Back To Chiropractic Continuing Education Seminars
LABS II ~ 6 Hours

Welcome:
This course is approved for 6 Hours of CE for LABS II 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

Labs II

Common Findings in Everyday Practice

A NUTRITIONAL PERSPECTIVE

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DC, CCSP

Course Objectives

- Labs II follows the Lab I Course which is a review of common blood labs. Labs II is a more in-depth look into lab tests, findings and how they correlate to specific symptoms or conditions.
- Lab II also covers nutrient recommendations for specific findings that can be used as an integral part within the chiropractic treatment plan.
- Normal/Abnormal reference ranges can vary from lab to lab. Whenever possible use the same lab for all your studies particularly with follow up labs on a patient.

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.

Relevant Lab Findings

- High and low findings for specific labs tests can help you, the clinician, confirm a diagnostic suspicion based on the patient's sign, symptoms and complaints.
- Even the most common tests can reveal a system dysfunction or the disease process, even in the early stages.
- Follow up testing is prudent and reviewing previous labs is recommended.
- Remember, Normal findings does not necessarily confirm a patient is healthy. Further investigation is needed for symptomatic patients.

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

It is a major organ function evaluation of:

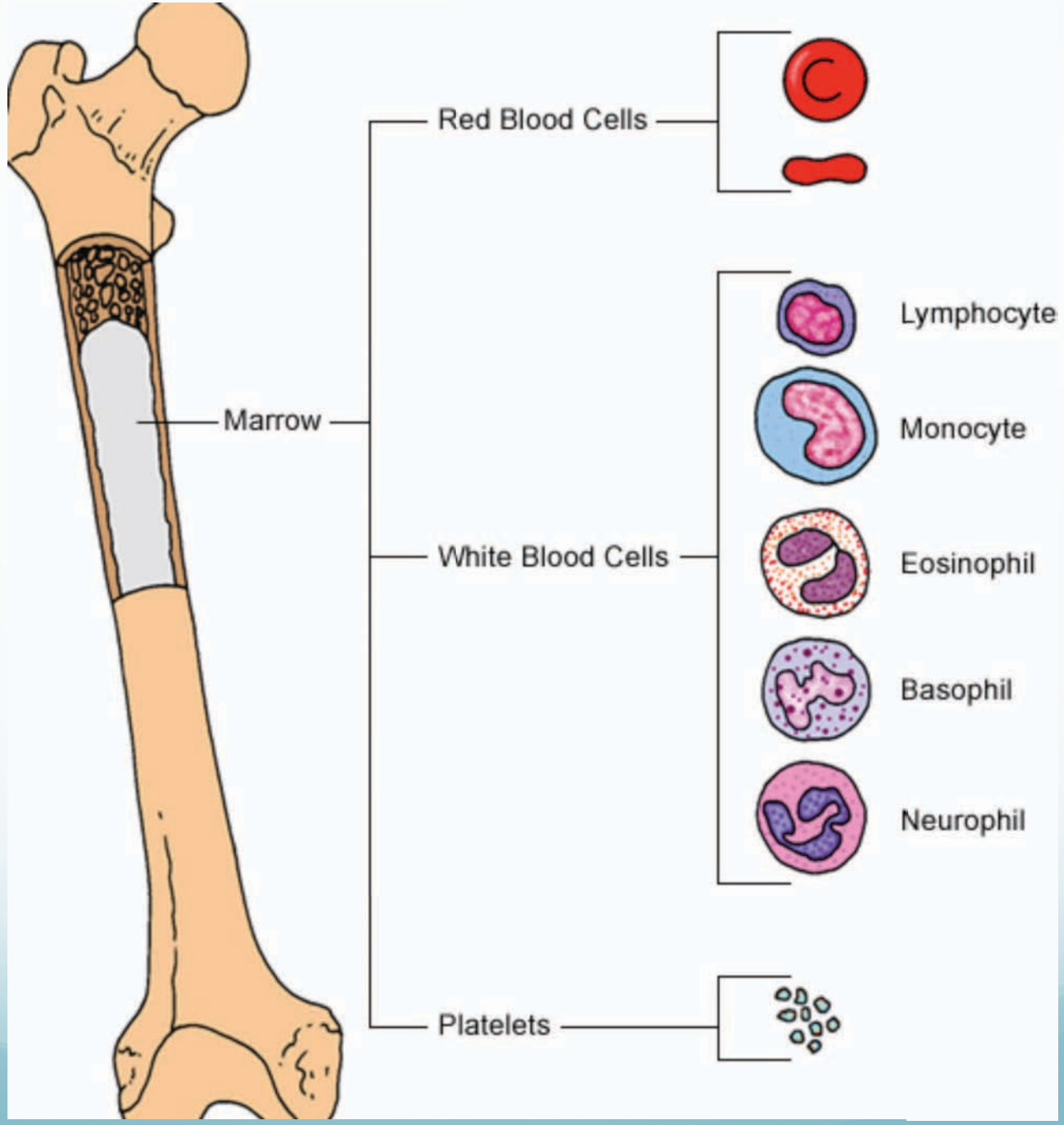
- Bone marrow
- Kidney
- Liver
- Thyroid gland
- Parathyroid gland
- Pancreas
- Immune system

