Blood Chemistry Intro: Bones and Minerals

Transcript

Welcome back to our blood chemistry module and now we're going to talk about bones and minerals. Most of them are not direct assessments, although some of them are, but they are indicators in the blood that you can infer that there's some mineral imbalances and some of them we directly measure it. Some of them are related to bone and bone metabolism. Let's have a look at that. Before we begin, make sure you understand when you're explaining this to patients and clients that this is not to replace qualified healthcare from their practitioner.

If they're on medication, you certainly want them to be talking to their provider, but you've giving them education and stuff that they could do to improve their nutritional status. Let's start with iron, good old iron. We talked a lot about iron in our anemia section. Iron is directly measured in the blood. You can look at what happens when it's high, what does it mean. Well, it could be hemochromatosis. An iron overload disease. We want to look at their ferritin levels to confirm that. It could be that they take too much iron.

It could be that they're on an iron supplement, they're eating red meat, they're eating spinach, spirulina, and they're just getting too much. Taking some herbs like yellow dock. Some people just like think a little is bit, more is better, and that's not true. They could be drinking alcohol heavily. Alcohol can actually increase iron absorption which people who are anemic maybe thinking oh good, I'll go have some wine and beer and that will help me. Well, there's other problems and challenges with that and what it does to the liver.

Then fortified cereals. A lot of people do go out and they buy the breakfast cereals and they're fortified. They add back iron that are not in a really great way. Not really the best form of iron, but it does get into the system, and it can contribute to high iron. The big you want to make sure that you're checking out is hemochromatosis. Low iron, well iron-deficiency anemia which we talked about and all those other signs and symptoms. Whenever you see low iron, you're going to go look at the ferritin and the transparent saturation and all those other things.

But the thing with low iron if you have to really rule out that they have blood loss or that they have some chronic disease or any disease going on, anything that would cause hemolysis, hemolysis some people say which is the killing of your blood cells. You got to make sure that there's not other signs going on. You have severe problems, severe anemia, and also other indications. Maybe they're saying they have blood in their stool or they have severe doubling over abdominal pain or they have severe gastric burning whenever they eat.

Maybe they have a bleeding ulcer. You really have to be doing a thorough history to make sure you're just not thinking oh this is just a low iron situation. Let's loot at calcium. Again we do measure calcium directly in the blood, but does it really mean that it's an indication of what's going on with our bones? Absolutely not because the calcium in the blood needs to be maintained at a very tight level because of its importance in the contraction of the heart muscle. It's really maintained. When it goes higher low, you really have to take keyed and not just think oh let me give this person more calcium or less calcium.

It's really not related to that. Usually, their level of calcium in the blood is not necessarily related to their level of bone health. What about if it's high? Well, other times when people are supplementing with T4 or Armour Thyroid, the calcium levels do go up. People who are alcoholic oftentimes we see a high level of calcium in their blood, but by enlarge by far the most common cause of high calcium is hyperparathyroidism. Let's talk and really like 99% of it. Hyperparathyroidism is well hyperparathyroid.

The parathyroids are these little glands that live right around your thyroid in your neck and they're responsible for calcium absorption, calcium and phosphorus absorption and the digestive track. When the parathyroid is overstimulated for whatever reason, and it could be that it has a tumor or a cyst on it, that it's just making too much parathyroid hormone. Your body is absorbing way more calcium from the foods that you eat then you should. Whenever you see a high calcium, you really should be having them getting their parathyroid checked.

You want to look for that and you can do a parathyroid hormone, PTH. You can have that done. They also call it parathormone as opposed to parathyroid hormone. Parathormone, you can have that checked. You can also look at ionized calcium to see if this is calcium inbound or calcium that's ionized. When the high calcium is ionized, then it's high. That's more indicative that there is a problem with the parathyroid. A very rare problem with high calcium could be cancer, but it's very rare. It's like 0.1% and at times actually can be cancer, but still anything like that has to be ruled out in other ways.

