NORTHWESTERN HEALTH SCIENCES UNIVERSITY

BLT SYSTEM
BLOOD LAB TESTING
www.BLTSYSTEM.com

Welcome to the Functional Blood Lab Testing Essentials Seminar / Webinar

Presented by:
Dr. John W. Larson, DC
Functional Medicine Provider
Creator of the BLT System and software
763-515-3405
support@BLTSystem.com
www.BLTSystem.com

All seminar materials, handouts, case studies can be found at this link:
bltsystem.com/documents

This is why your lab tests are "normal" but you still feel sick:

In these areas you will find lab results that a doctor will say are "normal" but they are not!

TSH	1.180	0.000 - 0.449	0.450 - 0.999	1.000 - 2.500	2.501 - 4.500	4.501 or higher
Thyroxine (Total T4)	7.8	0.0 - 4.4	4.5 - 5.9	6.0 - 12.0	NA	12.1 or higher
T3 Uptake	23	0 - 23	24 - 26	27 - 37	38 - 39	40 or higher
Free Thyroxine Index	1.8	0.0 - 1.1	NA	1.2 - 4.9	NA	5.0 or higher
Triiodothyronine (Total T3)	139	0 - 70	71 - 98	99 - 180	NA	181 or higher
Triiodothyronine, Free, Serum (Free T3)	2.8	0.0 - 1.9	2.0 - 2.9	3.0 - 3.8	3.9 - 4.4	4.5 or higher
Reverse T3, Serum	23.2	NA	NA	0.0 - 19.9	20.0 - 24.1	24.2 or higher
T4, Free (Direct)	0.90	0.00 - 0.81	0.82 - 1.02	1.03 - 1.56	1.57 - 1.77	1.78 or higher
Thyroid Peroxidase (TPO) Ab	10	NA	NA	0 - 19	20 - 34	35 or higher
Thyroglobulin Antibody (if <1.0 enter 0.9)	0.1	NA	NA	0.0 - 0.9	NA	1.0 or higher
Vitamin D, 25-Hydroxy	18.3	0.0 - 29.9	30.0 - 59.9	60.0 - 80.0	80.1 - 100.0	100.1 or higher

Blood Lab Testing System

Simple • Effective • Scientific

If haven't already done so for your clinic or office please create a new user account with the BLT System at:

www.bltsystem.com/register

Although not a requirement for this weekend. Having access to this account will allow you to more fully participate in what we have planned for this weekend.

It is FREE to create this new user account!

Goals for this Training Weekend

- To cover the entire process related to operating a successful Functional Blood Lab Testing service for your patients or clients to include:
  - The entire process from beginning to end – initial consultation to recommendations.
  - Recommending and ordering lab testing – making it easy and inexpensive.
  - Creating a lab report that allows you to quickly interpret the lab results.
  - How to quickly and effectively communicate lab results to your patient.
  - Creating and prioritizing recommendations – dietary, nutritional and lifestyle.
  - Patient flow and proper follow-up: appointments and testing.
  - The practical application of doing this service with your patients.

Goals for this Training

- We will review the interpretation of individual lab tests within the Comprehensive Lab Panel grouped together in the following sections:
    - Blood Sugar Control
    - Liver and Kidney Function
    - Electrolytes and Iron Status
    - Cardiovascular Health and Inflammation
    - Thyroid and Adrenal Function
    - Immune Function and Red Blood Cell Health
    - Digestive Function and Individual Nutrients

There will be some overlap with the same lab test being involved in more than one category above. There will be LOTS of repetition to reinforce and to keep building on the information that you learn.

Goals for this Training

- We will be covering some additional topics:
  - Many case studies
  - Specialty lab testing
  - Marketing this service to your friends, family, patient population and community
  - Moving from idea into action
  - There will be lots of time for questions

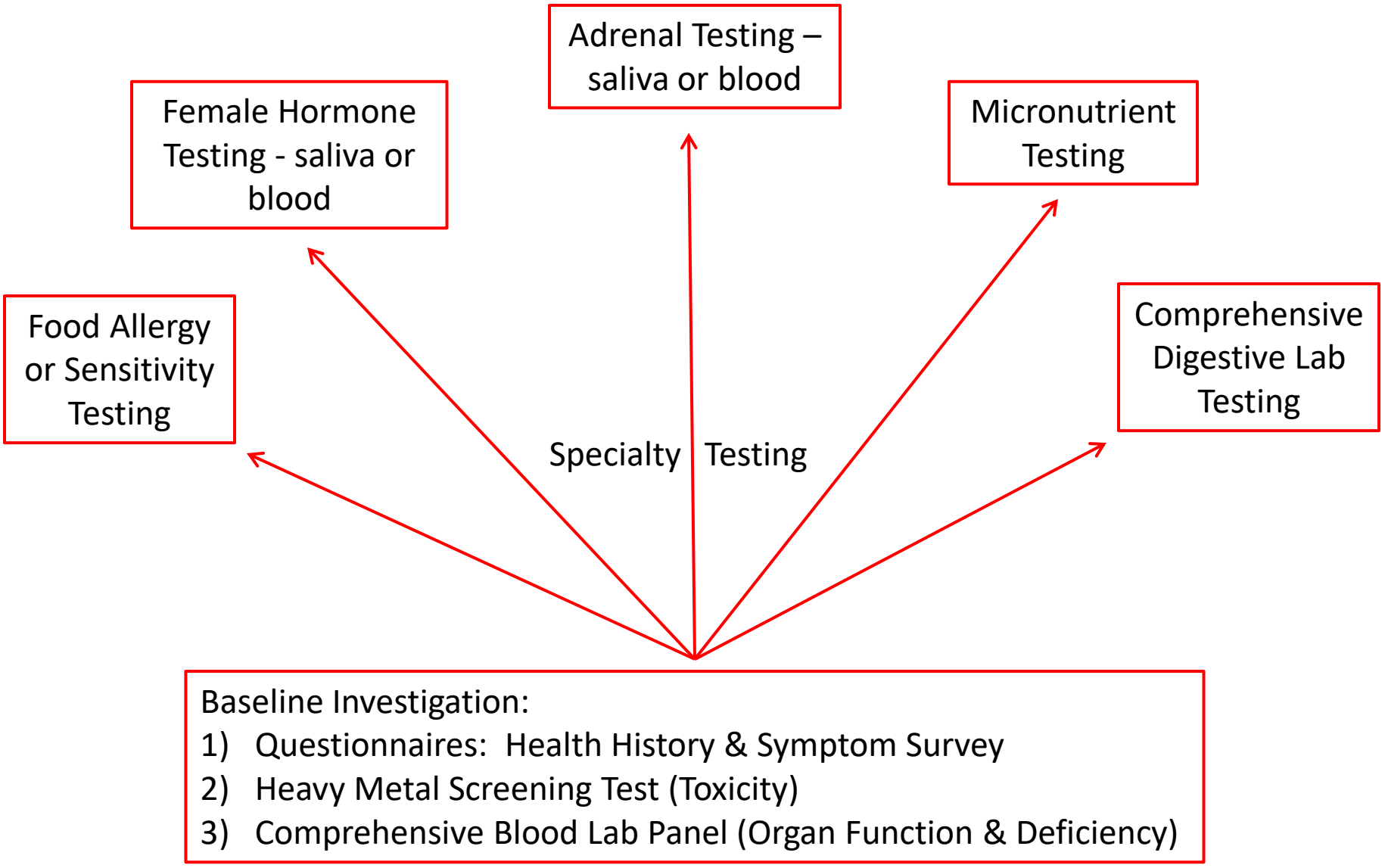
Please ask lots . . . AND LOTS . . . . AND LOTS OF QUESTIONS!

This is your chance to learn from a healthcare provider that has been doing this for a long time. Learn everything you can and make it your own!

When did I start doing lab testing?

Blood Lab Testing System

Simple • Effective • Scientific



Blood Lab Testing System

Simple • Effective • Scientific

When looking for nutrient deficiency or evaluating organ function . . . the Comprehensive Lab Panel is not the only way we can evaluate for deficiency and function.

Let's take these 4 evaluation methods and let me ask you a hypothetical question.

When comparing these 4 methods side-by-side:

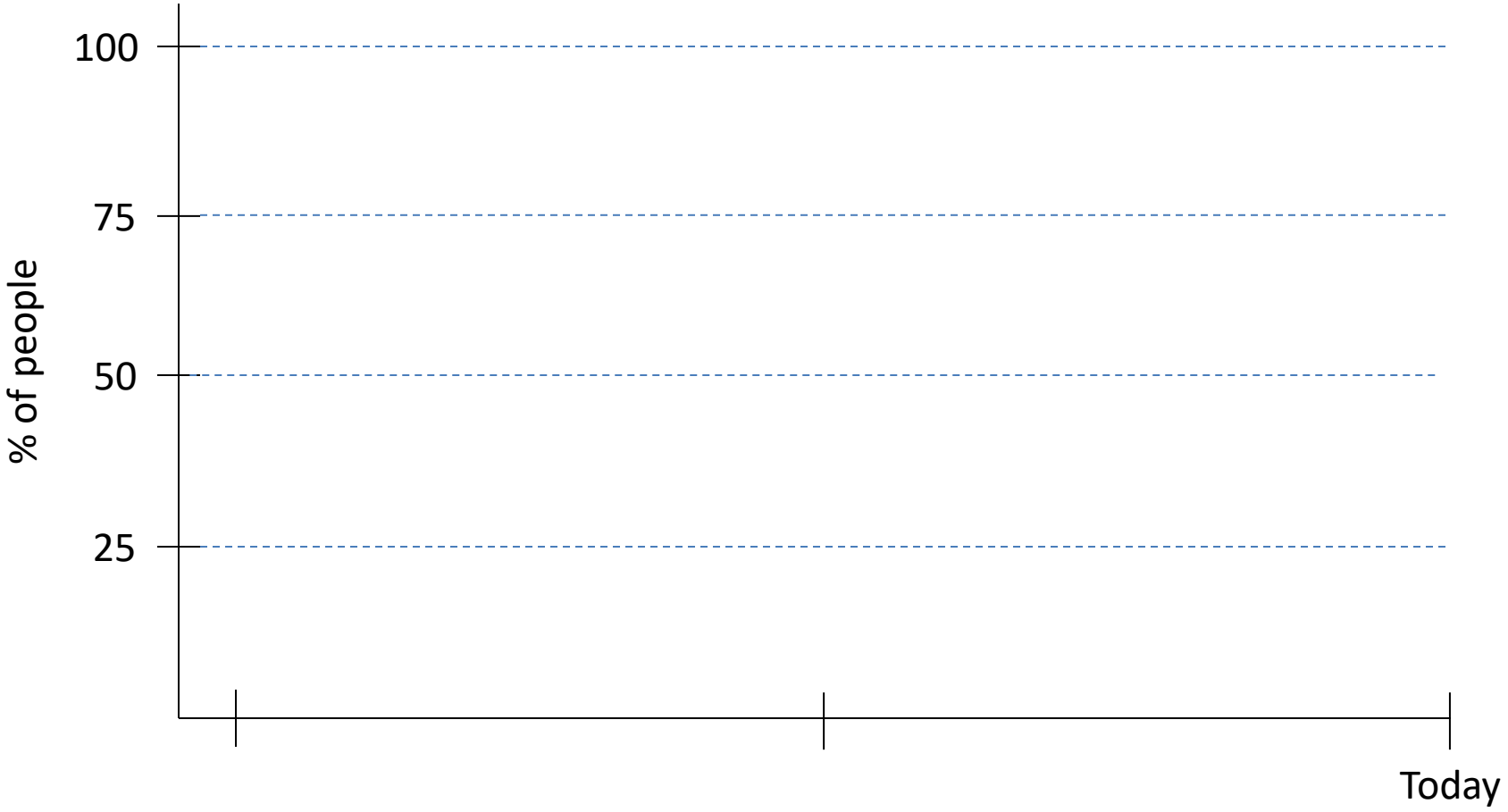
1. Symptom Questionnaire
2. Muscle Testing
3. Electro Dermal Screening (EDS)
4. Blood Lab Testing

Remove yourself and your way of thinking from this example, and focus on how a patient who is new to your office thinks and what that patient would choose.

Which one do you think the average patient would pick as the most reliable?
Which one is most likely to have the patient follow your recommendations?
Which one is the patient most likely to follow-up with you?
Why?

Blood Lab Testing System
Simple • Effective • Scientific

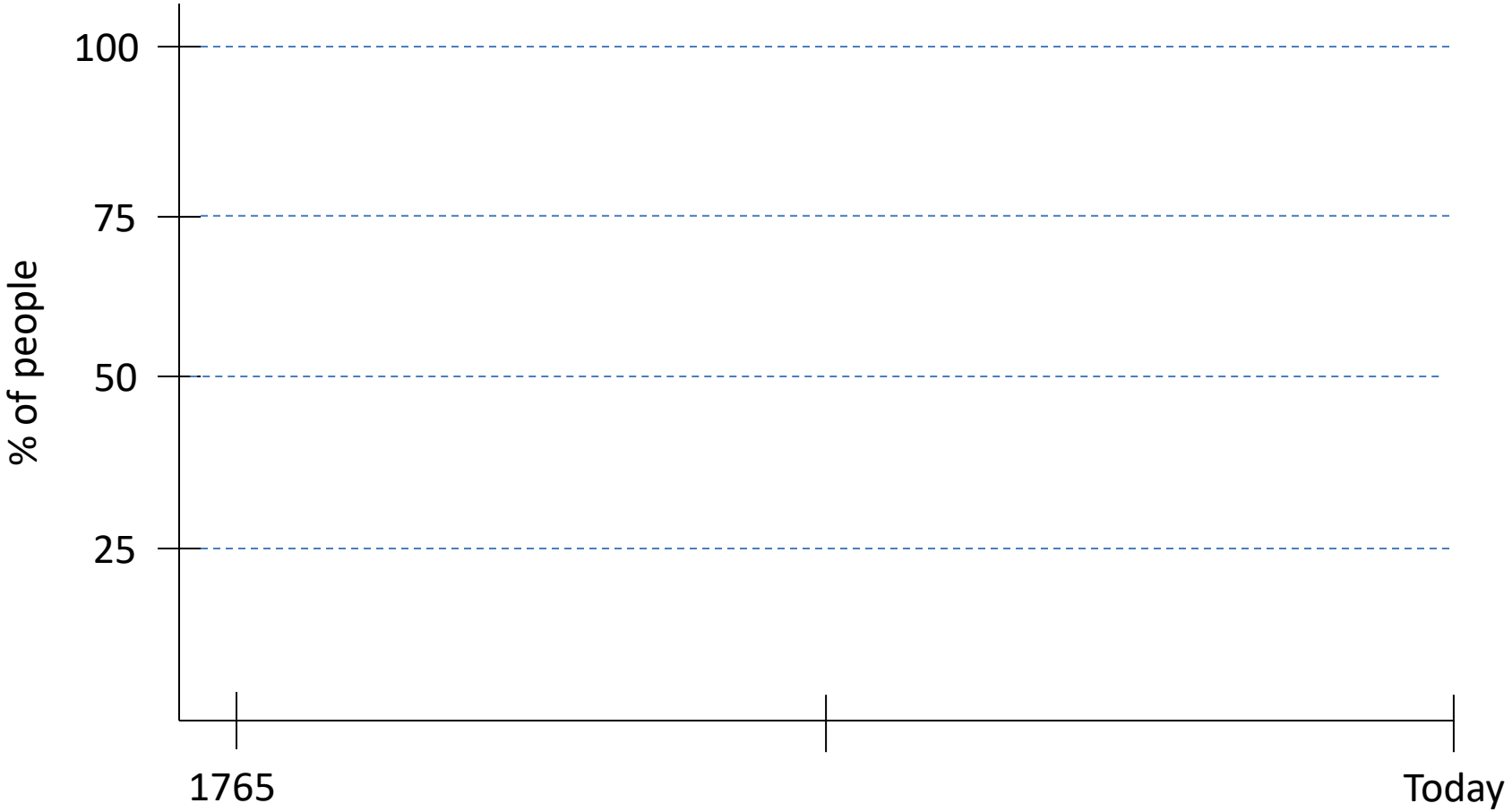
Let’s also look at this from another perspective!



Blood Lab Testing System

Simple • Effective • Scientific

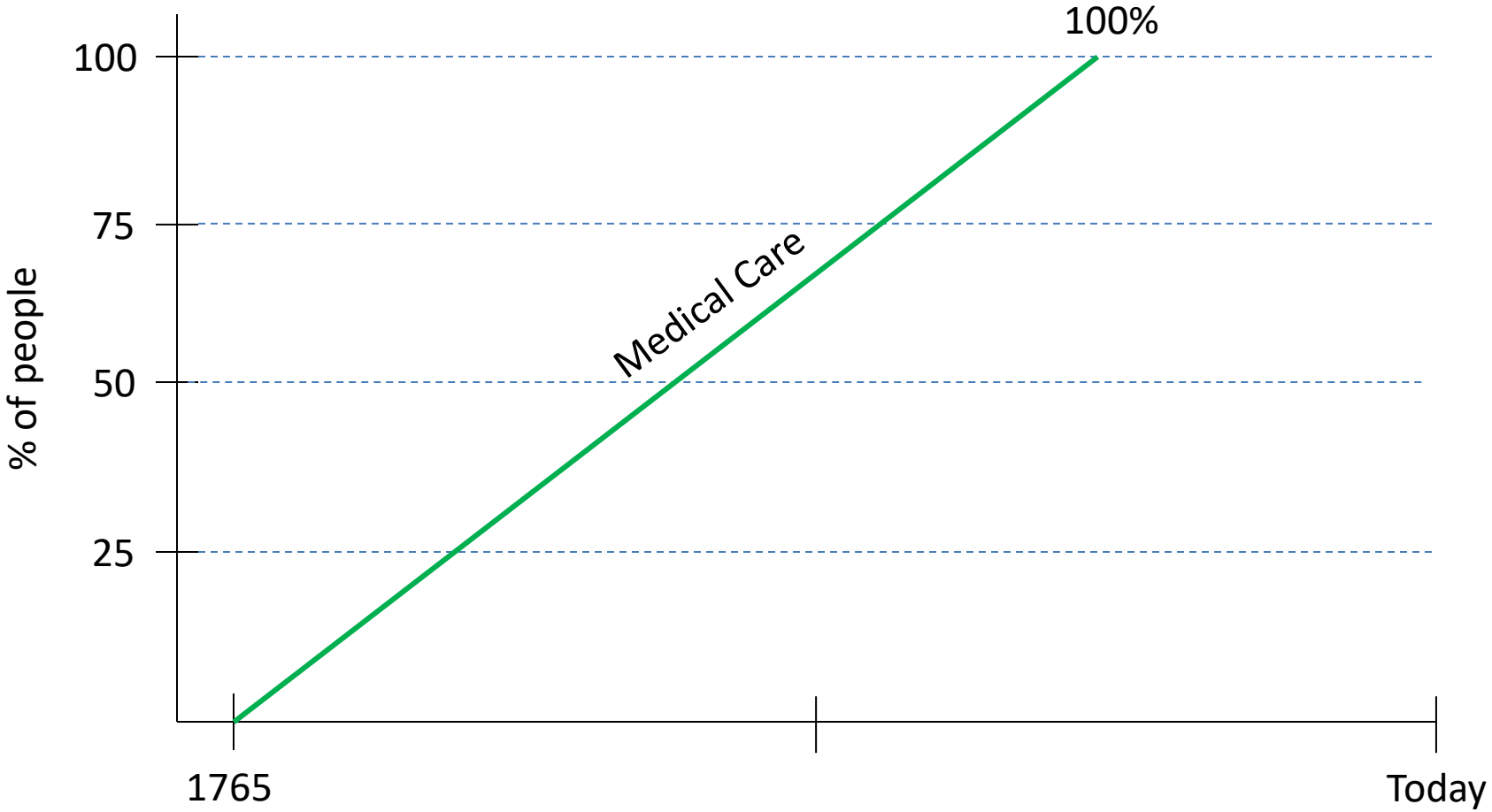
Let’s also look at this from another perspective!



