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Hello, and welcome to Supplementing Health, a podcast presented by Advanced Orthomolecular Research. I'm your host, Dr. Paul Hrkal. This show is all about applying evidenced-based and effective dietary lifestyle and natural health product strategies for your optimal health. We are going to feature some very engaging clinicians and experts from the world of functional and naturopathic medicine to help achieve our mission to empower people to lead their best lives naturally.

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[1:11] Hello, and welcome back to Supplementing Health. My name is Dr. Paul Hrkal, your host. I'm a naturopathic doctor and the Medical Director for Advanced Orthomolecular Research. This is Part 2 of our magnesium piece that we're doing. In Part 1, I covered all about what magnesium does in the body, what is some of the research supporting the benefits of magnesium, what are some of the signs and symptoms of magnesium deficiency from anything from muscle cramps to high blood pressure to restless legs to chronic pain and really tense muscles, chronic headaches, and many others. We talked a little bit about testing magnesium in the body. Then, we also talked about understanding why we're so deficient in magnesium.

[2:04] Now, that is such an incredibly important point to remember, which is that there are so many things in our environment and what we're eating, what we're consuming that are vying for the place of magnesium and that has actually replaced magnesium in a lot of ways.

[2:21] A lot of medications, for example, anything that blocks stomach acid. You need stomach acid to effectively absorb all your minerals, and magnesium is one of the most important ones. The biggest offender is going to be your proton-pump inhibitors, those acid-blocking medications. Unfortunately, that class of medications is prescribed like tic-tacs. It's prescribed so often. It's prescribed in infants and newborns. It's prescribed basically for anybody that has any sort of digestive issues.

[2:55] I was just talking to a colleague this past weekend, and there are so many examples of "Hey, you have nausea? Let's give you a PPI." On all those PPIs, there's a label warning saying, "May cause magnesium deficiency." Actually, it will cause, and it's not meant to be used long-term, and unfortunately, they are.

[3:19] There are so many other things that are leading to depleted magnesium. For example, in our soil, which translates into poor levels in our foods. A lot of people that say, “Oh, I get all my magnesium from foods.” That, unfortunately, is not something that I’ve seen get anywhere near what we need if we have any of the conditions that are related to magnesium deficiency.

[3:43] So, the research shows that almost 50% of people are not getting the bare minimum, not the optimal, the bare minimum amount of magnesium. That’s 50%. If you add in chronic stress, you add in periods of poor eating, you add in periods of medication use, you add in periods of chronic pain, conditions that may require excess magnesium or higher levels of magnesium, or you’re an athlete – 90% of athletes are deficient in magnesium.

[4:18] You can see how things really stack up to that we are a society of deficient people and suboptimal people. I should say, for suboptimal specifically, that it’s related to magnesium and your mineral levels. Your minerals are particularly at risk because it’s hard to find them in foods that are bioavailable, and often, those types of foods are not consumed as much anymore.

[4:49] There are a lot of reasons why we’re deficient, and that deficiency, unfortunately, is not something you are going to find on some bloodwork. So, you can’t go to your doctor and say, “Can you measure my magnesium levels.”

[5:00] There are tests that you can measure magnesium, but they become out of range when a person has severe diarrhea, fluid loss, vomiting condition because you’re losing so much fluid, and you’re losing electrolytes. Those are people who are at risk for electrolyte deficiencies, calcium, sodium, potassium, magnesium.

[5:28] There is such a thing as suboptimal levels. That’s something that bloodwork is not going to pick up. Just serum magnesium, which is magnesium in your bloodstream, is something that is tightly regulated. Your body regulates magnesium levels very tightly because it’s an essential electrolyte, just like it regulates potassium and sodium. So, it’s not something you can get tested very readily.

[5:53] There is this RBC magnesium, which is intercellular, but that’s often not run by doctors, and it may be more accurate at telling us what’s inside. Many of them have stopped running them in practice because they all came back in normal range. It might have been lower normal range, or it might be a higher-normal range, and usually, it’s higher after they’ve been taking magnesium, but I haven’t found that it’s been diagnostic of anything, so I stopped running it. It wasn’t very clinically helpful. If we have enough research to show that, in my opinion, we should all be taking magnesium, especially for any of the conditions or symptoms that we talked about.