The Routine Tests
A Wealth of Knowledge

- Complete Blood Count (CBC) – Hematology
- Comprehensive Metabolic Panel (CMP) – Blood Chemistry
- Renal Function
- Parathyroid
- Liver Function
- Thyroid
- Pancreas

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**


Marrow
Red Blood Cells
White Blood Cells
Platelets
Lymphocyte
Monocyte
Eosinophil
Basophil
Neurophil

RED BLOOD CELLS (RBC's)

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

RBC

- Mean Corpuscular Volume (MCV) indicates the volume in cubic microns occupied by a single red blood cell.
- Mean Corpuscular Hemoglobin (MCH) weight of hemoglobin in a single RBC. Very helpful in differentiating anemia when viewed together with MCV. Increases normally at high altitudes.
- Red Cell Size Distribution Width (RDW) is an electronic measurement of anisocytosis (red cell variability). A value below expected normal has no significance.
- An increase in RDW is indicative of iron deficiency anemia

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 is one of the most common conditions affecting the general population.

Anemia cont'

- **Microcytic:** Decreased RBC
- Most common is iron deficiency
- Decreased MCH (iron def. anemia)
- Decreased MCHC (tells us color)
- Decreased MCV (tells us size)
- Supplement with B complex; B1, B2, Niacinamide, B6, Folate, B-12 (as methycobalamin) formula
- And Liquid iron supplement (Flora)

Anemia Cont'

- **Normocytic:** decreased RBC
- Normal MCH
- Normal MCHC
- Normal MCV
- Decreased hematocrit and hemoglobin
- Supplement with B complex; B1, B2, Niacinamide, B6, Folate, B-12 (as methycobalamin)

Anemia Cont'

- **Macrocytic:** Decreased RBC showing anemia
- Most common is Megaloblastic anemia – B12 and or folate deficiency
- Increased or decreased MCH and MCHC
- Increased MCV
- When due to intrinsic factor deficiency it is called pernicious anemia. Elderly, chronic gastritis, gastrectomy patients are higher risk.
- Homocysteine level is more accurate for folate/B-12 levels. High Homocysteine levels suggest a deficiency of folate and or B-12
- B12 is required to metabolize Homocysteine.
- Elevated Homocysteine suggests B12 deficiency

White Blood Count (WBC)

- Total White Blood Count (WBC)
- Increased (leukocytosis) with active or acute infections.
- Decreased (leukopenia) with chronic infections; patients on a raw food diet; prescribed steroid use; hepatitis, anemia, B-12 or folate deficiency.
- Common for females over 40, tend to run low WBC as normal due to lower estrogen effect

WBC Differential

- There are 5 types of white blood cells.
- Neutrophils
- Lymphocytes
- Monocytes
- Eosinophils
- Basophils

Neutrophils

- Most abundant WBC (aka Poly's, PMN's)
- Increased in acute bacterial, viral and fungi infections.
- Increased in inflammation, tissue death (heart attack, burns), chronic leukemia
- Decreased in iron deficiency anemia

Lymphocytes

- Helps destroy the toxic products of protein metabolism.
- Life span of 4-6 months
- Large granular lymphocytes are called Natural Killer Cells (NK cells).
- Small lymphocytes are the T-cells and B-cells of the immune system.
- Increased in acute viral infections and chronic infections.