University of Pennsylvania
School of Medicine

Blood Lab Testing System
Simple • Effective • Scientific

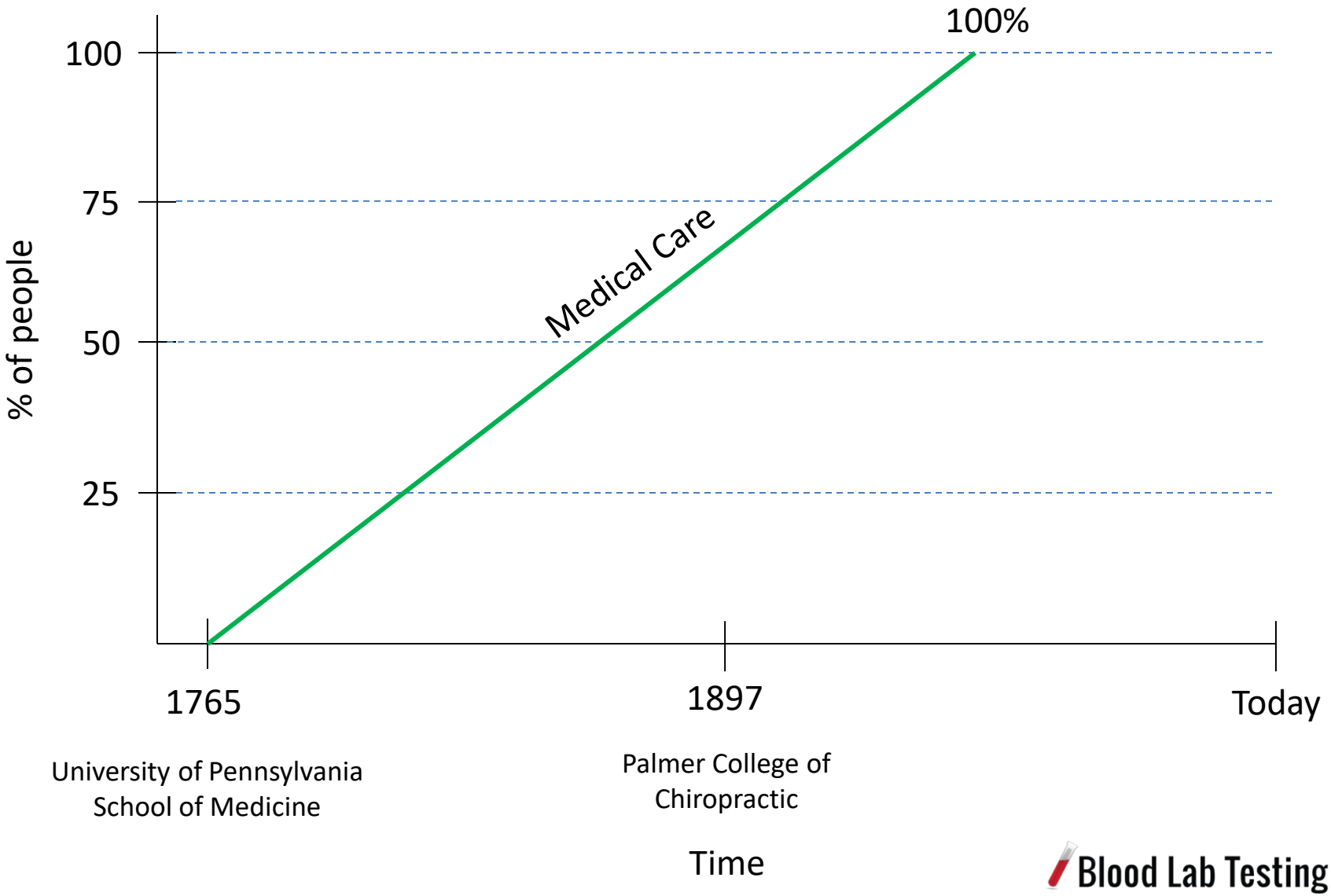
Let’s also look at this from another perspective!



University of Pennsylvania
School of Medicine

Blood Lab Testing System
Simple • Effective • Scientific

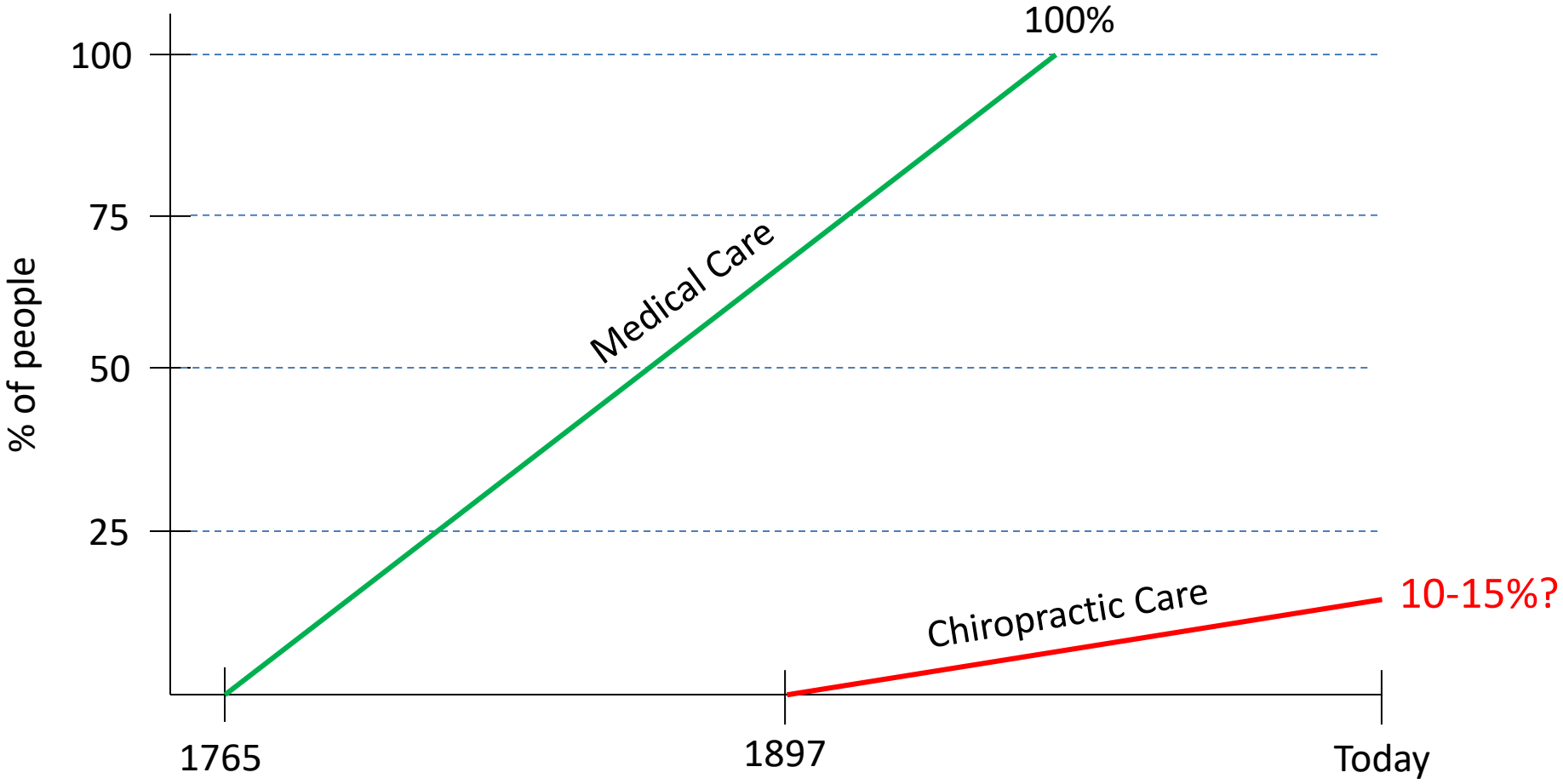
Let’s also look at this from another perspective!



Blood Lab Testing System

Simple • Effective • Scientific

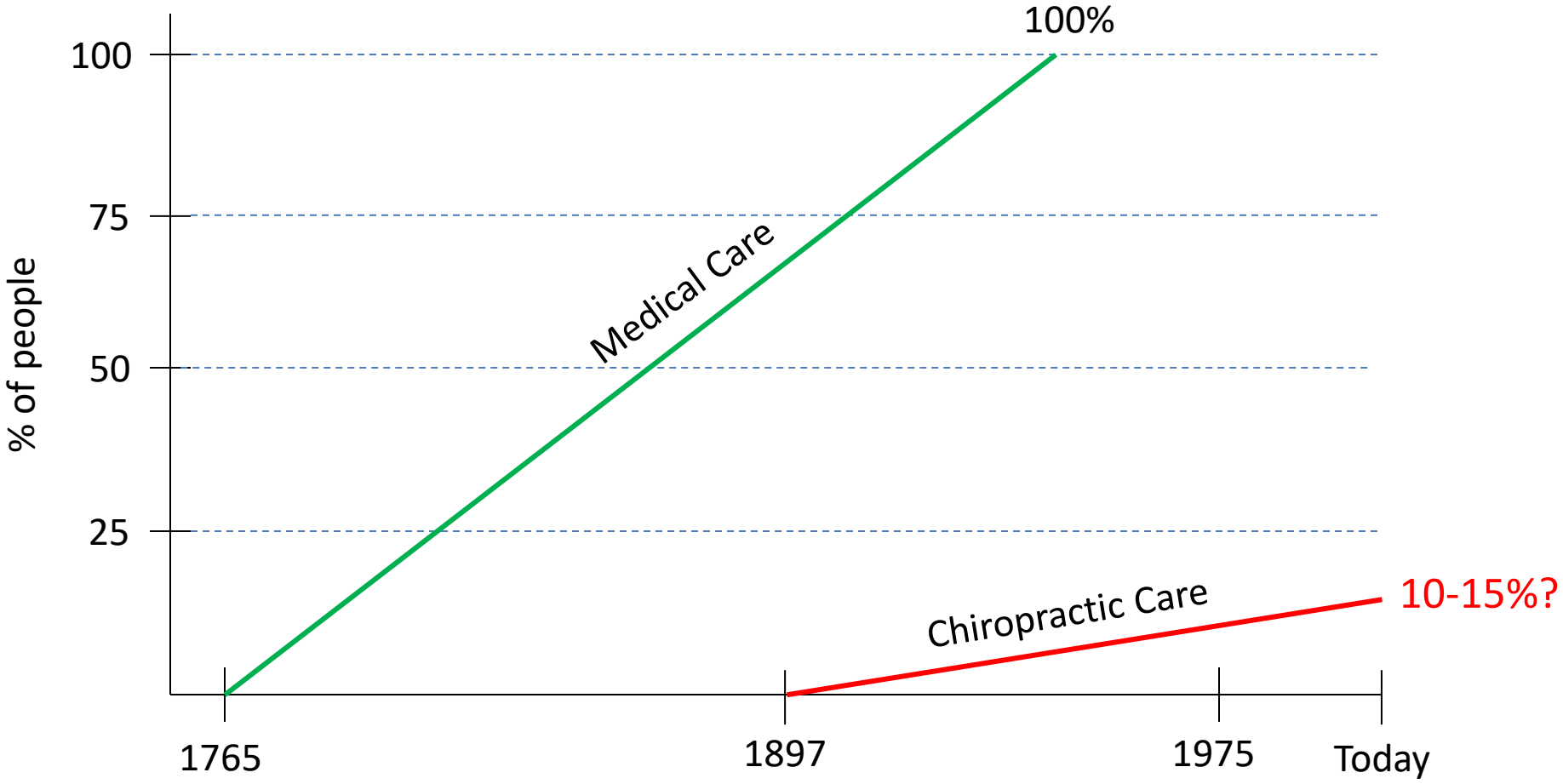
Let’s also look at this from another perspective!



Blood Lab Testing System

Simple • Effective • Scientific

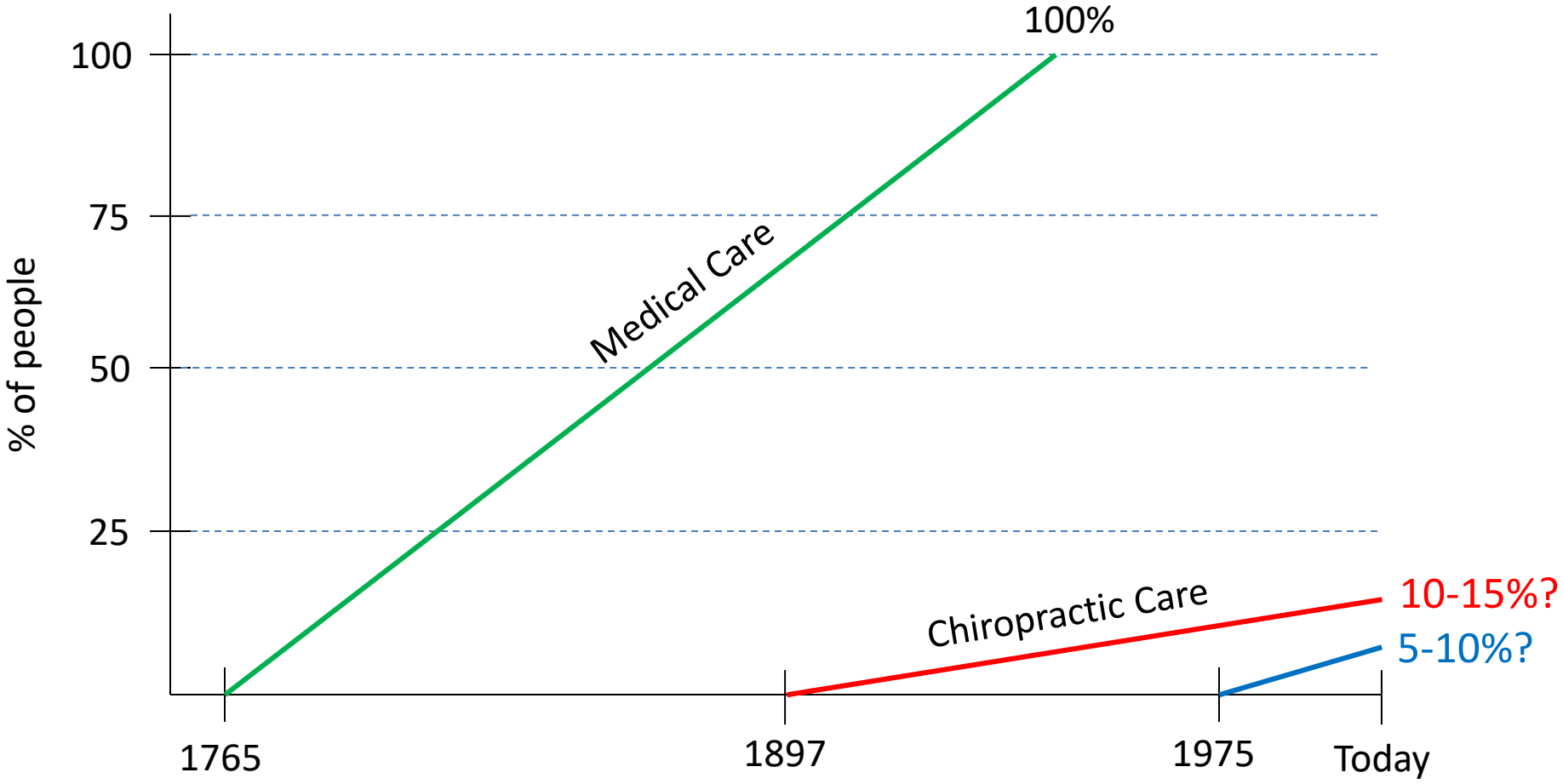
Let’s also look at this from another perspective!



Blood Lab Testing System

Simple • Effective • Scientific

Let’s also look at this from another perspective!



Blood Lab Testing System

Simple • Effective • Scientific

Now for a more difficult question.

If every chiropractic doctor, acupuncture doctor, naturopathic doctor, nutritionist in your community was doing functional blood lab testing . . . would you become more busy or less busy overall?

Now . . . let's get into the blood lab testing process.

Easy. Fast. Fun. Accurate. Profitable.

- This is everything a blood lab testing process needs to be in order for you to be excited and motivated to do this type of work with your patients and clients.
- Let's start with the end in mind!

Blood Lab Testing System

Simple • Effective • Scientific

The end result of a blood lab testing process is:

1. You need a way to do a critical (functional) evaluation of the lab results that will save you time!
2. You need a way to communicate the lab results that is going to be easy and save you time!
3. You need a way to create recommendations from the lab results that will save you time!
4. You need a system to help you do the proper follow-up with your nutrition patients that will save you time!

This is the purpose of the BLT System – it allows you to do EVERYTHING FASTER!

Blood Lab Testing System

Simple • Effective • Scientific

Let's start looking at the blood lab testing process with the end result in mind . . . the blood lab report.

- You are going to be creating many blood lab reports this weekend so let's get the first one started.
- First . . . let's have you create your first one with no product recommendations.
- Then . . . let's take a detailed look at a blood lab report for the Comprehensive Lab Panel.

Let’s have you create your first lab report for the Comprehensive Lab Panel:

Case Study #1:
Ima Hotmess

Blood Lab Testing System
Simple • Effective • Scientific

Now . . . let's take a detailed look at the lab report you've created for the Comprehensive Lab Panel:

Case Study #1:
Ima Hotmess

Questions

Blood Lab Testing System

Simple • Effective • Scientific

Let's discuss everything that happens BEFORE your create the lab report

- How they get in your door – marketing, referral, your recommendation.
  - We will discuss marketing principles throughout the weekend as time allows.

