



**Transcript of “The Powers of Vitamin K2 with Dr.
Kate Rhéaume-Bleue”**

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Dave: Hey, everyone. It's Dave Asprey with the Bulletproof Executive, funny enough, also with Bulletproof Executive Radio, the number-one ranked podcast on iTunes in the health category.

Today's Cool Fact of the Day is natto, which is a traditional Japanese food made from fermented soybeans with a bacterial starter. It has a really musty flavor, and it smells like ammonia or like the other thing that smells like ammonia, which is pee. All the other fermented foods that you might eat that are made out of soy ... things like miso, and tempeh, and tofu ... use yeast or mold as the ferment substance.

Natto is cool because it specifically uses bacteria which create these spider web sticky substance things made out of glutamic acid polymers, which can stretch up to eight feet long. The longer the stretchiness of the threads, the better the quality of the natto. That's a Cool Fact of the Day. Also, if you've never eaten natto, it is really like eating boogers. It's gross, but it's good for you, because it contains nattokinase.

I'm really excited about today's guest. Today's guest is Dr. Kate Rhéaume-Bleue. Kate, did I say that right?

Dr. Kate: Perfect, yeah.

Dave: Cool.

Dr. Kate: That's why I go with Dr. Kate.

Dave: All right, this is Dr. Kate. She's on today to talk about one of my favorite vitamins, something that you've read about if you look at my [top ten vitamin list on the Bulletproof Exec site](#), because she knows about vitamin K2. She wrote this book called [*Vitamin K2 and the Calcium Paradox: How a Little-Known Vitamin Could Save Your Life*](#). She's also a naturopath, at least a graduate of a college of naturopathic medicine, and has worked with a supplement company called Natural Factors



Nutritional Products as an educational spokesperson. Dr. Kate, welcome to the show.

Dr. Kate: Thanks, Dave.

Dave: All right. Why did you write a book on K2? What led you to do that?

Dr. Kate: Lots of reasons. Partly because I had read [Weston Price's *Nutrition and Physical Degeneration*](#), which was so interesting to me. A few months after that, maybe about six months later, I started to find articles ... this was back in 2007 ... on vitamin K2. I thought this nutrient was so fascinating, had so many interesting health benefits, even though it was still early days of research, and it still is. Went running back to Price's book to find out ... because I was sure that he had talked about it, and went through the whole book and found nothing about vitamin K2, or so I thought, in that book. It really confused me.

Anyway, I was still interested in K2. A couple months later, amazing article came out by Chris Masterjohn linking Price's work with Activator X to vitamin K2. From that point, I was really hooked, because I knew there was such an interesting story, a traditional story, lots of research, as well as new scientific evidence, modern studies.

Also around that time, the research was coming out looking at the problems with calcium supplements and calcium supplements causing increased risk of heart attack and stroke. That was so confusing, and it still is for people. That's because just looking at calcium and trying to figure out if it's safe or not, we'll never come to a good conclusion to that. Really, we need to be finding out how can the body safely utilize calcium, because we've always had to deal with calcium in our bodies and get it to the right places. That's what vitamin K2 does. There were lots of reasons I felt like it was an important story that needed to be told around this overlooked nutrient.

Dave: [Chris Masterjohn](#) has been a guest on Bulletproof Executive Radio, and he's such a fountain of knowledge. He's a guy I really, really respect. It's really cool how he called this out in the early days. It's awesome that he was an inspiration to you, as well. I've been telling people for quite a

while, based on all the anti-aging research I've done with the Silicon Valley Health Institute in Palo Alto, where I'm chairman, it's like, "Hey, maybe you ought not to be over-supplementing calcium, especially if you are not taking magnesium and potassium, and things like that." In fact, the only kind of calcium I really recommend is calcium AEP or calcium D-glucarate for most people, unless they have a need for extra calcium.

What is the calcium paradox from your perspective there? Because the anti-aging guys I know are mostly like, "You don't want too much of that stuff." They could be wrong, and it is multi-factorial. This darn complex system of the body, you can't just test one vitamin at a time and expect to get good results, just like you can't bake a loaf of bread by cooking the yeast first and then cooking the water. You got to mix them. How does all this work? What's the paradox?

Dr. Kate: There's two things there. The paradox, for me, is this situation which so many people find themselves in, in which we absolutely need calcium in our bodies. We especially need it in our bones and our teeth, and that's exactly where it tends to be lacking. People are prone to osteoporosis and dental cavities, so that is the minerals leaching out of the areas where they should be and leaving behind little holes, whether it's porous bones or a hole in your tooth.

Then the flip side of that is in the very same people, or in the population at large, we see a buildup of calcium in places where it shouldn't be, in places where you don't want it to be, like arteries, and kidney stones, and heel spurs, and breast tissue calcification, and heart valves, and carotids, all kinds of areas. There we have this paradoxical situation of needing calcium, but it can be dangerous if it gets in the wrong places.

That's really vitamin K2's role, is to keep calcium in its place at all times. It sounds incredible that you can boost your bone health and reverse heart disease and all that kind of thing, but it makes sense that the body does have a way of dealing with this if it has the right nutrients to deal with that. You're right. In general, we can't look at any individual nutrient and really pinpoint ... because all of the nutrients work

together, we can't really pinpoint the action of one away from the others.

Vitamin K2 is different and unique in that aspect, because we have Warfarin, which is a drug that artificially reduces your levels of vitamin K and vitamin K only. Because of that, it provides a unique example that we don't have for any other kind of nutrient, to see exactly what happens in the body when we're deficient in vitamin K. What happens there is inappropriate calcification. We see calcium leaching out of the bones and building up in soft tissues.

