Blood Chemistry Intro: Immune Function

Transcript

Hello and welcome to our blood chemistry module. Today, we're going to talk about immune function and the part of the CBC that has the immune function indicators. Let's just go ahead and begin.

Before we begin, make sure that you know that this is not intended to replace a one-on-one relationship with a qualified healthcare professional and it's not medical advice, and especially when we're looking at some of these infectious disease markers, you've got to be really careful not to say to somebody, "Oh, you have a virus or you have a bacterial infection," or something like that because that's medical advice. It's just, "Oh, wow, you have the markers that are there that suggest that this might be going on." You may want to explore further and you ask lots of questions based on what you see. All their decisions should be made in partnership with a qualified professional.

The CBC immune system markers are first and foremost the white blood cells. We looked at anemia markers and those were related to red blood cells. The white blood cells are the immune system markers. We got the total, so WBC alone is just the total number of white blood cells. The range is generally in the 6 to 10 would be good. Some people have as low as 3 or 4 and they're doing okay, but it often suggest that there's something going on. When someone has low levels of white blood cells on a chronic basis, usually means there's some chronic inflammation or chronic infection that they're dealing with.

If they have super high levels just for short periods of time, then that's usually an active infection. They might come in and say they have, I don't know, pneumonia, you might see white blood cell counts in the 15 to 20 range. If they have a chronic autoimmune disease or a chronic low grade, like an H. pylori infection, we oftentimes see those white blood cells getting low.

The next set are the differentials. You'll also see it called the CBC with differential. If somebody says you want a CBC with differential, that means the differentials of the white blood cells, so we want to know not just how many white blood cells they have but what kinds of white blood cells they have. The neutrophils are often elevated in bacterial infection whereas the lymphocytes are often elevated in viral infection. When you have both going on concurrently, they could actually look quite normal.

When the monocytes get elevated, that's the second line of defense, and that's elevated in the recovery stage and also in chronic infection. Somebody comes in and their monocytes are 10 or 12, you might ask them, "Did you just get over a cold or a flu or a sinus infection, or you still have a sinus infection that you're fighting off?" Low-grade sinus infections people have for months at a time sometimes and that could be seen with a high level of monocytes. Basophils are related to histamines and to allergy and eosinophils related to parasites and allergy. Also, basophils are also related to parasites. These two are interrelated to each other, but basophils are particularly when there's elevated histamine.

If you have a bacterial infection, what you're going to see is the white blood cell is either going to be high or low. It's going to be high if it's an acute bacterial infection, like they just broke out with a staph infection or they've got an E. coli infection in their gut. It could be low if they've got this chronic infection, so they've got like hep C, chronic low-grade infection, or they've got something like a gut infection, a dysbiosis, a candida overgrowth, something like that that's going on or H. pylori that's been going on for a long time.

The neutrophils will generally be high out of range and the lymphocytes will generally be low and we'll be looking at those ranges in a bit. Generally, neutrophils are somewhere around 60% at the high end and lymphocytes are 40% at the high end, and ideally 0s of all the rest of them. With a viral infection, we're going to see white blood cells high or low again, right, depending on whether it's a chronic viral infection or they're dealing with an acute pneumonia or an acute upper respiratory infection. Neutrophils would be low and lymphocytes would be high.

When you're looking at the white blood cell differentials, when you're looking at the neutrophils and lymphocytes and eosinophils, et cetera, you want to look at the percentages rather than the absolute numbers. They give you the absolute numbers and you can calculate it yourself. Now, sometimes the labs don't give you that, and I've seen that when somebody in a different country is giving me numbers. They won't have it and you have to actually calculate it yourself. Then, you have to look at, we have 10,000 total white blood cells and we have 7,000 neutrophils, oh that's 70%, so you have to do the numbers yourself. I like to get the easy way out when they give us the percentages.

In viral infection, high or low, acute versus chronic; high is acute, low is chronic. Neutrophils are low and lymphocytes are high. Other things that might be going on in a viral infection in addition to the white blood cells, you might be seeing low levels of hematocrit. You might be seeing high levels of eosinophils and basophils and monocytes depending on what else might be going on concurrently, and you might see high MCVs. These are not absolutes, but these are some of the things you might see. If you see a combination of these things, you might be even more suspicious that it's a viral.

