid Stimulating Hormone (TSH)
- TSH signals the thyroid to release thyroxine (T4) into the blood to produce T3 (via liver/kidneys)
- When the pituitary gland senses there is enough T4 it decreases thyroxine. (think thermostat)

What does TSH test reveal?

- Increase of TSH = Hypothyroid (body is saying more more more)
- Decrease of TSH = Hyperthyroid (too much thyroxine)
- If you had just one test relating to the thyroid, it should be TSH. It will tell the story for hyper/hypo conditions.

7. Pancreas

- Regulates Blood Sugar
- Glucose test: Under 100mg/dl reflects normal

Testing Lab: LabCorp of America

Specimen Number 066-216-4465-0	Patient ID 7020XXX	Control Number M680646303	Account Number 34511XXX	Account Phone Number XXX-XXX-XXXX	Account Delivery Route
Patient Last Name XXXXXXXXXX			Account Address Mark D. Emerson, D.C. 14375 Saratoga Ave Saratoga, CA 95070		
Patient First Name XXXXXX		Patient Middle Name			
Patient SSN	Patient Phone	Total Volume			
Age (Y/M/D) 58/2/0	Date of Birth 01/07/56	Sex F	Fasting Yes		
Patient Address Fort Myers, FL 33901			Additional Information		
Date and Time Collected 03/07/14 09:46	Date Entered 03/07/14	Date Entered 03/08/14 08:06	Physician Name M.Emerson	NPI	Physician ID
Tests Ordered CMP12+LP+TP+TSH+7AC+CBC/D/P...;Homocyst(e)ine, Plasma;Vitamin D, 25-Hydroxy					
General Comments PID: 70204407					
TESTS	RESULT	FLAG	UNITS	REFERENCE	INTERVAL
CMP12+LP+TP+TSH+7AC+CBC/D/P...					
Glucose, Serum	104	High	mg/dL	65-99	
Hemoglobin A1c	5.8	High	%	4.8-5.6	
<p style="color: red; font-size: 1.2em; margin-left: 20px;">Pancreas</p> <p>Increased risk for diabetes: 5.7 - 6.4 Diabetes: >6.4 Glycemic control for adults with diabetes: <7.0</p>					

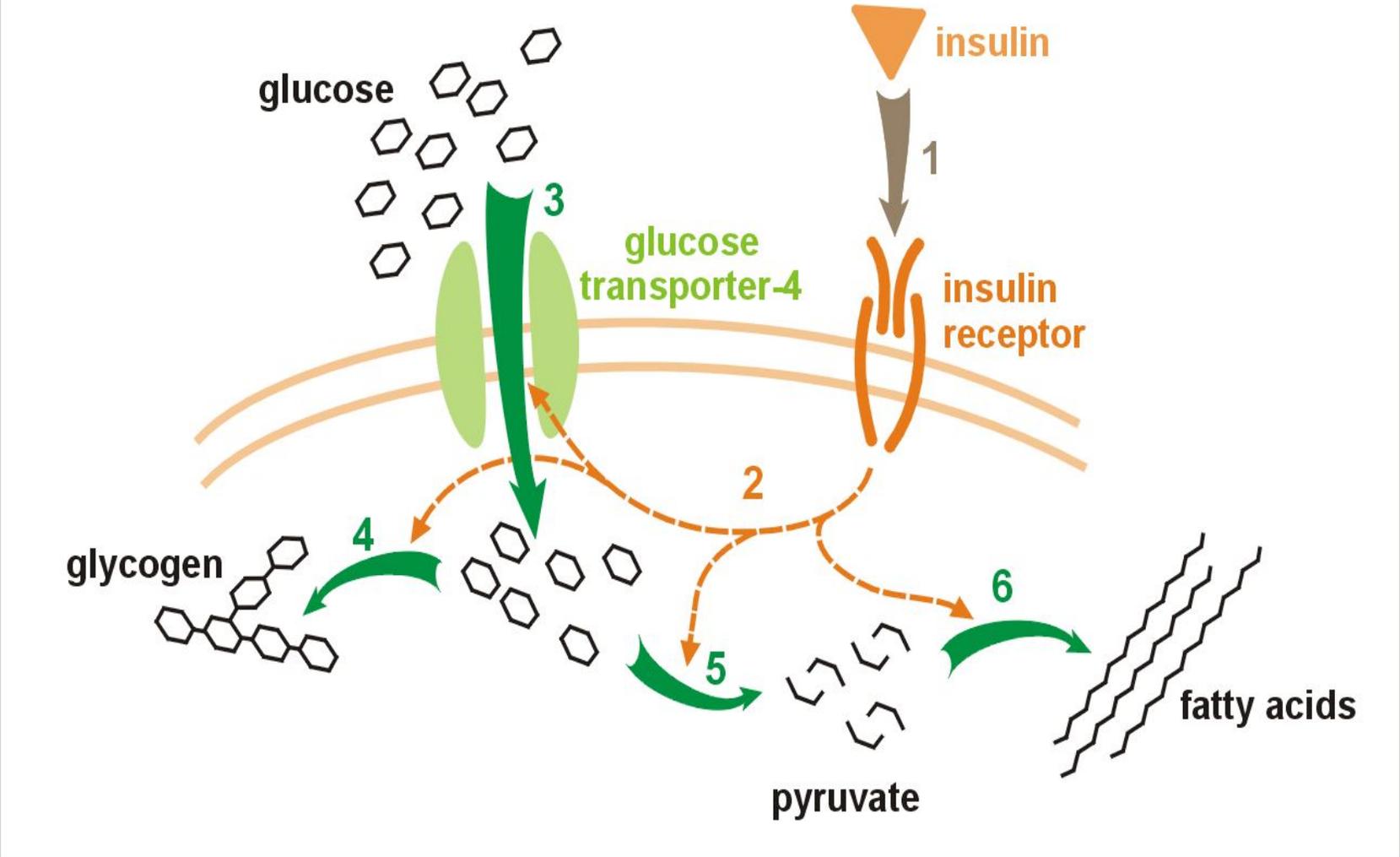
- A mildly high glucose could be a fasting issue, possible carb load the night before fasting lab.
- Therefore having the hemoglobin A1c is important to confirm blood handling issues.
- Hemoglobin A1c is the percentage of hemoglobin in the blood stream that is sticky with sugar. It is an average blood sugar over the previous 8-12 weeks.
- Over 7% confirms diabetes.
- Hb A1c is used to Dx diabetes and/or monitor diabetes patients.