Dave: I don't know if this is ... I just don't remember if this is in your book. Have you written about free oxalate, or oxalic acid or oxalates in the body, and free calcium? What's your take on that?

Dr. Kate: That is a conundrum. I haven't written about that in the book. There are so many things that you can write about, especially when you start talking about calcium. I do touch on magnesium. That's not an issue I have addressed, and it's one I actually still struggle with. Of course, green leafies being very important, and yet they also have this double-edged sword issue.

Dave: Let me ask you more about that. There's a comedian guy named Joe Rogan who's been talking about doing these kale smoothies, like raw kale in the morning. To just offer some value to his listeners when I went on recently, I looked at all the research here and ... If you cook kale and you choose the right species of kale, you can get a lot less oxalic acid. Oxalic acid, when it binds to calcium inside muscles or inside, say, the vagina, where it's a particular problem in women, or other places, it causes weakness and pain and all. I said, "Maybe you should add the calcium when you're cooking it, so that you can precipitate out the oxalic acid using calcium instead of allowing the calcium in your body to do it." What's your take on that idea?

Dr. Kate: I think that speaks to the tradition of serving foods like those ... green, leafy vegetables, Swiss chard, kale, all of those things ... first of all, not raw, always cooked, always with some sort of a fat ... which does all kinds of things ... but typically with some sort of cheese, like spinach

and cheese and this kind of thing. That introduces both some calcium as well as some fat. Aside from the fact that these things taste good, I think there was some traditional wisdom in preparing foods that way. I'm not a fan of raw kale. I avoid the whole kale Caesar salad, even the kale chips. I just don't think it's a good idea to be eating those things in large quantities raw. They just should be cooked.

Dave: You heard it here first from a naturopath. My research, my time as a raw vegan, taught me that, as well. When you do the research, you dig in, there's a reason that animals don't eat these raw leafy greens. Try and give raw kale to a horse, and it will look at you like you're dumber than a horse, because they won't eat it. There's a reason they don't eat it. It's not because they didn't want their vitamin K. It's because it needs cooking. It has toxins that are still active, and they particularly hit you in the kidneys, because that's where you're going to catch most of it.

Dr. Kate: These are, in one sense, the plants' ways of protecting themselves from being consumed. Humans, we found ways of getting around that. There's compelling evidence to suggest that we evolved exactly for that reason, because we learned to adapt and cook certain foods, and get nutrition out of them that other species couldn't. Then we're better off for it.

Dave: I would agree with you there, and I didn't used to. I used to be all into, "It's the enzymes. You got to eat everything raw." I lost weight, and I felt really good, and then I started to get sicker and sicker because nutrition's important. Now, I don't eat any leafy green without a lot of fat. I cook all of them. Even, honestly, when I do really intense things, I would rather sauté green lettuce in butter than eat ... like the dark green ... than just eat it raw.

Dr. Kate: Yeah, and it's just a traditional part of fine cuisine to prepare things that way. There's a reason for it. It's such a familiar story. I know people turn to vegan diets for very good reasons, good intentions, health reasons and others, ethical reasons. It just doesn't seem to be in our biology. It's such a common story. Feel great at first, and then health deteriorates. A lot of people are finding out about vitamin K2 in my book through that exact reason, and then finding, in particular, they've got problems with

their dental health. That is leading them down a very different path with their food intake.

Dave: It's funny. As a raw vegan, I started getting this severe temperature sensitivity and tooth pain. I even split a tooth down the middle. I hear this. There's a lot of recovering raw vegans who come to the [Bulletproof Forums](#). I know a few people who have been vegetarian and healthy for into their 60s, but the vegan thing, especially people who have been doing it for 20-plus years, there's very, very few of them. The few of them that I know aren't as healthy as I think they might possibly be if they included at least some animal ... like dairy fat or something. What's the role of that dairy fat when you're talking about vitamin K2, calcium, and dairy fat? How do those come together?

Dr. Kate: K2 is a fat-soluble nutrient, so you absolutely do need to get this in foods that have fat in them. Even looking at grass-fed foods, grass-fed meat, for example, is great, but it tends to be very lean, so you're not going to get a lot of vitamin K2 in grass-fed meat. It's the fat of the animals ... dairy, butter, organ meats ... that's where you'll find the K2.

K2 specifically, when we're talking about tooth sensitivity, I've become fairly convinced that that is specifically a K2 deficiency symptom. It's so common, tooth sensitivity. You see the ads for sensitive toothpaste all the time. That is something I used to have. Completely cleared up after I increased my K2 intake. Oral health improvements and oral is a common feedback that you get when you increase their K2 intake, and that tooth sensitivity's specifically one of them.

These nutrients are designed to come all together. You have a food that's high in calcium, like cheese or milk, and Mother Nature protects your body from the ill effects of that by providing you with some vitamin K2 in that food to make sure the calcium doesn't get into the wrong places. It just all fits.

Dave: Wow. That is really, really cool. Are you familiar with the role of mold toxins or mycotoxins in health? Is that an area we can discuss? I haven't seen that in your book, but ...