[6:35] Other things that contribute to magnesium deficiency, just as a review – it is really important, which is why I’m going over it again. Any intestinal surgery, so gastric bypass, is one. I’m working with a patient now where they had gastric bypass surgery, and we know, and it’s well established in the conventional medical system, as well in the research, that people that

have gastric bypass surgery can't absorb many of their nutrients, both fat-soluble and minerals as well.

[7:06] So, you actually have to take higher levels supplementing. In my experience, I've rarely seen somebody that's had one of these surgeries and is actually able to absorb the nutrients. They're always massively deficient, and often, a lot of health concerns start coming out and popping up after they've had the surgery.

[7:24] Even though they may lose a large amount of weight, like over 100 pounds, then autoimmune diseases start happening, chronic malnutrition starts happening, etc. Definitely, it doesn't come without major risks, and most people don't follow the recommendations on supplementing after one of these surgeries.

[7:44] Think of any conditions with intestinal permeability or intestinal inflammation – for example, Celiac Disease. Then there's that more grey area, Non-celiac wheat sensitivity, which is still an allergic condition. It's a sensitivity; it's not an autoimmune condition like Celiac, but that's affecting the lining of your gut. It's creating a more permeable or leaky membrane, and that is impairing your ability to absorb nutrients when your gut lining, your enterocytes, the lining that's inside of your GI, which is one cell thick, starts becoming infected and inflamed, and the normal pathways and processes get impacted, they're not absorbing as well.

[8:31] Magnesium has two major ways of being absorbed: passive diffusion. It's a mineral. Whenever magnesium is supplemented, it gets broken apart by your stomach acid. We just talked about that. Let's say its magnesium oxide that you're taking or magnesium in a complex, in an amino acid complex in food. We'll talk about food sources in just a second.

[8:55] It gets broken apart, and then it gets passively diffused, so that's small little minerals and ions can do that. But there's also another pathway, which is specific for absorption of your magnesium plus amino acid. The amino acid grabs the magnesium and pulls it through, but that is a much smaller percentage of absorption through that particular pathway, and it requires more energy for it to do. So, definitely passive diffusion by far is the most important, and it's the one that's most common.

[9:34] You can see how there are lots of things that are competing for magnesium and are limiting its ability to be absorbed. We haven't even talked about things like antibiotics, for example. That was one of the major issues with some of the hardcore class of antibiotics like the fluoroquinolone class of antibiotics, so like the Cipro, Floxin, and this class of antibiotics can bind magnesium directly.

[10:01] In fact, it says, "Don't take with magnesium" because the drug companies know that it grabs magnesium and doesn't let go. So, right there, you can see you're going to be grabbing magnesium if somebody is on these antibiotics, especially long-term. Not to mention the really detrimental impact that these antibiotics have on our microbiome, on our gut health. A lot of people will actually notice that's a huge problem.

[10:27] One of the theories is that when you become deficient in magnesium and deficient in some of these other minerals because of these antibiotics, this is over and above the effect on your microbiome. Microbiome does have a definite role to play, but some experts feel that it's one of the reasons why some people, after taking this class of fluoroquinolone, the Floxin class of medication, Cipro class, they get to what's called Floxin.

[10:59] It's very difficult for them to recover after this class of medication. Then, people experience severe muscle fatigue, nerve pain, and often very debilitating symptoms. I worked with a couple of patients like this, and they are treatment-resistant. It's harder to treat them or to address them.

[11:16] So, we have a chronic low-grade magnesium deficiency, so how are we going to fix this? That's what everyone wants to know, obviously. We want to look at how we're going to fix this. Let's look at foods. Obviously, as a naturopathic doctor, food is my main way of getting nutrients into people, and ultimately, that's the long-term strategy; it's the long-term play.

[11:38] There are foods that are higher in magnesium, and it's a great idea to include them in your diet. You mostly will probably be eating some of them. I try to break it down per serving, so it's not per bushel and/or per equal amount, so the serving maybe wouldn't change, but let's say an average serving.

[11:59] For example, the highest level per serving of magnesium is 320-some-odd milligrams in pumpkin or squash seeds. This is something that's really popular now with healthy fats, nuts and seeds, and it's something that is readily available. Eating a quarter cup of pumpkin seeds will give you 300 milligrams of magnesium.