- The patient below: Glucose 104 - Hemoglobin A1c 5.8 = Pre Diabetic
- NOW is the time to help this patient with dietary changes. Next years lab will most likely confirm DIABETES!

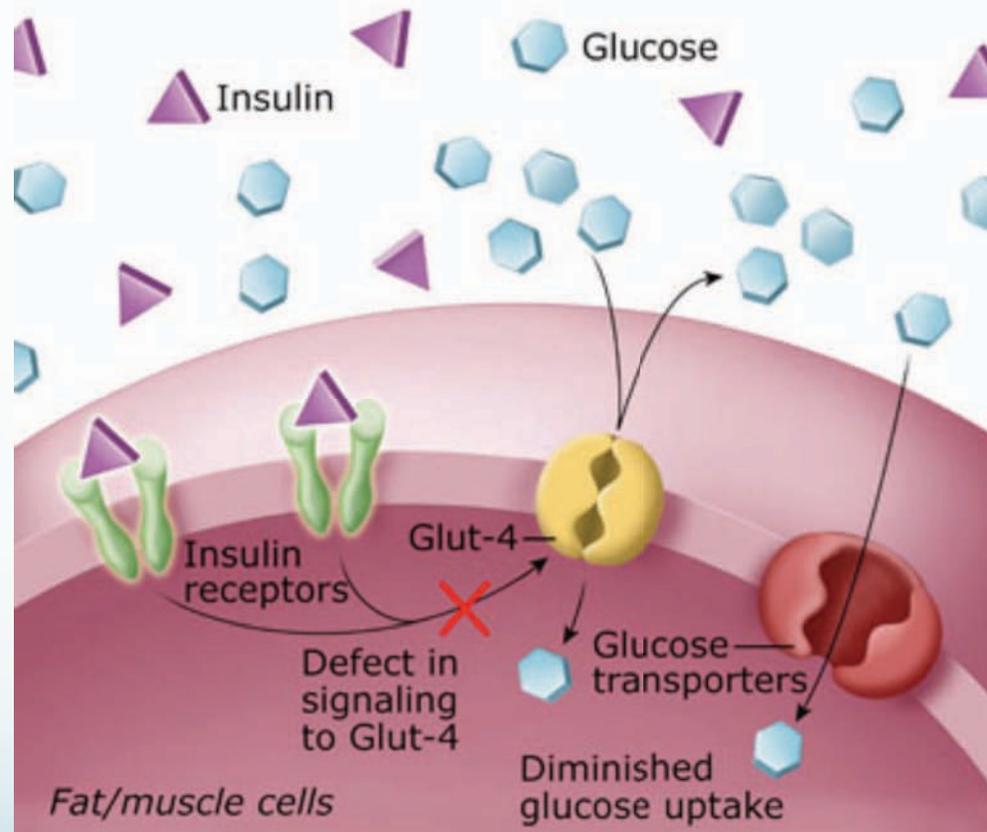
Testing Lab: LabCorp of America

Specimen Number	Patient ID	Control Number	Account Number	Account Phone Number	Account Delivery Route
066-216-4465-0	7020XXX	M680646303	34511XXX	XXX-XXX-XXXX	
Patient Last Name XXXXXXXXXX			Account Address		
Patient First Name XXXXXX		Patient Middle Name		Mark D. Emerson, D.C. 14375 Saratoga Ave Saratoga, CA 95070	
Patient SS#	Patient Phone	Total Volume			
Age (Y/M/D) 58/2/0	Date of Birth 01/07/56	Sex F	Fasting Yes		
Patient Address Fort Myers, FL 33901			Additional Information		
Date and Time Collected 03/07/14 09:46	Date Entered 03/07/14	Date Entered 03/08/14 08:06	Physician Name M.Emerson	NPI	Physician ID
Tests Ordered CMP12+LP+TP+TSH+7AC+CBC/D/P...;Homocyst(e)ine, Plasma;Vitamin D, 25-Hydroxy					
General Comments PID: 70204407					
TESTS	RESULT	FLAG	UNITS	REFERENCE	INTERVAL
CMP12+LP+TP+TSH+7AC+CBC/D/P...					
Glucose, Serum	104	High	mg/dL	65-99	
Hemoglobin A1c	5.8	High	%	4.8-5.6	
Increased risk for diabetes: 5.7 - 6.4					
Diabetes: >6.4					
Glycemic control for adults with diabetes: <7.0					

- A word on Diabetes. It has long been a medical misconception that Diabetes type 2 (adult onset) was caused by high sugar intake. We now understand Diabetes type 2 is a fat problem rather than a sugar problem. It causes a sugar handling issue but that is not where the problem starts.
- In order for glucose to enter the cell, the insulin receptor site acts like a key to open the cell for the glucose to enter. In the diabetic patient the insulin receptor sites of the cell membranes become impacted with fat that blocks the key thus deflecting glucose back into the blood stream
- High fat dietary intake as seen in the SAD, cause an excessive accumulation of intramyocellular lipids which block the cell key and result in insulin resistance contributing to diabetes 2, obesity and metabolic syndrome.
- Diabetes 2 is a dietary fat issue not a sugar intake issue.