If it's low, well thyroid imbalance, low thyroid function can lead to low calcium. It has to be pretty severely low and chronically low. Vitamin D deficiency can lead to low calcium because vitamin D helps with the absorption of the calcium. Vitamin D and calcium and phosphorus and a whole bunch of minerals are all important for bone health. Vitamin D is more of a telling indicator of how the bones are fairing than calcium is itself. Magnesium deficiency will often cause low calcium. Hypoparathyroidism, the parathyroid is not producing enough hormone and we're not absorbing enough of the calcium from the food and supplements.

Then the other things are more serious. Well, kidney disease, pancreatitis are pretty serious inflammatory conditions and that can cause low calcium. Finally, medications. Certain medications can cause it.

You'd go and do a search on low calcium medications that cause it and you'll find out what some of those are. Make sure the person isn't on them. Let's look at phosphorus. What happens if phosphorus is high? Well, when vitamin D levels get too high, it causes an increase absorption of phosphorus. Excess vitamin D intake.

If somebody has kidney disease or their kidneys are in failure, that can cause the phosphorus to go high. What you want to do is check the BUN, blood urea nitrogen which we'll all about in another section to confirm. You also want to look if they have laxatives. There are specific laxatives like phospho-soda laxatives that when they take a lot of it, it's going to cause their phosphorus to go high, so check on that. If they've got a tumor and the tumor is breaking down, the breakdown of tumor can cause high potassium.

A serious condition called rhabdomyolysis which is basically when the body is breaking down the muscle and when the muscle tissue is being broken down, it releases phosphorus and you get high levels of it. Hypoparathyroidism and under functioning will actually cause higher levels of phosphorus because it causes lower levels of calcium and they're usually in sync with each other. Then if somebody has broken a bone and they're in the healing phase, the healing fractures might cause an extra bit of phosphorus to be in the blood. Low phosphorus comes from what? Vitamin D deficiency.

If high phosphorus comes from excess vitamin D, low comes from vitamin D deficiency. Low stomach acid can lead to low phosphorus as it can lead to low in most minerals. If you're seeing a lot of minerals low and signs that their vitamin C is low and signs that a lot of nutrients are low, especially if you have them do the questionnaires, then you might suspect low stomach acid, especially if you also have low BUN which we'll show you in another section. If somebody is vomiting a lot, they lose their electrolytes.

They lose their phosphorus as well as some of the others and also diarrhea. It's basically you're losing the phosphorus. Let's look at some of the indirect indicators in the serum of minerals. We generally measure minerals in the serum because they're not accurate. Zinc though can be indicated if you've got a low alkaline phosphatase because it's a zinc-dependent enzyme and decrease white blood cell count. Molybdenum you might see increase serum iron and decrease uric acid. That combination can suggest that there is an issue with molybdenum.

Let's summarize. Bone metabolism is measured by vitamin D, calcium and phosphorus and you can get a good idea and parathyroid. We don't usually measure parathyroid, but we can.

The bones are related to those 3 that you measure in the CBC, but there is a whole lot of other ways that you measure bone too. You can do bone density test. You can do bone turnover tests and we'll talk about those in more detail in the functional lab testing sections. What else do we have? Let's look at in the analysis.

Okay, so let's just look at the ranges of some of these things, calcium and the phosphorus in the blood. We already have looked at iron. We looked at calcium and phosphorus. Iron, the range in the lab is 40 to 180. It's way too wide. We like to see it between 80 and 130. With the calcium serum, the ideal is between 9.2 and 10.1. remember, we maintain that at a tight range and whenever it goes out of that range, you start to be suspicious.

We wouldn't start to think parathyroid issues until it got outside the lab ranges though. It just might not be as tightly controlled. The pathology like a parathyroid tumor or something like that, you'd be suspicious if their calcium went up into like the 11 or 12 or 13. The phosphorus ranges are very small, 2.3 to 4.8 is the lab range. We like the tighter range of 3.5 to 4. In this particular case that we see here, it just shows you some good stuff. That's the end of our minerals.