Monocytes

- In the inflammatory process neutrophils predominate for 2-3 days then they break up and Monocytes remain to clean up cell fragments.
- Often found increased during the recovery phase of an infection.
- Reference range = 4-13% of total WBC
- Optimum range is below 8%.

Eosinophils

- Commonly increased with intestinal parasites and allergies.
- Also asthma, COPD, & cancer
- Reference range is 0-7% of total WBC
- Optimum Range is 1-3% of total.

Basophils

- During inflammation, Basophils deliver heparin to the inflamed tissue to prevent clotting. Almost always increased with inflammation.
- Reference range is 0-2 % of total WBC
- Optimum range is 0-1 % of total
- When C-Reactive Protein and Sed rate are not available a basophil count >2% should be considered a primary marker for inflammation.

Platelets

- Involved with clotting
- When a small vessel is injured, platelets adhere to each other and the edges of the injury to form a plug.
- Lifespan an average of 8-10 days
- Thrombocytopenia (low platelets) occurs in acute infections, hemorrhagic diseases and anemia
- Thromobocytosis (increased platelets) occurs after surgery and following hard exercise or trauma

Comprehensive Metabolic Panel

- The Comprehensive Metabolic Panel (CMP) is used as a broad screening tool to evaluate organ function and check for conditions such as diabetes, liver disease, and kidney disease. The CMP may also be ordered to monitor known conditions, such as hypertension, and to monitor people taking specific medications for any kidney or liver related side effects.

Blood Chemistry

Blood Chemistry: Blood from a chemical point of view.

A profile of 3 major organs:

- Kidney (Renal)
- Liver
- Parathyroid

Renal Function

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

High Blood Sodium Level:

- Almost always due to inadequate water intake and dehydration. Symptoms include dry mucous membranes, thirst, agitation, restlessness, acting irrationally, and coma or convulsions if the sodium level rises to extremely high concentrations.

Low Blood Sodium Level:

- Usually due to loss of too much sodium, too much water intake or retention, or to excess fluid accumulation in the body (edema).
- If the sodium level falls quickly, a person may feel weak and fatigued; in severe cases, they may experience confusion or even fall into a coma. When the sodium level falls slowly, however, there may be no symptoms. That is why sodium levels are often checked even if someone has no symptoms.
- It's not uncommon to see low sodium with dehydration during endurance athletic events.

High Blood Potassium Levels:

- Acute or chronic kidney failure
- Addison's disease
- Hypoaldosteronism
- Injury to tissue
- Infection
- Diabetes
- Dehydration

High Blood Potassium Levels:

- Excessive dietary potassium intake (for example, fruits are particularly high in potassium, so excessive intake of fruits or juices may contribute to high potassium) - benign finding if only reason.
- Excessive intravenous potassium intake.
- Certain drugs can also cause hyperkalemia in a small percent of patients; among them are NSAIDs, ACE inhibitors, beta blockers and potassium-sparing diuretics.

Low Blood Potassium Levels:

- GI disorders associated with diarrhea and vomiting
- As a complication of acetaminophen overdose
- In diabetes, the potassium level may fall after someone takes insulin, particularly if the person has not managed their diabetes well.

High Blood Chloride

High blood chloride: called Hyperchloremia

- Dehydration
- Cushing syndrome
- Kidney disease

Low Blood Chloride

Low blood chloride levels: called Hypochloremia

- Congestive heart failure
- Prolonged vomiting or gastric suction
- Addison disease
- Emphysema or other chronic lung diseases (causing respiratory acidosis)
- Metabolic alkalosis

Blood Urea Nitrogen (BUN)

- 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)

Blood Urea Nitrogen (BUN)

- The blood urea nitrogen test is primarily used, along with the Creatinine test, to evaluate kidney function in a wide range of circumstances, to help diagnose kidney disease, and to monitor people with acute or chronic kidney dysfunction or failure.
- It also may be used to evaluate a person's general health status when ordered as part of a comprehensive metabolic panel (CMP).