Type 2 Diabetes: Insulin Resistance



- Diabetes 2 is preventable and reversible with proper dietary protocols and monitoring.
- By utilizing the Blood Glucose and Hemoglobin A1c tests you can help manage and in most cases prevent your patients from progressing to diabetes.

8. Tissue Damage Tests

- Looking for cellular turnover and tissue damage markers. Uric Acid and LDH Levels:
- Uric Acid: is from the chemical breakdown of the purine bases that form DNA and RNA. As cells die they release their DNA from their chromosomes, purines are converted into uric acid. High levels of uric acid suggests large amounts of tissue death and the kidneys are having a hard time excreting the amount of uric acid. High levels can cause uric acid crystal formation leading to gout.
- Lactic Acid Dehydrogenase (LDH): is released into the blood stream with tissue destruction i.e.: abscess, cancer, mm damage, myocardial infarction. When LDH levels are high, there is something seriously wrong with the patient.
- The lower the levels of Uric Acid and LDH, the better!

Inflammation: CRP, Cardiac CRP & SED RATE

- C-Reactive Protein (CRP): blood test that measures the amount of a protein called C-reactive protein in the blood. C-reactive protein measures general levels of inflammation in the body. High levels of CRP are caused by infections and many chronic diseases. A CRP test cannot show where the inflammation is located or the exact cause, however, it does serve as a good inflammatory marker in conjunction with the other tests included in the standard lab orders.
- High Sensitivity C-Reactive Protein: (cardiac CRP) is more specific for CVD. It picks up a protein that leaks off the surface of damaged blood vessels. A good test for high risk patients and/or patients with significant family history of CVD. Not a routine test, more often ordered by cardiovascular specialists.

- Sedimentation Rate (Sed Rate): Old time inflammatory marker. The sed rate is determined by measuring the time blood cells fall and “Sediment” on the bottom of a test tube.
- How fast they fall is the Sedimentation Rate. Normal cells fall at 10-30 mm/hour (20 male, 30 female)
- If inflammation is present in the body ie: RA, colitis, migraines, there will be a change in blood chemistry and the sed rate increases. Similar to most inflammatory markers, the lower the test value the better.

Special Chemistry Values

- B-12: I don't order B-12 tests much any more as so many patients are taking fortified blue green algae, sea veggies and meat substitutes and these foods can give falsely high reading due to B-12 analogous and not the active form of B-12
- Homocysteine Test is better: Homocysteine is an antioxidant by product from the breakdown of Methionine (essential amino acid). But too high of Homocysteine damages arteries.
- To lower high levels of Homocysteine, B-12 is required to metabolize Homocysteine, therefore Homocysteine levels are a good index of the B-12 function. If increased Homocysteine levels are present, 1000mcg of B-12 per day for 3 months plus increased dietary greens for folate and B-6 will help.
- If there is increased Homocysteine + decreased Vitamin D then B-12 and Vitamin D need to be supplemented.

- Vitamin D: once thought to be important for calcium utilization and the prevention of rickets, it is now understood that Vitamin D has hundreds of reactions in the body.
- It stabilizes membranes, has anti-cancer properties, Alzheimer's protection and supports immune function. There are many reasons to keep Vit D levels up.
- Vitamin D levels should be between 30-70 ng/ml
- Vitamin D is easy to supplement and too important to overlook.

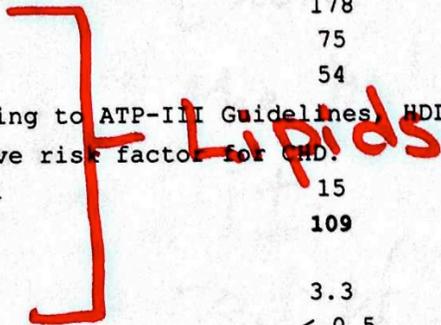
9. Lipids

- Cholesterol: is an essential molecule in the body where it is used as a building block material for important substances such as hormone production, estrogen, testosterone, cortisol etc.
- Cholesterol is not an evil substance. The body needs it, the liver makes it and therefore it is important, however, if cholesterol levels become too high and then oxidize from free radicals associated with poor eating and poor lifestyle then it can become a sticky substance that contributes to plaque buildup. Too much means too many “sticky” opportunities.

Lipid Panels

UMP12+LE+TF+TSH+TAC+CBC/D/P...; HOMOCYSTE (e)INE, Plasma; vitamin D; 20 mg/dL

General Comments					
PID: 70204407					
TESTS	RESULT	FLAG	UNITS	REFERENCE INTERVAL	
Ferritin, Serum	161	High	ng/mL	15-150	
Cholesterol, Total	178		mg/dL	100-199	
Triglycerides	75		mg/dL	0-149	
HDL Cholesterol	54		mg/dL	>39	
According to ATP-III Guidelines HDL-C >59 mg/dL is considered a negative risk factor for CHD.					
VLDL Cholesterol Calc	15		mg/dL	5-40	
LDL Cholesterol Calc	109	High	mg/dL	0-99	
Comment:					
T. Chol/HDL Ratio	3.3		ratio units	0.0-4.4	
Estimated CHD Risk	< 0.5		times avg.	0.0-1.0	
T. Chol/HDL Ratio					
			Men	Women	
	1/2 Avg.Risk		3.4	3.3	
	Avg.Risk		5.0	4.4	
	2X Avg.Risk		9.6	7.1	
	3X Avg.Risk		23.4	11.0	
The CHD Risk is based on the T. Chol/HDL ratio. Other factors affect CHD Risk such as hypertension, smoking, diabetes, severe obesity, and family history of pre-mature CHD.					
TSH	3.820		uIU/mL	0.450-4.500	
Thyroxine (T4)	6.8		ug/dL	4.5-12.0	