- Dr. Kate: I know a little bit about it, but I can't say it's an area of expertise for me.
- Dave: Okay. I'm interested specifically around K2 and its effect on mitigating certain mycotoxins, because one of the other things I've noticed is that certain tooth sensitivity, especially around temperature and around inflammation at the root of the tooth, is, even on a day-day-to basis, influenced partly by intake of mycotoxins in the diet or exposure in the environment. I recently had a few experts on from that. I'm wondering what the K2-mycotoxin interplay is, but I know that's a weird technical question.
- Dr. Kate: Now that you've explained that, I can say that certainly Price's work showed that K2 has some antimicrobial properties, specifically in the mouth. He specifically showed that by increasing ... or when he used Activator X concentrates, that it would lower the bacterial count in the mouth. He was only looking at bacteria. He wasn't looking at other micro-organisms, but I wouldn't be surprised, given all the benefits it has for the health of the mouth, if that's not also one of the things that it's doing. In addition to lowering bacterial count, maybe it's also killing other micro-organisms.
- Dave: All right. Is Activator X related to Professor X from X-Men? Because I'm sure hoping. I'm kidding. Tell the people who are listening who probably haven't heard about Activator X, if they're not in the fermented cod liver oil/butter oil crowd, what is Activator X? How does it relate to calcium and K2?
- Dr. Kate: Sure. Activator X is the nutrient ... When Weston Price traveled around the world and found people all over the world who were very healthy ... beautiful, perfect, straight, white, healthy teeth that didn't get cavities, even though, shockingly, they didn't brush and floss. They didn't have dentists. They were able to maintain this health with good diets ... he found that although people ate lots of different types of things ... what they actually ate in their diets varied widely ... that all their diets provided high levels of vitamins and minerals, but particularly fat-soluble vitamins.

He saw very high levels of vitamins A and D, as well as high levels of another fat-soluble vitamin that he didn't know what it was. To his knowledge, it hadn't been identified yet. This was back in the 1930s, '20s and '30s. He just called it X, Activator X. He referred to the fat-soluble vitamins as activators in a similar way that nowadays, we refer to vitamins A and D as hormones, because we know that those will actually activate our DNA to allow us to benefit from and utilize the other nutrients, other vitamins and minerals, in our diet.

He started to do a lot of focus on Activator X, because he knew it often came along with the other fat-soluble vitamins A and D, but he didn't know what its properties were. It turns out he found it very useful in conjunction with vitamins A and D for healing dental cavities. Being a dentist, that was a focus of his. He actually stopped drilling and filling teeth, and in fact replaced that almost entirely with a nutritional protocol, and published radiographs before and after of mouths full of open cavities that completely sealed over. It's actually possible for your teeth to heal up. They're designed to do that, if they have the right nutrients.

He found that this Activator X was particularly high in certain foods. He's identified which foods it was high in, and a concentrate of grass-fed butter was the highest food that he could find for this Activator X. Again, for ages, it was a mystery and a subject of debate in the medical and nutritional world, what is Activator X? It really was only when Chris Masterjohn's article brought it together that brought that to the forefront. Price was onto this so long ago, if not the name of the vitamin, at least its properties. He noticed it healed teeth. He had radiographs of it healing bones. If he'd had access to a CAT scan, he would have seen some arteries clearing up, too.

Dave: One of the things I'm best known for is [creating this drink after I went to Tibet and drank yak butter tea](#). Talk about a nutrition-deficient environment. These guys, they live on yak butter tea and ground-up barley flour that they mix with their fingers, and they're stronger than I am and half my weight. Just amazing supermen. It's not just the grass-fed ... or, I guess, lichen-fed yak butter, but it's similar substance.

They're in probably the harshest environment I can think of for that sort of nutritional intake, and they manage to survive with it.

I came back to the States, and I made [Bulletproof Coffee](#), after a year of iterating different things, which includes grass-fed butter as a substantial part of it. I've been really privileged a couple times to see vegans deciding to try Bulletproof Coffee for the first time ... for the first time since, at least, in a long time, since they've had any type of protein from dairy. Literally, you see almost a shaking of their hands. They're like, "I need it." You can see the biological, "Give me some more of that."

You're thinking that the vegan diet caused a K2 deficiency, or it contributes to one, anyway. Then when people get a grass-fed butter source, that it's contributing K2. I know animals and babies will pick out healthy foods when you give them a choice. They'll eat non-GMO corn before they'll touch the GMO corn. I feel like even as adults, our bodies sense there's a craving that's a negative craving, but there's also, "Give me some of that," mostly pregnant women. Is K2 what we're craving in butter? Or, is it also the saturated fat, or is it conjugated linoleic acid, is it something else, or are you not sure?

Dr. Kate: It may be all of those. That craving for fat is very deep, and on some level, I'm sure the body knows that there are specific nutrients that usually go along with it. In the modern world, we can be duped by that, because we can be craving the fat, and the nutrients aren't always there, depending on, for example, how the butter's produced. I think that in general, the body knows, or it used to know, that when you got good fat, there'd be a lot of good stuff and good nutrients that went along with it.

Dave: Got it. That could be some of what we're craving. Weston A. Price and Pottenger, when they wrote their book, when they were putting together this butter oil thing, is butter oil different from ghee? For people listening who don't know about ghee ... ghee, G-H-E-E ... is clarified butter, basically. You cook the butter until the moisture and all the protein falls out, and all that's left is just the fat. Butter oil, is that a different thing than ghee, in your opinion or your knowledge?