Let's discuss everything that happens BEFORE your create the lab report

- The initial consultation
  - My conversation with every Functional Medicine new patient consultation begins with: *"The goal for today's consultation is for me to learn more about you, your symptoms and health concerns, and what kind of help you are looking for. I will know by the end of your consultation what will be the best or smartest way to get started for you . . . which often includes some form of lab testing."*

Blood Lab Testing System

Simple • Effective • Scientific

Let's discuss everything that happens BEFORE your create the lab report

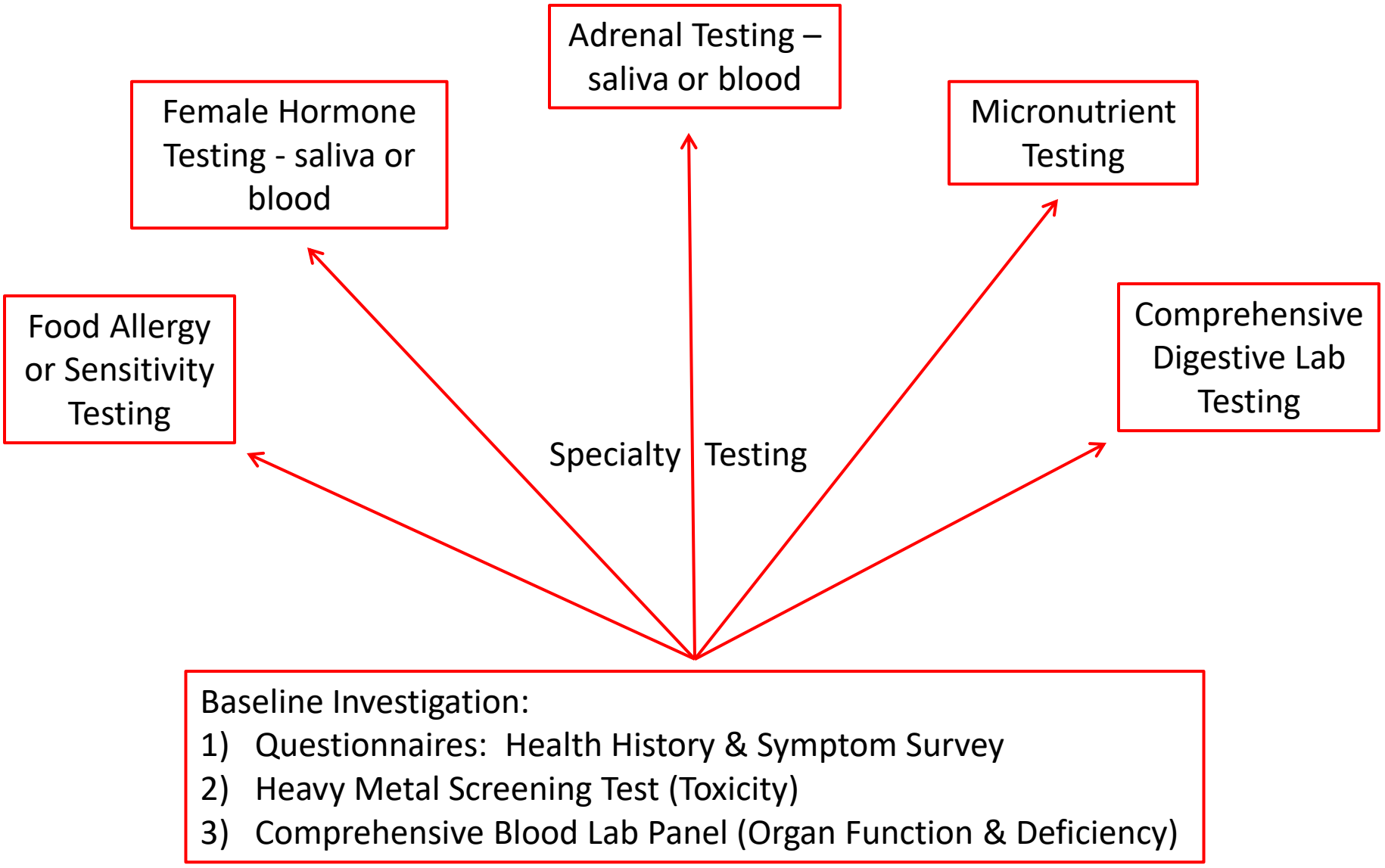
- The initial consultation
  - To get them focused on what I want to know I will then say: *"My first question is . . . when you think about your body and how it's feeling and how it's functioning . . . what is the number 1 thing that concerns you the most?"*
  - Then get your history on that specific concern. I recommend getting the timeline as timing in relation to other events, injuries, stresses can be important.
  - Then ask them their 2nd concern . . . then 3rd . . . then 4th . . . and so on until you have a handle on their top 3 – 5 health concerns. You will need to know this when it comes time to explain lab results and recommendations to your patient / client.

Let's discuss everything that happens BEFORE you create the lab report

- Recommending and ordering lab testing.
  - Go to www.BLTSystem.com and then click on "Order Lab Tests" in the upper right side of page.
  - In your Control Panel click on the orange button in the left column called "Order Lab Testing.
  - Some providers will place a link onto their own clinic website that takes their patient to the Wholesale Lab Ordering Service website.
- Receiving lab results and then creating the lab report.
  - A simple data entry that can be done by you or any staff member after logging into your BLT System account.

Blood Lab Testing System

Simple • Effective • Scientific



Blood Lab Testing System

Simple • Effective • Scientific

Baseline Investigation

- Questionnaires:
  - General Health
  - Symptom Survey – many good ones out there.
  - Toxicity/Detox Questionnaire – if you think you may be incorporating a detox process into your patient programs.
- Heavy Metal Screening Test (HMT)
  - Nissen Medica
  - 1-888-888-9145
  - info@nissenmedica.com
  - Clinic cost is @ $10 per kit for HMT1 (Item #110) and I sell for $29.95

Blood Lab Testing System

Simple • Effective • Scientific

Blood Lab and Specialty Testing

- Comprehensive Lab Panel or other blood lab testing:
  - www.bltsystem.com – “Order Lab Testing”
- Specialty Lab Testing
  - Food Sensitivity Testing – ELISA/ACT Biotechnologies – I typically do the 166 food panel – cost is $395.
  - Female Saliva Hormone Testing – Diagnos-Techs
  - Adrenal Testing – DHEA and Cortisol blood testing through the BLT System, or saliva testing (ASI) through Diagnos-Techs.
  - Micronutrient Testing - SpectraCell Micronutrient Test
  - Comprehensive Digestive Stool Analysis (CDSA) – Doctors Data as the CDSA with Parasitology x3.

How can we more quickly interpret lab results and more quickly explain the results to our patient / client?

Option #1: Group lab results together into categories.

Option #2: Use the Blood Lab Report Card

Blood Lab Testing System

Simple • Effective • Scientific

Here's how we place lab results together into groups:

- Blood Sugar Levels / Blood Sugar Control Group
  - Glucose, Serum
  - Hemoglobin A1c
  - Triglycerides – within the cholesterol group
  - Insulin, Fasting – not part of the Comprehensive Lab Panel

Here's how we place lab results together into groups:

- Kidney Function Group
  - Uric Acid, Serum
  - BUN – Blood Urea Nitrogen
  - Creatinine, Serum
  - eGFR – Glomerular Filtration Rate
  - BUN/Creatinine Ratio

Here's how we place lab results together into groups:

- Electrolytes / Basic Minerals Group
  - Sodium, Serum
  - Potassium, Serum
  - Chloride, Serum
  - Carbon Dioxide, Total
  - Calcium, Serum
  - Phosphorus, Serum
  - Magnesium, Serum

Here's how we place lab results together into groups:

- Liver Function (Gall Bladder) Group
  - Protein, Total, Serum
  - Albumin, Serum
  - Globulin, Serum
  - A/G Ratio
  - Bilirubin, Total, Serum
  - Alkaline Phosphatase
  - LDH
  - AST
  - ALT
  - GGT

Here's how we place lab results together into groups:

- Iron Levels / Iron Status Group
  - Iron Bind. Cap. (TIBC)
  - UIBC
  - Iron, Serum
  - Iron Saturation
  - Ferritin, Serum

Here's how we place lab results together into groups:

- Cholesterol / Cardiovascular Risk Group
  - Cholesterol, Total
  - Triglycerides
  - HDL Cholesterol
  - VLDL Cholesterol
  - LDL Cholesterol
  - Total Chol/HDL Ratio
  - C-Reactive Protein, Cardiac
  - Homocysteine, Plasma
  - Fibrinogen Activity

Here's how we place lab results together into groups:

- Thyroid Function Group
  - TSH
  - Thyroxine (Total T4)
  - T3 Uptake
  - Free Thyroxine Index
  - Triiodothyronine (Total T3)
  - Triiodothyronine Free, Serum (Free T3)
  - Reverse T3
  - T4, Free (Direct)
  - Thyroid Peroxidase (TPO) Ab
  - Thyroglobulin Ab

Here's how we place lab results together into groups:

- Vitamin D
  - Measured as Vitamin D, 25-Hydroxy in the Comprehensive Lab Panel
  - There are other measurements that can be done for Vitamin D status as well.

Here's how we place lab results together into groups:

- Red Blood Cell Health / Platelet Group
  - RBC
  - Hemoglobin
  - Hematocrit
  - MCV
  - MCH
  - MCHC
  - RDW
  - Platelets

Here's how we place lab results together into groups:

- White Blood Cell / Immune Function Group
  - WBC
  - *Neutrophil
  - *Lymphocytes (Lymphs)
  - *Monocytes
  - *Eosinophils (EOS)
  - *Basophils (Basos)
  - *Immature Granulocytes

*Measured as both a percentage and absolute count.

Here's how we place lab results together into groups:

- Urinalysis, Complete
  - We will spend very little time talking about the complete urinalysis this weekend.
  - Because the sample can easily become contaminated by poor sample collection by the patient . . . an abnormal urinalysis usually has me recommend they visit their medical provider to redo the urinalysis.
  - A urinalysis guide is provided for you at end of your Lab Interpretation Guide.

Another option to make your lab interpretation and explaining lab results to patient go faster is to use the Blood Lab Report Card:

- Intro to the Blood Lab Report Card
  - See Handout
  - Can be a way to make your interpretation and creating recommendations easier.
  - Can allow the patient to quickly visualize what area are good and what needs help.

Blood Lab Testing System

Simple • Effective • Scientific

Lab Test Review

We are going to review individual lab test by answering these 4 questions:

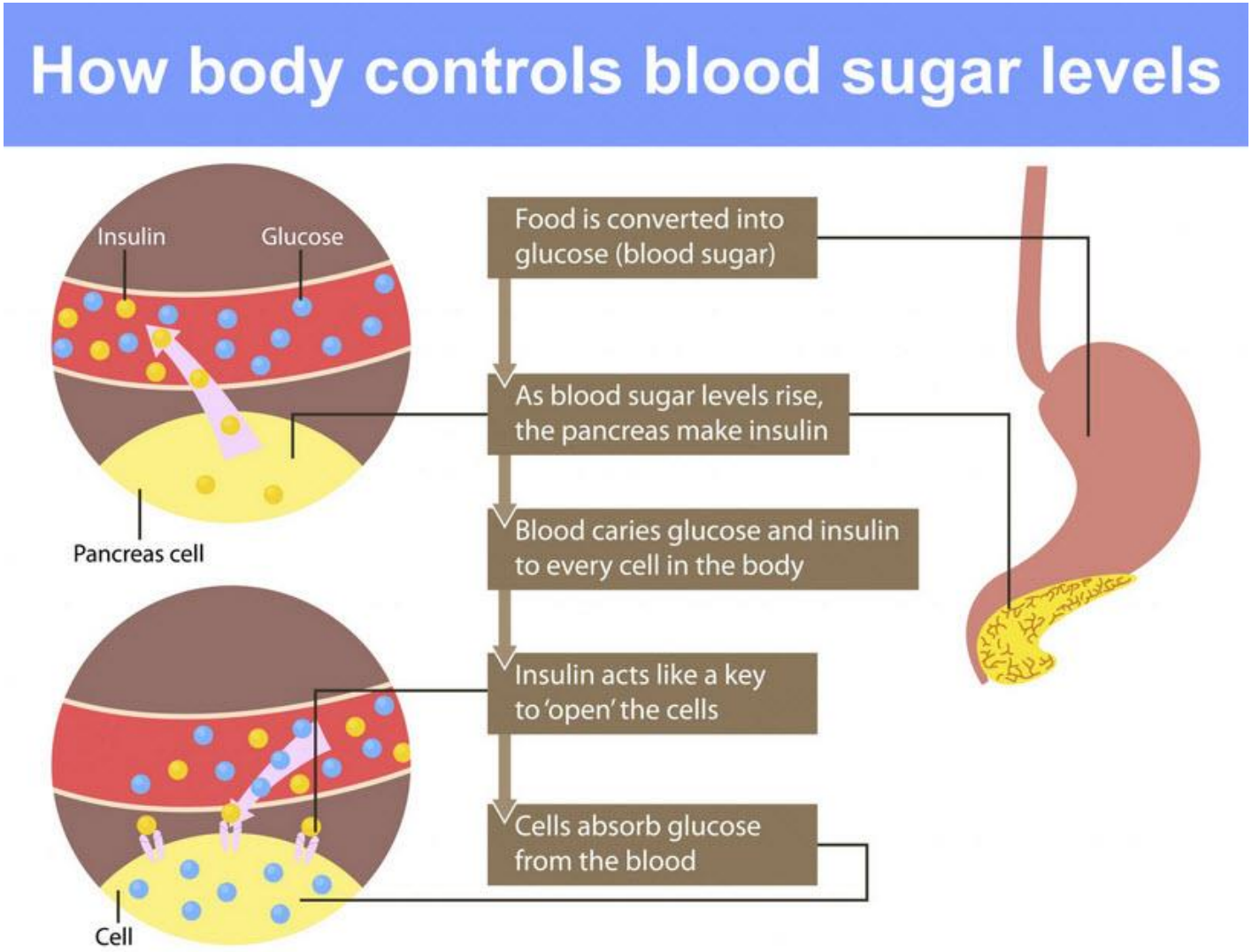
1. What is it?
2. Where does it come from?
3. Why do we care about it clinically?
4. What does it mean if its too high or low?

Keeping in mind we are only reviewing the “essentials”, so we will not be going into extreme detail on any of the individual lab tests.

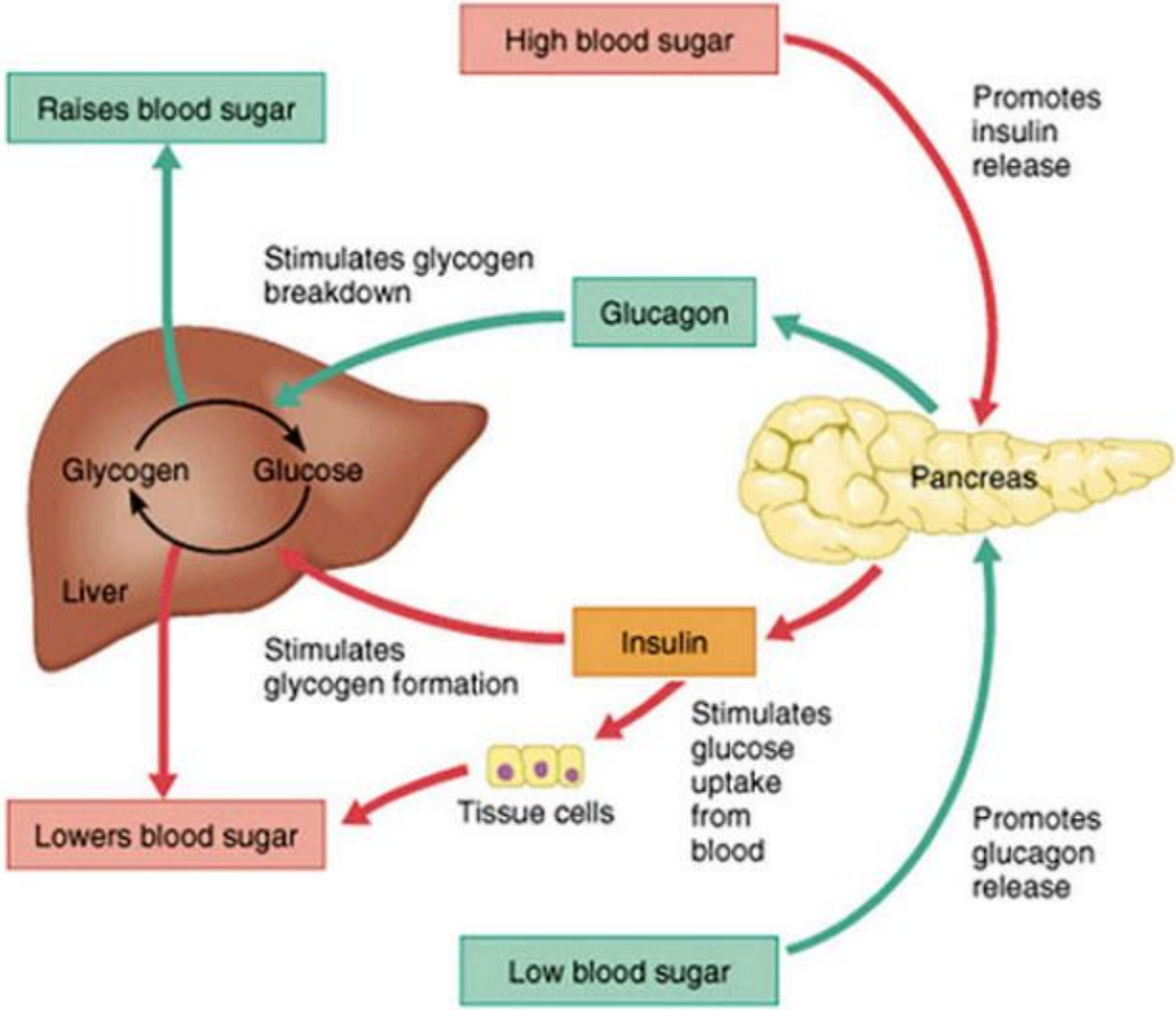
Lab Test Review: Blood Sugar Control

- Blood Sugar Levels / Blood Sugar Control Group
  - Glucose, Serum
  - Hemoglobin A1c
  - Triglycerides – we will review in cholesterol group
  - Insulin, Fasting

Lab Test Review: Blood Sugar Control



Lab Test Review: Blood Sugar Control



Lab Test Review: Blood Sugar Control

Glucose, Serum

Quick Thoughts (QT) – High: Pre-Diabetes, Diabetes
Quick Thoughts (QT) – Low: Reactive or Clinical Hypoglycemia

What is it?
A simple sugar that is an important energy source in living organisms and is a component of many carbohydrates.

Where does it come from?
The foods we eat. All carbohydrates become blood glucose.

Lab Test Review: Blood Sugar Control

Glucose, Serum

Why do we care about it clinically?

The primary source of fuel for the brain and nervous system

Gets incorporate into most or all of your cells to create energy or ATP. Excess glucose is very acidic.

What does it mean if it's too high?

Poor blood sugar control, Diabetes Type I, II and III. You need to confirm they truly did a 12 hour fasting prior to the blood draw. Can be falsely elevate if patient has a phobia of needles as the stress response will increase cortisol which puts more sugar (glucose) into the blood.

Lab Test Review: Blood Sugar Control

Glucose, Serum

What does it mean if it's too low?
Reactive Hypoglycemia. Typically of their fasting glucose is at 79 or less I will start asking them about symptoms of reactive hypoglycemia. *"When you go too long between meals do you ever feel weak, shaky, headachy, more fatigued . . . and you feel like you need to eat something to feel better?"*

Clinical hypoglycemia is quite rare and I would likely refer out for medical evaluation.

Lab Test Review: Blood Sugar Control

Types Of Sugars- Simple

Sugars	Common Names	Sources
Glucose	Blood sugar or blood glucose, dextrose	All carbohydrates have glucose, become blood glucose
Fructose	Fruit sugar	Fruits and juices, honey, table sugar, high fructose corn syrup
Sucrose (glucose + fructose)	Sugar, table sugar granulated sugar	Sugar, brown sugar, molasses, turbinado, raw sugar, cane sugar, powdered sugar, fruits
Maltose (glucose + glucose)	Malt sugar	Molasses, bread
Lactose (glucose + galactose)	Milk sugar	Milk, dairy products, whey

Lab Test Review: Blood Sugar Control

Hemoglobin A1c

QT – High: Pre-Diabetes, Diabetes
QT – Low: Hypoglycemia

What is it?
Measures the number of glucose molecules attached to the hemoglobin in the red blood cells.

Where does it come from?
During the average 120 day lifespan of a red blood cell . . . some glucose molecules are attaching to the hemoglobin (glycosylated) to form a "glycohemoglobin" complex. The glucose molecule stays attached for the life of that RBC.