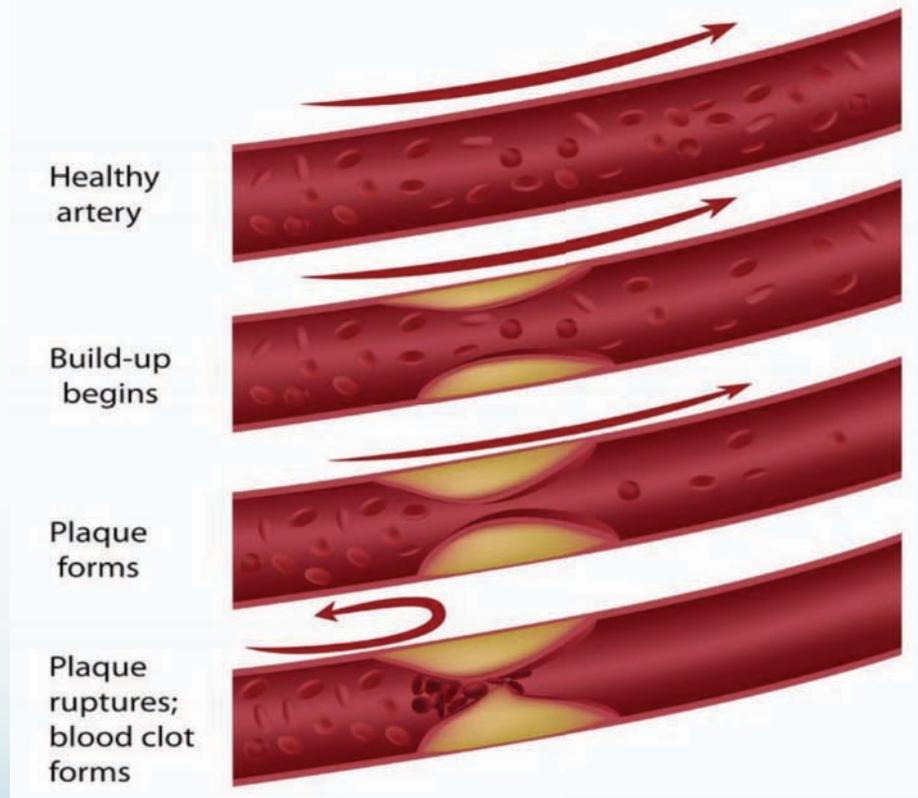
- High Density Lipoproteins (HDL): The protective good cholesterol.
- Pulls cholesterol out of the plaques and arteries. Known as the “garbage truck” that removes garbage away from the arteries.
- Higher the better for patients who eat the SAD
- Ideally Over 49 mg/dl
- Low Density Lipoprotein (LDL) & Very Low Density Lipoprotein (VLDL): these are the bad cholesterol that contribute to plaque build up.
- The lower the better for LDL & VLDL

- Clinical pearl: It is not uncommon for vegans/vegetarians who follow a healthy low fat diet to test low in all levels of cholesterol. Low levels of HDL's are not of a clinical concern.
- If the diet is clean and the arteries are clean the need for the HDL's (garbage trucks) goes down. No garbage = no garbage trucks.
- Low HDL's + low LDL's are not a risk factor!
- Food for thought: High HDL's are an artifact of the SAD. They are a protective response from the body. The truth is; ALL levels should be low since there should not be much cholesterol to remove from the arteries if the patient is eating a cleaner more healthy diet.

- Clinical Question:
- The Question is NOT how “high” is your Cholesterol?
- The true question is: How Clean are your arteries???
- If the arteries are clear, cholesterol levels are not important.

Clean Arteries?