- Dr. Kate: In my opinion, not really. Based on reading Price's work, and the steps he took to create his butter oil is almost identical, very, very similar to how ghee is prepared. You get the butter. You heat it at low temperatures to separate out the proteins, which is the milk solids, and you have left behind pure fat, which is a very concentrated form of the fat-soluble vitamins. It would be very similar to the yak butter that you had, which I imagine was quite an orange color.
- Dave: Oh yeah.
- Dr. Kate: That's typically a sign, if something is a darker yellow or an orange color, a sign that there is more K2 in it. It's not the K2 that's orange, but it's the beta-carotene and K2. They tend to travel together. From the research I've done on modern-day butter oil as well as Price's methods of making butter oil and ghee, they are close enough, in my mind, that you can use these interchangeably.
- Dave: That's remarkable. I've used ghee to make Bulletproof Coffee, particularly when I'm working with clients who are sensitive to dairy proteins or if they're getting a little bit of postnasal drip. Then they switch to ghee, and you get less foam in the coffee, but you still get all that fat. The body just responds so nicely when it's blended into a hot substance like that. To get the foam back, I add in another product that I make called [Upgraded Collagen](#). It's a hydrolyzed source of grass-fed beef collagen, which brings the foam back. You can still get this, but instead of the little bit of dairy protein causing the foam, you're getting a little bit of beef skin protein, the kind that your body needed anyway.
- It's really different how people respond when it's blended versus not blended. Do you have any info in your research about, does K2 work better when you chew it up or mix it with fat in some sort of blending process? Or, am I just going out on a limb here?
- Dr. Kate: In nature, K2 would be naturally found in a matrix of fat, whether it's in butter or cheese. It would already be like that. In your process of making the coffee that way, you are emulsifying the fat. That, of course, is going to make it absorbed that much better and likely deliver the nutrients in it that much more efficiently.

Dave: How heat stable is vitamin K2?

Dr. Kate: It's quite heat stable, actually. That's pretty good news. Studies have been done looking at, say, calf's liver, which is a moderate source of K2, either raw or pan-fried. The amount of K2 barely changes. I don't have any concerns about low heat. Maybe high-heat cooking will reduce it somewhat, but from what we can tell, it's pretty heat stable.

Dave: Wow. You've just informed tomorrow morning's biohacking experiment. I take vitamin K2 every day. I'm going to dump it into the blender as I'm making my [Bulletproof Coffee](#), and then I'm going to give it to my kids. I'll take it, too, myself. They get about two tablespoons of [Bulletproof Coffee](#) in the morning, because I want them to get the short-chain, medium-chain triglycerides and to get the grass-fed butter. Plus, they just like it. They metabolize caffeine very, very fast compared to adults, so it's not like I'm getting them all amped up on anything.

Dr. Kate: I'm sure their teachers really appreciate that.

Dave: I drop them off ... no. They don't get hyper from it. They just feel good. I definitely did my research before I did that. It's shown that caffeine and coffee do not stunt growth in children. That was a rumor spread by one of the cereal companies trying to get you to drink burnt cereal acrylamide brew instead of coffee. I'm convinced I'm helping my kids with that. To get them the extra K2 like that, I'm going to do it. Does K2 have a bad taste? Butyric acid tastes like sweat socks. What does K2 taste like?

Dr. Kate: It has no particular flavor. As a matter of fact, I give my little ones ... the older one, from when he was two and a half, my younger ones, a year and a half. They just chew the little K2 softgels, and they have no problem with it at all.

Dave: Okay, great. It's an easy thing to do. How much K2 do you give your kids?

Dr. Kate: I'm giving them about 120 micrograms per day. That is close to the adult dose that I do talk about in my book. I've actually increased my

recommendations on K2 intake since I put the book out. The reason why I have recommended, and still do, at least 120 micrograms for kids is, first of all, it's nontoxic. Secondly, although we tend to think of children needing less ... their bodies are smaller, so they need less ... the exception here is that even though their bodies are smaller, their bodies are growing.

When your body's growing, your skeleton's growing, that is time for a huge demand for vitamin K2. The reason why kids and adolescents tend to get more cavities than adults is specifically because their skeletons are growing. They need more nutrients. I don't hold back on the K2, so 120 micrograms. That's even for my 18-month-old. As the older one gets into the teen years, I'll probably double that up.

Dave: I keep a list on the Bulletproof Executive site around the [top ten list of supplements](#). I have vitamin K2 on there. From the top of my mind, I'm not remembering exactly what my recommended dose is. I get the recommended doses from experts. I will update my recommendations based on what you're saying, because you've done a lot of research about this. For adults, is it weight dependent? I'm around, I'm guessing, 220, because I've recently put on some muscle with electricity. If I weigh 220 pounds, what's my dose, versus if I'm a 100-pound woman?

Dr. Kate: We don't know exactly. There aren't studies to look at, say, optimal dosing. I imagine that, for sure, body weight does make a difference, because you've got more tissue, more muscle mass, more bones, more everything. You're going to have more nutritional requirements there. The rule of thumb that I'm using ... When I wrote the book, I was going by the studies. Most of the studies were using and still are using about 180 micrograms of MK-7. We can get into the different forms of K2 that are out there in supplements. If you were eating one serving of natto per day, you'd be getting about 350 to 400 micrograms. I'm using that as my new guideline for nutritional intake. For somebody who is eating one serving of natto per day, they'd be getting about 350 to 400 micrograms of K2.

Dave: Now people know why that was my Cool Fact of the Day, because it's one of the highest natural sources of K2. Do you eat it, by the way? Do you like it?