[12:25] This doesn't mean this magnesium is readily absorbed. Most things in food may have an issue with absorption because you have to break them out of the fibre. You, obviously, have to break apart the outer, tougher shell for anyone that's tried a pumpkin seed, you have to break them down. If you're not chewing as well, you're not able to break some of that stuff down. If you don't have as much stomach acid – you can see how, again, like with any absorption, we have to consider that you have to pull this out of your foods. So, that's number one.

[13:00] It's actually number one by quite a bit. The next one that I have on the list is Brazil nuts. I try to take some Canadian values on this. It's applicable for anybody in the world, but I try to grab some Canadian values because I'm Canadian. Brazil nuts is number two on the list. They are about 130 milligrams per serving, which is ¼ cup of Brazil nuts, which is quite a bit, actually for Brazil nuts. I only recommend maybe two or three or four – not more than that. Brazil nuts are high in something called selenium, which is an amazing mineral and very important for glutathione production. It is synergistic with magnesium in the production of glutathione.

[13:44] Magnesium is a cofactor in the production of our master antioxidant called the glutathione. It warrants our having a separate conversation about how important this antioxidant

is. But you don't want to do this for six months straight, eating ¼ cup of Brazil nuts. So, pumpkin seeds are your best bet.

[14:03] Then, you get peas – about 120 milligrams. Sunflower seeds are 120 milligrams. Fermented soy like Tempe, 120 milligrams per serving. Then cereals are on that list, almonds, soybeans, salmon – cooked salmon, in 2½ ounces you're getting about 92 milligrams. So, not too much. Most supplements will give you anywhere from 100 to 200 milligrams, and we're going to talk about that now.

[14:32] Flaxseeds are about 78, in case somebody's wondering. Spinach at 83, that's cooked. Swiss chard at about 80, so really, a lot of great healthy foods. I encourage everyone to incorporate these into their diet. You're getting anywhere from 300 to maybe 100 milligrams of magnesium for any one of these foods.

[14:53] As we talked about, there are some limitations with foods. Whether a person may be sensitive, you can't get them in all day, so magnesium is one of those minerals that get on my list of "It's a daily supplement," or pretty regularly throughout the week because there are so many things causing it to be deficient, as we've already pointed out in the beginning of the show.

[15:17] Let's break down all the different ways you can get magnesium through supplementation. There are many different types of magnesium. Probably one of the most diverse forms out of any natural health product. Like, with vitamin D, there are two forms: D3 and D2. D3 comes from lichen or traditionally lanolin, which is sheep's wool. D2 comes from the cell wall of fungi – mushrooms. D3 is much better, in case you're wondering, so always stick with D3 vitamin D supplementation, and most of the good ones are now, anyway. Look for an oil-based.

[16:00] When it comes to magnesium, you have magnesium oxide, magnesium carbonate, chloride, hydroxide, magnesium citrate, gluconate, magnesium glycinate, magnesium malate, orotate, threonate, aspartate. All these magnesiums have different characteristics. I'm going to break them down into three categories.

[16:21] Magnesium oxides, carbonates, chloride, and hydroxide: these are what's called the inorganic salts. In general, the advantage of this group is that the magnesium is a small mineral, and this other molecule is attached to it, like oxide, which means one oxygen is a small molecule. You have a very high ability to pack a ton of this one molecule – 2 atoms: magnesium + oxygen into a capsule, so you can easily get 500 milligrams of magnesium oxide into a tablet or into a supplement.

[17:00] The problem with this class, which goes for oxide, carbonate, specifically for those two, is that you have poor oral bioavailability. What does that mean? Basically, it means absorption, so getting that magnesium from your gut, what you put in your mouth, into your bloodstream where it's needed so it can be absorbed by your cells.

[17:25] That's the tradeoff. You get a ton of it. It's very inexpensive. You can find it at most pharmacies, and you'll usually find it in the laxative aisle because it's like Milk of Magnesia, for example. That's magnesium hydroxide or magnesium oxide. One of its functions, when you take it in high doses and high amounts, it will rush your digestive system with pulling water to itself, so it will cause a person to go to the bathroom. It's used acutely as a laxative. Effective for a laxative? I don't think we need that form when we're looking at trying to get it into the body.