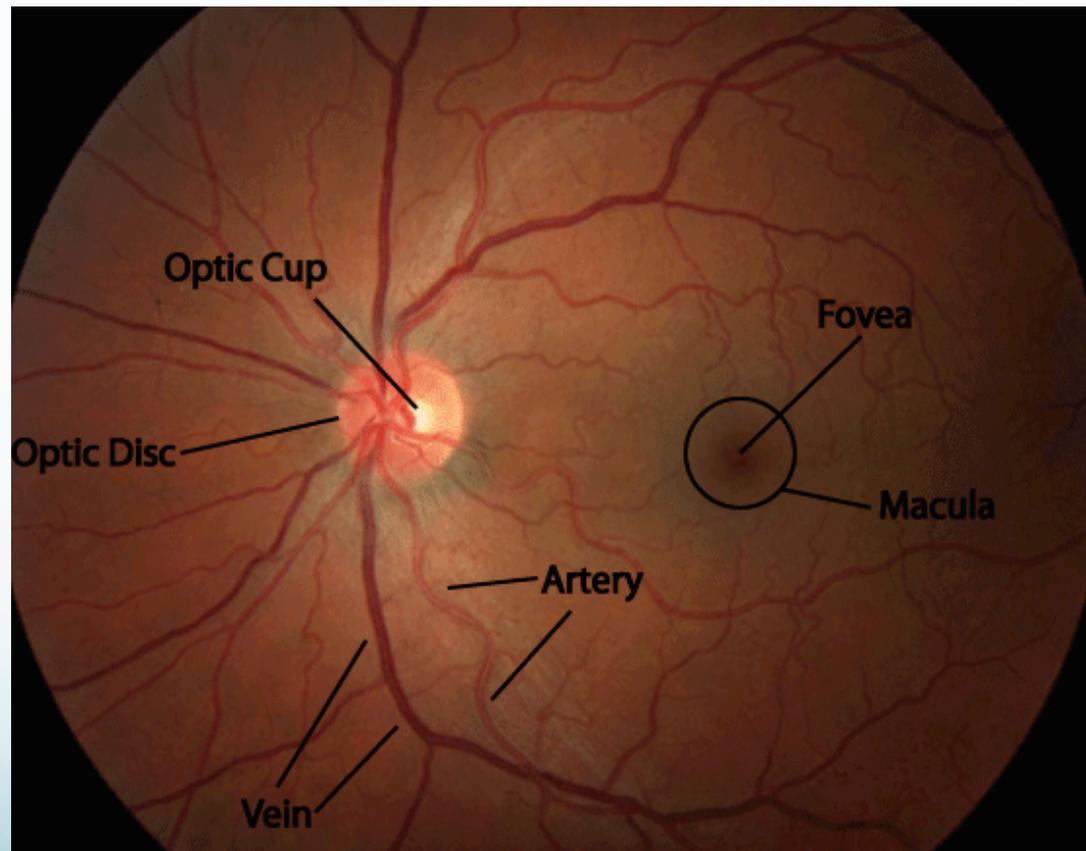
STAGES OF ATHEROSCLEROSIS



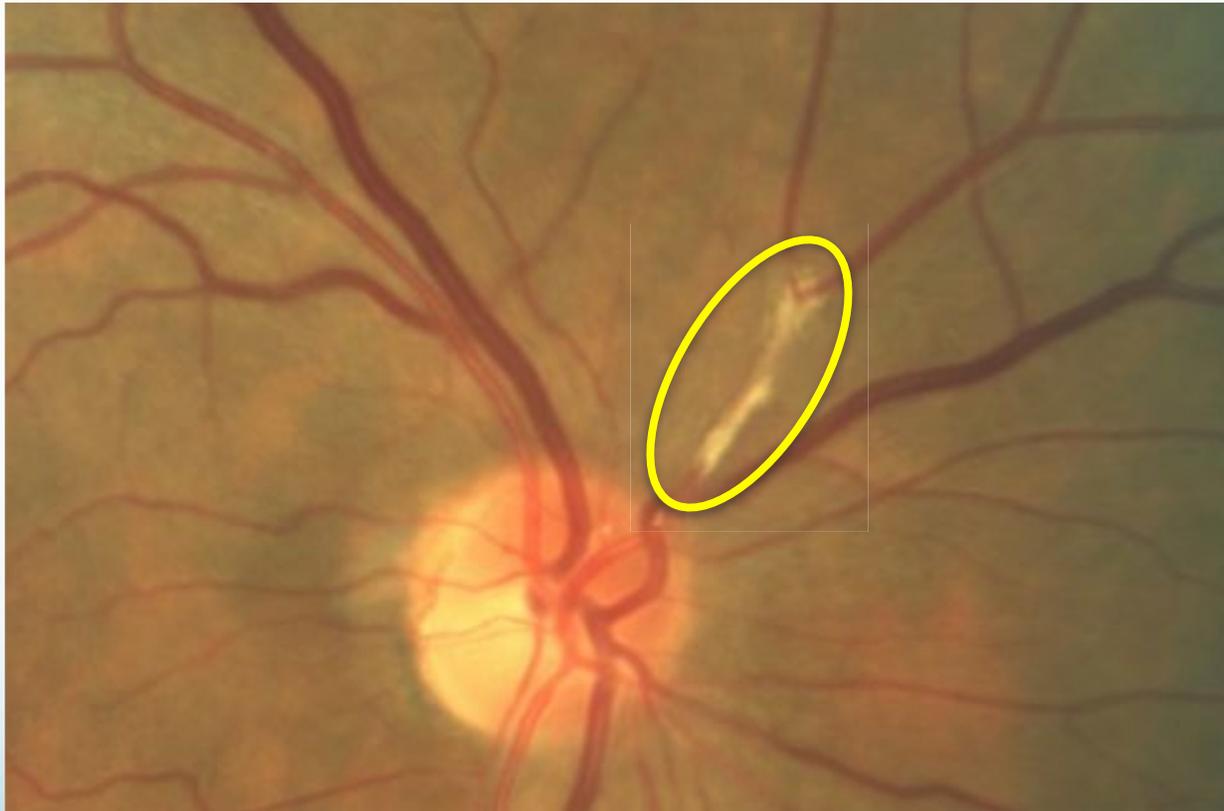
How do we tell how clean the arteries are??

- Non invasive procedures:
- Ophthalmoscope Exam, Ultrasound Scan and Carotid Intima Media Thickness (CIMT)
- Ophthalmoscope exam: The eye is where we can look at the arteries directly!
- Check the arteries in the retina. They should look healthy.
- It is possible to see cholesterol plaques within the arteries of the retina.