Dr. Kate: I still try to eat it, yeah. You know what, I have come to ... maybe this is just to make myself feel better, but ... I've become convinced that natto is like cilantro. You'll love it, or you hate it. I love cilantro. There's got to be some kind of genetic component there in terms of your taste buds, because I have met so many people who have tried natto and have said, "Actually, that's not bad," or, "Actually, that's pretty good."

I spoke at the Weston Price Conference last fall, and I had a friend, a host of the Biodynamics Now podcast, Alan Balliett, who organized a natto tasting. There were a number of people who emailed me to say, "Hey, we actually liked the natto. Where can you get it," or who tasted it and commented, "It was pretty good." I still struggle with it. I try to eat it because I know it's good for me, but, yeah, it's a tough one.

Dave: My wife, Dr. Lana, loves the stuff, but she's from Sweden. They eat spoiled fish as a sport, so I don't always trust her desire to eat strange foods, like salmon eggs, which also are one of those superfoods that Weston A. Price would have ... I take them like capsules, because I know they're good for me, but she and my kids, they'll eat a bowl of them, if possible. I feel like I'm eating pimples. I just can't do it.

Is there any animal source, besides a little bit of fat in grass-fed beef ... because like you said, it's often lean ... and grass-fed dairy, which is my favorite source, with the whole putting butter in everything ... What are some other, besides natto? Mushrooms? I'm just guessing there. Are there other sources people can target? A little bit of kale, if you cook it?

Dr. Kate: No, no kale. No green, leafy vegetables. There's no K2 in your green, leafy vegetables, only vitamin K1. There's very little conversion of K1 to K2. Studies have shown, for people eating lots of green leafies, you're converting maybe five percent of that, and you're not absorbing very much of that, either. You can't rely on that. Other sources of K2 ... Natto's the highest-known food for vitamin K2. Next after that is goose

liver, which is also, as delicious as it is, very hard to come by and not necessarily something we can eat on a daily basis.

Dave: Is it grass-fed geese? Not really, but does it matter if you feed the goose a bunch of mycotoxin-laden corn from GMO sources or not?

Dr. Kate: I don't think that actually affects the K2 content.

Dave: It doesn't? Okay.

Dr. Kate: Of course, there's other concerns there, as well. They just tested standard goose liver produced in a standard way.

Dave: Okay. Then it was with chemical foods, and they still produced K2. That's good.

Dr. Kate: Yeah. There's a lot more testing to be done, because I'm sure that there are a lot more foods out there that are high in K2 than we know of. The next ones on the list are certain types of cheeses. K2 in nature will come from some types of bacterial fermentation, like the natto. Goose livers is naturally occurring. Even goose leg and, I'm convinced, goose fat is also high, although it hasn't been tested, because the rest of the goose is high. I use a lot of goose fat in cooking around the house.

The next after that would be certain types of cheeses. Although grass-fed cheese would be the best, it actually doesn't have to be grass-fed milk to make the K2, because it's the bacteria that makes the K2. Gouda and brie top the list. New research since I wrote the book suggests that some types of blue cheeses but not all. Gouda and brie are always made with the same bacteria, whereas blue cheese, it varies quite a bit. There's lots of different types.

Dave: There's a lot of fungal stuff going on in blue cheese, like Roquefortine is a known toxin in blue cheese, which is why it's called Roquefort. Gouda and brie would be preferable. For people on the [Bulletproof Diet](#), there's a little bit of casein and there's some other problems from the fermentation process where I'm a little skeptical that's your best source compared to natto. It's certainly more flavorful, and if you tolerate those well, do it.

Dr. Kate: Exactly. Yeah, and I think that there is, like I said, there's lots more research that we need to do in terms of testing and identifying foods, because every healthy culture would have had their high-K2 foods. We haven't identified them all. Fish eggs are probably one of them. Price suggested that fish eggs were high in Activator X. It was traditional food that would be eaten by people who were going to be married, so this was for boosting fertility. A lot of those high-K2 foods important for fertility and proper facial development in children in utero.

Dave: My wife and I wrote [*The Better Baby Book*](#). It's funny you mention that specific point, because we included that, eat fish eggs during pregnancy, but don't eat the dyed ones, when they put the orange dye, like the tiny fish eggs, tobiko, you can get at a sushi restaurant. Those have petroleum-derived dye in them. It's funny. If you're listening, you're like, "Okay, how do I know all this stuff," like how do you know this stuff if you're trying to eat for fertility. It's rough, and no one's going to be perfect. Okay, do something that's kind of right, and you'll still be better off.

When it comes to the different sources of K2, I wanted to really dial in, because we have a lot really science- and information-based people listening to this. We have vitamin K1. We have vitamin K2. We have MK-4, and we have MK-7. Can you walk through specifically what are the differences between K1 and K2? We already know that K1 doesn't convert to K2 very well. What about MK-4, MK-7, and if you're at the supplement store buying this, what do you look for?

Dr. Kate: Very good question. Confusion around exactly this question is the reason why vitamin K2 was overlooked for so long, because K1 and K2 were both discovered back in the 1930s. The "K" comes from the German word for coagulation. At the time, researchers recognized vitamin K1 ... they were talking about ... is found in high amounts in green, leafy vegetables. It participates in blood clotting. That's its role in the body, is to make sure our blood can clot properly. Blood clotting's so important that it just can't be left to the whims of our diet. You can't afford to bleed to death because it's winter and you can't get green vegetables. The body developed a mechanism to recycle vitamin K1, so

you'd always have it there for your blood clotting. Deficiency is very rare with vitamin K1.

