Micronutrients - Vitamins: Vitamin K

Transcript

Hello and welcome to our micronutrients module talk on Vitamin K. I'm excited to talk to you about Vitamin K. There's a lot of confusion and a lot of information. Be ready to learn a lot and to take lots of good notes. Let's start.

Before we begin, this is not medical advice and this is a sharing of educational information. When you're working with your clients make sure that if they're under the care of a medical practitioner that you let them know that they should work with their practitioner. If they're on any medications to be sure to check with their practitioner before they change doses or anything. That your goal is to bring them into balance, not to cure anything.

Vitamin K, the basics. It's a fat soluble vitamin. That means that it can be stored in the liver and the fat and other kinds of tissue in the body. It's best known for its role in helping blood to clot and, in fact, the K comes from the German name coagulation's vitamin. Vitamin K plays an important role in bone health. It works synergistically with Vitamin D and, to a lesser extent, A, but also important in helping to keep the bones strong.

Vitamin K is found abundantly in green foods and there's different types of Vitamin K and the kind of K found in green foods is different from the K that's found in other animal-based foods. We'll talk about the differences between them. Also the cool part is the bacteria in your intestines can make Vitamin K and fermentation, a.k.a. the bacteria in some of the foods that we eat, the fermented foods, can actually make Vitamin K as well. There's a lot of great ways to get Vitamin K in your diet. There's no reason for somebody to be deficient unless they're not actually taking this stuff in, or they're not absorbing it, or they have gut dysbiosis.

What's some of the Vitamin K activity? Its essential co-factor for the carboxylation of glutamic acid residues in many Vitamin K dependent proteins. We call those the VKDPs for short as we go on. What does that mean? Carboxylation of glutamic acid residues. Glutamic acid is a type of, or derivative of, an amino acid, of gluatmine amino acid, glutamic acid residues. Carboxylation is the adding on of a particular carboxyl groups onto that. That's important in many different proteins in the body and those become K-dependent proteins.

Where are these proteins found? They're in the blood coagulation cascade, they're in bone metabolism, they're used in the prevention of vessel mineralization, that means the development of plaque and deposit of calcium and other minerals into your blood vessels, and then various cellular functions which we will review.

Let's look at the forms of Vitamin K. There's three basic types: K1, K2, and K3. K1 is the kind found in green leafy vegetables and it's really the predominant form in the diet. It may not be the predominant form in the diet if people are not eating green leafy vegetables, which is common in our western society, but for the average person who's eating at least a normal amount of green leafies, and for us who eat a tremendous amount, and for your clients who you're going to be coaching to eat a tremendous amount, they're going to get a lot of K. That form of K is called phylloquinone.

K2 are the menaquinones, they are synthesized by your intestinal bacteria. You get foods down there, the bacteria there, if they're good flora, if you have a healthy gut flora, they're going to make the Vitamin K. Or they're found in fermented foods and also found in animal products like cod liver oil, things like that. The fermented foods we'll talk about in a bit, things like natto are really good ones.

Vitamin K3 is a synthetic form and it's menadione. In order for the synthetic form to work it needs to be converted to one of the menaquinones called MK4 in order to be active. Let's take a look at what the difference is between MK4 and MK7. Here's a picture, you've got phylloquinone which is found in your green leafy vegetables, abundantly in your green leafy vegetables. Then we've got another kind which is when you add oxygen to it, phylloquinone epoxide. Then you've got the menaquinones, that is slightly different, it's a shorter chain. There's different Ns, N would be MK7, MK4. Then this is the menadione which is the synthetic, it looks quite a bit different, it doesn't have the long chain like they do. The menaquinone 4, MK4, has got some number here, the N is … This little parentheses is some number, this is what the four is, the seven would have three more. Let's look at what those mean, what they do.

There's actually 15 different types of menaquinones, anywhere from one to 15. The number refers to the number of isoprene residues on each side chain of the molecule. Isoprene is a fancy name for a tail. If you look back at the picture here, this is a tail. The number of these little tails is going to determine what the MK number is. M, menaquinone, -K, for Vitamin K, and then the number. Four and seven are the most common.

Fermented foods like natto which is … See this picture, that's natto, it's real stringy. That's a fermented soybean product. It doesn't have to be soybean, in fact my friend Karen created a natto from garbanzo beans and she actually brought some over so I could try it. It was actually quite good. It has a strong taste, something you have to get used to, but she mixes it with avocado and sauerkraut and other things to make it pleasant.