What are some other immune system markers that go along with these that we need to take a look at? If the uric acid's high, that can often happen in autoimmune things and gout, so rheumatoid arthritis and gout. Those are related to the immune system, right, not infection, but they're related to inflammation in the immune system fighting off an autoimmunity. You might look at the globulin. What are globulins actually? The immunoglobulins are a type of globulin. There's a number of different kinds of globulins, but immunoglobulins, type of globulin. When you've got low globulin, it could be that there's an infection going on, a low-grade infection, and there's low antibodies. If you've got high globulin, it could be that there's an autoimmune response, an allergy, or a chronic infection.

Bilirubin, which is, we'll talk more about that in the liver section, but bilirubin basically is hemoglobin that's been broken down for excretion, and if it's high, that would be indicative of some kind of liver inflammation. When alkaline phosphatase is high, it could be shingles. These are not absolutes, but when you're seeing this, you might be, "Okay, maybe this rash that they're having along the C5 nerve root is shingles.

LDH, another liver enzyme, lactate dehydrogenase, if that's high, it often indicates inflammation and possibly a viral infection. AST, which is another liver enzyme, when that's high, it's often indicative of mono, and other things that affect the liver; infections that affect the liver like mono, Epstein-Barr, cytomegalovirus, hepatitis. When the iron is high in conjunction with these other markers, it could be viral, so in people that show high iron, you might be looking at, are they in acute viral infection.

Cholesterol or LDL, when that's low, it can often be an autoimmune disease. When the HDL is high, again, it could be an autoimmune, so people think, HDLs, and we'll talk more about that in cardio, but HDLs, yeah, you want them as high as can be. No, there's a range, and when they go over 100, it could be indicative of an autoimmune disease. Of course, thyroid antibodies and any other kind of autoantibodies, that's indicative of an immune system stress because it's an autoantibody happening, an autoantibody occurrence, so an autoimmune occurrence.

Let's look at some inflammatory markers. These are all related to the immune systems, not just the CBC that shows it. If you got CRP, C-reactive protein, or C-reactive protein highly sensitive, HS is related to the heart, that's an inflammatory marker, as is erythrocyte sedimentation rate, AKA sed rate, AKA ESR, that can be elevated. When those are elevated, those usually minuscule, little teeny, tiny amounts, and when those are elevated, there's indicative of there's some kind of inflammation going on.

Interestingly enough, I wasn't really connecting this until my husband had a routine blood test, and he had CRPs through the roof. It was 22, and it should be less than 1. His had always been like 0.2, and I was freaked out because he's had familial hypercholesterolemia, meaning his family history and his genetics predispose him to high cholesterol.

It's like, "Oh, my God, now he has." I wasn't worried about it before because his CRP-hs was just super duper low, like "What's going on?" It turned out he had just been getting over an upper respiratory thing. He had something that went into bronchitis and it was with him for about 6 weeks.

We looked it up and I said, "Well, maybe that's it." We looked it up and sure enough, okay, maybe that's it. He got over that, went back about 6 weeks later, and his CRP was back down to 0.2. If you start to see those high numbers in addition to being concerned about inflammation in the endothelial linings in the blood vessels, you really need to be looking at what, is there some sort of an infection. The thing that clued me off to that is his monocytes were elevated. He had like a 6 or 8 on his monocytes, and I said, "Okay, he's never had high monocytes before. Maybe it's related."

Homocysteines, another inflammatory marker, causes damage to the endothelial linings. Blood spot fatty acid is a great test. It's outside the range of this, but it's something I also order and have people look at to see what the status of the immune system is. That basically looks at your omega-3 and omega-6 fatty acids. You can get a more advanced fatty acid test on whole blood that goes through all of the fatty acid pathways.