High BUN Levels:

- Suggest impaired kidney function.
- May be due to acute or chronic kidney disease, damage, or failure.
- Congestive heart failure, shock, stress, recent heart attack.
- Excessive protein breakdown (catabolism).
- High protein in the diet. (watch patients taking protein powders)
- Gastrointestinal bleeding.

Low BUN Levels:

- Low BUN levels: Usually not of concern – The LOWER BUN, The BETTER.
- Both low or high BUN concentrations may be seen during a normal pregnancy.

High Creatinine

- Damage to or swelling of blood vessels in the kidneys (glomerulonephritis).
- Bacterial infection of the kidneys (pyelonephritis).
- Death of cells in the kidneys' small tubes (acute tubular necrosis) caused by drugs or toxins.
- Prostate disease, kidney stone, or other causes of urinary tract obstruction.
- Reduced blood flow to the kidney due to shock, dehydration, congestive heart failure, atherosclerosis, or complications of diabetes.

Low Creatinine

- Low Creatinine: usually not of clinical importance.

Parathyroid

Calcium Blood Levels assess Parathyroid Function

- A blood calcium test is ordered to screen for, diagnose, and monitor a range of conditions relating to the bones, heart, nerves, kidneys, and teeth. However, Blood calcium levels do not directly tell how much calcium is in the bones, but rather, how much calcium is circulating in the blood, which is regulated by the **parathyroid gland**.

High Total Calcium - Hypercalcemia

Two of the more common causes of Hypercalcemia are:

- Hyperparathyroidism, an increase in parathyroid gland function: This condition is usually caused by a benign tumor of the parathyroid gland. This form of Hypercalcemia is usually mild and can be present for many years before being noticed.

- Cancer: Cancer can cause Hypercalcemia when it spreads to the bones and causes the release of calcium from the bone into the blood or when a cancer produces a hormone similar to PTH, resulting in increased calcium levels.

Low Total Calcium - Hypocalcemia

The most common cause of low total calcium is:

- Low blood protein levels, especially a low level of albumin.

Other causes of Hypocalcemia include:

- Underactive parathyroid gland (hypoparathyroidism)
- Extreme deficiency in dietary calcium -rare in USA
- Increased levels of phosphorus
- Renal failure
- Alcoholism
- Supplement with Calcium, Magnesium and Vitamin D

Liver Tests:

- **Albumin and Globulins** – (Synthesizing functionality of the liver).
- **Bilirubin** – (Eliminating functionality).
- **AST (SGOT) and ALT (SGPT)** – (Liver enzymes).
- **Alkaline Phosphatase** – (Liver enzymes that suggest inflammation).
- **GGT** Gamma-Glutamyltransferase, Serum

Low Albumin:

- A low albumin can suggest liver disease.
- Symptoms include: jaundice, fatigue, weight loss, or symptoms of nephrotic syndrome such as swelling around the eyes, belly, or legs.
- Albumin/Globulin ratio – decrease albumin + increased globulin suggests pathology, cancer.

Low Albumin:

- Total protein, albumin, and the calculated ratio of albumin to globulins, is the A/G ratio.
- Normally, there is a little more albumin than globulins, giving a normal A/G ratio of slightly over 1.
- Because disease states affect the relative amounts of albumin and globulin, the A/G ratio may provide a clue as to the cause of the change in protein levels.

Low A/G Ratio

A **low A/G ratio** may reflect overproduction of globulins such as in:

- Multiple myeloma.
- Autoimmune diseases.
- Cirrhosis, or selective loss of albumin from the circulation, as may occur with kidney disease (nephrotic syndrome).
- Some genetic deficiencies.
- Some leukemia's.

Bilirubin (Eliminating functionality).