She got on this kick because she had broken her bones in her foot a couple of times and she said, "Something must be wrong here with my bones." Started to do the research, realized she probably wasn't getting enough K, so she started doing natto every day, just a small amount, doesn't take much. Her pain is gone and she's doing so much better.

The MK4s are from animal fats and animal organs. When you hear all this stuff about MK-whatever, that's what it means. It's the menaquinone, the K, and then however many of those tails it has.

The making of the natto is not that hard. We're actually going to get her to do a video on how to actually make the natto. She said it's not that hard to do.

MK4, produced by the Vitamin K conversion, it happens in the testes, the pancreas, the arterial walls. It actually happens inside the body. It has a short biological half-life of only an hour. Mostly it remains in your liver and it's used in synthesizing blood clotting factors. It's injunctive therapy for the pain of osteoporosis.

MK7 is the richest source of natural K and natto has the most available. The bacteria that are involved in the fermentation process is bacillus subtilis. The MK7 is much more utilized in keeping the calcium in the bones and out of the arteries. It's much more useful there than it is the clotting factors, the MK7. This is the cool part, it's highly absorbed and long-lasting in the body. Which is why just a small little bowl that she has every day for breakfast, a little bit of natto with a little bit of sauerkraut for her good bacteria and avocado and spices, goes a long way because it will last in the body. It's a nice way to get your K as opposed to taking pills.

Vitamin K and clotting, let's look at the coagulation cascade. This is a really complex process in the body and I don't expect you to have this memorized. In fact, when I first learned this in school and I had to memorize all these factors, these clotting factors, and the cascade and the proactive, the prothrombin … It drove me crazy. After you take a test in that and you don't use it on a day-to-day basis you promptly forget. It took me a little doing to study this. I'm giving it to you again so you see the big process and not that you're going to remember every single thing about it.

Let me tell you a little bit about the clotting factor and then we'll look at some pictures. It's a series of events, each dependent on one or the other, that stop the bleeding through the clot formation. They're triggered by tissue damage or injury and then this whole cascade starts. One thing … It's a cascade because one thing triggers the next thing, triggers the next thing, triggers the next thing, like a waterfall or a series of waterfalls cascading down a mountain.

You need to be able to bind calcium ions to activate these Vitamin K-dependent clotting factors. Vitamin K actually helps to bind these calciums by the carboxylation of glutamic acid residues. If that doesn't make any sense to you, it's okay. It probably sounds like Greek.

It's basically this, we've got these factors and one has to lead to the next, has to lead to the next, in order to get the clot to form so that somebody doesn't bleed so healing starts to happen. Some of those steps are Vitamin K-dependent and it's important to have calcium to activate those steps. Factor two, which is prothrombin, seven, nine and 10 make up the core of the coagulation cascade. We're going to look at a picture which shows where the K comes in and why it's so important.

There are some other things. There's a protein called Z that appears to enhance the action of thrombin. There's prothrombin, which remember we talked provitamins, prohormones, it's the before the actual thrombin. Thrombin is what helps to form the clot. The prothrombin needs to get activated. We don't want thrombin all running around in our system all the time, we want it only when it's needed. The prothombin is a really accessible form and boom, it gets activated. Then there's phospholipids in the cell membranes that get triggered to send the signals down.

Proteins C and S are anticoagulant proteins. Those help to prevent too much clotting from happening. The whole cascade, the coagulation cascade, is about balance. We want the clot to form, we want to have anticoagulant if there's too much clotting, we want to keep it balanced. C and S are anticoagulants. Z can also have an anticoagulant function, it goes both ways depending on how it's triggered. The coagulation cascade has controls that obviously because we don't want life threatening uncontrolled bleeding. We also don't want big clots to form and thicken up the blood. It has to stay in balance. There are Vitamin-K coagulation factors that are synthesized in the liver. If you have liver disease, you can have an increased risk for uncontrolled bleeding.

Here's a picture, and again I don't expect you to memorize this, but you can see it jumps. You've got a damaged surface which triggers some enzymes, which goes from the 12 to 11 to nine, all these different factors, 10 is down here. They just keep triggering different things all the way down to triggering the prothrombin. The prothrombin to convert to the thrombin, fibrinogen converting to fibrin, and then the clot forms. Vitamin K has an effect on two, seven, nine, and 10. There's two, seven, nine, and 10 are the ones that Vitamin K affects as well as protein S, C, and Z. It keeps things in balance.