At the time, researchers noticed a slightly different form of vitamin K that they called K2, but they more or less said, "K1, K2, same thing. They're blood-clotting vitamins. That's it. Let's keep moving forward." It turns out that was wrong. That's why K2 was overlooked, because K2 does not come from green, leafy vegetables. It does not participate in blood clotting under normal circumstances. Because of that, we don't have a mechanism to recycle it. It's not recycled, so you can become deficient in K2 in as little as seven days if you have a K2-deficient diet. Studies have shown now that that's really common, several, actually. One that came up just a couple months ago. Very common in adolescents as well as adults, K2 deficiency.

Dave: If you eat kale chips every day, even though kale starts with the letter K, you still could be deficient in vitamin K?

Dr. Kate: That's right. You'll have lots of K1. All you have to do is eat the parsley on the side of your plate once in a while, and you'll have plenty of K1, because the body reuses it. K2, you won't have it.

Dave: Looks like those kale smoothies weren't the best advice, after all. Too bad. Then again, if you add grass-fed butter to your kale, you've got some K2 right there, and you've got some K1. Is there an advantage to taking K1 and K2 together for the body?

Dr. Kate: I don't think so, necessarily. They work differently. It's funny. I guess all these traditional recipes, like some green, leafy vegetables cooked up with butter and cheese, that would be high in both of those nutrients. Maybe there is some kind of interaction there.

Dave: Okay. That sounds like there could be something, but who knows. It's like vitamin A and beta-carotene. There's different interactions there. What about MK-4 versus MK-7? Can you go into more info on those?

Dr. Kate: Yeah. When we're talking about vitamin K2, there are lots of different types of vitamin K2. In nature, MK-4, menaquinone-4, is a short-chain

form of vitamin K2 that we find naturally in animals and animal food. We as humans have this in our bodies. Grass-fed animals, if you have an egg yolk from a grass-fed chicken or butter, all of those things, those will be high in MK-4, the short-chain form. Bacterial production of vitamin K2 will produce a number of long-chain forms, MK-5, 6, 7, 8, through 10. Natto is very high in MK-7. Cheeses are high in MK-7, 8, 9, and 10.

As far as we know, all of these, 4 through 10, have all the same health benefits. The difference is the dose that you have to take when we're looking at supplements. When you're looking at buying a vitamin K2 supplement, there's two types that you'll find on the market, MK-4 supplements and MK-7. The MK-4 supplements are not from animals. They're not, say, making grass-fed butter, and extracting that and putting it into a supplement. That would be crazy expensive. That's not what they're doing. It's actually a synthetic form of vitamin K2 when you buy MK-4 supplement. The MK-7 supplements are generally from natto, although there are some now soy-free synthetic forms of MK-7 coming onto the market for people who want to completely avoid soy for whatever reason.

Both of these forms of vitamin K2 work. There's been research done on both forms, and I get good feedback about both types. You just have to know what dose, because the dose varies depending on the type of vitamin K2 you're taking.

Dave: Okay. We'll post a summary of that on the show notes for this. Of course, we'll have links to your site and all, as well. My recommendations for vitamin D have been based on Dr. Cannell's exhaustive research from the Vitamin D Research Council. I've donated money to support his research. Are you familiar with Dr. Cannell's work?

Dr. Kate: Mm-hmm.

Dave: Okay. Cool. That recommendation is 1,000 IUs of vitamin D3 based on every 25 pounds of body weight. Number one, do you agree with those recommendations? Number two, how does K2 and vitamin D interact, either from a dose perspective or just tell us how it works?

Dr. Kate: This is a really important question, because there's been so much debate around what's the right dose of vitamin D. A lot of people saying in low amounts, like 400 IUs or 1,000 at the most. Then there's other people at a much higher end, 10, 20, 30,000 IUs. It turns out that the right amount of vitamin D, I don't think, can actually even be determined by your body weight, because how much vitamin D you take and how much vitamin D anybody should take, the right answer to that is, it depends.

Dave: Test your blood?

Dr. Kate: Actually, it depends. You can test your blood, but even that won't tell you, because what it depends on is actually vitamin K2. Chris Masterjohn is the one that really brought this to the forefront, the relationship between D and K in this way. In fact, the toxicity we see with vitamin D is actually an induced deficiency of K2. What are the toxic symptoms of vitamin D? You just keep absorbing calcium, and that calcium starts to deposit all over your body in inappropriate areas. You can prevent that by taking K2 with your D. Really, once you've got some K2 with your D, the sky's the limit. D also ...

Dave: The sky's the limit on ... Wait, hold on. What does that mean?

Dr. Kate: On how much D you could safely take.

Dave: Oh, okay. Got it.

Dr. Kate: There's a relationship here with vitamin A, because studies have shown that by giving D and A together, A has a K2-sparing effect. A and D are like the gas and the brakes on the car. They will balance one another and complement one another. Then K2 completes the cycle and allows your body to use calcium perfectly with all of these fat-soluble nutrients. It's impossible to say how much D you should be taking, unless you're having some K2 in your diet.

Dave: Let's assume someone has enough K2, and they're taking vitamin D3. Will their D3 blood levels, the 25-OHD, will that change because of the K2?