When people have chronic inflammation and they have an autoimmune disease, they have a chronic viral infection, I'm wanting to look at that so I can optimize their EFAs. I don't want to just take the chance and say, "Okay, take 2 grams of this." I want to really make sure that they're doing the right thing when they have those symptoms. ANA are antinuclear antibodies and RF is our rheumatoid factor, and those are autoantibodies that are inflammatory markers. Interleukins and cytokines, those are way more advanced testing and we'll do that in our advanced testing module. You can actually measure those and see what the level of systemic inflammation is.

There's advanced cardiovascular testing that shows the level of inflammation inside the vessels, like apolipoprotein B and A1 and the ratio of those, which would give you an inflammatory marker. We're not going to go through those advanced ones. I'm going to introduce you to them here, and then in our advanced blood testing, which is in year 2, that's going to have way more advanced stuff on those markers.

Let's look at an example. I see neutrophils at 32. Wow, 32 is super low for neutrophils. They should be 40 to 60. Lymphs, they're a little bit high. They should be 25 to 40; they're 43, so they're a little high. The neutrophils are quite low. The 2 of them being in that range of being low and a little bit high, where's the rest of those differentials. We look at monocytes, which should be between 0 and 7. I like to see it lower than that. We see it's a 7, but look at the eosinophils at 18, they should be at 3, and then the basophil is 0, so I'm suspicious that this person has some severe allergies going on.

Now, remember I said eosinophils and basophils, they both get involved with allergies and parasites, but basophils are more geared towards parasites, eosinophils toward allergy, and the fact that I see those basophils super low at 0, I'm way more suspicious that the eosinophils are related to allergy. We look at this person and start to suspect, do they have any inhalant allergies that they're exposed to? Do they have particular things in their environment at home, carpets, flooring, paint, cats, et cetera, that they're allergic to, or are they eating foods that they're allergic to?

There's the description, allergies. Okay, so in this case, I correlated with the person's history and it might be parasites because they had a high score in the colon. Maybe, maybe not, it may not have anything to do with it. Chronic viral infection, this person has a history of EBV and mono, so she's got low white blood cell count, which is a chronic situation, and she's got high lymphocytes and low neutrophils, so that says to me that there's more viral there. A lot, you have to take into account the person's history. I wouldn't have thought about the parasites except in this case she had a high score in the colon, so I kept that in mind.

The action was antiparasitic herbs to support the immune system and decrease the viral load. I went for herbs that do both, like oregano, thyme, garlic, oil of oregano, olive leaf, Reishi, astragalus, echinacea, berberine-containing herbs. Any of those could go because it would hit both parasites and the viral infection that we're looking at, and then testing followup.

The next one, I'm leaving this blank so that you can look at it, and so I want you to just look at this and jot down some ideas. We've got a low white blood cell count. We've got a normal neutrophil count. We've got high lymphocytes, high monocytes, high eosinophils, and we have little bit elevated basophils but really not out of range. Platelets are fine. Red blood cells are fine. One thing I want to just get back to, which we talked about on the anemia thing is aplastic anemia. We talked about aplastic anemia, but what I didn't mention is you're also going to see pretty much other indicators, like platelets would be low too in aplastic anemia because that's affecting the bone marrow and the bone marrow's where the cell get produced.

Okay. Let's just review. It looks like a recovery from acute illness because she's got monocytes at 10 or a chronic infection. Viral shows up and the white blood cells are low, so it could be either recovery from acute illness or she has a low-grade viral infection that's been going around for a long time. We might be thinking EBV. We might be thinking mono, hepatitis. If we're thinking anything related to the liver, what we would be doing ... what we would be looking at would be liver enzymes because some of that stuff in hepatitis you'll see elevated liver enzymes.

We could look at allergy parasites, viral, recovery from acute illness, but more likely this is going to be something where she's got a chronic infection. I'm suspicious of chronic viral infection and possibly parasites, but maybe not, but allergy perhaps as well, so supporting the immune system, avoiding sugars, avoiding fats, exercise.

I would retest this in 3 to 4 months, and if it still looks this way or if there's still indications and we don't suspect the allergies, I would look at stool analysis for parasites.

This is the end of our immune system case and we're going to move on to our next topic.