Episode 110: Berberine's Impact on Muscle Mass

David Roberts (00:01):

Hey everybody. This is David Roberts and you are listening to the Mara Labs podcast. And today I have John Gildea with me and we are going to briefly talk about berberine and our version of berberine called BerbElite. We had a person write in, concerned about some studies they read and wanted to touch base with that. I'm going to read what was written. And we are going to discuss. And so this person said, "After reviewing a range of berberine studies, I've come to the conclusion that for healthy, exercising individuals, its positive impact on blood glucose control does not compensate for its negative impact on muscle hypertrophy." And so that's what I want to discuss. This person read some research, made a conclusion that actually there's some hypertrophy going on with the muscles and it may not be beneficial. John, we've talked about this some, but can you dive in and just share your thoughts on this?

John Gildea (01:12):

Yeah, so I think the general thing that he said there was that in a healthy, exercising person, there's not huge benefit for berberine. That may be a very general statement that is true, that when you're, say in your twenties or thirties, and you're not having problems with your blood glucose, and you're lifting weights, you're an avid exerciser, that you may not see a big benefit from berberine. And I think that could be said for, say a person... One of our other products is sulphorophane. So if you're young and healthy and haven't had any health compromises, that probably is a generally true statement. I think that's very true.

So in one of the studies that I have read and remember about berberine and blocking protein synthesis and muscle was a mouse study. It's a pretty famous mouse study, where they did a diabetic mouse and a normal mouse. And I think the surprising finding from that study was berberine blocked muscle, it decreased muscle mass and protein synthesis in both the diabetic mouse and the normal mouse. And that does seem like that would be a negative thing to happen for anybody if that's translated to humans. So in mouse studies, one of the things that you have to be careful about is, is it mimicking what is going on in humans? And in this case, they took berberine and put it into a peritoneal. So they put it in the peritoneal cavity, which is the fluid surrounding your intestines. And for berberine, that's known to dramatically increase bioavailability, so much so, that there's a study showing lethality in mice from-

David Roberts (03:51):

In overdose.

John Gildea (03:52):

From taking berberine in that method. Yeah.

David Roberts (03:55):

And real quick, since we did mentioned overdosing, can you overdose from oral berberine?

John Gildea (04:01):

No, they tried to do that with the same mouse study. So the mouse study where they have an LD 50 for intravenous-

David Roberts (04:09):

Lethal dose 50.

John Gildea (04:10):

Yeah, where 50% of the mouse die. There's intravenous berberine can be lethal, certain dose. And interperitoneally, it can also cause death in 50% of the mice, and not a huge dose, either. But in that same study, they... I don't know how much more, but maybe 100, or 200, 300 times as much orally and they didn't see a single harm at all, let alone lethality. So that's the big first difference, is there's a massive difference in dose going on here. And I think the other perspective to keep is that in that same study, they blocked the effect by activating a transcription factor involved in mitochondria biogenesis called PGC1α. And so PGC1α is the transcription factor that turns on the production of mitochondria, basically it induces mitophagy. So it makes you eliminate under-functioning mitochondria and causes the higher functioning mitochondria to divide and replenish. So it's basically what you're doing when you exercise.

So the take home of that paper, I would interpret it as if you take tons of berberine, you don't do anything that you could very easily... If you take huge amounts of berberine and don't do anything, it would harm both a normal person and a diabetic person by possibly blocking protein synthesis and muscle development. But if you're exercising, you're activating PGC1α. You're actually inducing naturally the thing that they did genetically in that mouse, and proved that you block the effect. So having berberine, we would always say, "A healthy lifestyle involves exercise."

David Roberts (06:35):

Absolutely.

John Gildea (06:35):

And that would also be protective of any overdose of berberine.

David Roberts (06:43):

And are there supplements that might also block or block that negative effect or induce the PGC1α?

John Gildea (06:50):

Yeah, definitely. So also age dependence. So as you get older, the amount of CoQ10 that you're able to transport and bring into mitochondria for inducing PGC1α and also just making mitochondria function well. So CoQ10 would be one. If you're older than 40, ubiquinol, the reduced form of CoQ10 would help. And then PQQ is another supplement that's been known to induce PGC1α. So if you're worried about the ill side effects of berberine, which I don't think has been shown in human studies, at least the number of studies that I've seen, because they actually use berberine to try to prevent sarcopenia, which is age dependent muscle loss. And it activates AMP-kinase, which is the pathway that is lost in diabetics. So loss muscle is perfectly equivalent with insulin resistance loss, so increase in insulin resistance. So insulin sensitivity would combat it, in general. And berberine's known to increase insulin sensitivity.

So in real world, in humans, if you're aging, in an aging population, exercising and taking berberine, I think would generally be in the direction of counteracting insulin resistance and sarcopenia. And controlling blood sugar, of course, in general, is going to keep you from those ill effects of prolonged high insulin and prolonged high glucose, that is inducing those ill effects from long term. So insulin being high does a lot of bad things. It's basically sugar rusting, that version of when your sugar is high, you get glucose conjugates damaging tissue in general. And then insulin high in general is associated with a lot of bad health effects.

David Roberts (09:31):

Yeah. Great. Well, I think that pretty much covers it. So thank you for that, John. And real quick, so is there... With our version of berberine, it's more bioavailable. Is there a number that you could take where you would... A number that you recommend not taking? Like I take four a day. Is that too much, about right? We recommend taking two a day.

John Gildea (10:07):

So there's probably a good way to estimate those sort of things so that the ill effects of berberine are associated with dramatic drops in glucose. So if you give berberine in a sub lethal dose, but a high enough dose, you'll drop your blood glucose, I think it's by 67% with a dose. So those are really dramatic drops in glucose. Which is not too surprising that that would show effects on protein synthesis. And so I don't think that those levels are achievable orally. We measure blood glucose all the time. With a berberine, even when you try to take more... We're all really interested in what is too much, and we've pushed it with our own product, purposefully taking very large doses of broccoli as well, just because we want to know where that margin is. And we've taken pretty big doses of berberine, too, and you rarely get blood glucose drops of more than 10, at least for me.

David Roberts (11:23):

Yeah. Same. Great. Well, John, thank you for answering that important question. And we will be back next week with another podcast. Thanks John, for joining us, and thanks everybody for listening.

John Gildea (11:38):

Yeah. And thanks for the question. It was a really great question.

David Roberts (11:42):

Great question. Yep.