

Lesson #3 - Biomarkers Needed for Comprehensive Analysis of Dysfunction

I am often asked what biomarkers I put on my comprehensive blood panels, so I thought I'd share with you my thoughts on this important topic.

The rest of this article is going to follow my "Biomarkers Needed for Comprehensive Analysis of Dysfunction" handout, which you can get by [CLICKING THIS LINK](#).

My list starts out with blood glucose. Fasting Blood glucose is an essential biomarker to be running on any patients that you suspect have blood sugar dysregulation, which is probably about 90% I would think! So a very, very important biomarker to run.

BUN, creatinine, and eGFR, are all biomarkers for kidney disease and kidney dysfunction, a condition that I call renal insufficiency. BUN is also used to assess for dehydration and is used in my hypochlohydria pattern as well.

Then we have sodium, potassium, chloride, and CO₂. These constitute the electrolytes on a blood panel and are the body's anions and cations. We can use these four biomarkers to compute the Anion Gap, which is really helpful for looking at metabolic acidosis, metabolic alkalosis sleuthing out electrolyte insufficiency. The anion gap is also helpful for assessing thiamine insufficiency.

Sodium and potassium are two biomarkers that we look at for adrenal issues. In my [Functional Blood Chemistry Training Program](#) I go over a whole module on the adrenals and how you can use sodium and potassium and other various biomarkers to really get a good handle on the levels of adrenal dysfunction affecting our patients.

Uric acid is a really good marker for inflammation. From a more pathological perspective it tells us about gout and a dysfunction I have called pre-clinical gout, which is a migratory inflammation that can occur in patients with a high uric acid.

Protein, albumin and globulin are really important biomarkers in terms of the GI function and for determining the protein status in the body. Albumin is also one of my key markers for looking at liver function. Decreased albumin is one of those important signs that the liver is not functioning properly and the body may be overwhelmed with oxidative stress as well.

Calcium and phosphorus are obviously very important biomarkers in the body. Calcium can tell us about calcium need in the body and Phosphorous is part of a hypochlorhydria pattern. The software also looks at the ratios between the two.

Magnesium, if it is low, can help us determine if there is a magnesium deficiency. We can also add to that a decreased GGT, which is an important magnesium deficiency marker.

Alkaline phosphatase, AST, ALT, and LDH are part of the liver enzyme complex:

Alkaline phosphatase has different isoenzymes that are produced by different organ systems in the body, so we can look at an elevation of Alk phos in terms of the tissue that produces it: bone

or liver or gall bladder. An elevated Alk phos is a really good marker for the gall bladder. Low levels of alkaline phosphatase are very important for assessing for zinc deficiency.

AST and ALT are helpful for determining where in the body a particular dysfunction lies. ALT is a bit more specific to the liver and AST is more associated with issues outside of the liver, i.e. the heart or skeletal muscle.

Low LDH is a marker for reactive hyperglycemia. LDH above the optimal range is associated with tissue inflammation and tells us that something is happening on the tissue and cellular level.

Then we have our gall bladder markers: bilirubin (total, direct and indirect) and GGT. These biomarkers tell us about liver and gall bladder function and indirect bilirubin tells us about increased red blood cell destruction systemically and spleen health.

GGT is very much associated with the gall bladder. Levels will also be increased in any patients that are drinking alcohol.

Total globulin is a very important marker for hypochlorhydria and gastric inflammation and is also an immune and inflammation marker.

Serum iron and ferritin are the basic markers for looking at iron issues in the body. If you suspect iron deficiency anemia or situations of iron overload (hemosiderosis and hemochromatosis) you will want to add TIBC and the % transferrin saturation.

Vitamin D is something we should all be testing for.

Then we have the lipid panel: Total Cholesterol, triglycerides LDL, HDL, and the cholesterol HDL ratio. The software will also calculate the triglyceride/HDL ratio, which is associated with an increased risk of developing insulin resistance and type 2 Diabetes.

Then we have the basic Thyroid biomarkers. It's important to remember that TSH is just a very basic thyroid marker. In fact, I'm almost tempted to include not only total T3 and total T4 but also free T3 and free T4 to my comprehensive panel. We know that TSH levels are normal for many people who have thyroid symptoms. This is even true when we tighten the reference ranges up and look at it through the lens of a Functional Physiological range. Some people with thyroid issues have normal TSH, so it's important to look at the individual levels of the thyroid hormones themselves.

Next up is the total white blood cell count, which measures the sum of the absolute count of the individual white blood cells measured in the blood sample. We want to look at the total WBC count in relation to the individual white blood cells themselves: the neutrophils, lymphocytes, monocytes, eosinophils and basophils. These are usually expressed as a percentage of the total WBC count. This is really important for helping us assess immune issues in our patients. In a very simplistic explanation, neutrophils are usually elevated in bacterial infections, lymphocytes are usually elevated in viral infection, eosinophils are often elevated in allergies or intestinal parasites and basophils are often elevated in inflammation. Monocytes are often elevated in a chronic case of immune activation and are also often elevated after the acute phase of an illness.

The Functional Blood Chemistry Analysis Crash Course

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And then just at the top of the list we have the red blood cell count, hemoglobin, hematocrit, MCV, MCH, MCHC. These are what we call the Red Blood Cell Indices. These are very, very important for sleuthing out anemia. One of the things to remember about anemia is that anemia is a sign. It's not good enough to say "you're anemic". You have to qualify what type of an anemia you're looking at. So in my training I do go into a lot of the differences between hyperchromic versus hypochromic anemias, and microcytic versus macrocytic anemias. Looking at the red blood cell indices can be very helpful in sleuthing out B12 deficiencies, iron deficiency anemia and other forms of anemia.

Platelets play a role in blood clotting but can also help us assess oxidative stress. Finally, RDW is a calculated measurement of the average size of a red blood cell.

So that's a summary of the biomarkers to put on a basic panel. You can take this list and go to your lab and say I want to get a price quote on this panel. Then you can add biomarkers to the panel if and when you want to do further investigation.

For instance, if you're thinking that your patient has blood sugar issues, add a hemoglobin A1C, a fasting insulin, and a DHEA sulfate. You could also add in C-peptide and fructosamine if you really want to drill down to the blood sugar issues.

If you're looking at creating what I call a Comprehensive Anti-Aging panel, which is a panel for anyone over the age of 35, you're going to want to add in high sensitive C reactive protein, which is also known as Hs-CRP or Cardio CRP. You'll also want to add in homocysteine, fibrinogen, DHEA sulfate, total testosterone, free testosterone, estradiol, and for you male patients, a PSA test. The addition of these biomarkers will give you a really good comprehensive antiaging panel.

As I mentioned above, if you're wanting to rule out iron deficiency anemia you can add the TIBC or the total iron binding capacity with a percent transferrin saturation. Together with a serum iron, ferritin and a CBC you're going to have a good tool to uncover hidden iron deficiency and anemia issues in your patients. In my book I go through a table of how you can use these three: percent transferrin saturation, TIBC, and total iron and depending on whether they are up or down or normal it can actually mean various different things. So if you have my [book](#) there's a nice table that you can use for that.

If you're really wanting to get more information on your patient's thyroid function you will want to order more than just a TSH. The biomarkers you will need to run in order to round out your thyroid panel will be free T3, total T3, free T4, total T4, T3 uptake, and reverse T3. All of these will give you a good panel for evaluating the thyroid.

I hope you have found this helpful.

Until next time,

All the best,
Dicken

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