Again, I don't want you to have to memorize this but I'll give you some resources where you can look it up and study it and enjoy it. There's a picture right there. This is from the Linus Pauling Institute study and it has all these diagrams and all these descriptions and you're welcome to go if you want to go deeper with it. Also the textbook for the course that I recommended, Advanced Nutrition and Human Metabolism, that has excellent descriptions of each and every one of these vitamins if you want to go deeper and really understand those pathways.

Now, here's the deal, here's what you go to know.

If somebody comes in on warfarin, coumadin, these anticoagulant nutrients, because they tend to clot, because they've had a heart attack, because they've had a stroke, the warfarin interferes with the Vitamin K process, it stops the process of forming the clot. There's spots in here where the warfarin is interrupting so that it's an anticoagulant. There's a lot of misunderstanding about the whole role of if you're taking coumadin or if you're taking Vitamin K. You want to err on the side of caution and leave it up to their doctor to decide how much Vitamin K they're allowed to take, how much green leafy vegetables. The truth of the matter is the studies have shown it's really a good idea while somebody is on the warfarin to have a set amount of Vitamin K that they do every day so it's predictable. They get the benefits of the green leafy vegetables. When I say Vitamin K I mean the green leafy vegetables. They get the benefit of that and they get the anticoagulant effect.

There's all kinds of other things you can do for anticoagulant like Vitamin E and Omega-3 fats and those are all typically told to be contra indicated if somebody's on coumadin or warfarin. This is basically where it interferes. The Vitamin K helps in the clotting, helps maintain the clot. It also has some effects in the anticoagulant balance within this but it basically is important for the clotting. The warfarin or coumadin come in and interfere with some of those mechanisms that the Vitamin K do so that you end up not making the clot. The best thing would be to have the levels in balance. Have them work with a doctor, find a functional medicine doctor that understands Vitamin K and understands the medication. Don't get messed up in it yourself because it can be ugly, it can be complicated, and it can be dangerous.

Somebody says, "I can't eat green leafy vegetables because my doctor told me because I'm on coumadin." The best bet would be to maybe have a conversation with the doctor and talk to them about it and you can find some good research at this link that I've given you that talks about some of the ups and downs and maybe educate them and give them some links so that they can make better decisions for your client. When it all comes down to it, you're offering education, the doctor is who tells them what to do in terms of their medication. You need to be well educated before you start talking to them.

What they found is that abnormal clotting is not related excess Vitamin K intake. I've given people huge amounts of Vitamin K, it doesn't cause increased clotting. There's a balance in the mechanism. There's actually no known toxicity with K1 or K2. Some of the oral anticoagulants, like warfarin, coumadin, jantoven, are different brand names of it, inhibit coagulation by antagonizing the Vitamin K like I said and showed you in that picture. Large quantities or dietary or supplemental Vitamin K can overcome the anticoagulant effect so you have to be careful they're not going into excess. It is not known to cause coagulation if somebody takes too much, but if they have this tendency to coagulation and they're on anticoagulants you do have to be careful.

The recommendation is daily supplementation of low dose phyloquinone, which is the plant-based, may improve the stability. Get them on a regular amount of green leafy vegetables, amount that you're comfortable with, amount that the doctor is comfortable with. Have them talk it over with their doctor.

What else? Vitamin K and protection of the heart. It's been shown in studies to prevent hardening of the arteries, it binds to calcium and deposits it back into the bones and teeth and away from the soft tissue, like the artery linings, and also joints. You ever hear of people who have calcified shoulders and they have to have surgery? The K is really helpful for keeping the calcium where it belongs in the bones and teeth and away from the soft tissue and the artery lining. It's a super important function.

K is, like I said before, the cofactor for carboxylation of glutamic acid residues and it's really, really important that you have enough K and that your clients get enough K in order to have good coagulation, bone metabolism, and to prevent vessel remineralization. That's just your review of what we've talked about before.

How does K tie into osteoporosis? It's related to osteocalcin. Osteocalcin is a bone protein and it's binding protein that's synthesized by osteoblast. Osteoblast are the bone building cells. Osteoblast, B, blasts, are bone building. Osteoblasts, bone building. Osteoclasts are bone destroying. The B is for building, the C is for crushing. Osteoclasts are bone crushing. They remove old bones, they basically … It's turnover. People think of bone as this solid mass and it's really not, it's a living tissue that's added to, subtracted from, added to, subtracted from. We want that balance. We want to be able to build bones.