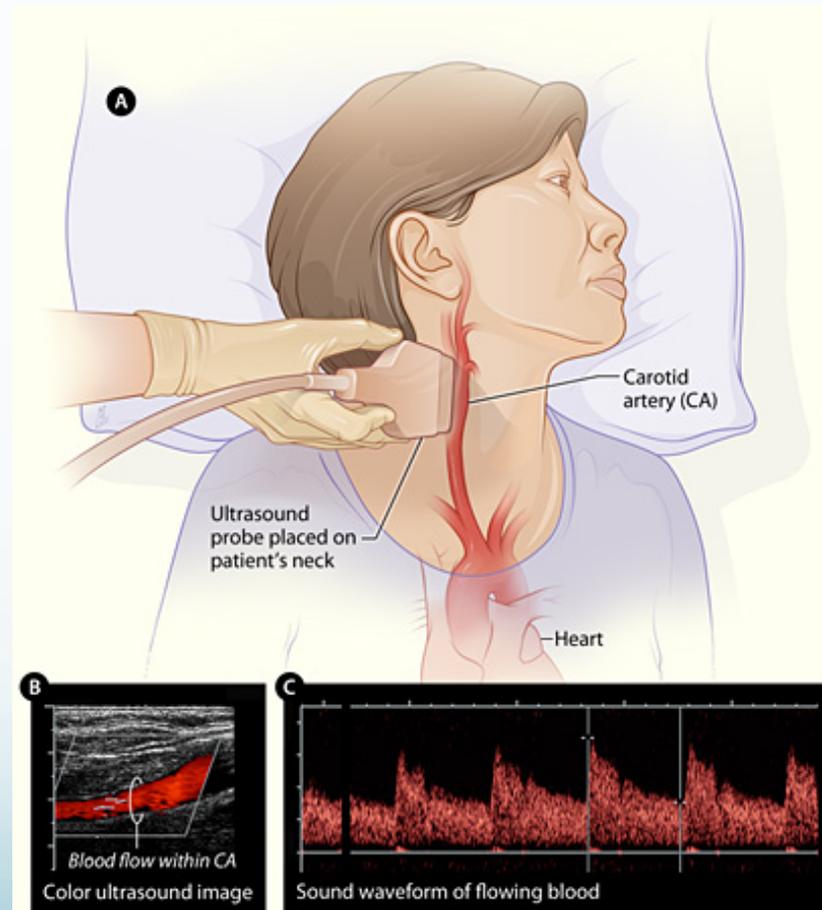
Healthy Retinal Arteries



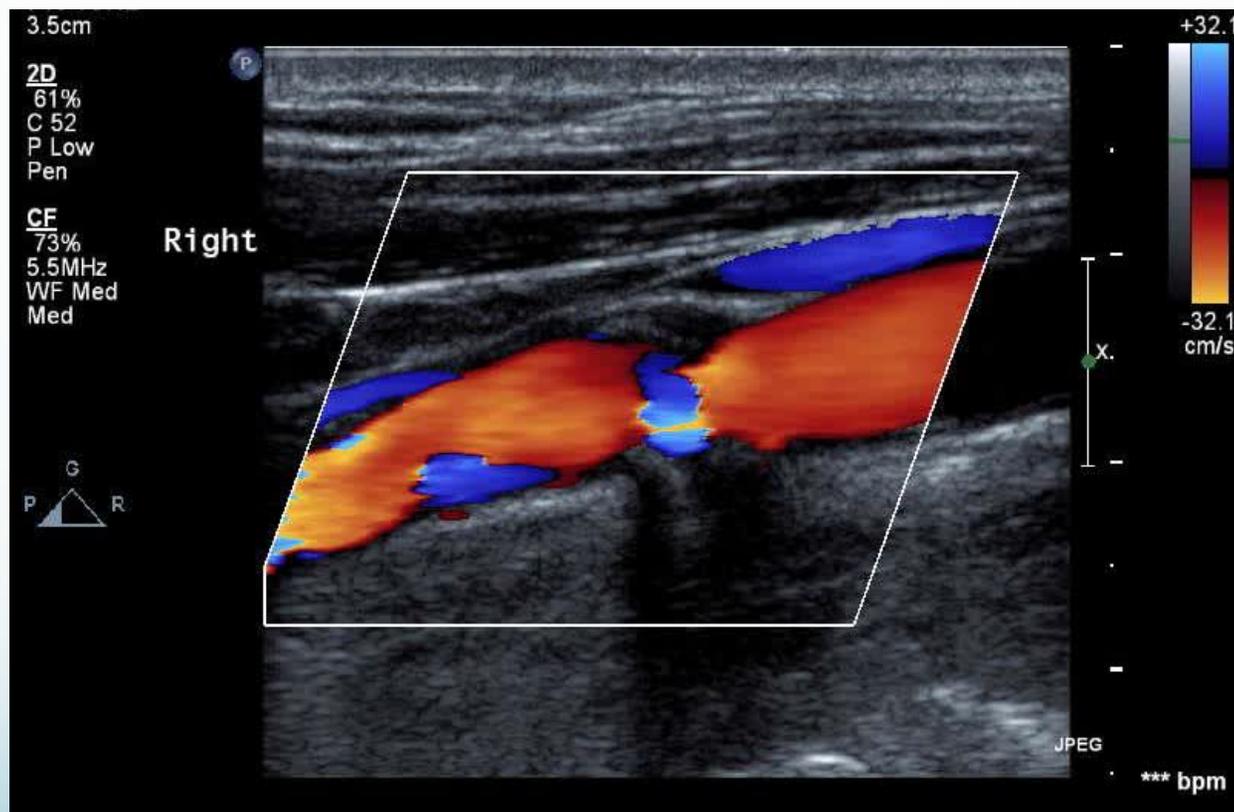
Cholesterol Plaques



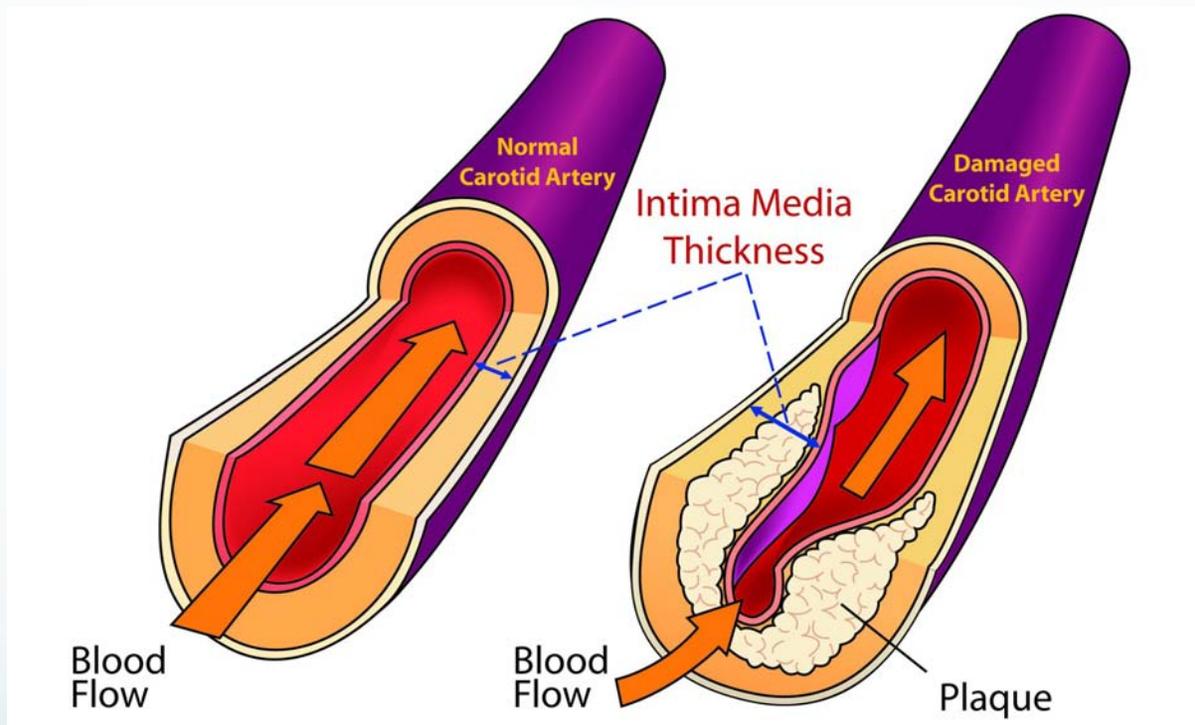
- The Ultrasound Scan of the Carotid or Abdominal Aorta