[18:07] I'll come back to mag chloride because there are some companies touting mag chloride in the solution as being more bioavailable. I've tried to look into it. I think that there's something definitely something to it. In my evidenced-based world, I typically have found more research on the other forms of magnesium we're about to talk about, but just know that there are some liquid magnesium chlorides.

[18:35] Anything that you put in a gel, like, for example, anything topical is a magnesium chloride. Some companies have continued to perfect the application of that. Usually, when you put these magnesium chloride gels on, they feel salty because it's magnesium chloride, just like sodium chloride, which is salt. It's a table salt, so it might be a little itchy for some people, and I think that's improved with some of the deliveries of carrier creams that you put on. I, personally, don't use magnesium chloride in my practice. Maybe I should, but I get good results with the other forms when I'm going to use it.

[19:17] Organic salts: this is magnesium citrate, magnesium lactate, magnesium gluconate, magnesium sulphate. Magnesium sulphate is Epsom salt. That is something that you pour in a bath, and you can dissolve it, and it is absorbed through your skin. We don't always have to get magnesium orally. Magnesium sulphate is a great way of getting it. You can find magnesium sulphate as Epsom salts in Costco; you can find it in any pharmacy.

[19:49] Typically, there are some companies that have touted, "We have a very clean source of magnesium salts. It doesn't have any heavy metals." That's something to consider if you're looking for a really clean source whenever you're doing any sort of minerals coming from the ground, could there be other contaminants? Maybe. I'm not sure, but I've seen a couple of companies touting that they're heavy-metal-free. But magnesium sulphate is a great option.

[20:14] Magnesium citrate: there's tons of research on magnesium citrate as a form. This class, this category has good bioavailability. They are absorbed pretty well, but higher doses can cause loose stools as well. They're missing the additional benefit of the last class of magnesium, which is magnesium chelates or magnesium complexes connected to an amino acid.

[20:47] So, it's magnesium + an amino acid. You notice, magnesium oxide is magnesium + an oxide. These are called inorganic salts. The magnesium citrates are called organic salts. Then the magnesium complexes are amino acids. The additional benefit of the amino acids is that they have good absorption. The reason is, is that because it's connected to an amino acid,

there's a specific pathway in the body that absorbs mineral complexes with amino acids directly. You're not only just getting the passive diffusion; you're also getting the direct absorption. That's really an additional benefit.

[21:25] Plus, you're getting the benefit of the actual amino acid, for example, glycine – magnesium glycinate. You're getting the benefit of glycine amino acid. What's so good about glycine? Glycine actually is a very important amino acid for the function of your detoxification pathways.

[21:46] It also is majorly depleted by glyphosate, so Round-Up. Round-Up is one of these herbicides that is being used on crops. For example, in Canada, unfortunately, it's been used in wheats. It's connected a lot with GMOs and Monsanto because Monsanto created it, and they created the Round-Up ready plants, which have these genes that basically prevent the plant from dying when it's sprayed with Round-Up. When you spray with Round-Up, all the things around it die, except this plant.

[22:23] The problem with Round-Up and as it relates to magnesium, specifically magnesium glycinate, what Round-Up does is that it binds glycine, this amino acid in the plant. Then when you consume the residues of Round-Up – let's say you ate a piece of bread that was made with regular wheat; regular wheat is sprayed by Round-Up to kill it at the end and to speed up the harvesting process. Now, it's starting to bind glycine in you.

[22:56] Glycine is important for detox and neurotransmitter function. Glycine is a very calming neurotransmitter. So, magnesium glycinate often is used for calming purposes, so people will recommend it for sleep, tight muscles, anxiety. It's probably one of the most popular and commonly recommended magnesium supplements you'll find in the health food store.

[23:22] A quick point about the name of magnesium glycinate. Some brands or labels will say magnesium bis or magnesium bis-glycinate. That's an organic chemistry term for two molecules of glycine. Bis means two molecules. It's actually magnesium in the middle and two glycine amino acids beside the magnesium.

[23:47] What this means is that there are these two big amino acid groups that make the molecule big. The downside of this class of amino acid complexes is that they tend to be really big. That means you can fit less of magnesium into a capsule. If you wanted to, you could fit 500 milligrams of magnesium oxide into one capsule pretty easily. But you could only fit maybe 100 milligrams of magnesium glycinate into a capsule. So, that's the biggest difference, so you're going to have to take a bit more.

