Micronutrients: Magnesium

Transcript

Welcome to Micronutrients and we're here for a specific presentation on magnesium. Before we begin we'll just do the quick disclaimer, this is not a medical advice, this is not intended to replace a one on one thing with a Doctor, when you're working with people, make sure that they know that. You're giving them education based on your experience, your research and everything else and if they're on any medication or under the care of a doctor, they should always check with their Doctor before doing anything different.

Let's start with general information about magnesium. Magnesium is an essential macro mineral. Remember we said that macro minerals were those that were needed in large amounts, usually in the hundreds of milligrams per day versus micro minerals only needed in less than that. Micro gram doses or like ten, twenty, thirty at the most milligrams. Magnesium is a mineral that's very frequently deficient in the modern diet and when we look at the food sources, it's no wonder why. In addition to the soils being depleted from poor agricultural practices, people just don't eat foods that are high in magnesium unless they've seen the light and been guided to eat more of the fresh whole foods. It's vital though for over three hundred and twenty five enzymes in the human body.

We're always figuring out new things that magnesium is good for and there's just all kinds of reactions so magnesium deficiency can show up in a lot of different ways. We'll share with you some ways that you can look for it. Magnesium is important for over three hundred and twenty five enzymes in the body so let's look at some of those functions that magnesium serves. Energy production, like ATP. Transport, storage and utilization, how we handle our energy from the fact that it's important in the ATP production, it's important in transporting nutrients and minerals throughout the body and it's important for the storage and utilization of say glucose even, it's really important in the glucose cycles in the uptake of glucose into the cells.

It's important for nerve conduction, the communication between one nerve to the next nerve to the next nerve. It's important for muscle contraction, not just skeletal contraction but heart muscle contraction which is why we see a lot of magnesium deficiency in heart patients, patients who have had heart attacks or arrhythmia's. It's important for skeletal strength so it's an important constituent of bone, of putting the bones together.

A lot of folks think, "I just take my calcium and I'm good for that for the bones," and some people are taking Tums because they've been told that it's good for their bones because it has calcium. They don't realize that it has the wrong kind of calcium, it has a very alkaline form of calcium and the body needs a more acidic form of calcium.

They also don't realize that in shutting down their stomach acid by the Tums that they can't absorb their minerals anymore. Nobody realizes that magnesium is an important piece of it and that calcium and magnesium need to be in good ratio with another. It's also very important in DNA and RNA synthesis and repair and cell reproduction and growth. Heart activity, not just the heart muscle contraction but the electrical conduction of the heart as well. You see arrhythmia's when magnesium is low and magnesium sulfate is actually something that's given when people have a heart attack, it's given intravenously. In neuro muscular transmission, when you get to the end of the nerve which is going to talk to the muscle, magnesium's important in that communication.

It's also important for blood pressure and for peripheral blood flow. You see a lot of people who can bring their blood pressure down dramatically by getting proper amounts of magnesium in the body and also the entry and release of calcium from the cells. These are some of the enzymes that magnesium goes into, obviously we're not going to go into all three hundred and twenty five of those. In fact, I looked hard and wide online and in my textbooks to see a complete list of those three hundred and twenty five and I think it doesn't exist as far as I can tell and if anybody finds one for me, I would really appreciate it. I was just looking for a list and none of my textbooks had it, none of the websites had it. They would have an enzyme here, an enzyme there but you had to look at all the scientific research for that.

What are some of the functions that magnesium does? It catalyzes enzyme activity obviously and it's mainly in the energy production area, that's a really big one. It assists in bringing calcium and potassium into the body so the uptake and absorption in the gut. What we'll see is that there's a Goldilocks principle at work here where to much calcium and potassium actually impair the absorption of magnesium but with not enough, we don't have enough magnesium to help absorb the calcium and potassium. It's this, again, another one of those cycles that you have to break. It's important to prevent the calcification of soft tissue, it balances with calcium so that the calcium doesn't get deposited in the tendons and the ligaments and the joints and yet it still happens and a lot of people get calcified deposits in their shoulders and other parts and then they end up having surgery on them.