Lab Test Review: Blood Sugar Control

Hemoglobin A1c

Why do we care about it clinically?
More of a long-term measure of blood sugar control over @ the past 2-3 months. A better measure if someone is moving towards pre-diabetes or diabetes than Serum Glucose alone.

What does it mean if it's too high?
Poor blood sugar control leading to pre-diabetes or diabetes.

What does it mean if it's too low?
Frequent low blood sugar (hypoglycemia).
<5.0 may indicate a need for Folic Acid.

Lab Test Review: Blood Sugar Control

Insulin (fasting)

QT – High: Insulin Resistance

QT – Low: Pancreas problem – Type I Diabetes, insulin "bank account" is depleted.

What is it?

A hormone that helps glucose move from the blood (serum) to inside the tissue and cells of the body so that glucose can be used in the creation of cellular energy (ATP).

Where does it come from?

The pancreas . . . more specifically the beta cells of the pancreatic islets (islets of Langerhans).

Lab Test Review: Blood Sugar Control

Insulin (fasting)

Why do we care about it clinically?

- With no insulin (or insulin resistance) glucose increases in the blood and can begin to damage cells and tissues. ↑ glucose makes the body chemistry more acidic which makes it easier for illness, infection, disease and cancer to develop.
- Insulin also helps move glucose from the blood and into storage in the fat cells, skeletal muscle and liver.
- ↑ insulin and/or ↑ glucose = more body fat.
- ↑ insulin strongly inhibits movement of glucose out of the liver which then converts to fat = fatty liver disease.
- ↑ insulin can directly suppress a normal ovulation leading to ovarian cysts or PCOS, estrogen dominance, excess estrogen can directly suppress thyroid function, and a whole domino effect of bad things keep happening.

Lab Test Review: Blood Sugar Control

Insulin (fasting)

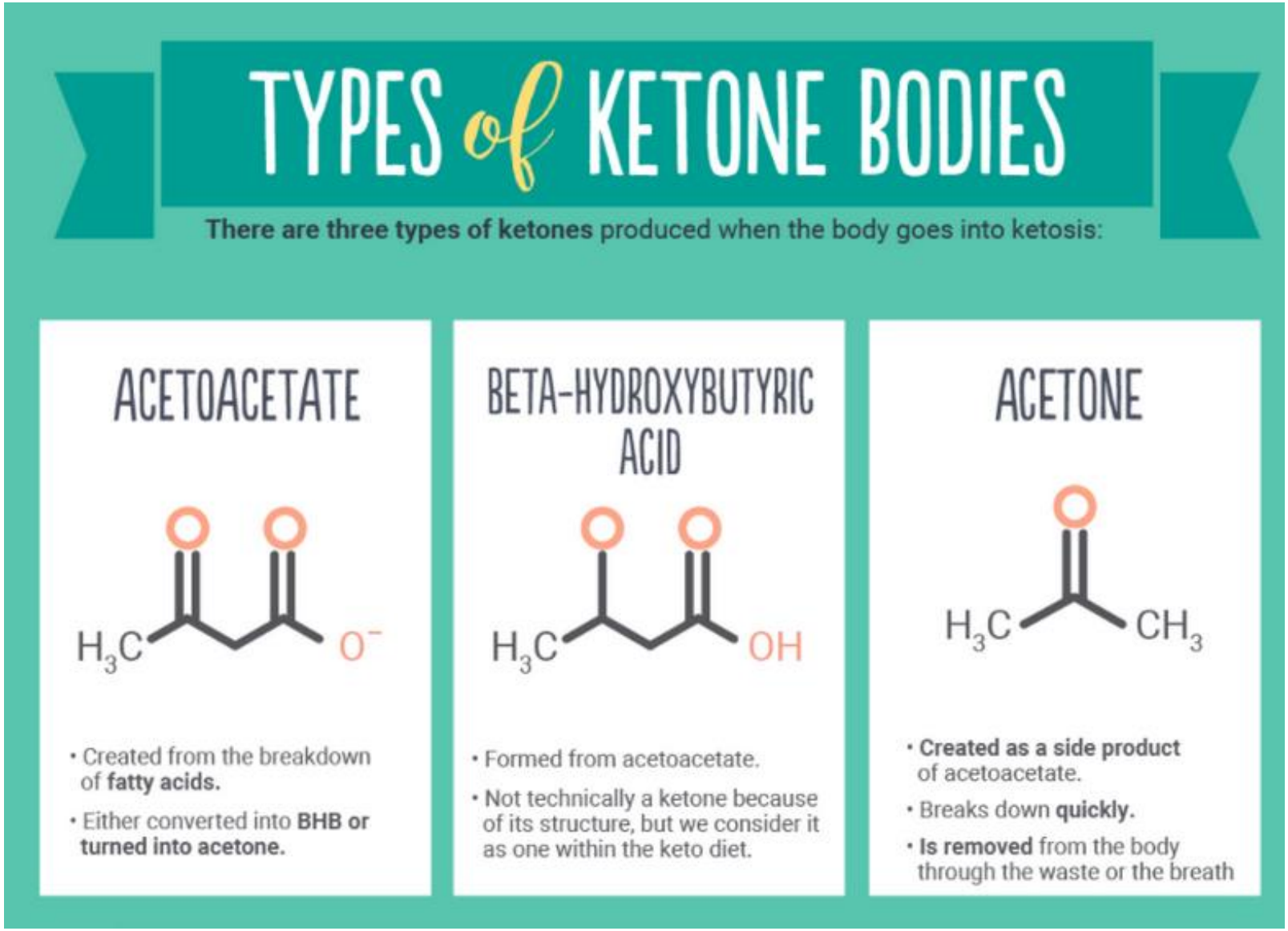
What does it mean if it's too high?

- Increased production by the pancreas due to insulin resistance (cells have become resistant to insulin).
- Excess and abnormal production by an insulin producing tumor (very rare).
- ALWAYS confirm if they truly did a 12 hour fasting prior to their blood draw.

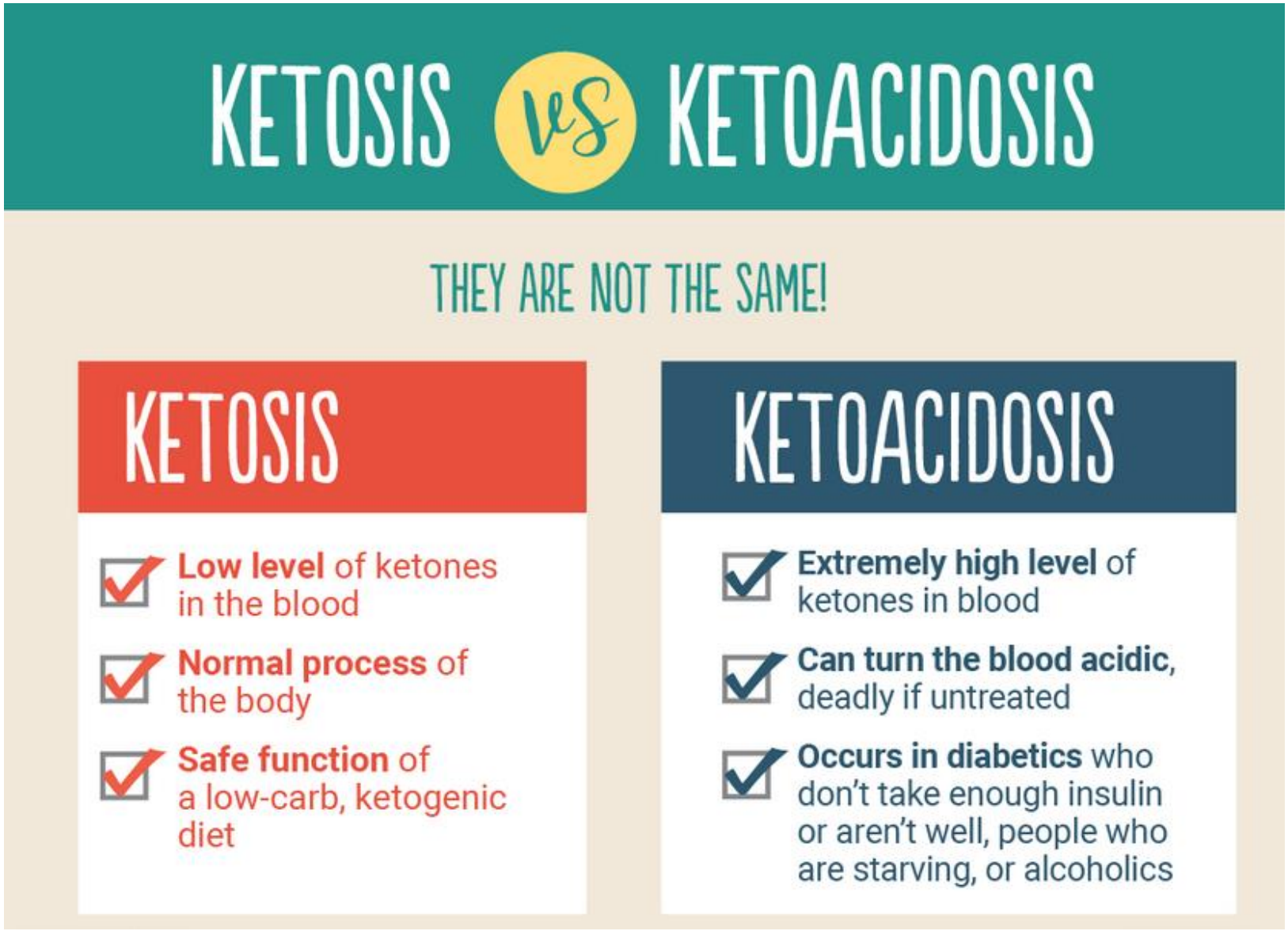
What does it mean if it's too low?

- Poor production / no production by the pancreas. Sugar (glucose) in the blood increases. Cells are starving for energy. Brain is starving for fuel . . . and the brain is unhappy.
- To make the brain happy again we produce ketones (produced by liver) as the back-up energy supply (the back-up generator) – good in the short-term but proceed with caution in the long-term.

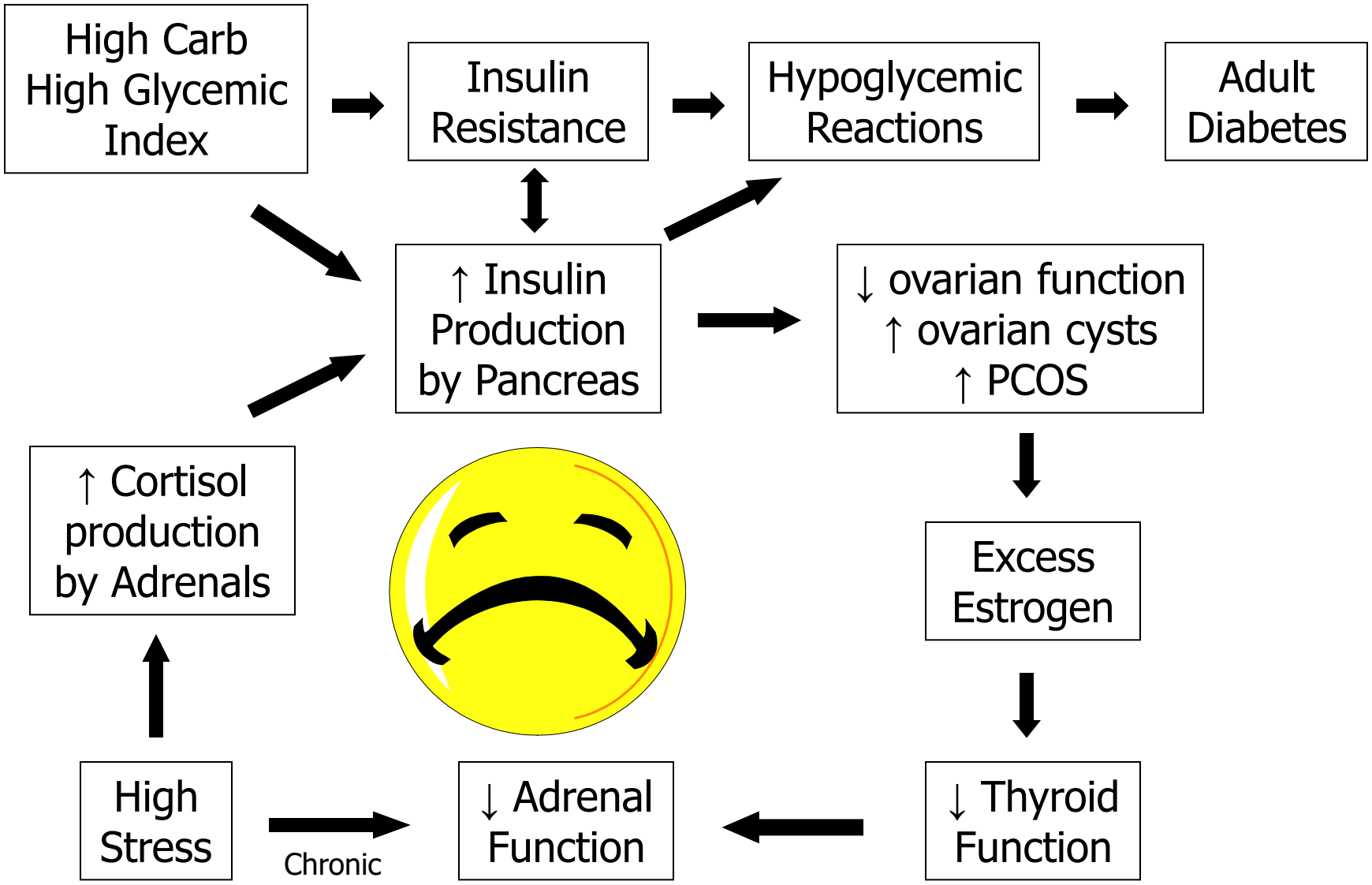
Lab Test Review: Blood Sugar Control



Lab Test Review: Blood Sugar Control



Blood Sugar & Hormone Imbalances



Questions

Blood Lab Testing System

Simple • Effective • Scientific

Let's discuss everything that happens AFTER you create the lab report

- Reviewing the lab results.
- Creating the dietary, nutritional and lifestyle recommendations.
- Prioritizing those recommendations.
- Explaining the lab results to your patient.
- Reviewing recommendations.
- Getting the patient started and follow-up.

Blood Lab Testing System

Simple • Effective • Scientific

Let’s have you create your 2nd lab report for the Comprehensive Lab Panel:

Case Study #2:
Ima Hurtin

This patient started out as a chiropractic patient with reoccurring right upper back and right shoulder pain.

Blood Lab Testing System
Simple • Effective • Scientific

Lab Test Review: Kidney & Liver Function

Uric Acid, Serum:

QT – High: Poor blood sugar control, Pseudo-Gout, Gout
QT – Low: B12 / Folic Acids deficiency, Molybdenum deficiency

What is it?
A nitrogen-containing byproduct during metabolic breakdown of purines and protein, and it is normally removed in the urine.

Where does it come from?
Purines are organic compounds found in high concentrations in meat and meat products . . . especially when eating organs like liver and kidney. Plant-based diets are usually low in purines.

Lab Test Review: Kidney & Liver Function

Uric Acid, Serum:

Why do we care about it clinically?

- Another indicator of poor blood sugar control – insulin resistance and/or elevated glucose.
- Could be contributing to general aches and pains throughout the body when in the functional high (pseudo-gout).
- Could be the origin of pain and inflammation in a specific joint of the body – classically big toe but could affect other joints as well.
- Can increase the formation of kidney stones (ammonium acid urate).

Lab Test Review: Kidney & Liver Function

Uric Acid, Serum:

What does it mean if it's too high?

- Insulin resistance
- Kidney's not filtering it out of blood . . . poor kidney function.
- Function High: possible pseudo-gout
- Clinical High: possible gout.
- Also can be increased with inflammation and stress.

What does it mean if it's too low?

- Molybdenum deficiency -with MCV, MCH, and homocysteine levels normal.
- Vitamin B12 / Folic Acid deficiency – with MCV, MCH and/or homocysteine levels elevated.

Lab Test Review: Kidney & Liver Function

BUN (Blood Urea Nitrogen):

QT – High: Poor kidney function

QT – Low: Digestive dysbiosis (increased bacterial overgrowth)

What is it?

A byproduct of metabolism of proteins that are consumed.

Where does it come from?

Primarily made in the liver from protein metabolism and protein digestion. Remove from the body by the kidneys.

Lab Test Review: Kidney & Liver Function

BUN (Blood Urea Nitrogen):

Why do we care about it clinically?

- It tells us about kidney, liver and digestive function.
- Skin problems are more likely to develop with low kidney function, and ↑BUN is an early indicator of lower kidney function.

What does it mean if it's too high?

- Lower kidney function
- Low HCL
- Only accurate after a 12 hour fast before blood draw.

What does it mean if it's too low?

- Low HCL leading to poor protein digestion leading to intestinal dysbiosis.
- Dietary protein intake is low.
- Low functioning liver.
- Sign of 88: BUN is < 8 and total protein is > 8 . . . favorable for developing cancer.

Lab Test Review: Kidney & Liver Function

Creatinine, Serum:

QT – High: Low kidney function, enlarged prostate or uterus

QT – Low: Low protein intake, low HCL, low liver function

What is it?

A breakdown product of creatine phosphate in muscle tissue during muscle contraction.

Where does it come from?

Creatine is produce by the liver, and metabolized in the skeletal and heart muscle to then become Creatinine.

Lab Test Review: Kidney & Liver Function

Creatinine, Serum:

Why do we care about it clinically?

- Tells us about liver and kidney function, and poor protein intake and poor protein digestion.

What does it mean if it's too high?

- Poor kidney function
- Urine obstruction due to enlarged prostate when above 1.1 (with increased monocytes) before you see PSA increase, or enlarged uterus (pregnancy or fibroids).

What does it mean if it's too low?

- Low protein intake, poor protein digestion (low HCL)
- Low muscle mass on the body
- Poor liver function

Lab Test Review: Kidney & Liver Function

BUN/Creatinine Ratio:

The BUN/Creatinine Ratio adds little information beyond simply understanding the reasons for abnormal values to BUN and Creatinine individually.

So we will skip this one and go to the next!

Lab Test Review: Kidney & Liver Function

Protein, Total, Serum:

QT – High: Dehydration, low HCL, excessive protein intake

QT – Low: ↓protein intake, low HCL, poor liver function

What is it?

Albumin + Globulin = Total Protein

Where does it come from?

Liver – when proteins are consumed they must first be processed by the liver to become the proteins in the blood.

Lab Test Review: Kidney & Liver Function

Protein, Total, Serum:

Why do we care about it clinically?
Can tell us about protein intake, protein digestion, and liver function.

What does it mean if it's too high?
Dehydration, low HCL, excessive protein intake, RA.

What does it mean if it's too low?
Poor liver function, low protein intake or poor protein digestion (low HCL), absorption, or digestive inflammation.

Lab Test Review: Kidney & Liver Function

Albumin, Serum:

QT – High: Rare to see . . . maybe dehydration

QT – Low: Poor liver function, low protein intake, low HCL

What is it?

Major protein the blood.

Where does it come from?

Liver

Lab Test Review: Kidney & Liver Function

Albumin, Serum:

Why do we care about it clinically?

- Responsible for much of the osmotic pressure of fluids between the tissues and blood.
- Albumin is an important transporter of nutrients, hormones and resources to all the cells and tissues of the body.
- Do NOT like to see it below 4.0 as cells are less happy and disease / cancer is more likely to develop.
- < 3.5 considered a danger zone, and are more likely to have or develop a serious pathology.