[24:20] Some of you might be thinking, "Well, hold on. I take 150 mg magnesium glycinate." Or "I take a 200 mg magnesium glycinate." It's a perfect time for me to tell you a little bit about some of the trickery that occurs in the nutraceutical world. It's now something I have to say I was terribly proud of when I found out about it. I was actually pretty upset. But it happens in any industry, and manufacturers – the companies that supply the nutrients or herbs, in this case,

magnesium, to the company that you are buying it from. Many supplement companies are actually really just sales and marketing companies. They don't make their own products. Very few companies do. A lot of the big professional brands do. I know, for example, AOR has its own facilities in Calgary, but many other companies that you're probably using supplements from, they actually get these custom manufacturers to make their products for them.

[25:29] They buy these raw materials, this magnesium and these suppliers started getting wise, and they said, "Magnesium glycinate is one of the most popular products that everybody's buying. Why don't we find a way to make magnesium higher while still calling it magnesium glycinate?"

[25:50] What they did is, they started mixing magnesium glycinate with magnesium oxide, and they started calling it magnesium glycinate chelate. That's a fancy word for magnesium glycinate mix. A lot of people thought, "Oh, chelate. Nothing's wrong with that." If you add 100% chelate, which means pure magnesium glycinate, that's great, and many companies were touting that. But when they started dropping the 100% and just saying chelate, a lot of companies were saying, "Oh, it must be good."

[26:22] A lot of companies started selling 150 mg per capsule of magnesium. 200 mg per capsule magnesium glycinate and people started buying it. They thought, "More is better. I don't have to take less." But what I started noticing in my patients is that my patients started coming in, and they were getting loose stools after just maybe two capsules. One of the ways that I – really saturated levels of magnesium inside a person's body is that we slowly increase the dose, and then you're able to get to five, ten capsules, usually without getting loose stools.

[27:00] When I started noticing this, I started asking, "What's happening with this particular type of magnesium?" I started doing some investigation and realized that some of these other companies were using this chelate. And nothing is inherently wrong with that. There's still magnesium glycinate present. It's not harming the patient. You're just basically getting magnesium oxide when you thought you were getting magnesium glycinate.

[27:35] From a therapeutic perspective, we could argue what the problem with that is. I want more magnesium glycinate. I want the full therapeutic dose. The big kicker is that many of these companies, when this started being an issue, is that they weren't reporting the magnesium oxide. Fortunately, many of them got wise and smart. They had to because people were getting upset. There were actually two lawsuits in the U.S. for exactly this. They're saying, "You're actually mis-advertising. You're misrepresenting your magnesium formulation."

[28:16] There is, in a 200 mg magnesium – we're just talking magnesium – 200 mg. You're roughly getting 68% of your magnesium from magnesium oxide. That means only 30% of it is coming from magnesium glycinate. That's not what people are buying.

[28:44] Anyway, a word to the wise. More magnesium per capsule is not necessarily better. It's something that you should consider. So, use magnesium glycinate – that is, I would say roughly about 100 mg per capsule is going to get you pretty close to pure magnesium glycinate.

[29:07] Let's move onto some of these other forms. Magnesium malate is another one of my favourite forms. Malic acid is found in apples. It gives you that nice tart flavour. Malic acid is part of something that is happening inside of each one of our cells called the citric acid cycle, the energy production cycle. It's actually happening inside of mitochondria.

[29:31] Many clinicians will use this form of magnesium for the production of energy. It's been studied for muscle pain, so fibromyalgia is the big one that a lot of people are using this for. It's a very popular form. With fibromyalgia, the research shows that their cells are deficient of lower levels of ATP, energy precursor. Malic acid helps promote the function of this citric acid cycle.

[29:58] There is magnesium citrate, which we talked about. It's been used for headaches; it's been used for replacing deficiency. Magnesium citrate is a good form. It's not an amino acid form, so I would point that out. You're going to get the additional benefits of magnesium glycinate and malate. Citric acid and citrate, there are some benefits of taking that. It's not an amino acid.

[30:29] A couple of other ones that I want to point out here: magnesium orotate. Magnesium orotate is probably a form you've never heard of before because most of the research actually comes from Old Eastern Europe, actually communist Eastern Europe, like Russia, Ukraine. They were looking at a type of magnesium that was able to repair heart tissue.