- Elevated Bilirubin causes:
- Gallbladder infection/itis, stones or tumor
- Hepatitis
- Liver failure
- Mononucleosis
- Pernicious anemia
- Sickle cell

Bilirubin Cont

- Low Bilirubin causes:
- Caffeine
- Drugs
- Barbiturates
- Anemia

Gallbladder function

- Gallbladder surgeries are on the rise. Liver/gallbladder function is an important assessment of your patients health.
- Sx of Gallbladder disease:
- Abdominal fullness and pain
- Occurs within minutes following meals
- Radiating to back or below the right shoulder blade
- Fever, nausea, vomiting, heartburn, Jaundice

Risk Factors for Cholecystitis

- Female
- Oral contraceptives (fertile)
- Increasing age
- Obesity
- Diabetes 2
- Chronic alcohol use

Gall bladder protective factors

- Low calorie
- Low fat diet
- Increased intake of vegetables, fruits and fiber
- Vegan diet
- Decreased intake of Alcohol, regular and decaffeinated coffee
- HCL/betaine, vitamin C supplementation

ALT & AST (liver enzymes)

- Alanine aminotransferase (ALT) is an enzyme that is found **in** the liver and , to a lesser extent, in the muscles, heart, kidneys, and pancreas.
- Along with the measurement of aspartate aminotransferase (AST) the ALT reading is one of the most important tests used to determine liver damage or disease.
- Normally, blood levels of ALT and AST are low. The reason, liver enzymes should be **in** the liver and **not** in the bloodstream.

ALT (SGPT)

- Specific for liver disease/injury ALT will spill into the serum following damage to cell membranes, initially causing high levels in the blood. Over time levels may fall within clinical range due to lymphatic removal of dead hepatocytes.
- High ALT: (think liver injury)
- Cirrhosis, Viral Hepatitis, Liver disease and Biliary obstruction
- Congestive heart failure, Pancreatitis
- Diabetes
- Numerous Rx medications

AST (SGOT)

- Causes of high AST: (liver and/or muscle)
- Hepatitis/Cirrhosis/Biliary Obstruction/Gallstones
- Cancer
- Fibromyalgia
- Congestive heart failure
- Mononucleosis
- Rx that can damage liver

Alkaline Phosphatase

- Enzyme that normally originates from liver & bone
- When elevated Alk Phos is reliable tumor marker for metastatic conditions
- Decreased in:
- Pernicious anemia (deficient B12 & folic acid)
- Celiac disease
- Zinc/Magnesium/Vit C deficiency
- Rx: Estrogen, steroids, Statins

Alk Phos cont

- Increased in:
- Bone grown; Healing fractures, growing children, osteoporosis Rx
- Liver, Bone, Blood, Prostate cancers/Hodkins
- Cirrhosis/Liver damage/Fatty Liver
- Chronic Inflammatory response
- Alk Phos will be released from damaged intestinal tissues from a general inflammatory state of the gut.
- Rx: BCP, Testosterone, Phenothiazines
- Elevated Alk phos or Bilirubin out of proportion to the ALT or AST suggests cholestasis.

GGT
Gamma-Glutamyltransferase Serum

- (GGT) is primarily present in kidney, liver, and pancreatic cells. Small amounts are present in other tissues.
- Diagnosing and monitoring hepatobiliary disease, it is currently the most sensitive enzymatic indicator of liver disease.
- Even though renal tissue has the highest level of GGT, the enzyme present in the serum appears to originate primarily from the hepatobiliary system, and GGT activity is elevated in any and all forms of liver disease.

GGT cont'

- Elevated values can also indicate alcoholic cirrhosis or individuals who are heavy drinkers.
- Increased GGT and alkaline phosphatase activity is consistent with hepatobiliary disease.
- Normal GGT activity and increased Alkaline phosphatase activity is consistent with skeletal disease.

Thyroid Profile

- A thyroid panel is used to screen for or help diagnose hypo- and hyperthyroidism due to various thyroid disorders.
- The preferred test to screen for thyroid disorders is a TSH test. If your TSH level is abnormal, it will usually be followed up with a test for total T4 or free T4. Sometimes a total T3 or free T3 will also be performed. Often, the laboratory will do this follow-up testing automatically and this is known as reflex testing.