- Dr. Kate: That we don't know. We haven't looked at whether it actually affects your blood levels. We do know that ...
- Dave: Okay, we're back on. It looks like you froze. We were just talking about what your blood levels would look like with taking adequate vitamin K2 and taking vitamin D. Would your 25-OHD change?
- Dr. Kate: Not that we know of. We haven't really looked at how the intake of K2 would affect your blood levels of vitamin D. We just know that D and K2 work together to optimize your calcium metabolism and makes sure that calcium's getting into the right places. D helps you absorb calcium. K2 puts it into the right places.
- Dave: Right now, I recommend people take between 400 and 800 milligrams of absorbable forms of magnesium on a regular basis, as long as they're not getting the runs from it, because magnesium works with calcium. It also works to counter some of the excess calcification that is a problem. If people are taking adequate K2 and adequate vitamin D, should they change their magnesium intake, or should they add calcium back into their supplement regiment?
- Dr. Kate: I don't think that they should add calcium back in, because they're actually going to be using the calcium from their diet more efficiently. That wouldn't be necessary. I think the magnesium is still necessary. K2 and magnesium seem to complement one another in terms of health benefits and actions in the body in so many different ways that it's actually driving me crazy. I can't figure out exactly how they're related, but I know they are. They do good things together.
- Dave: Here's a suggestion for that. We know that magnesium is a cofactor for vitamin D doing what it needs to do inside the cell. It could just be that because magnesium helps vitamin D work better, that therefore vitamin K2 works better through the indirect effect on vitamin D. It's just a theory. No science behind it, but it makes sense.
- Dr. Kate: It's a good theory. It's plausible, for sure.

Dave: Okay. Who knows. That's going to require a whole bunch of medical studies or something. This is really fascinating, to be able to ask all these good questions. If you're listening to this going, "Ah, what does it mean I should do?" What it means you should do is you should take vitamin D. I think the levels that I'm recommending on the site are very science-based. Dr. Cannell has reviewed thousands and thousands of vitamin D studies. He's one of the most concentrated sources of knowledge I know of, so I tend to go with his recommendations there for that nutrient.

Dr. Kate today is going to cause me to update the vitamin K2 recommendations on the site, which are already there, but we'll tighten them up a bit and maybe increase the levels. The magnesium levels, we've just checked, are borne out. We're not going to be talking about adding any calcium back into the diet, with the exception of calcium AEP ... which I recommend for cell membrane stability, not as a source of calcium ... and calcium D-glucarate ... which is something that I recommend for increasing your liver's ability to use its second-best detox mechanism, which is called glucarination. If that was too technical, there's ten things listed on the site. You can just go download them and read them, and it's all free.

Other question for you, though, Dr. Kate. I like bubbly water. I'm holding a bottle of San Pellegrino in front of my face. I like San Pellegrino because it tastes good, particularly with lime. I also like it because, if you look at the really super-fine print on the label there that I'm holding up to the screen, that you probably won't be able to read, it is one of the few things that contains appreciable amount of sulfate.

That's one of the reasons that San Pellegrino, Saint Pellegrino, is a healing spring in Italy, because sulfate can have a really cool effect inside the body. We're just figuring out what vitamin D sulfate does, for instance, that only gets activated from the sun. If you want to get it, you drink Pellegrino. You get a lot of calcium in here. Am I overdosing on calcium because I drink between 750 and 1,500 milliliters of this stuff every day? Should I be worried?

Dr. Kate: I don't think you should be worried, because you've got K2 working for you and making sure the calcium isn't depositing in your arteries. You

are taking magnesium, which will balance out the amount of calcium you're getting in there. I think you're fine. When I'm looking for a bubbly water, I usually look at the ratio of magnesium to calcium. It's hard to find a high-magnesium bubbly water, as well as, then, finding one with sulfates. Really nice water in that way is really tough. With your magnesium and K2, no, I don't think you need to be concerned.

Dave: Okay. Cool. I don't think so, either, also because I eat a stick of butter every day. I have for a long time, because I drink [Bulletproof Coffee](#) and I add [Brain Octane](#), which is another fully saturated short-chain fat, onto my diet in copious amounts. I'm going to go down to Seattle and get a calcium scan of my arteries. Of course, I'll talk about those results. I'm pretty sure I know what they're going to say, but hey, let's be safe and careful. As an N equals 1 experience, I will share that data. I'm pretty sure you could predict the outcome of that, as well, given that you know what I take. We'll get the data. I haven't done the scan yet, so I don't know what it is. I'll tell you when I know.

Dr. Kate: Looking forward to seeing that.

Dave: What else should people know about K2 that I haven't asked?

Dr. Kate: I touched on the fact that it is such an important nutrient for prenatal health, during pregnancy, and childhood. It plays a really important role in proper facial development. I've got before and after pictures in my book. Price focused on this. This is also borne out by modern research, looking at defects and deficiency in vitamin K and how this affects facial development.

Important for nice, wide, straight teeth. If you've got kids coming and you want to avoid braces down the road, K2 will help you do that. Throughout childhood, to improve skeletal growth as well as fighting cavities. Then again throughout adolescence, when those hormones kick in and the skeleton starts to grow, it's a huge time of increased nutrient need. Vitamin K2 is a really important nutrient here. Osteoporosis prevention really starts in adolescence, when you can gain as much bone density as possible by the age of 20 and 30 to save it for later on.