[30:54] If you're looking at the amount of research on different types of magnesium, most people would be quite surprised that there's very little published research on magnesium malate or magnesium glycinate. It's pretty funny because they're the two most common forms that you're finding in retail stores.

[31:17] Magnesium orotate has much more research behind it. Orotic acid is a specific amino acid that helps pull magnesium into the bloodstream, but also into the heart specifically, and orotate or orotic acid helps the repair of your DNA. They were specifically using it for heart failure, high blood pressure, symptoms of heart pains like angina, arrhythmia, exercise performance. I use this specifically in those conditions.

[31:49] I have to be honest. I still probably use magnesium glycinate and malate. There's a lot of mechanistic and reasonable benefits why you would want to use this one, why you would want to use those two forms. Magnesium orotate is a bit more expensive, but if somebody has a heart condition and they need to repair their heart, magnesium orotate.

[32:13] Magnesium taurine is another one that I mentioned in the last episode. Magnesium is really well-paired with taurine. Taurine is an amino acid that has multiple benefits. Like glycine, it helps with detoxification. It helps improve your insulin signalling so your blood sugar regulation.

It also has a calming effect. It is called the master osmolyte. What does that mean? That means that taurine has this ability to keep the electrolytes in the right areas. Magnesium and potassium are intra, meaning intra, inside the cell electrolytes, where something like calcium and sodium are inter, so they're between cells. They're outside the cells.

[33:00] Magnesium taurine normalizes these electrolytes, which normalizes electrical activity across membranes. So, think like heart conduction; think brain conduction; think nerve conduction, bile secretion and detoxification, so the additional benefit of taurine – I'm a huge fan of combining magnesium and taurine. I might do them separately. There are a number of formulas that have magnesium and taurine in it together.

[33:30] Magnesium and taurine are not well reacted together, meaning there's not a pure chelate, so they're not actually combined as a molecule. Usually, that taurine is added as an amino acid. It's stable by itself, and then magnesium citrate is added. That's what you might find in the formulation because it's hard to find a pure magnesium taurine chelate. That's more of just on the practical side.

[33:55] So, that's a little bit about the forms of magnesium. Oh, I forgot: magnesium threonate. I've got to mention that. Magnesium threonate is the new kid on the block in terms of the forms. It has research showing that it can get across the blood-brain barrier and get into the CSF, cerebral spinal fluid better than other forms.

[34:19] Specifically, there was research – I believe it was a Stanford and one other prestigious U.S. institution, and they were finding that it was getting in the brain, and it was increasing nerve transmission and nerve growth. That was pretty neat. We know magnesium has a lot of benefits on brain health. And always inflammation, you think of Alzheimer's, brain injuries, Multiple Sclerosis. If you're really intent on getting magnesium into the brain, that's where you really need it.

[34:54] There is research supporting the benefit of magnesium threonate. It is probably the most expensive form of magnesium. Like orotate, very specific, but you're getting that specific benefit. That gives you a pretty good idea of all the different forms of magnesium – some of the pros and cons to each one. Some of the amino acids we just talked about. We have the additional benefit of those amino acids.

[35:25] I want to finish off by talking a little bit about some of the most commonly-asked questions about magnesium. You're probably thinking about some of these questions as you're listening, and some of the key takeaways as we're talking about the different forms.

[35:42] How much magnesium should I take? This is a really common one. I mentioned a couple of minutes ago that one of the ways of actually getting your magnesium dose is that you increase your levels slowly. Maybe every couple of days, you add an extra capsule. I always recommend, with the guidance of a healthcare practitioner. We always say, "Don't start a supplement before knowing your basic things like blood pressure and some blood work." But

magnesium is very safe. It's one of the ones that people probably would be the safest without getting a full workup, but if you're going to increase it slowly and get up to high doses, that's when you should have somebody monitoring you.

[36:24] That's how you get to your right dose. Normally, as a maintenance dose, usually around 400 mg. You break that up throughout the day. If you take one massive dose of magnesium, you're going to get maybe 20% of it absorbed. The more doesn't necessarily mean better absorption. In many cases, with natural health products, you get less absorption because there's a diminishing returns point. You saturate the pathways in gut, and it actually starts competing against itself.