Lab Test Review: Kidney & Liver Function

Albumin, Serum:

What does it mean if it's too high?

- Dehydration

What does it mean if it's too low?

- Low protein intake
- Poor protein digestion / low HCL
- Poor liver function

Lab Test Review: Kidney & Liver Function

Globulin, Total:

QT – High: Rare to see . . . possible dehydration.

QT – Low: Chronic infection, poor liver function, low protein intake, low HCL

What is it?

A family of different proteins in the blood made up of different fractions (types) of globulin.

Where does it come from?

Liver and immune system.

Lab Test Review: Kidney & Liver Function

Globulin, Total:

Why do we care about it clinically?

- Globulin is used by the body to create the many different immunoglobulins for proper immune function.
- Used in the creation of antibodies, carrier proteins for hormones (thyroglobulin), blood cells and enzymes.

What does it mean if it's too high?

- Acute infection
- Inflammation

What does it mean if it's too low?

- Chronic viral or bacterial infection / low immune function
- Poor liver function
- Poor digestion / low HCL
- Anemia

Lab Test Review: Kidney & Liver Function

A/G Ratio:

A low A/G Ratio (less than 1.0) is considered an ominous sign for increased likelihood of having or developing a serious disease or pathology.

The A/G Ratio adds little information beyond simply understanding the reasons for abnormal values to Albumin and Globulin individually.

Lab Test Review: Kidney & Liver Function

Bilirubin, Total, Serum:

QT – High: Gilbert's Syndrome, liver/GB problem, RBC destruction

QT – Low: No worries.

What is it?

Formed when hemoglobin is broken down.

Where does it come from?

When RBC are injured or breakdown . . . the breakdown of hemoglobin releases bilirubin into the blood.

Lab Test Review: Kidney & Liver Function

Bilirubin, Total, Serum:

Why do we care about it clinically?
Tells us about RBC destruction.

What does it mean if it's too high?

- Slight elevation that remains stable – think Gilbert's Syndrome. Genetic variation that decreases an enzyme needed for easy removal of bilirubin. Affects @ 5% of the population.
- Liver / gallbladder obstruction
- Increased RBC destruction – infection, autoimmune, heart valve problem.

What does it mean if it's too low?

- Old RBC are always dying off so you will likely always see some bilirubin in the blood.
- Possibly low functioning spleen if very low.

Lab Test Review: Kidney & Liver Function

Bilirubin, Total, Serum:

Direct (Conjugated) vs. Indirect (Unconjugated)

Conjugation means that the bilirubin has been linked, connected or bound to something else. This conjugation of bilirubin takes place in the liver making it water soluble and leaving though the bile (some kidney).

High Indirect (unconjugated) Bilirubin means a higher destruction of RBC somewhere else in the body resulting in an increase of the un-bound (unconjugated) version in blood testing before getting to the liver.

High Direct (conjugated) Bilirubin means the bilirubin has found its way to the liver, has been directly bound to something, but unable to leave the body due to a likely obstruction/dysfunction of the liver or GB.

Lab Test Review: Kidney & Liver Function

Alkaline Phosphatase:

QT – High: Liver problem, increased bone activity

QT – Low: Zinc deficiency

What is it?

An enzyme found in all tissues of the body, but mostly in the liver and bone tissue. Has it's maximum activity at a pH of 9.0 – 10.0 . . . thus the term "Alkaline" Phosphatase.

Where does it come from?

Mostly from the liver and bone tissue, but in smaller amounts in all tissues of the body.

Lab Test Review: Kidney & Liver Function

Alkaline Phosphatase:

Why do we care about it clinically?

- It indicates a problem in the liver or bone when elevated.
- It is a zinc dependent enzyme and indicates a zinc deficiency when lower than optimal.

What does it mean if it's too high?

- Liver inflammation, infection or other liver/GB obstruction or problem.
- Bone fracture healing, new bone growth – osteoblastic activity (as in a teenagers bones growing), or some type of bone pathology.
- Can be slightly increased 2 to 4 hours after eating a fatty meal.

What does it mean if it's too low?

This is a zinc dependent enzyme . . . meaning your body needs enough zinc in order to produce this enzyme. Low Alkaline Phosphatase is strong indicator for low zinc levels in the body.

What other signs or symptoms might was see with a zinc deficiency?

Lab Test Review: Kidney & Liver Function

LDH (Lactate Dehydrogenase):

QT – High: Cell injury or destruction

QT – Low: no concerns

What is it?

Enzyme found in all tissues of the body.

Where does it come from?

From all tissues of the body, but normally found within the cell . . . so to find it elevated in the serum means that cell destruction is occurring somewhere in the body.

Lab Test Review: Kidney & Liver Function

LDH (Lactate Dehydrogenase):

Why do we care about it clinically?
Means that abnormal cell destruction / cell death is happening somewhere in the body.

What does it mean if it's too high?

- Elevated 36-55 hours after a Myocardial Infarction.
- Non-specific for cell destruction occurring anywhere in the body.
  Note: this can fluctuate up and down more quickly in blood testing. Repeat testing can reveal if this is a short-term tissue injury or a longer cell destruction process.
- Falsely elevated with hemolysis (RBC destruction) during blood draw.
- Falsely elevated with strenuous exercise before blood draw.

What does it mean if it's too low?

- Reactive Hypoglycemia
- Heavy Metal issue with decreased isoenzyme #5

LD (LDH) Isoenzyme Testing

Diagnostic importance of LDH

Type	Composition	Location	Importance
LDH1 30%	HHHH	Heart, RBC,	Myocardial infarction
LDH2 35%	HHHM	White cells	Megaloblastic anemia Leukemia, malignancy
LDH3 20%	HHMM	Lung	Pulmonary infarction
LDH4 10%	HMMM	Kidney, placenta, pancreas	Kidney and pancretic disease.
LDH5 5%	MMMM	Liver, skeletal muscle	Liver disease, muscle injury

Lab Test Review: Kidney & Liver Function

AST (SGOT):

QT – High: Cardiac problem, Liver problem
QT – Low: Low liver function, low Vitamin B6

What is it?
Enzyme – Aspartate Aminotransferase.

Where does it come from?
Some in the liver, but mostly in the heart, muscle, brain, kidneys and lungs. This enzyme gets released into the bloodstream when damage happens to these tissues.

Lab Test Review: Kidney & Liver Function

AST (SGOT):

Why do we care about it clinically?
Helps us learn if damage is happening to specific tissues.

What does it mean if it's too high?
Cell damage is happening to the heart, muscle, brain, liver, kidneys, or lungs.

What does it mean if it's too low?
Vitamin B6 (pyridoxine) deficiency as AST is a B6 dependent enzyme.

Lab Test Review: Kidney & Liver Function

ALT (SGPT):

QT – High: More specific to a Liver problem

QT – Low: Low liver function, Vitamin B6 deficiency

What is it?

Enzyme – Alanine Aminotransferase.

Where does it come from?

Found mostly in the liver, but in some other tissues as well like: heart, muscle and kidney.

Lab Test Review: Kidney & Liver Function

ALT (SGPT):

Why do we care about it clinically?
Helps us learn if damage is happening to specific tissues – more specifically to the liver.

What does it mean if it's too high?

- Liver stress – possibly inflammation or infection. As we get closer to 100 we're thinking about fatty liver. AS we get closer to 200 we are thinking about Hepatitis.

What does it mean if it's too low?
Vitamin B6 (pyridoxine) deficiency as ALT is a B6 dependent enzyme.

Lab Test Review: Kidney & Liver Function

GGT:

QT – High: Gall Bladder problem, Liver problem

QT – Low: Vitamin B6 deficiency

What is it?

Enzyme – Gamma Glutamyl Transferase

Where does it come from?

Gall Bladder and Liver, to a lesser extent in the kidney, prostate and pancreas.

Lab Test Review: Kidney & Liver Function

GGT:

Why do we care about it clinically?

Elevated levels help us to differentiate between a liver or gall bladder problem. Higher GGT usually means its more likely a Gall Bladder (biliary tree) issue.

What does it mean if it's too high?

- Elevates with chronic alcohol intake.
- If higher than AST and ALT . . . more likely a problem of the biliary tree – gall bladder, common bile duct and pancreas.
- Could be elevated with a liver problem, but ALT should be higher to reflect the liver problem.

What does it mean if it's too low?

- Vitamin B6 (pyridoxine) deficiency as GGT is a B6 dependent enzyme.
- Possible magnesium deficiency.

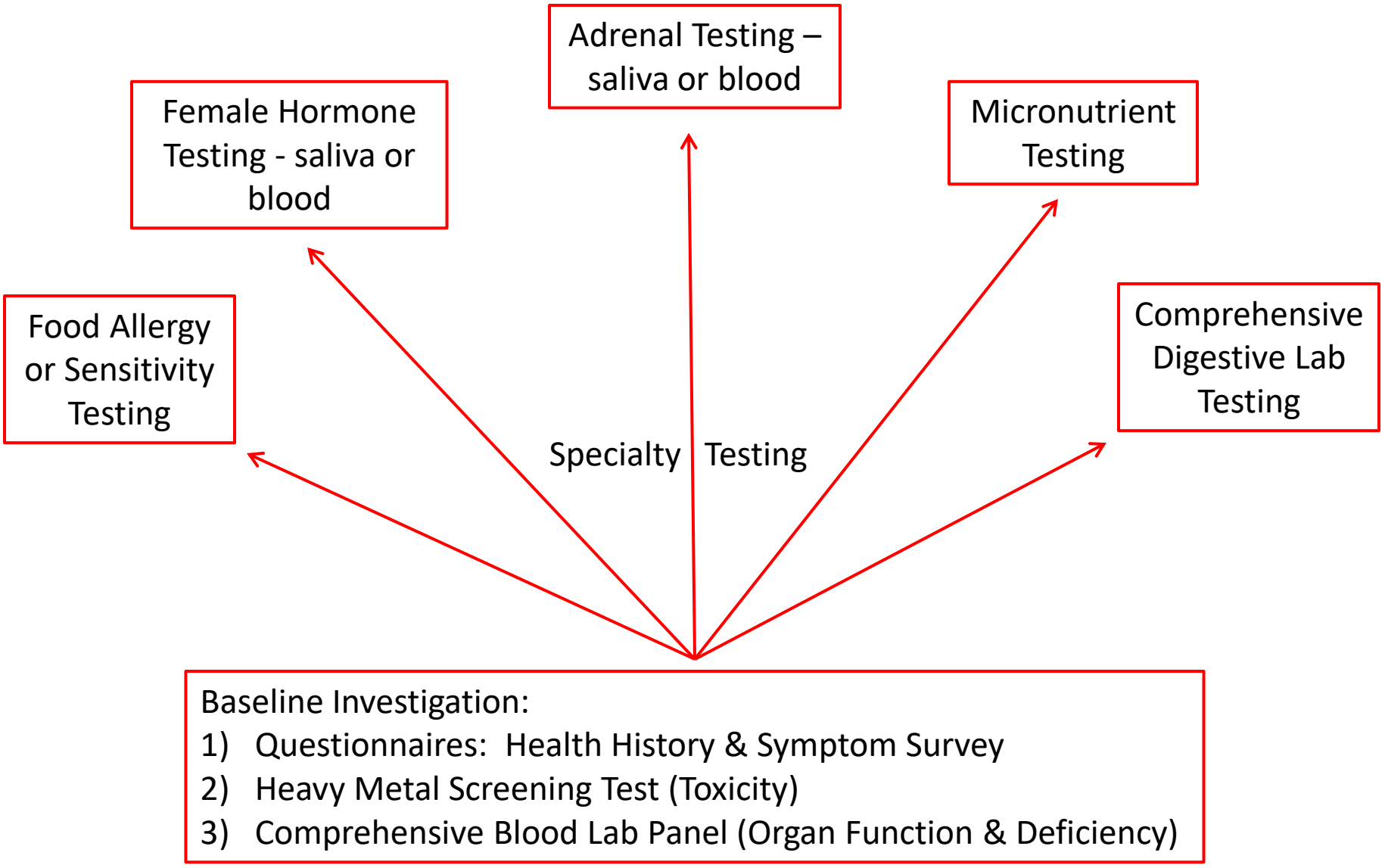
Questions

Blood Lab Testing System

Simple • Effective • Scientific

Developing Your Thought Process

- Organizing your thinking around the patients symptoms and health problems and what lab tests to order.
- What is your strategy for creating dietary, nutritional and lifestyle recommendations and prioritizing those recommendations.
- The Natural Healthcare Funnel



Blood Lab Testing System

Simple • Effective • Scientific

Prioritizing Recommendations

Remove Negative Factors

- Infection
- Inflammation
- Chemical & Heavy Metal Toxicity
- Food Allergy / Sensitivity
- Excess Sugar in the Blood and your food
- Body pH that is too acidic
- Excess Hormones - Estrogen / Cortisol / Insulin
- Nerve Interference / Subluxation
- Other Excess Stress - Mental / Emotional / Physical

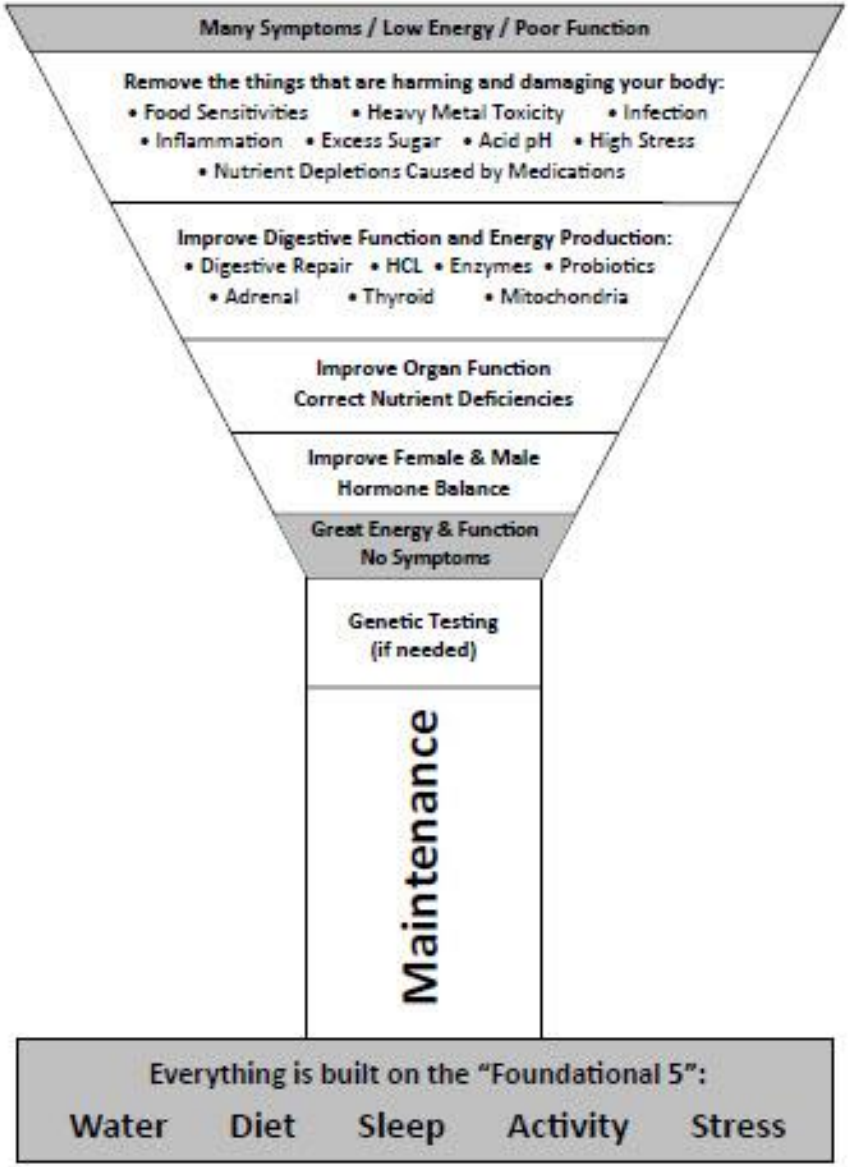
Bring in Positive Factors

- Correcting Nutrient Deficiencies:
  - Vitamins
  - Minerals
  - Amino Acids
  - Fatty Acids
  - Enzymes
- Balance or Improve Organ Function
- Correct Low Hormone Levels
- Improve Digestive Function
- Improve Immune Function

Blood Lab Testing System

Simple • Effective • Scientific

The Natural Healthcare Funnel



Blood Lab Testing System

Simple • Effective • Scientific

Let’s have you create your 3rd lab report for the Comprehensive Lab Panel:

Case Study #3: Ima IronMan

Blood Lab Testing System

Simple • Effective • Scientific

Another case: 24 year old male with fatigue and just not feeling good.

Iron Bind. Cap. (TIBC)	348	0 - 249	NA	250 - 350	351 - 450	451 or higher
UIBC	218	0 - 149	150 - 199	200 - 300	301 - 375	376 or higher
Iron, Serum	130	0 - 34	35 - 79	80 - 125	126 - 155	156 or higher
Iron Saturation	37	0 - 14	15 - 19	20 - 40	41 - 55	56 or higher
Ferritin, Serum	659	0 - 30	31 - 79	80 - 250	251 - 400	401 or higher
Cholesterol, Total	241	0 - 99	100 - 154	155 - 199	NA	200 or higher
Triglycerides	871	NA	0 - 74	75 - 100	101 - 149	150 or higher
HDL Cholesterol	32	0 - 39	40 - 59	60 - 80	81 - 99	100 or higher
T. Chol/HDL Ratio	7.5	NA	NA	0.0 - 2.5	2.6 - 4.4	4.5 or higher
C-Reactive Protein, Cardiac	0.97	NA	NA	0.00 - 0.99	1.00 - 3.00	3.01 or higher
Homocysteine, Plasma	7.5	NA	NA	0.0 - 8.9	9.0 - 15.0	15.1 or higher

Hereditary Hemochromatosis

Result: H63D/H63D

Two copies of the same mutation (H63D and H63D) identified

Interpretation:

This patient's sample was analyzed for the hereditary hemochromatosis (HH) mutations C282Y, H63D, and S65C. Two copies of H63D were identified. Results for C282Y and S65C were negative. The mutations analyzed by LabCorp are most common in the Caucasian population. Although some patients with this genotype experience biochemically defined abnormalities of iron overload, the penetrance for clinical symptoms, such as cirrhosis, cardiomyopathy, diabetes and arthropathy, is low. The diagnosis of HH should not rely on DNA testing alone. Diagnosis of HH should include clinical findings and other test results, such as transferrin-iron saturation and/or serum ferritin studies and/or liver biopsy. HH is inherited in a recessive manner.

Lab Test Review: Electrolytes & Iron Status

TIBC (Total Iron Binding Capacity):

QT – High: Iron levels too low

QT – Low: Iron levels too high

What is it?

Measure how much iron is able to bind to a protein (transferrin) that is responsible for transporting iron throughout the body.

Where does it come from?

Nowhere. This is a calculated measurement.

Lab Test Review: Electrolytes & Iron Status

TIBC (Total Iron Binding Capacity):

Why do we care about it clinically?
Only slightly useful as an indicator of iron status.

What does it mean if it's too high?
A lot of binding sites are available on transferrin indicating there may no be enough iron in the body.

What does it mean if it's too low?
Very few binding sites are available on transferrin indicating there may be too much iron in the body.

Lab Test Review: Electrolytes & Iron Status

UIBC (Unsaturated Iron Binding Capacity):

QT – High: Iron levels too low

QT – Low: Iron levels too high

What is it?