It protects the arterial linings from the stress caused by sudden blood pressure changes, a really important role. It plays a role in the formation of bone, yes, we talked about that already. It's important in carbohydrate mechanism and insulin sensitivity. It's one of the key nutrients that we give people who are having difficulties with blood sugar maintenance, people who are insulin resistant and no longer sensitive, magnesium helps the process of those receptors to become more sensitive to insulin.

It also helps to dissolve kidney stones, so calcium phosphate related and it also may help prevent the oxalate type stones. Oxalate is important to remove from the body and the magnesium and vitamin BC will bind the oxalate's and take it out.

Oxalate's can form kidney stones if you can't excrete it. Let's look at more magnesium functions. It has been shown to possibly reduce cholesterol levels and it's certainly an important part of a program for anybody with a history of cardiac problems, a history of elevated cholesterol levels and a history of any sorts of arrhythmia's. We help people with their heart by giving them adequate doses of magnesium, whether it's food or supplementation. It's effective at preventing premature labor and convulsions in pregnant women. If somebody goes in with preeeclampsia or premature labor, then they are dosed up with magnesium sulfate. They have to be careful not to do to much but it's very effective at stopping those contractions. Magnesium's good at activating muscles and nerves so making them act the way they're supposed to properly.

If you have a deficiency of magnesium, you'll often get cramping, muscles that cramp. Contraction, contract, relax, contract, relax, they stay cramped because the magnesium isn't there to help balance the calcium and help them to relax. When you have to little at night, people have Charley horses that wake them up in the middle of the night, a lot of times you can use topical magnesium before they go to bed, either at the bottom of their feet or right over those muscles themselves to help absorb it better or an Epson salt bath, which has a lot of magnesium in it. It's also important for ATP, because it activates ATP in the body. If you don't have enough magnesium, you may have the other pieces of the Kreb cycle working but you don't have enough magnesium, you're not going to actually activate the ATP. It helps with digestion of proteins, carbohydrates and fats.

One of its kissing cousins there is zinc which helps to really help the body create the protein, carbohydrate and fat digesting enzymes. It's a building block for DNA and RNA synthesis and also it's actually a precursor for neurotransmitters like serotonin. A lot of times, some people are low in serotonin, we jump in and want to give them 5 HTP and B6, that usually works but if you've got somebody where that's not working, maybe it's a magnesium deficiency. Magnesium deficiencies are rampant, rampant and part of it is, it's not all that well absorbed. It's mainly absorbed in the distal part of the jejunum, that middle segment of the small intestine and that's where most things are absorbed but also some of it in the ilium, which is the last part of the small intestine and there's some final absorption of minerals there and magnesium is one of them.

When you have somebody whose taking in low levels of magnesium, say they're taking in ... the RDA'S somewhere like three fifty to four hundred depending on whether you're male or female. Say they're just barely taking in two hundred milligrams, the body is going to up its ability to absorb it, it increases it's ability to absorb it and it uses something called active transport.

You may not remember from high school chemistry that well so I'll review what active transport and it's diffusion because it's the ways that our nutrients get into our cells. Diffusion is just where it seeps in from a concentration gradient of higher to lower. If you've got a higher concentration of magnesium in the digestive tract moving into the blood stream, then you're going to have it move in.

If you've got a higher concentration of magnesium in the blood stream, you're not going to have it absorb through diffusion. At very low levels, we're trying to really up that level, up it, up it, get as much of that magnesium as possible so we create an active transport of it and we have that active at low levels. At low levels, because there's not that much of a gradient there, we want to be able to pull it into the blood stream. There's some proteins that will bind to the magnesium and actively transport it through protein channels in the cells. Some of the absorption can actually occur in the large intestines if some of it's still in there, it can occur but it's very, very little. Consider that anywhere from forty to sixty milligrams, sixty percent of your magnesium that you take in is actually absorbed when you're having regular intake.