In some of the medications that are given for osteoporosis they actually decrease osteoclastic activity, but they don't increase osteoblastic activity. Basically you get big buildup of bone but it's old bone and it tends to be brittle and it really doesn't decrease fracture rate. We want to build up more bone and we want to be able to do that and Vitamin K is important for that.

Vitamin K and cancer. There's a number of studies that show that Vitamin K can be very helpful in inhibiting cancer growth. In K2, in particular, inhibits cancer growth. K1 in the liver restores normal clotting and stops cancer cell growth. They both do but they do it in different ways. There are several studies that show the benefits of K. Prostate cancer is best with K2, leukemia with MK4, colon cancer, lung cancer, ovarian cancer, and breast cancer all are benefited by the K2, according to the studies.

Other health benefits. Some people actually get relief from menstrual cramps and protection from internal bleeding. It's obvious why it would prevent in stroke prevention if it's a hemorrhagic stroke. A hemorrhagic stroke would be a bleeding stroke and the K would prevent that. It would also because it helps prevent damage to the vessel linings. Improvement of insulin sensitivity related to the osteocalcin affected glucose metabolism.

That's a good thing. Vitamin K, it also can help prevent Alzheimer's. Some people think that disregulated calcium in the brain is one of the underlying causes.

It's interesting that the APOE gene is another one of those snips, and that APOE gene predisposes people to Alzheimer's and also cardiovascular disease. This connection was that patients that are prone to broken bones have an APOE gene. Isn't that interesting? Somebody that continuously breaks their bones may want to check the genetics to see if they have the APOE gene. With the APOE gene you want to be really careful about how they eat. Too much fat is going to really harm them. Whereas most people can do good fats, the APOE they have to be really careful about their amount of fats.

Here's what we need. How much do we really need? An adult, 19 years of age and older, need about 120 for males and 90 for females. It's not a lot. The dose is … The range of dose that we want to do to play it safe may go from 90 up to maybe 250. Above 250 you want to be really super careful about. Studies have shown that up to 200, 225, 250 are just fine.

Here's some of the food sources of K. All of your green leafies are loaded with them. Kale, spinach, mustard greens, collard greens, beet greens, Swiss chard, turnip greens, parsley, broccoli, Brussels sprouts. Remember that the beet greens and the Swiss chard and the spinach are high in oxylates. Whenever you're working with people on their dietary stuff you're really working with how do we balance this so that they get the right amount of their greens and their nutrients but balance it with other sensitivities they have, like the oxylates. Certainly nobody should be taking in a lot of the really high oxylate foods like rhubarb and beet greens on a regular basis. I mean a lot. Most people should be able to enjoy them on a regular basis unless you've got a known oxylate problem.

Food sources of K2, MK4, are found in grass fed butter, cows fed on rapidly growing grass, organ meats, egg yolks, and raw cheese. Then MK7 is found in natto and, to a lesser extent, in miso. Those can be soybean products but you can also do for people sensitive to soybean in chickpea. There's chickpea miso and you can make chickpea natto.

Here's a chart, and this is again from the WH Foods, you have an extensive chart, I've just done a summary just to show you how much Vitamin K. Quite a bit … A cup of kale has 1,000 micrograms, which is a gram. This is micrograms. Let's look at the RDAs again and this is micrograms. You can see that the green leafies are huge amounts of K.

All right. That's it for our Vitamin K presentation. It's really important that you coach your clients into making sure that they have some form of K in their diet, especially as they age and start to go through menopause, and naturally get into the state where the bones will start to soften if you're not taking care of them. Making sure that they've got that, talking to them about the foods, the natto, the miso, and getting a good form of K. If they're not getting enough in their diet to make sure that they're getting it supplementally.

The K1, which is in the vegetables, and then there's the K2. If somebody's eating a lot of green leafy vegetables, you might also want to make sure that they're getting some form of the K2 as well in the form of the fermented foods like the natto.

If that person has a really good gut flora, they don't have to worry about getting the K2 from outside, their body is going to make it. Most of the people you're working with have messed up gut flora. That's part of their problem and that contributes to so many of their health issues. Once you get people's gut flora managed, and it really feels like it's working well, then you can rely on their gut to make it. Until you can rely on their gut to make it, you want to get them to take an external source.

Thank you.