- Dave: Wow. That's really cool information. Is there a connection between ... wow, I hadn't thought of that. Is there a connection between vitamin K2 and folic acid? Because you see cleft palate in children who are deficient, actually, in activated ... it's not even folic acid. It's folinic acid or folate. This is something we wrote about in *The Better Baby Book*, and we talked about K2 and its importance. Is there an interaction that I don't know about between folic acid and K2?
- Dr. Kate: Not a direct interaction between those nutrients that I've come across. Any time you see a midline deficit like that, you're looking at a nutrient problem. The deficits that we see with K2 are different. All of those conditions, any nutritionally related condition, will increase in prevalence with birth order. In other words, Mom tends to give lots of her nutrients to the first baby that's born. Unless she knows the right foods to eat, subsequent kids will have a higher risk of facial and dental deformities and these kinds of problems, if she's not replenishing her body to pass it onto the kids.
- Dave: After you have a baby, if you're going to have more, eat a lot more liver, is what that comes down to, right?
- Dr. Kate: Lots more liver. Wait a couple years, space those babies out, and eat lots of liver and butter and all those foods.
- Dave: Awesome. That is good advice, even though liver tastes gross. Dr. Kate, there's a question that every guest on the podcast has answered. That is, what are the top three recommendations you have for people who want to perform better, who want to kick more ass? This doesn't have to be just K2. It doesn't have to be just medicine. Based on your entire life's knowledge, if you had to share three things, what would they be?
- Dr. Kate: Oh, wow. Based on my entire life's knowledge, that's putting me on the spot.
- Dave: Yes.
- Dr. Kate: Let me stick to nutrition for the moment. I would say number one is, try natto. You might hate it, but you might love it. Dave, you were pretty

cagey there. You actually didn't admit whether or not you're eating it. I'm guessing you're not. It's worth a try for everyone if you can find it and try it, because you might like it and you'll be much better off for it.

Dave: Truth be told, if I'm at a sushi restaurant and they have natto, I eat it sometimes, but I wonder if the soybeans are genetically modified or not, because I try not to eat them. I don't know the right answer to do there.

Dr. Kate: Fair enough. If you can find organic natto, which would be made with non-GMO soybeans. I also know people that are making their own, or using things like black beans and using the natto culture, and making their own ferment with the natto culture.

Dave: Okay. I would do that. I eat all sorts of things that taste gross because they're good for me, so I don't mind making a natto raw liver smoothie. Okay, I'll do that, but I don't have to like it. That was one, eat natto.

Dr. Kate: Number two, I already touched on it. That would be, eat liver sometimes. It's not sexy. It doesn't always ... You can make it taste good, if you learn to cook it. Chicken livers are a lot easier if you learn to cook it properly. Eat it sometimes, because it really is probably the most nutritious food.

Dave: I take desiccated grass-fed liver capsules, so I don't have to taste it, or I freeze it. When we buy a whole animal, I freeze it in little cubes and swallow them like pills, because I don't like it. Yeah, okay. Got it. Liver, check.

Dr. Kate: You could do that, too.

Dave: Okay.

Dr. Kate: Number three ... and I think that you'll like this one a lot better ... is brie cheese and a glass of red wine is the ultimate heart-healthy snack.

Dave: Red wine with ochratoxin A. You've lost me on that one. Why wouldn't you use coffee instead?

Dr. Kate: You could, but in the evening before bedtime or later in the day, if you're caffeine sensitive like I am, even with the Bulletproof Coffee, it'll keep me up.

Dave: Oh, yeah. I don't drink that before bed. Never drink it after 2. That's my recommendation. That stuff is rocket fuel. I'm about to publish some more research about red wine and the prevalence of mycotoxins and mold toxins in red wine, and tell people how they can choose a healthier red wine with less effect on their kidneys and their cardiovascular health, because there are some serious problems, particularly in North America, where the standards are more lax around mold toxins.

I'm seeing European wines that are not designed for export have dramatically lower levels of toxins than some of the other wines. It's funny, how you feel the next morning, based on the quality of the cheese and the quality of the wine, is huge. The differentiating factor there are these toxins that are active at a parts-per-billion amount. What I don't know, and I'm dying to know, is whether K2 would make me more resilient against mold toxins. I'm going to have to see if I can dig that one up, if there is anything.

Dr. Kate: You're right. I should have qualified that with "good quality," because that makes a difference in everything, even with your liver. It's got to be organic.

Dave: Oh, yeah. Good point.

Dr. Kate: Water, and, yeah.

Dave: Cool. What a cool list of questions. I can tell you that out of more than 100 people who have been on this show, including, like I said, Chris Masterjohn ... let's see, Chris Kresser's been on, and who else was just on? Mark from Mark's Daily Apple was just on, Mark Sisson ... out of all of those people, no one has put "eat liver and eat natto" as their top three. You're totally nailing some new ideas here. I love it. Thank you.

Dr. Kate: All right. You're welcome.

- Dave: Would you tell people the title of your book, where they can find out more about your book and more about you?
- Dr. Kate: Sure. My book is called [*Vitamin K2 and the Calcium Paradox: How a Little-Known Vitamin Could Save Your Life*](#). That's literally true. They can find my book on all of the online booksellers ... although they've been selling out a lot lately, so be patient with them ... or by going to my website, www.doctorkatend.com.
- Dave: Dr. Kate, ND, as in naturopathic doctor, just so people will hear the "N" versus "M," if they're driving. Dr. Kate, it's been a pleasure being able to ask you those detailed questions that hopefully didn't bore any listeners. Remember, if you heard this, there's a reason that vitamin D and vitamin K2 and magnesium ... actually, and vitamin A ... are all on the top ten vitamins list for people who want to be more bulletproof in their life. Signing out now. If you like the show, please click "like" or whatever it is you do on [iTunes](#) to tell people it's a good show and they should listen. Have an awesome day.

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