- 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.

Iron

- Serum iron, total iron-binding capacity (TIBC), and/or transferrin tests are usually ordered together and, subsequently, the transferrin saturation can be determined and used to assess how much iron is being carried in the blood. A ferritin test may also be used to evaluate a patient's current iron stores.

- These tests are used together to detect and help diagnose iron deficiency or iron overload. In people with anemia, these tests can help determine whether the condition is due to iron deficiency or another cause, such as chronic blood loss or some other illness. Iron tests are also ordered if a doctor suspects that a person has iron poisoning and to screen for hereditary hemochromatosis, an inherited condition associated with excessive iron storage.

Iron Deficiency Anemia

- Decreased Serum Ferritin
- Increased TIBC or Transferrin
- Microcytic/Hypochromic
- Low hematocrit, low hemoglobin, elevated RDW and elevated platelet count
- Common cause is hypochlorhydria – not enough HCL to cleave iron off of protein, or GI bleeding
- Tannins in "tea" will also inhibit absorption of iron – ask pts if they are large tea drinkers.

Total Iron Binding Capacity (TIBC)

- This is the **Gold Standard Test** for diagnosing iron overload/ hemochromatosis
- TIBC is the chemical approximation of *transferrin.*
- Transferrin is responsible for 50-70% of the iron binding capacity of the serum.
- Increased w/iron anemia, internal bleeding, hemorrhoids, recently gave blood etc
- May also be increase with exogenous estrogen, BCP, ERT
- Decreased w/hemochromatosis/iron overload

Iron Results Chart

Disease	Iron	TIBC/Transferrin	%Transferrin	Ferritin
Iron Deficiency	Low	High	Low	Low
Hemochromatosis	High	Low	High	High
Chronic Illness	Low	Low	Low	Norm
Hemolytic Anemia	High	Norm	High	High
Iron Poisoning	High	Norm	High	Norm

Extremely High Serum Ferritin

- Ominous Sign
- Several types of Cancer, HIV, hepatitis,
- alcoholism, hepatic disease, renal disease, chronic inflammation
- Inherited anemias (thalassemia, sickle cell)
- Refer to medical specialist for further investigation if over 600ng/ml

Pancreas

- Regulates Blood Sugar
- **Glucose test:** Under 100mg/dl reflects normal
- The blood glucose test is used to screen for both:
- high blood glucose (hyperglycemia)
- low blood glucose (hypoglycemia)
- Help diagnose diabetes
- Monitor glucose levels in persons with diabetes

Glucose & Hb A1c

- A mildly high glucose could be a fasting error 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.
- HbA1c over 7% confirms diabetes.
- Hb A1c is used to Dx diabetes and/or monitor diabetes patients.

- A word on Diabetes 2. It has long been a medical misconception that Diabetes type 2 (insulin resistant) was caused by high dietary sugar intake. We now understand Diabetes type 2 is due to high dietary fat intake rather than high sugar intake.
- High intake of refined sugars can aggravate elevated glucose levels, but the insulin resistance diabetes 2 mechanism is coming from fat accumulation inside the cell.
- In order for glucose to enter the cell and be used as energy, the insulin receptor site on the cell membrane must act like a key to open the cell for the glucose to enter. In the diabetic 2 patient the insulin receptor sites of the cell membranes become impacted with fat that blocks the insulin key from opening the cell thus deflecting glucose back into the blood stream resulting in high blood glucose levels and arterial inflammation.
- 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.

Findings and Corollaries

- Reference for common conditions you may see in everyday practice.
- View your patients blood labs in a systemic approach. Gastric, liver, kidney, heart, blood etc

GI Complaints

- GI complaints are some of the most common reasons that patients seek medical care.
- Symptoms: persistent diarrhea, constipation, bloating, gas, nausea, indigestion and irritable bowel syndrome.
- Other non-GI symptoms: eczema/skin rashes, headaches, fatigue, joint pain and food sensitivities.