If you're having five hundred milligrams of magnesium intake, forty to sixty percent of that's going to be absorbed. If you're taking much higher doses like five hundred and fifty to eight hundred milligrams, only eleven to thirty five milligrams is going to be absorbed at the higher intakes. Some people need to take those higher levels because they're so low or they have such dependent needs in their body for magnesium or they have genetics that impair the utilization of magnesium. They're going to need higher doses but you know that they're not going to be absorbing it as efficiently. When there's a deficiency, if somebody's just in over deficiency of magnesium, they can absorb actually up to seventy five percent.

That's why we can see rapid change when we give people massive doses right away because those massive doses are just absorbed in at seventy five percent until the deficiency is healed and then it will go back into the forty to sixty or eleven to thirty five, depending on how high their dose is. This is a picture, a picture of the effects and the absorption of your magnesium. It's really small and hard to read, so on the right hand side of the top we've got the intake. You see the arrow pointing to the mouth. Four point five milligrams per kilograms per day is recommended, so that's going to vary from the size of the person. If somebody's much bigger they're going to need more magnesium, if they're smaller, they're going to need less and that makes total sense.

You get the magnesium rich foods and you avoid those foods that impair the absorption and we'll look at a more detailed list of that in a moment, and they're going to have that in their diet or they're taking a supplement. The magnesium then goes into the system, the parathyroid is going to promote magnesium absorption in a piece of the kidney called the Loop of Henley, so that that will control that and that's what controls that how much we keep, and how much we get rid of and how much we pee away. It also stimulates the gut uptake so parathyroid's super important, it has effects on calcium as well.

It stimulates the release from the bones, so if the levels get to low, you're going to get the trigger of we need magnesium, release it from the bones.

That's the danger that people run into of having a magnesium deficiency, in addition to those various co enzymes not working effectively, you risk losing bone as a result. In regards to insulin reactions, it's very common and has been reported that we have low magnesium in diabetics and when we increase that magnesium we help them to have much, much better insulin sensitivity. Uptake ... the uptake is in the ilium and the jejunum. This picture says mechanism unknown but most of the stuff I've read says it's either active or passive, diffusion or active transport. They may not now the exact mechanisms but that's okay, we don't need to know that. It's stored in the bone, fifty two percent of it's stored in the bone, twenty seven percent is stored in the muscle and nineteen percent in other soft tissue.

Glycogen will increase magnesium, it's the opposite of insulin. Insulin and glycogen. When you have good balance and you've got those foods that don't trigger a high glycemic response and high insulin needs, the glycogen is keeping that balance and you have much more effective utilization of magnesium. Eighty percent is filtered in the kidneys, ninety five percent is actually reabsorbed unless its been shifted away from that due to excess or some other metabolic defects. We lose some of it in the urine everyday and the kidney can either increase or decrease losses depending on the concentration. The kidney will read the concentration and then it will either increase or decrease the amount that it let's go of. That's why some of the testing that we do is not necessarily an active reflection of the tissue stores because we're looking at the kidneys which are looking at the bloodstream and we don't know, we may have a decent amount in the bloodstream but not enough in the tissues.

Really the bloodstream in magnesium is only five percent or less that the magnesium is in there. What kind of things are influences on magnesium absorption? These are things that you can share with your clients so that they can clean up their act and avoid things that are going to decrease it. Excess phytates which are found in whole grains and sometimes in legumes, this doesn't mean that any whole grains are going to impact it but the phytates and oxalates will bind magnesium and pull it out of the system and pull it out in the gut or in the bloodstream. Things like non fermentable fibers, they will create a problem for magnesium, or too much regular fiber, just any kind of fiber. Non fermentable fibers are fibers that your gut flora cannot break down, those will decrease the absorption of magnesium.

Something called creatorrhea, which is basically excess fat. It's fat mal-absorption and so there's more fatty acids in the gut that bind the magnesium, they actually form soaps and you might see this in terms of foaminess in the stool. If you have excessive calcium or excessive phosphorous, that's going impede the magnesium absorption and the magnesium can form with the phosphorus to form a compound that renders both non absorbable. It's like everything's locked in there so it's really important to have that Goldilocks' principle at work. Things that increase that magnesium absorption, protein but in the right amount.