[36:59] Magnesium is one of those things that you should be taking alone, on an empty stomach, probably would be the best because it's the highest stomach acid, and you're not competing with any amino acids. If you think that there's enough magnesium in your multi, there's probably not because magnesium is with all those other things. So, you just massively decrease the absorption of all these other nutrients because they're competing.

[37:20] For example, magnesium competes with zinc, and it competes with other minerals for absorption. That's not to say that mineral complexes are not effective. It just means that you are probably going to have to take a little bit more.

[37:35] That's the dose piece. How long do you have to take it? Well, I alluded to this before. Only 1% of your magnesium is in your bloodstream, which is one of the reasons that blood testing is inaccurate. Over 50% of it is stored in your bones. A lot of people think of calcium for bone health. Magnesium is just as important.

[38:00] Oftentimes, the reason that a person is impacted by poor bone health is because they fall, they have poor muscle function that regulates their ability to walk and strength. That is actually the real issue with brittle bones. So, magnesium and calcium are very important together, not just calcium for bone health.

[38:19] Magnesium is stored in bone. That means it's the reservoir in bone. If you're eating a poor diet, like there's a period in your life that it was just fast food, and you were eating a lot of refined foods and refined carbs and meats, and pro-inflammatory foods, the body usually becomes acidic with those particular foods, and that means that it actually pulls alkaline minerals. Magnesium, calcium, and potassium are alkaline minerals stored in the bone.

[38:51] Bone is not just for structure; it's actually as a dynamic tissue. There is an exchange of minerals that are constantly being remodelled. It's producing our red blood cells in our bone marrow, which is in the middle of our bone.

[39:04] We understand magnesium, that 50% of it is in the bone, it takes a while for those levels to be built back up. So, I always recommend at least six months of consistent supplementation if you want to build your levels back up.

[39:19] Safety of magnesium: I also alluded to this as well. Magnesium, like vitamin C, if you take too much, you get loose stools. So, that's a built-in safety valve. There are rare cases of people taking magnesium and causing issues, and they have to be hospitalized with heart function, so there's usually some sort of underlying issue, or there's some kind of absorption pathway that's either being blocked or an elimination pathway that's blocked. It's overall very, very safe. People don't usually absorb anything they don't need.

[40:06] We talked about synergistic nutrients. B6 helps pull magnesium into the cell. We talked about taurine. Taurine is complementary to magnesium and a lot of similar functions. It regulates electrolytes, including magnesium. When B6 is low, both magnesium and taurine become further deficient, and B6 is another massive issue with the deficiency. One of the biggest things that depletes B6 is the birth control pill. It depletes B6 in the B vitamin class. You can start seeing how so many things conspiring to make magnesium massively deficient.

[40:49] There is a connection between vitamin D and magnesium. Vitamin D is converted from cholesterol with the sun hits cholesterol under the skin. That's converted to a more active form called 25-OH Hydroxy Vitamin D. Then, for these conversions, you need magnesium. So if you're deficient in Vitamin D, you may actually be deficient in magnesium because you're not able to convert it. So, it goes hand-in-hand. Not to mention, we just talked about how important vitamin D and magnesium are for bones. So, obviously, we know vitamin D for magnesium.

[41:31] Those are some of the most common questions that people ask, and hopefully, this was really helpful for you to understand some of the differences between forms, some food sources, again a quick review of all the reasons that we're deficient. I think the takeaway is that this is one that probably you need to add to your regime if it's not already. It's important for so many different things: energy production, heart function, nerve function, chronic pain prevention.

[42:01] If you have any health issues, magnesium would be one of the ones that would be top of the list. If you're giving it to kids or if you're pregnant, obviously, talk to your health care provider and practitioner about that. That will make sure that you're covering all your bases, but overall, it is very, very safe.

[42:20] I had a lot of fun today. Magnesium, as you can probably tell, is my jam. I use it a lot with my patients. I have five or six different forms in my clinic, and I use them all. They all have different therapeutic actions. Thank you so much for joining me for this episode of Supplementing Health. Hopefully, you will join me next time, and we'll talk about another key health issue. Until next time, take care and be well.

** * * Outro Music * * **

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marketing@aor.ca. We hope you tune in again next week to learn more about supplementing your health.

[End of episode 43:34]