- The Ultrasound is a helpful study the DC (check your state scope rules) or an MD can order. Helps determine carotid plaque build up, swirls, eddies, ulcerating plaques for clot, stroke risk.



Carotid Intima Media Thickness: Measurement of the artery wall. Increased thickness = Increased risk



- Remember, most everything our patients present with; High lipids, inflammation, reduced liver function, increased cardiac risk, they got there with poor dietary and lifestyle choices. However, these are reversible.
- The arteries, organs and systems will repair with proper dietary changes.

Proof?? Heart Can Fix Itself

- Challenging decades of medical dogma, researchers have discovered that damaged hearts can repair themselves by growing brand-new muscle cells.... Until now, experts had assumed that the heart-unlike other body parts, such as skin and bone-could not form new heart cells...*"The bottom line: We didn't know before. Now we know that heart cells divide. It's obviously highly significant,"*

David Finkelstein National Institute on Aging.

Other Valuable Tests

- Gluten Stool Test
- Leaky Gut Test

Gluten Intolerance Test

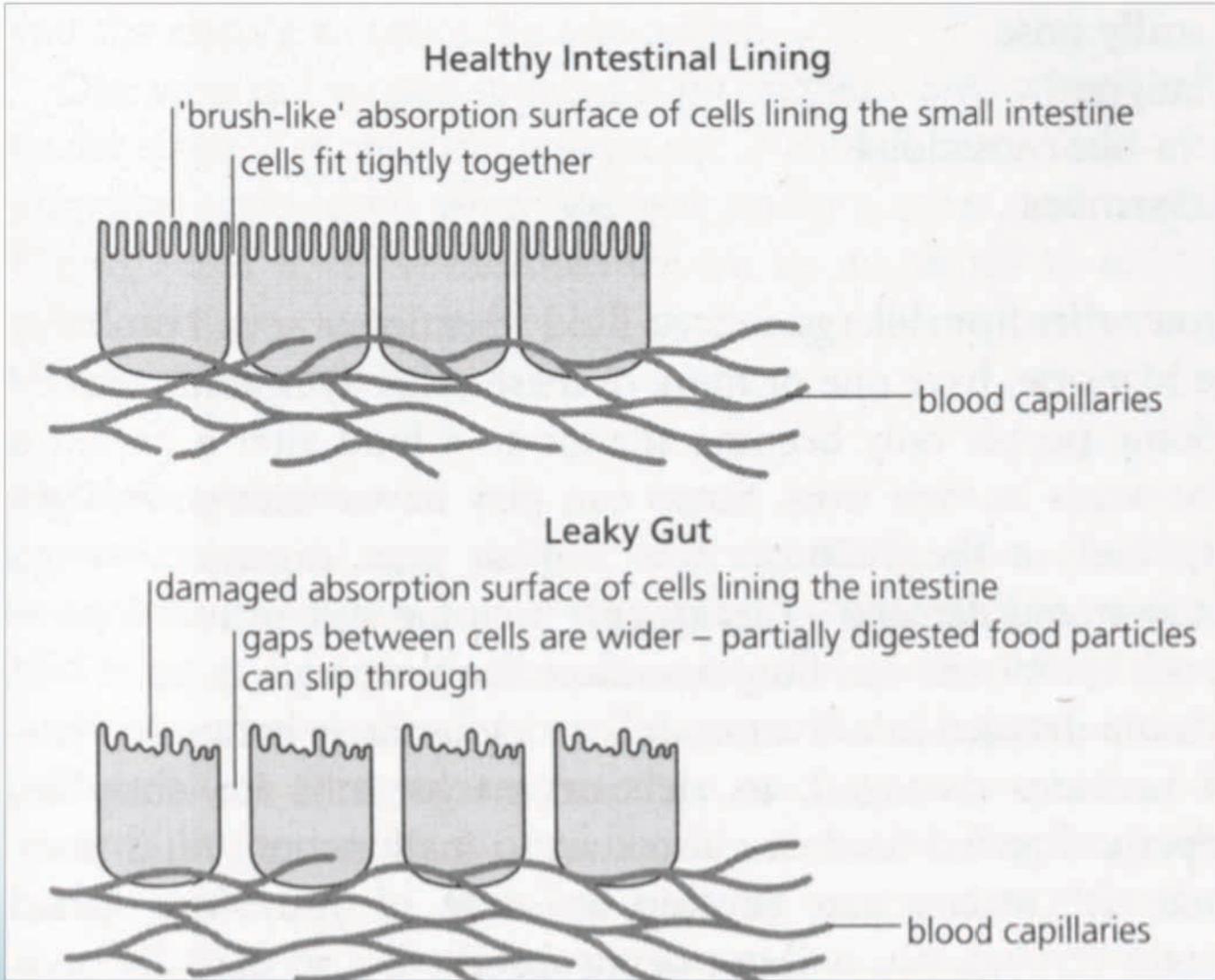
- “Gluten Free” has taken the food industry by storm.
- Many patients think they have a gluten allergy and desire testing.
- Often times, they have digestive dysfunction rather than a true gluten intolerance or allergy.
- A blood test is usually negative until a full blown case of gluten allergy with intestinal damage is present.
- An effective and inexpensive test for gluten intolerance is a stool test for gluten antibodies.