GI Dysfunction/Hypochlorhydria:

- High Globulins and high A/G ratio
- High Total Proteins
- High BUN
- Low Chloride
- Low Serum Calcium
- Low Serum Phosphorous
- Check RBC's for anemia. Decreased GI function can lead to a decrease in absorption of B vitamins, iron.

Fixing GI Problems

- Remove offending pathogens and foods (alcohol, coffee, refined or fatty foods....aka SAD, etc)
- Supplement with HCL and digestive enzymes
- Increase fresh fruits and vegetables
- Re-inoculate with pro-biotics between meals
- Repair mucosal lining (leaky gut repair – see DocEmerson nutrition seminar)

Blood Sugar Dysregulation

- Increased Fasting Blood Glucose
- Increased HbA1C
- Increased Triglycerides
- Increased Fasting Insulin

Oxidative Stress

- Increased Uric Acid
- Decreased Lymphocyte count
- Decreased Albumin level
- May also see low platelet count and increased total globulins.

Inflammatory State

- Increased ESR
- Increased Uric Acid
- Decreased Albumin
- Increased Eosinophils
- Increased Neutrophils
- Increased C-Reactive Protein
- Increased Ferritin levels
- Increased Homocysteine

Cardiac

- Elevated LDL and VLDL
- Decreased HDL
- Total Cholesterol level over 250
- Elevated C-reactive protein and CRP-Cardiac test
- Elevated homocysteine
- Possible elevated Creatine Kinase
- Possible low Magnesium
- Low thyroid is commonly associated with cardiac findings
- Support with Vitamin C, B complex, CoQ10

Liver Inflammation

- When ALT, AST and GGT are a little high this can suggest that the liver is a little hypermetabolic or a little inflamed. Many drugs or alcohol can cause or contribute to this.
- Other supportive findings: High Blood Glucose • High Blood Total Protein • High Blood Serum Iron • High Blood Ferritin • High Blood Triglyceride • Low Blood Polys/Neutrophils
- Supportive nutrients: Vitamin C 3000 mg/day for 4 weeks.
- Liver support formula and reduce fat intake to take load off of liver.

Alcohol related liver findings

- Elevated AST
- Elevated ALT
- Elevated GGT
- Ratio of AST to ALT greater than 2 suggests alcohol hepatitis
- Dehydration effects

Dehydration effects

- Low Sodium - Hyponatremia (not uncommon during athletic events)
- High Bun/Creatinine Ratio
- High Protein and Albumin
- Consider if patient drinks alcoholic beverage(s) every day • Drinks caffeinated coffee • Tendency of High Blood Pressure • Leg cramps during bedtime

Vitamin D

- Vitamin D level is clinically low at levels less than 32 ng/mL. The preferred test is Vitamin D 25-Hydroxy (total)
- Low Vit D can also correlate to low levels of calcium and phosphorus. This can affect calcium metabolism. Low Vit D has been shown to reduce intestinal calcium absorption, reduced bone density, reduced immune system, increased insulin resistance and risk of many types of cancer.
- Support with Vit D supplement and increase potassium rich foods such as broccoli, sweet potatoes, avocados and bananas to help with increasing the calcium and phosphorus levels.

- The majority of our patients eat the Standard American Diet (SAD) which can lead to a slow progressive vitamin/mineral deficiency which is reflected in elevated/decreased lab values.
- The standard blood tests offers a good picture of the patient's major organs. Supplementing the patients diet with an infusion of nutrient based foods and supportive vitamins and minerals can prove beneficial.
- As a general rule of thumb, nutrient intervention for a period of eight weeks followed by a repeat lab to to assess progress or consider referral options.

Final Note

- Many patients have routine labs run every year as a part of their visit to their doctor. These labs provide valuable insight to the nutritional status of the patient.
- Evaluating several past labs can help you see the progression of many asymptomatic nutrient deficiencies the patient may have.
- Intervention with appropriate lifestyle changes can dramatically improve the patients level of health which will reflect in future labs. The proof is in the pudding!

Thank You

Mark D. Emerson DC, CCSP

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