Measure the portion of the transport protein for iron (transferrin) that has been not saturated with iron. Essentially a duplicate measurement of TIBC.

Where does it come from?

Nowhere. This is a calculated measurement.

Lab Test Review: Electrolytes & Iron Status

UIBC (Unsaturated Iron Binding Capacity):

Why do we care about it clinically?
Only slightly useful as an indicator of iron status.

What does it mean if it's too high?
If there is not enough iron bound to this transport protein (called transferrin) then this protein is poorly saturated with iron and the UIBC (the unsaturated portion) will measure at a higher level. This would indicate that there may not be enough iron in the body.

What does it mean if it's too low?
if most of this transport protein is highly saturated with iron . . . then the UIBC (the unsaturated portion) will be at a much lower level. This would indicate that there may be too much iron in the body.

Lab Test Review: Electrolytes & Iron Status

Iron, Serum:

QT – High: Excess iron in the body

QT – Low: Iron deficiency

What is it?

Mineral

Where does it come from?

Iron comes from food, water, supplements we consume.

Lab Test Review: Electrolytes & Iron Status

Iron, Serum:

Why do we care about it clinically?

- Iron is necessary for healthy hemoglobin which transports oxygen throughout the body.
- Low iron = low hemoglobin = low oxygen in the body = fatigue and not feeling good.

What does it mean if it's too high?

- Person is consuming too much iron.
- Hemochromatosis – genetic condition resulting in high iron.
- Inflammatory process in the body.

What does it mean if it's too low?

- Person is likely not consuming enough iron.
- Person is loosing iron due to bleeding.
- Poor iron digestion – low HCL.
- Poor liver function.

Lab Test Review: Electrolytes & Iron Status

Iron Saturation:

QT – High: Excess iron in the body

QT – Low: Iron deficiency

What is it?

Iron Saturation is a measure of how much Transferrin is saturated with iron, and this is measured as a percentage.

Where does it come from?

Nowhere. This is a calculated measurement.

Lab Test Review: Electrolytes & Iron Status

Iron Saturation:

Why do we care about it clinically?

Helps us understand if too much or too little iron is in the body.

What does it mean if it's too high?

- Person is consuming too much iron.
- Hemochromatosis – genetic condition resulting in high iron.
- Inflammatory process in the body.

What does it mean if it's too low?

- Person is likely not consuming enough iron.
- Person is loosing iron due to bleeding.
- Poor iron digestion – low HCL.
- Poor liver function.

Lab Test Review: Electrolytes & Iron Status

Ferritin, Serum:

QT – High: Excess iron in the body

QT – Low: Iron deficiency

What is it?

A protein found within the cells that stores iron in the body.

Where does it come from?

Found mostly in the bone marrow, liver, spleen, brain and skeletal muscle. Very little ferritin in the blood (normally).

Lab Test Review: Electrolytes & Iron Status

Ferritin, Serum:

Why do we care about it clinically?
Tells us if iron storage has exceed capacity, or if there is to little iron stored away in reserves.

What does it mean if it's too high?

- Person is consuming too much iron.
- Hemochromatosis – genetic condition resulting in high iron.
- Inflammatory process in the body.

What does it mean if it's too low?

- Person is likely not consuming enough iron.
- Person is loosing iron due to bleeding.
- Poor iron digestion – low HCL.
- Poor liver function.

Lab Test Review: Electrolytes & Iron Status

Sodium, Serum:

QT – High: Dehydration, hyper-adrenal, high sodium intake

QT – Low: hypo-adrenal, low sodium intake

What is it?

Mineral and electrolyte regulated by kidneys.

Where does it come from?

Foods and beverages.

Lab Test Review: Electrolytes & Iron Status

Sodium, Serum:

Why do we care about it clinically?
Your kidneys regulate sodium to keep within a very narrow range in your blood, but it is also strongly affected by the adrenals.

What does it mean if it's too high?

- Dehydration
- Kidney problem
- Excessive sodium intake in diet or beverages
- Hyper-adrenal function

What does it mean if it's too low?

- Low salt intake
- kidney problems
- hypo-adrenal function

Lab Test Review: Electrolytes & Iron Status

Potassium, Serum:

QT – High: Poor blood draw, kidney problem, acidic chemistry

QT – Low: kidney problem, digestive problem, alkaline chemistry

What is it?

Mineral and electrolyte that is critical to cell metabolism and muscle function . . . including heart muscle.

Where does it come from?

Food and beverages.

Lab Test Review: Electrolytes & Iron Status

Potassium, Serum:

Why do we care about it clinically?
Most potassium is located in your cells, so high serum potassium could mean cell destruction or poor blood draw. Also tells us about kidney function.

What does it mean if it's too high?

- Poor blood draw
- Kidney problem
- Dehydration
- Medication / diuretics
- More acidic body chemistry

What does it mean if it's too low?

- Kidney problem
- Medications / Diuretics (potassium-wasting)
- Digestive problem / Low HCL
- More alkaline body chemistry

Lab Test Review: Electrolytes & Iron Status

Chloride, Serum:

QT – High: Dehydration, kidney problem, acidic chemistry
QT – Low: Low HCL, hypo-adrenal

What is it?
Mineral and electrolyte

Where does it come from?
Food and beverages

Lab Test Review: Electrolytes & Iron Status

Chloride, Serum:

Why do we care about it clinically?
Helps to regulate fluid in the body, and helps maintain acid-alkaline balance in your body. We need chloride for the stomach to produce HCL.

What does it mean if it's too high?

- Dehydration
- Kidney problems
- Hyper-adrenal function
- Acidic chemistry

What does it mean if it's too low?

- Possible low HCL
- Alkaline body chemistry
- Hypo-adrenal function

Lab Test Review: Electrolytes & Iron Status

Carbon Dioxide, Total:

QT – High: Kidney problem, respiratory problem
QT – Low: Acidic body chemistry

What is it?
An electrolyte. Total Carbon Dioxide is actually a measure of a bicarbonate (an alkaline molecule), and not a measure of the CO2 gas in the blood since carbon dioxide in the blood occurs mostly in the form of a bicarbonate molecule.

Where does it come from?
Cellular respiration and regulated by the kidneys.

Lab Test Review: Electrolytes & Iron Status

Carbon Dioxide, Total:

Why do we care about it clinically?

Bicarbonate (what we call Total Carbon Dioxide in blood lab testing) is a highly alkaline molecule which helps to neutralize metabolic acids and very important in maintaining acid-alkaline balance of your body chemistry.

What does it mean if it's too high?

- Alkaline body chemistry
- Kidney problem
- Respiratory problem
- Low HCL
- Excessive bicarbonate antacid intake
- Hyper-adrenal function

What does it mean if it's too low?

- Acidic body chemistry
- Kidney problem
- Hypo-adrenal

Lab Test Review: Electrolytes & Iron Status

Calcium, Serum:

QT – High: Parathyroid problem, hyperthyroid

QT – Low: Low HCL, Low Vitamin D, low calcium intake

What is it?

Mineral

Where does it come from?

Food, beverages and supplements.

Lab Test Review: Electrolytes & Iron Status

Calcium, Serum:

Why do we care about it clinically?

The most abundant mineral in the body, and does more than just help with bone density. Important for muscle function, nervous system, heart function, immune function and more.

What does it mean if it's too high?

- Significantly elevated – possible hyper-parathyroid gland problem.
- Slightly elevated – hyperthyroid or thyroid medication dose is too high.
- Excessive Vitamin D intake
- Hypo-adrenal function

What does it mean if it's too low?

- Significantly decreased – possible hypo-parathyroid gland problem.
- Slightly decreased – hypothyroid or thyroid medication dose is too low.
- Low HCL
- Low Vitamin D

Lab Test Review: Electrolytes & Iron Status

Phosphorus, Serum:

QT – High: Hypo-parathyroid, kidney problem, excess Vitamin D
QT – Low: Hypo-parathyroid, low Vitamin D, Low HCL

What is it?
Mineral

Where does it come from?
Food and beverages

Lab Test Review: Electrolytes & Iron Status

Phosphorus, Serum:

Why do we care about it clinically?
Vital for energy (ATP) production, muscle and nerve function, bone tissue, and in helping to maintain the acid-alkaline balance of your body chemistry.
Phosphorus is inversely related to calcium – as one increases the kidney excrete more of the other.

What does it mean if it's too high?

- Hypo-parathyroid (rare to see)
- Will normally be higher with bone growth and bone fracture healing.
- Kidney problem
- Vitamin D intake is too high
- High intake of phosphoric acid within soda pop

What does it mean if it's too low?

- Hyper-parathyroid (rare to see)
- Vitamin D deficiency (common to see)
- Low stomach acid / low HCL (common to see)

Lab Test Review: Electrolytes & Iron Status

Magnesium, Serum:

QT – High: Rare to see, excessive Mg intake?
QT – Low: Low HCL, low Mg intake

What is it?
Mineral. About half stored in muscle and half stored in bone.

Where does it come from?
Food, beverage and supplements

Lab Test Review: Electrolytes & Iron Status

Magnesium, Serum:

Why do we care about it clinically?
Important for energy production, hormone balance, brain chemistry (memory), heart function, and proper muscle function. One of the most common mineral deficiencies.

What does it mean if it's too high?

- Excessive Mg intake – antacids or supplements
- Kidney problem
- Hypo-thyroid

What does it mean if it's too low?

- Low Mg intake
- Low HCL or other digestive problem
- Hyper-thyroid
- Low Mg = tighter skeletal muscles (muscle cramps) and tighter smooth muscles (increase blood pressure)

Questions

Blood Lab Testing System

Simple • Effective • Scientific

Let’s have you create your 4th lab report for the Comprehensive Lab Panel:

Case Study #4: Ima CardioRisk

Lab Test Review: Electrolytes & Iron Status

Total Cholesterol:

QT – High: Low hormones, low antioxidants, Start with diet and/or detox, can be early indicator for low thyroid.

QT – Low: Poor liver function, hyper-thyroid

What is it?

- Total Cholesterol is the sum total of all 3 lipoproteins – HDL, LD and VLDL.
- Precursor to many hormones.
- A pretty good antioxidant.

Where does it come from?

About 75% is from liver and about 25 from diet.

Lab Test Review: Electrolytes & Iron Status

Total Cholesterol:

Why do we care about it clinically?

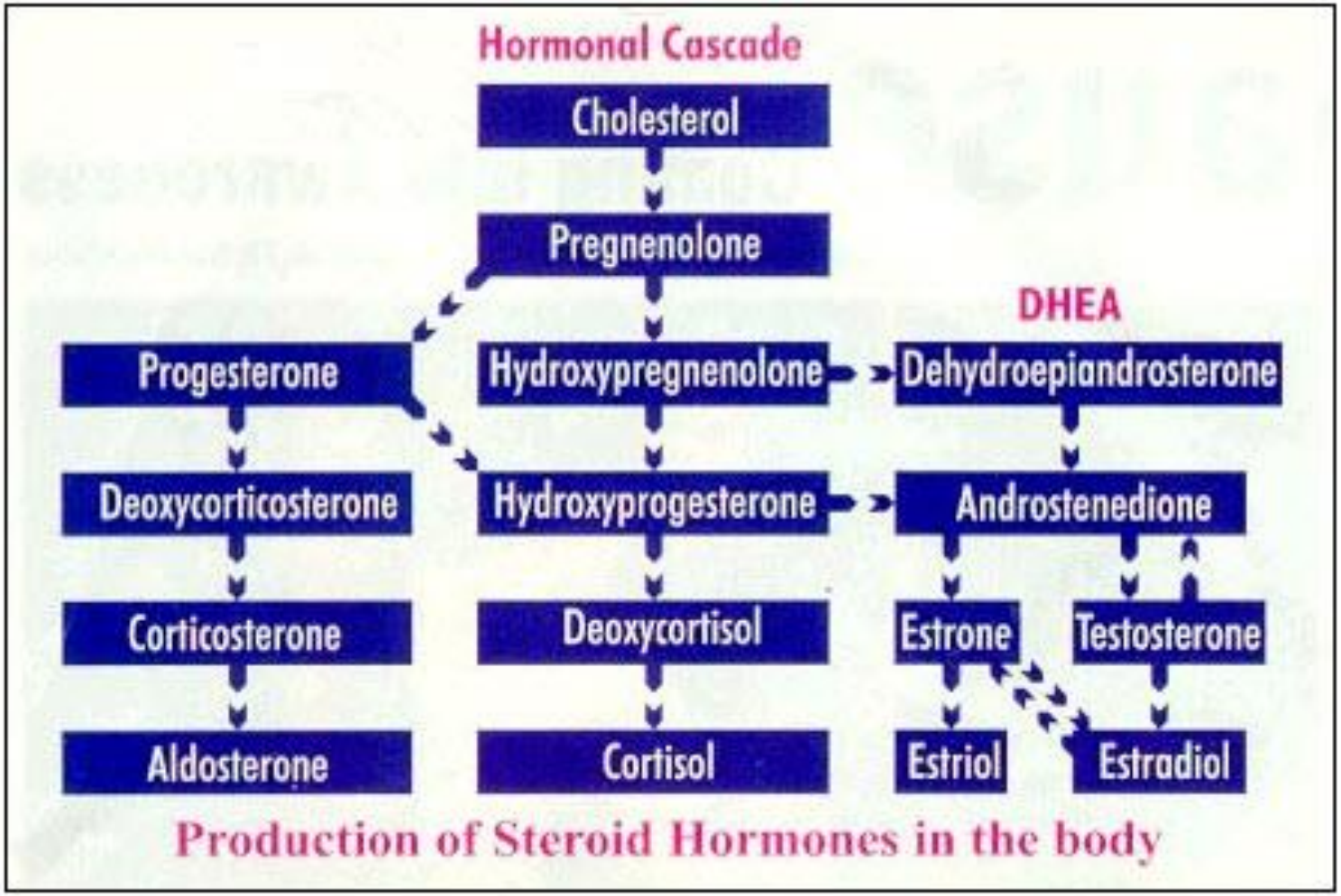
- Too high = cardiovascular risk
- Too low = cancer risk

What does it mean if it's too high?

- Blood sugar issues / excessive sugar, carb or fat intake.
- Hypo-thyroid / Hypo-adrenal
- Genetic predisposition
- Allergy / sensitivity to egg

What does it mean if it's too low?

- Poor liver function
- Hyper-thyroid / Hypo-adrenal
- Digestive problem / poor fat absorption / very low fat intake
- A very rapid drop in cholesterol = possible pathology



Lab Test Review: Electrolytes & Iron Status

Triglycerides:

QT – High: Insulin Resistance, hypo-thyroid, too much alcohol

QT – Low: Hyper-thyroid, autoimmune with HDL >80

What is it?

A Triglyceride is a substance that has sugar and fat combined together. Fuel source for cells.

Where does it come from?

Liver and Diet

Lab Test Review: Electrolytes & Iron Status

Triglycerides:

Why do we care about it clinically?
Strong indicator for insulin resistance when elevated.
Strong indicator of excessive alcohol intake.

What does it mean if it's too high?

- Blood sugar issues / excessive sugar, carb or fat intake.
- Hypo-thyroid / Hypo-adrenal
- Genetic predisposition
- Extremely high Triglycerides can indicate pancreatitis or excessive alcohol intake.

What does it mean if it's too low?

- Poor liver function
- Hyper-thyroid / Hypo-adrenal
- Digestive problem / poor fat absorption / very low fat intake
- A possible autoimmune condition - especially with a high HDL at >80.

Lab Test Review: Electrolytes & Iron Status

HDL Cholesterol:

QT – High: Possible autoimmune condition

QT – Low: Insulin Resistance

What is it?

- High Density Lipoprotein
- Referred to as the "good cholesterol". Helps to transport cholesterol from the blood vessel walls and various tissues around the body to the liver for processing.

Where does it come from?

Liver

Lab Test Review: Electrolytes & Iron Status

HDL Cholesterol:

Why do we care about it clinically?

- High HDL = lower cardiovascular risk
- Low HDL = higher cardiovascular risk
- HDL carries cholesterol to the adrenals, ovaries and testes for steroid hormone production.

What does it mean if it's too high?

- Autoimmune, inflammatory or cell destruction.
- Hypo-thyroid

What does it mean if it's too low?

- Deficiency of health fats / Omega 3 EFA
- Insulin resistance
- A diet high in sugar and carbs
- Hyper-thyroid
- Sedentary lifestyle

Lab Test Review: Electrolytes & Iron Status

VLDL Cholesterol:

QT – High: Cardiovascular risk

QT – Low: Rare to see.

What is it?

VLDL Low Density Lipoprotein. Transports triglycerides to cells for energy of body fat for storage.

Where does it come from?

Liver.

Lab Test Review: Electrolytes & Iron Status

VLDL Cholesterol:

Why do we care about it clinically?

- As VLDL increases = increase in cardiovascular problems.

What does it mean if it's too high?

- Deficiency of health fats / Omega 3 EFA
- Insulin resistance
- A diet high in sugar and carbs
- Hyper-thyroid
- Sedentary lifestyle

What does it mean if it's too low?

Rare to see. Starvation?

Lab Test Review: Electrolytes & Iron Status

LDL Cholesterol:

QT – High: Cardiovascular risk

QT – Low: Rare to see.

What is it?

Low Density Lipoprotein. Carries fat and cholesterol to cells.

Where does it come from?

- Liver
- It is a calculated measurement.
- LDL = Total Cholesterol – (HDL + Triglyceride/5)

Lab Test Review: Electrolytes & Iron Status

LDL Cholesterol:

Why do we care about it clinically?

- As LDL increases = increase in cardiovascular problems.
- LDL delivers fat molecules to the cells and can drive the progression of atherosclerosis if they become oxidized within the walls of arteries.

What does it mean if it's too high?

- Deficiency of health fats / Omega 3 EFA
- Insulin resistance
- A diet high in sugar and carbs
- Hyper-thyroid
- Sedentary lifestyle

What does it mean if it's too low?

Rare to see. Starvation?

Lab Test Review: Electrolytes & Iron Status

HDL/Cholesterol Ratio:

QT – High: Higher cardiovascular risk

QT – Low: Lower cardiovascular risk

What is it?

A ratio of HDL to Total Cholesterol. A calculated measurement.

Where does it come from?

- No one knows. It just appeared one day. It's so weird!
- Just kidding – it came from some of the sharpest minds in human history.
- Still kidding – its just a ratio. Some providers use it some don't. It's more valuable to know the individual readings.

Lab Test Review: Electrolytes & Iron Status

HDL/Cholesterol Ratio:

Why do we care about it clinically?
Just a ratio. Better to understand the individual readings.

What does it mean if it's too high?
Increased cardiovascular risk.

What does it mean if it's too low?
Lower cardiovascular risk.

Lab Test Review: Electrolytes & Iron Status

C-Reactive Protein (CRP), Cardiac (High Sensitivity):

QT – High: Inflammation, infection , trauma.

QT – Low: Possible viral issue when very low.

What is it?

- CRP is not inflammation.
- CRP is a protein whose levels rise in response to inflammation.

Where does it come from?

IL-6 stimulates the liver to produce CRP. IL-6 is produced by macrophages and adipocytes.

Lab Test Review: Electrolytes & Iron Status

C-Reactive Protein (CRP), Cardiac (High Sensitivity):

Why do we care about it clinically?

CRP is a more sensitive and accurate reflection of the acute phase response than the ESR. ESR may be normal while CRP is elevated.

What does it mean if it's too high?

Inflammation, infection, trauma, malignancy , allergic reaction, sleep apnea.

What does it mean if it's too low?

We want it to be low, but if it's surprisingly low may indicate a possible viral issue.