- Stool test for gluten antibodies:
- If allergic environment exists, the body will produce IgA antibodies.
- These antibodies will be found in intestinal mucosa which sloughs off during bowel movements.
- Stool test is quicker determination than “waiting” for antibodies to show in blood which can take years.

- Stool test kit; Gluten Sensitivity Stool Test (Fecal Anti-Gliadin IgA) from www.Enterolab.com
- \$99 and patient can order themselves.
- Positive is positive for gluten intolerance/sensitivity
- Negative – look for underlying digestive dysfunction
- (disclaimer; I have no financial interest or affiliation in Enterolab)

Leaky Gut Syndrome

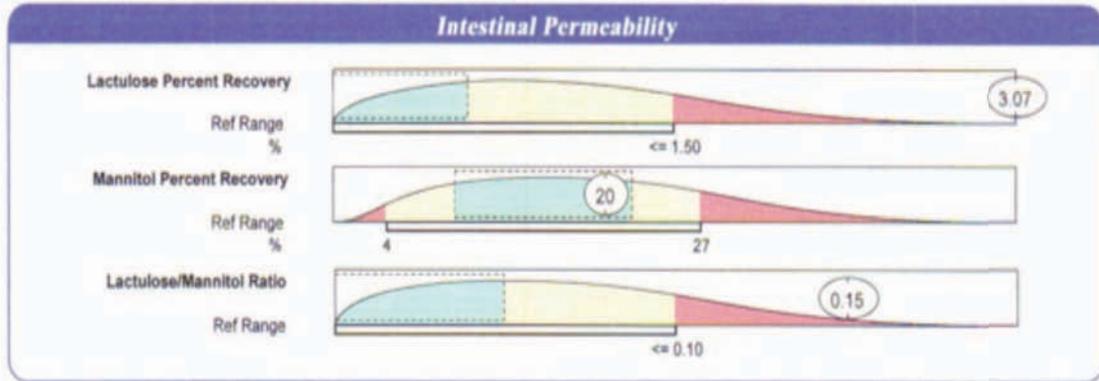
- Separation of cellular membrane allowing proteins and other foreign molecules to “leak” into the bloodstream.
- Leaky gut has been observed in a range of disorders such as:
 - Inflammatory Bowel Disease (IBD)
 - Food allergy
 - Inflammatory joint disease
 - Chronic dermatologic conditions



Leaky Gut Test

- *Intestinal Permeability Assessment* is a powerful noninvasive gastrointestinal test assessment of small intestinal absorption and barrier function in the bowel. The small intestine uniquely functions as a digestive/absorptive organ for nutrients as well as a powerful immune and mechanical barrier against excessive absorption of bacteria, food antigens, and other macromolecules.
- Both malabsorption and increased intestinal permeability (“leaky gut”) are associated with chronic gastrointestinal imbalances as well as many systemic disorders.

- The Intestinal Permeability Assessment gastrointestinal test directly measures the ability of two non-metabolized sugar molecules to permeate the intestinal mucosa. The patient drinks a premeasured amount of lactulose and mannitol. The degree of intestinal permeability or malabsorption is reflected in the levels of the two sugars recovered in a urine sample collected over the next 6 hours.



Commentary

This test has been developed and its performance characteristics determined by Genova Diagnostics, Inc. It has not been cleared or approved by the U.S. Food and Drug Administration.

The **Reference Range** is a statistical interval representing 95% or 2 Standard Deviations (2 S.D.) of the reference population.

One Standard Deviation (1 S.D.) is a statistical interval representing 68% of the reference population. Values between 1 and 2 S.D. are not necessarily abnormal. Clinical correlation is suggested. (See example below)



Commentary is provided to the practitioner for educational purposes, and should not be interpreted as diagnostic or treatment recommendations. Diagnosis and treatment decisions are the responsibility of the practitioner.

- A positive test for increased intestinal permeability suggests Leaky Gut Syndrome. (LGS)
- LGS can be conservatively managed with appropriate dietary protocols and nutrient supplementation.

Lab & Nutrient Corollaries

- The lab results are full of helpful information which if viewed with a nutrient point of view, can be used to help your patients make better decisions about their health and long term wellbeing.
- As you can see, most of the problems are due to a lack of appropriate nutrient intake or uptake.
- They are not caused by a drug deficiency. Yet the standard of care is to prescribe drugs to combat the symptoms of poor nutrient intake and systemic breakdown that manifest on lab reports as “abnormal”.
- Lets look at a few common lab results and how they correspond to nutrient issues:

Common Lab Findings

- Hemoglobin – Iron deficiency
- Hematocrit – B12, Folic Acid
- MCV – B6, Iron MCV – B-12, Folic Acid
- MCH – Iron, B-12, Folic Acid
- MCHC – Iron, B-12, Folic Acid
- WBC – B-12, Folic Acid
- Do you see the common denominator? Nutrients!!!!

- Anemia and Methyl donor deficiency is rampant in the Standard American Diet (SAD)
- If Clinicians focused on nutrient insufficiency/deficiency more closely, then managing a patients well being is far more achievable.
- The nutrient correlation should not be overlooked and most patients are looking for nutritional guidance.
- You now have an understanding of what routine labs assess and how in the absence of advanced pathology, the routine lab is an excellent tool for holistic based practitioners to provide nutritional insight.
- Take Nutritional Labs Part 2 for specific clinical protocols to utilize in your practice.