Lab Test Review: Electrolytes & Iron Status

Homocysteine, Plasma

QT – High: Increased cardio risk, B12, Folic acid, B6 deficiency.
QT – Low: Lower glutathione production = Lowered capacity to handle oxidative stress and certain types of toxin exposure.

What is it?
An amino acid.

Where does it come from?
It is biosynthesized from methionine by the removal of its terminal methyl group. Homocysteine can be recycled into methionine or converted into cysteine with the aid of certain B-vitamins.

Lab Test Review: Electrolytes & Iron Status

Homocysteine, Plasma

Why do we care about it clinically?

A high level of homocysteine in the blood makes a person more prone to endothelial cell injury, which leads to inflammation in the blood vessels which can result in ischemic injury. High homocysteine is therefore a possible risk factor for coronary artery disease.

What does it mean if it's too high?

- Increased cardiovascular risk
- Low B12, low folic acid, low B6

What does it mean if it's too low?

- Lowered ability to handle oxidative stress (free radicals) and less tolerance to certain toxins.
- The most common treatment for low homocysteine is administration of sulfur-containing amino acids such as methionine, N-acetylcysteine and taurine.

Lab Test Review: Electrolytes & Iron Status

Fibrinogen Activity:

QT – High: Increased tendency for blood clot formation
QT – Low: Liver problem

What is it?
This does not measure fibrinogen. Measures the tendency for clots to form.

Where does it come from?
Fibrinogen is a protein produced by your liver.

Lab Test Review: Electrolytes & Iron Status

Fibrinogen Activity:

Why do we care about it clinically?

The Fibrinogen Activity test does NOT measure the amount of Fibrinogen in your blood. Instead it measures the activity or function of Fibrinogen and its ability to help you form a blood clot.

What does it mean if it's too high?

- Potential for easier clot formation in the blood.
- May be elevated simply due to inflammation.

What does it mean if it's too low?

- Poor liver function
- Blood clots have difficulty forming when needed to properly stop bleeding.

Questions

Blood Lab Testing System

Simple • Effective • Scientific

We are done for today!

Leave

Rest your brain and get a good nights sleep.

Be ready to learn more tomorrow starting at 8:00 am.

****

Bring a lunch or large snack with you for tomorrow as we will be working through lunchtime to be completed by 2:00 pm.

****

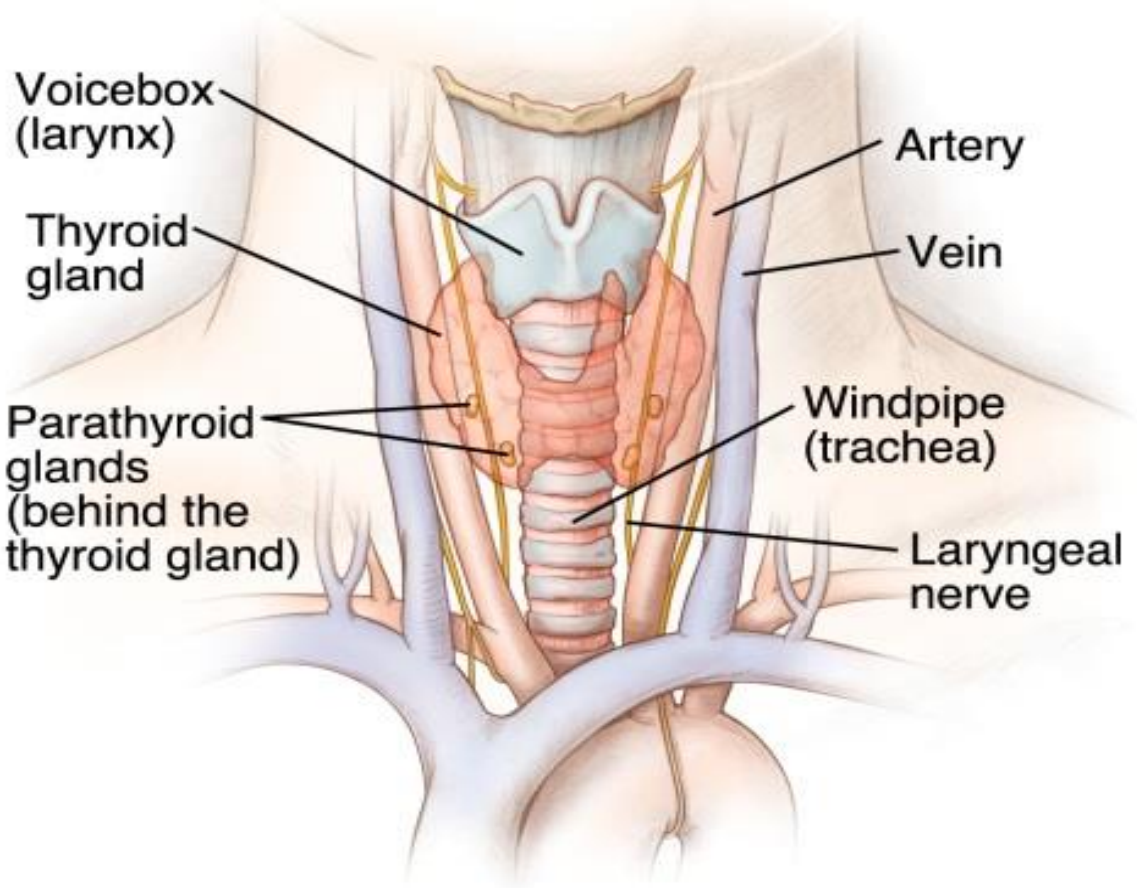
See you tomorrow!

Blood Lab Testing System

Simple • Effective • Scientific

Welcome to Thyroid School

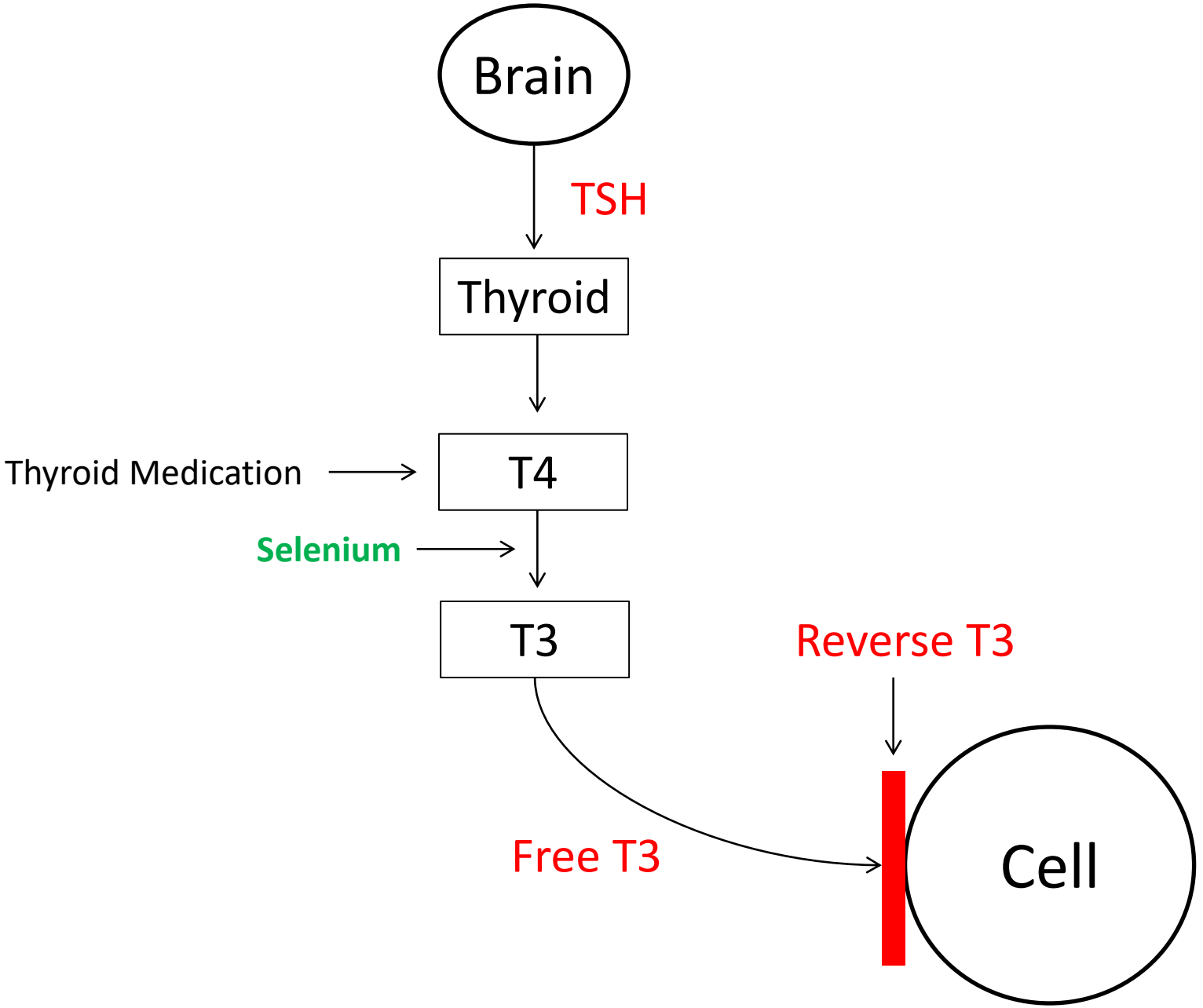
Where is the thyroid gland located?



Blood Lab Testing System

Simple • Effective • Scientific

Welcome to Thyroid School



Let’s have you create your 5th lab report for the Comprehensive Lab Panel:

Case Study #5:
Ima Tired

Blood Lab Testing System

Simple • Effective • Scientific

Lab Test Review: Thyroid & Adrenal Function

TSH – Thyroid Stimulating Hormone:

QT – High: Hypothyroid
QT – Low: Hyperthyroid, low pituitary function

What is it?
A hormone that tells the thyroid to increase or decrease its output of thyroid hormone.

Where does it come from?
Pituitary

Lab Test Review: Thyroid & Adrenal Function

TSH – Thyroid Stimulating Hormone:

Why do we care about it clinically?

Gives a quick read if someone has too much or too little thyroid hormone in their body, but not as accurate as looking at the thyroid hormone levels directly.

What does it mean if it's too high?

- Functional high: Pre-Hypothyroid
- Clinical High: Clinical Hypothyroid.

What does it mean if it's too low?

- Hyperthyroid – too much thyroid hormone in the body.
- Low pituitary function – not able to produce enough TSH.

Lab Test Review: Thyroid & Adrenal Function

Thyroxine (Total T4):

QT – High: Hyperthyroid
QT – Low: Hypothyroid

What is it?
Measures the total amount of T4 in the body – both active form (Free T4) and the inactive form.

Where does it come from?
The thyroid produces mostly T4, and very little T3.

Lab Test Review: Thyroid & Adrenal Function

Thyroxine (Total T4):

Why do we care about it clinically?

Tells us if the thyroid is working well enough to produce enough thyroid hormone.

What does it mean if it's too high?

- Hyperthyroid – overactive thyroid.
- T4 thyroid medication (Synthroid / Levothyroxine) dose is too high.

What does it mean if it's too low?

- Hypothyroid – underactive thyroid.
- Taking a T3 only medication - Cytomel.

Lab Test Review: Thyroid & Adrenal Function

T3 Uptake:

QT – High: High testosterone

QT – Low: High estrogen (estrogen dominance)

What is it?

Has nothing to do with T3 levels. Measures the open or available (unsaturated) biding sites on thyroxine-binding proteins. In other words it has little practical value . . . who cares?

Where does it come from?

Nowhere. It is a calculated measurement with little diagnostic value.

Lab Test Review: Thyroid & Adrenal Function

T3 Uptake:

Why do we care about it clinically?

- Provides limited value as an individual test for thyroid.
- If both T4 and T3 Uptake are increased it helps confirm a true excess of T4 in the body.
- Low T3 Uptake is a strong indicator of Estrogen Dominance.

What does it mean if it's too high?

- Hyperthyroid – overactive thyroid
- Excess testosterone in the body

What does it mean if it's too low?

- Hypothyroid – underactive thyroid
- Excess estrogen in the body – estrogen dominance

Lab Test Review: Thyroid & Adrenal Function

Free Thyroxine Index:

QT – High: Hyperthyroid
QT – Low: Hypothyroid

What is it?
Indirect way to determine Free T4 (old method). Now we just measure Free T4 as a direct measure.

Where does it come from?
Nowhere. It is calculated by multiplying Total T4 and T3 Uptake together.

Lab Test Review: Thyroid & Adrenal Function

Free Thyroxine Index:

Why do we care about it clinically?
We don't. Skip it and just look at the Free T4 test.

What does it mean if it's too high?
Possible hyperthyroid

What does it mean if it's too low?
Possible hypothyroid

Lab Test Review: Thyroid & Adrenal Function

Triiodothyronine, Total (Total T3):

QT – High: Hyperthyroid
QT – Low: Hypothyroid

What is it?
Measures the total amount of T3 in the body – both active form (Free T3) and the inactive form.

Where does it come from?
Very little comes from the thyroid. Mostly comes from the conversion of T4 into T3 elsewhere in the body – mostly liver and some in the intestinal system.

Lab Test Review: Thyroid & Adrenal Function

Triiodothyronine, Total (Total T3):

Why do we care about it clinically?

Tells us if T4 is getting converted into T3 effectively.

What does it mean if it's too high?

- Hyperthyroid
- Thyroid medication dose is too high

What does it mean if it's too low?

- Hypothyroid
- Low selenium as selenium is a critical nutrient needed for proper conversation of T4 into T3.
- Poor liver function
- Poor digestive function / intestinal issues.

Lab Test Review: Thyroid & Adrenal Function

Triiodothyronine, Free (Free T3):

QT – High: Hyperthyroid
QT – Low: Hypothyroid

What is it?
Measures only the Free T3 in the body

Where does it come from?
Very little comes from the thyroid. Mostly comes from the conversion of T4 into T3 elsewhere in the body – mostly liver and some in the intestinal system.

Lab Test Review: Thyroid & Adrenal Function

Triiodothyronine, Free (Free T3):

Why do we care about it clinically?

- Free T3 is the bioactive form of thyroid hormone.
- This is the most important measure of thyroid function in regards to metabolism and energy levels.
- Free T3 is what communicates to the mitochondria of the cells to stimulate energy production.

What does it mean if it's too high?

- Hyperthyroid
- Thyroid medication dose is too high

What does it mean if it's too low?

- Hypothyroid
- Low selenium as selenium is a critical nutrient needed for proper conversation of T4 into T3.
- Poor liver function
- Poor digestive function / intestinal issues.

Lab Test Review: Thyroid & Adrenal Function

Reverse T3:

QT – High: Reverse T3 Dominance, Low selenium, high stress/cortisol, excess T4

QT – Low: Hypothyroid, too little T4 in the body

What is it?

Helps the body clear excess T4 out of circulation. Considered biologically inactive – this is questionable.

Where does it come from?

Conversion of excess T4 into Reverse T3 takes place mostly in the liver.

Lab Test Review: Thyroid & Adrenal Function

Reverse T3:

Why do we care about it clinically?

Reverse T3 Dominance. Reverse T3 can occupy binding sites on the cell wall and has a blocking effect on Free T3 preventing Free T3 from binding with cells. This means lower energy production = slower metabolism and more fatigue.

What does it mean if it's too high (Reverse T3 Dominance)?

- Too much T4 in the body due to hyperthyroidism or thyroid medication dose is too high.
- Higher cortisol levels due to high stress.
- Low selenium levels. Regardless of the reason for high Reverse T3 . . . more selenium is need to remove the high Reverse T3.

What does it mean if it's too low?

Possibly hypothyroid due to too little T4 in the body.

Lab Test Review: Thyroid & Adrenal Function

Free T4 (Direct):

QT – High: Hyperthyroid

QT – Low: Hypothyroid

What is it?

Measures only the free form of T4 in the body.

Where does it come from?

The thyroid produces mostly T4, and very little T3.

Lab Test Review: Thyroid & Adrenal Function

Free T4 (Direct):

Why do we care about it clinically?

Tells us if the thyroid is working well enough to produce enough thyroid hormone.

What does it mean if it's too high?

- Hyperthyroid – overactive thyroid.
- T4 thyroid medication (Synthroid / Levothyroxine) dose is too high.

What does it mean if it's too low?

- Hypothyroid – underactive thyroid.
- Taking a T3 only medication - Cytomel.

Lab Test Review: Thyroid & Adrenal Function

Thyroid Peroxidase (TPO) Antibody:

QT – High: Autoimmune thyroid

QT – Low: No concern.

What is it?

Antibody that attacks the enzyme (Thyroid Peroxidase) that helps bring iodine in to the thyroid follicle to make thyroid hormones.

Where does it come from?

The immune system as an abnormal (autoimmune) reaction.

Lab Test Review: Thyroid & Adrenal Function

Thyroid Peroxidase (TPO) Antibody:

Why do we care about it clinically?
Helps us learn of thyroid dysfunction is in-part due to an autoimmune reaction.

What does it mean if it's too high?
Autoimmune thyroid that can lead to a hyperthyroid and/or hypothyroid problem.

What does it mean if it's too low?
No concern

Lab Test Review: Thyroid & Adrenal Function

Thyroglobulin Antibody:

QT – High: Autoimmune thyroid

QT – Low: No concern.

What is it?

Antibody that attacks the protein Thyroglobulin which is a precursor to the creation of thyroid hormones T4 and T3. the enzyme (Thyroid Peroxidase) that helps bring iodine in to the thyroid follicle to make thyroid hormones.

Where does it come from?

The immune system as an abnormal (autoimmune) reaction.

Lab Test Review: Thyroid & Adrenal Function

Thyroglobulin Antibody:

Why do we care about it clinically?
Helps us learn of thyroid dysfunction is in-part due to an autoimmune reaction.

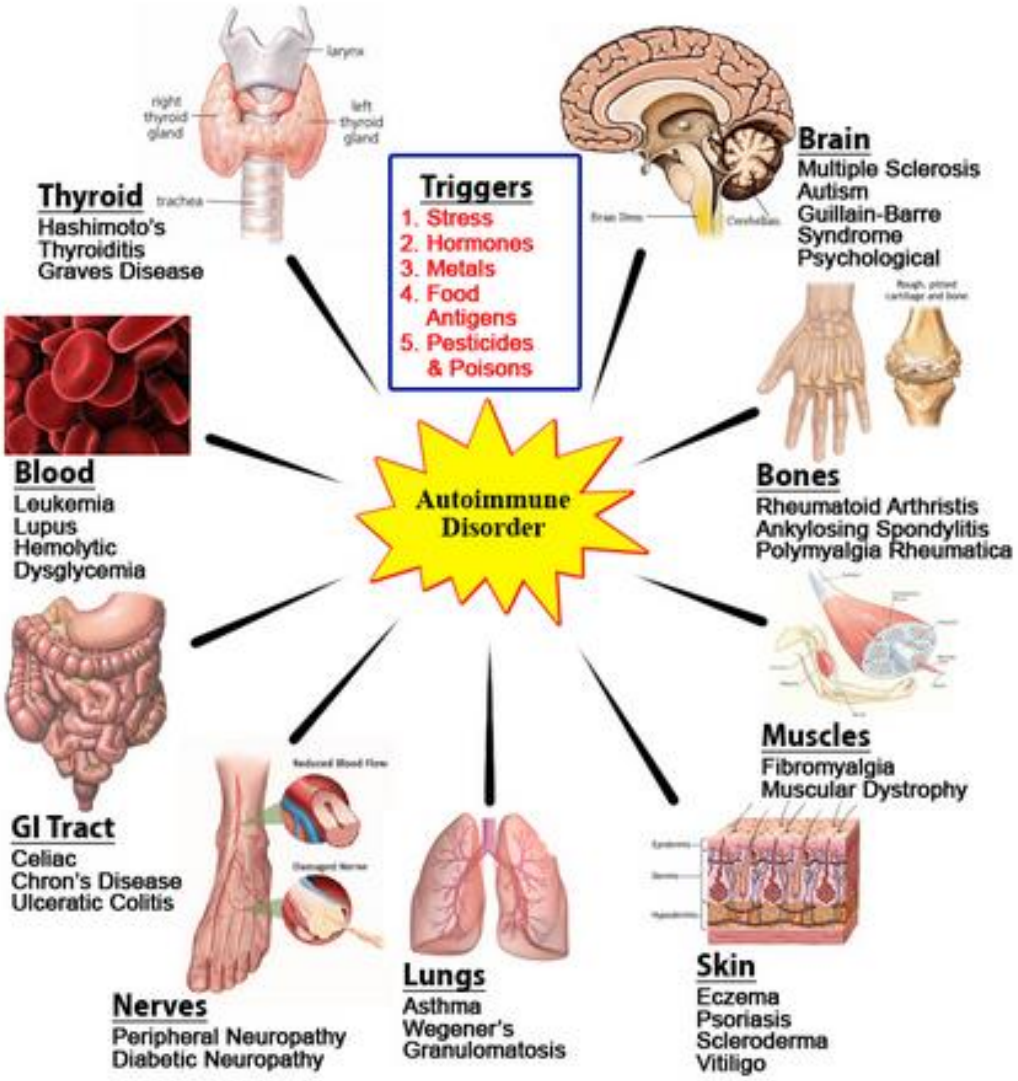
What does it mean if it's too high?
Autoimmune thyroid that can lead to a hyperthyroid and/or hypothyroid problem.

What does it mean if it's too low?
No concern

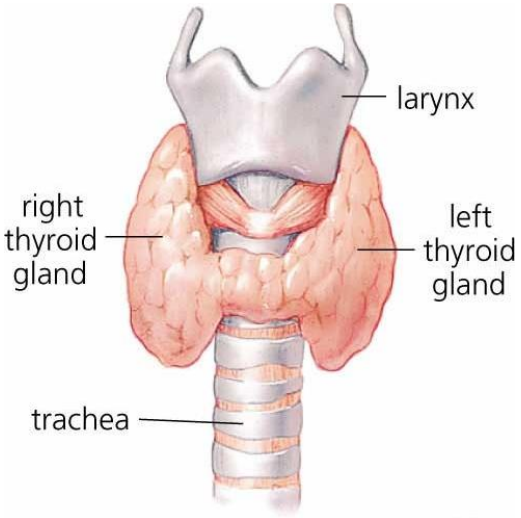
Autoimmune Discussion

What exactly is an auto-immune condition?

Tissues of The Body Affected By Autoimmune Attack



The Auto-Immune Thyroid



3 Things that promote the development of aggravation of the auto-immune thyroid problem:

Hashimoto's Thyroiditis
Grave's Disease

1. Invading Organisms
2. Toxic Heavy Metals
3. Food allergy / sensitivity
4. Inflammation

A couple key nutrients that are helpful in an auto-immune problem:

1. Vitamin D3
2. Omega-3 Fish Oil

Blood Lab Testing System
Simple • Effective • Scientific

Questions

Blood Lab Testing System

Simple • Effective • Scientific

Let’s have you create your 6th lab report for the Comprehensive Lab Panel:

Case Study #6:
Ima Sick

Blood Lab Testing System

Simple • Effective • Scientific

Lab Test Review: Immune Function and RBC Health

WBC - White Blood Cells:

QT – High: Acute infection, inflammation

QT – Low: Chronic infection, autoimmune problem

What is it? A grouping of the 5 different types of White Blood Cells when added together equal the total WBC count.

Where does it come from?

Bone Marrow

Lab Test Review: Immune Function and RBC Health

WBC - White Blood Cells:

Why do we care about it clinically?

White Blood Cells are important part of your immune system, and help to protect your body against invading organisms such as bacteria, viruses, parasites and fungal issues.

What does it mean if it's too high?

- Infection
- Inflammation
- Allergies or asthma
- Adrenal problem
- Bone marrow producing too many

What does it mean if it's too low?

- Chronic infection
- Autoimmune condition
- Adrenal problems
- Bone marrow not producing enough

Lab Test Review: Immune Function and RBC Health

Neutrophils:

QT – High: Bacterial infection, inflammation

QT – Low: Viral infection

What is it?

One type of WBC.

Where does it come from?

Bone marrow

Lab Test Review: Immune Function and RBC Health

Neutrophils:

Why do we care about it clinically?
Tells us if the immune system is dealing with bacterial challenge.

What does it mean if it's too high?

- Bacterial infection
- Inflammation
- Adrenal problems
- Respiratory problem – asthma, emphysema

What does it mean if it's too low?

- Chronic viral infection – often with increased lymphocytes.
- Adrenal problems
- Heavy metal exposure
- autoimmune conditions
- Food allergies

Lab Test Review: Immune Function and RBC Health

Lymphocytes:

QT – High: Viral Infection, inflammation

QT – Low: Bacterial infection

What is it?

One type of WBC.

Where does it come from?

Bone marrow

Lab Test Review: Immune Function and RBC Health

Lymphocytes:

Why do we care about it clinically?

Lymphocytes are primarily involved in fighting off viral infections, and they often become activated with inflammation.

What does it mean if it's too high?

- Viral infection
- Inflammation
- Hypo-adrenal, hypothyroid
- Autoimmune condition

What does it mean if it's too low?

- Bacterial infection – often with increased Neutrophils.
- Hyper-adrenal
- Autoimmune condition
- Multiple food allergies

Lab Test Review: Immune Function and RBC Health

Monocytes:

QT – High: Bacterial or viral infection, possibly parasite with high eosinophils. Mononucleosis (epstein-barr virus).

QT – Low: No concern

What is it?

One type of WBC.

Where does it come from?

Monocytes are produced in the bone marrow and then travel to tissues that are infected where they turn into a macrophage - a type of cell that consumes and removes infecting organisms, the fragments of damaged cells, and any other material left behind from an infection. It is typical to see Monocytes elevated in the final stages of an infection when the body is recovering from the infection.

Lab Test Review: Immune Function and RBC Health

Monocytes:

Why do we care about it clinically?

Kind of the clean-up crew that increases towards the tail-end of an infection to clean-up all the remnants of the immune attack.

What does it mean if it's too high?

- Bacterial or viral infection.
- Possible parasite – when combined with ↑ eosinophils
- Mononucleosis (Epstein-Barr virus)
- Inflammation
- Possible enlarged prostate (BPH) in men over 40 wen combined with ↑ Serum Creatinine and ↑ LDH (#4).

What does it mean if it's too low?

- No concerns

Lab Test Review: Immune Function and RBC Health

Eosinophils:

QT – High: Allergy (food or environmental), parasite

QT – Low: No concerns

What is it?

One type of WBC.

Where does it come from?

Bone marrow

Lab Test Review: Immune Function and RBC Health

Eosinophils:

Why do we care about it clinically?

Eosinophils are more often involved in parasite infections and environmental or food allergies and sensitivities.

What does it mean if it's too high?

- Environmental or food allergy/sensitivity
- Asthma or respiratory issues
- Hypo-adrenal
- Hyper-thyroid

What does it mean if it's too low?

- No concern

Lab Test Review: Immune Function and RBC Health

Basophils:

QT – High: Pretty much any type of inflammation or infection

QT – Low: No concerns

What is it?

One type of WBC.

Where does it come from?

Bone marrow

Lab Test Review: Immune Function and RBC Health

Basophils:

Why do we care about it clinically?

Once Basophils enter the tissue they are then referred to as a Mast cell. Both Basophils and Mast cells contain small pockets of powerful chemicals like histamine, serotonin and heparin which alter blood supply to tissues, help prevent clotting in inflamed tissue, and help mobilize the body's immune system. Basophils can be elevated in nearly any type of inflammatory condition or immune system reaction.

What does it mean if it's too high?

- Inflammation
- Infection
- Allergy
- Increased histamine

What does it mean if it's too low?

- No concerns

Lab Test Review: Immune Function and RBC Health

Immature Granulocytes:

QT – High: Immature WBC, acute infection, inflammation, bone marrow problem

QT – Low: No concerns

What is it?

A Granulocyte is a different type of White Blood Cell that you would normally NOT see in a healthy person's blood. Granulocytes are given their name because they contain many granules - which are microscopic pockets filled with enzymes and chemicals to digest invading organisms.

Where does it come from?

Bone Marrow

Lab Test Review: Immune Function and RBC Health

Immature Granulocytes:

Why do we care about it clinically?

The presence of Immature Granulocytes in the blood simply means that the bone marrow is releasing these granulocytes at a faster rate before some of them have had a chance to fully mature. This could happen with a severe infection or some type of disease process within the bone marrow.

What does it mean if it's too high?

- Acute infection – including sepsis
- Inflammatory disorders
- Bone marrow problem

What does it mean if it's too low?

- No concerns

Lab Test Review: Immune Function and RBC Health

RBC – Red Blood Cells:

QT – High: Dehydration, excess iron, high testosterone
QT – Low: Anemia, deficiency of iron/B12/Folic acid

What is it?
Primary cell of the blood to transport oxygen and carbon dioxide..

Where does it come from?
Bone marrow

Lab Test Review: Immune Function and RBC Health

RBC – Red Blood Cells:

Why do we care about it clinically?
Your Red Blood Cells are primarily responsible for picking up oxygen in your lungs, and transporting that oxygen to all the tissues of your body (with the help of hemoglobin located within the RBC). Your Red Blood Cells also have the important task of removing some carbon dioxide as a waste product of cell function, and transporting carbon dioxide back to the lungs so it can be removed from your body when you exhale during breathing.

Lab Test Review: Immune Function and RBC Health

RBC – Red Blood Cells:

What does it mean if it's too high?

- Dehydration
- Excess iron in body
- High testosterone levels
- Excess production by bone marrow (Polycythemia Vera)
- Kidney tumor resulting in excess production of erythropoietin
- Decreased oxygen in the body – smoking, asthma, sleep apnea

What does it mean if it's too low?

- Blood loss – ulcer, colon cancer, bladder or kidney infection, heavy menstrual bleeding
- Anemia – iron, B12, B6, Folic Acid, copper
- Autoimmune process
- Kidney damage or disease = less erythropoietin
- Bone marrow problem – not producing enough RBC

Lab Test Review: Immune Function and RBC Health

Hemoglobin:

QT – High: Same things that cause RBC to increase
QT – Low: Same things that cause RBC to decrease.

What is it?
The iron-containing protein in the red blood cells that transports oxygen.

Where does it come from?
Hemoglobin develops in cells in the bone marrow that become red blood cells. When red cells die, hemoglobin is broken up: iron is salvaged, transported to the bone marrow by proteins called transferrins, and used again in the production of new red blood cells.

Lab Test Review: Immune Function and RBC Health

Hemoglobin:

Why do we care about it clinically?
Hemoglobin is an important part of your Red Blood Cells that allows you to pick-up oxygen from your lungs and transports that oxygen to all the cells of your body. It also helps transport carbon dioxide from your cells back to the lungs to be removed from your body when you exhale during breathing.

What does it mean if it's too high?
Same as RBC info.

What does it mean if it's too low?
Same as RBC info.

Lab Test Review: Immune Function and RBC Health

Hematocrit:

QT – High:

QT – Low:

What is it?

Hematocrit is telling us what percentage of a blood sample is purely Red Blood Cells.

Where does it come from?

Nowhere and everywhere . . . it's like Batman!

Just kidding . . . it's just a calculation reflecting the percentage of the blood that is only RBC.

Lab Test Review: Immune Function and RBC Health

Hematocrit:

Why do we care about it clinically?
Helps to confirm anemia. RBC and Hemoglobin are more clinically useful.

What does it mean if it's too high?
Same things as high RBC

What does it mean if it's too low?
Same things as low RBC

Lab Test Review: Immune Function and RBC Health

MCV – Mean Corpuscular Volume:

QT – High: Folic acid and/or B12 deficiency
QT – Low: Iron deficiency

What is it?
Measures the average size or VOLUME of the Red Blood Cells.

Where does it come from?
It's a measure of volume in RBC.

Lab Test Review: Immune Function and RBC Health

MCV – Mean Corpuscular Volume:

Why do we care about it clinically?
When anemia is present the MCV, along with other measurements on the health of your Red Blood Cells, may help to determine the type of anemia. A high MCV indicates your Red Blood Cells are larger than normal.

What does it mean if it's too high?

- Anemia due to Folic Acid or B12 deficiency
- Low HCL

What does it mean if it's too low?

- Anemia - Iron deficiency, hemolytic anemia
- Low HCL – poor iron digestion and absorption
- Blood loss
- Vitamin B6 deficiency
- Lead or other heavy metal toxicity

Lab Test Review: Immune Function and RBC Health

MCH – Mean Corpuscular Hemoglobin:

QT – High: Folic acid and/or B12 deficiency
QT – Low: Iron deficiency

What is it?
MCH refers to the Mean Corpuscular Hemoglobin, or the average weight or mass of hemoglobin inside a Red Blood Cell.

Where does it come from?
This measurement is calculated by taking the total mass of hemoglobin and dividing this by the number of Red Blood Cells in a volume of blood.

Lab Test Review: Immune Function and RBC Health

MCH – Mean Corpuscular Hemoglobin:

Why do we care about it clinically?
When anemia is present the MCH, along with other measurements on the health of your Red Blood Cells, may help to determine the type of anemia.

What does it mean if it's too high?

- Anemia due to Folic Acid or B12 deficiency
- Low HCL

What does it mean if it's too low?

- Anemia - Iron deficiency, hemolytic anemia
- Low HCL – poor iron digestion and absorption
- Blood loss
- Vitamin B6 deficiency
- Lead or other heavy metal toxicity

Lab Test Review: Immune Function and RBC Health

MCHC – Mean Corpuscular Hemoglobin Concentration:

QT – High: Folic acid and/or B12 deficiency

QT – Low: Iron deficiency

What is it?

MCHC refers to Mean Corpuscular Hemoglobin Concentration, or how much of the Red Blood Cell is occupied by Hemoglobin.

Where does it come from?

It is calculate by dividing Hemoglobin by the Hematocrit.

Lab Test Review: Immune Function and RBC Health

MCHC – Mean Corpuscular Hemoglobin Concentration:

Why do we care about it clinically?

Can help us understand the type of anemia. This measurement is most helpful to evaluate if a person's treatment for anemia is working and their anemia is improving.

What does it mean if it's too high?

- Anemia due to Folic Acid or B12 deficiency
- Low HCL

What does it mean if it's too low?

- Anemia - Iron deficiency, hemolytic anemia
- Low HCL – poor iron digestion and absorption
- Blood loss
- Vitamin B6 deficiency
- Lead or other heavy metal toxicity

Lab Test Review: Immune Function and RBC Health

RDW – Red Cell Distribution Width:

QT – High: Anemia

QT – Low: Anemia

What is it?

RDW refers to Red Blood Cell Distribution Width, and this test measures if there is an abnormal variation in the size or width of your Red Blood Cells in a blood sample.

Where does it come from?

The average width on a sampling of Red Blood Cells.

Lab Test Review: Immune Function and RBC Health

RDW – Red Cell Distribution Width:

Why do we care about it clinically?

The RDW is only a relevant test for those people that have anemia, and is not a helpful measurement for those that do not have anemia. If anemia you will rely on other tests to determine what type.

What does it mean if it's too high?

Anemia

What does it mean if it's too low?

Anemia

Lab Test Review: Immune Function and RBC Health

Platelets:

QT – High: Inflammation, infection, tissue damage
QT – Low: Bone marrow problem, autoimmune problem

What is it?
Platelets are essential for normal blood clotting, and this test for Platelet Count is to determine the number of Platelets in your blood sample.

Where does it come from?
Platelets are formed in the bone marrow and have a life-span of 8 - 10 days, so the bone marrow must be constantly creating new platelets to replace the old ones and to replace ones that are lost due to bleeding.

Lab Test Review: Immune Function and RBC Health

Platelets:

Why do we care about it clinically?

Platelets help to stop bleeding by adhering to the location of blood vessel damage, by clumping together to form a "platelet plug", and by releasing chemicals that help to stimulate more Platelets to clump together. Platelets are part of a complex series of events in the body that leads to proper clotting when a person is bleeding - called a coagulation cascade.

What does it mean if it's too high?

- Infection or inflammation
- Oral contraceptive or estrogen replacement
- Tissue Damage or bleeding issue
- Bone marrow problem

What does it mean if it's too low?

- Decreased production by bone marrow
- Autoimmune – attaching platelets
- Heavy Metal Toxicity
- Vitamin K deficiency

Questions

Blood Lab Testing System

Simple • Effective • Scientific

Let’s have you create your 7th lab report for the Comprehensive Lab Panel:

Case Study #7:
Ima Hungry

Blood Lab Testing System

Simple • Effective • Scientific

Lab Test Review: Digestion and Individual Nutrients

Vitamin D, 25-Hydroxy:

QT – High: Excess Vitamin D intake

QT – Low: Low sun exposure, low Vitamin D intake.

What is it?

A fat-soluble "vitamin". In reality it is more like a hormone.

Where does it come from?

The major natural source of the vitamin is synthesis of cholecalciferol in the skin from cholesterol through a chemical reaction that is dependent on sun exposure.

Lab Test Review: Digestion and Individual Nutrients

Vitamin D, 25-Hydroxy:

Why do we care about it clinically?

Vitamin D is one of the most heavily research of all the individual vitamins and minerals for many years. Although it is referred to as a vitamin . . . the active form of Vitamin D functions in many ways like a hormone in the way it communicates and controls the function of your cells. It is responsible for increasing intestinal absorption of calcium, magnesium, and phosphate, and multiple other biological effects.

Some benefits of Vitamin D include:

- The pancreas needs enough Vitamin D to produce insulin.
- Important for hormone balance.
- Needed for balance of brain chemistry
- Affects energy production.
- Immune benefit – more of a viral benefit
- Cancer protective effects.
- Autoimmune regulation

Lab Test Review: Digestion and Individual Nutrients

Vitamin D, 25-Hydroxy:

What does it mean if it's too high?

- Excessive Vitamin D intake can lead to Hypervitaminosis D – resulting in calcium getting deposited abnormally in to wrong tissues such as the soft tissues (hypercalcemia).
- Nausea with excess vitamin D

What does it mean if it's too low?

- Low mineral absorption – calcium, magnesium, phosphate
- Refer to prior slide on benefits of Vitamin D.

Lab Test Review: Digestion and Individual Nutrients

Individual Nutrient Indicators:

- B1 – Thiamine (needed for glucose to cross the blood-brain barrier): ↑Glucose + ↓CO2
- B6 - ↓AST, ↓ALT
- B9 – Folate: Hemoglobin A1c less than 5.0
- B12 - ↓ Uric Acid, ↑ Homocysteine, ↑ MCV, ↑MCH
- Zinc - ↓ Alkaline Phosphatase
- Molybdenum - ↓ uric acid with normal MCV, normal MCH, normal homocysteine.

Working Lunch - feel free to eat a we continue talking

Specialty Lab Testing
Marketing
Turning though into ACTION!!!
Review
Questions

Blood Lab Testing System
Simple • Effective • Scientific