Too much protein inhibits and to little protein inhibits so just exactly the right amount of protein and you can calculate that based on the person's weight, based on the person's lean body mass, their activity level, et cetera.

Another thing that increases magnesium absorption is Vitamin D, although too much Vitamin D can actually impair it. Vitamin B1, important thiamine is important for magnesium absorption. Selenium is, as are Vitamin E and B6. All these things can increase but again, we don't want excesses because you may go to the other side and cause them to impair the magnesium absorption. Specific things that deplete your magnesium, good old gluten is very specific mechanisms by which it impairs so much, part of it is very general and that's the gut inflammation. Processed and overly cooked foods strip minerals from the body period. Magnesium would be one of them. Things that are stripped of their nutrition by making white flour products for example or hydrogenating or refining oils.

They're going to strip minerals from the body. Alcohol depletes magnesium, as do herbicides and pesticides. All the refined sweeteners do. Stress and as a result of cortisol and the cortisol depleting minerals in general and causing a very acid state instead of alkaline. Table salt because it's imbalanced, it's mostly sodium and it throws off the ratios. Tap water because of the fluoride in the water. Unfermented soy products have inhibitors of minerals, they do have phytates and things like that. Coffee, it's not just the caffeine because it's regular and decaffeinated, it has to do with the acids and the tannin's in there that deplete the body of magnesium. Excess zinc and vitamin D can create a problem, so it's really important when you're working with people to help figure out the best amounts.

There's no set formula for determining that, there is a lot of trial and error and really understanding their full health picture. Let's take a look at some new train interactions with magnesium. One in particular is zinc, high doses of zinc in supplemental form interfere with the absorption of magnesium, so really being careful not to just say, "This person needs zinc, give them a ton of zinc," is to go according to what they need and often times you can tell by symptoms relieving. If you put them on really high doses of zinc and then they start to show a whole slew of magnesium deficiency symptoms, you know you need to back off. One study that showed that zinc supplements of a hundred and forty two milligrams a day, which is huge, huge, significantly decreased magnesium absorption and disrupted magnesium.

What is that high level? We don't exactly know for each individual person, so like I said, it's really looking at creating balance and not going to fast or to high when you're doing zinc supplementation. Somewhere between thirty and fifty which is a little higher than the RDA can be helpful but I've worked with people who have massive imbalances in their sex hormone channels and I've put them on up to ninety a day for short periods of time and I'm making sure that I'm supplementing extra magnesium. If you are putting somebody on a high dose of zinc, make sure that they're also on a high dose of magnesium to counteract the negative effects unless you can look at the study there.

Magnesium interactions with protein, there was a study done with teenage kids, like adolescents and the magnesium absorption was lower when the protein intake was less than thirty grams a day.

That's pretty low protein intake for adolescent boys but when they went to higher protein intakes, they were associated with improved magnesium. Somewhere between forty three and ninety three would be the ideal dose and it probably would depend on that kid's activity level or the person's activity level, how much muscle they had and how much lean muscle mass they had. What causes magnesium deficiency? We've already talked about deficient soil, our soils are horribly deficient because of the agricultural practices and if we do things like using seawater to fortify our soils versus the pesticides and all that other stuff, and you can also use some of these bio dynamic processes and homeopathic solutions of bio dynamically grown soils can actually be helpful.

Fluoride in the water, and fluoride is also in the water that's used, not just that people would drink but it's in the water that people are watering their plants with so that can be antagonistic. Food antagonists like we talked about, high protein, tannin's, oxalates, phytates, excess of the mineral antagonists like we've mentioned, calcium and phosphorus, drugs, a deficient Vitamin D and also excess Vitamin D, so there's certain drugs that interfere with the magnesium. What's the impact? What are the symptoms? What does it look like? How does it present itself when somebody's deficient in magnesium? They can have anxiety and panic attack and that affects the adrenals. They can have asthma, that's bronchial spasmings and histamine problems and there have been some studies that showed that with supplementing people with magnesium, and magnesium drips, I'll show you that later, have been very effective at helping kids get out of asthma.

As effective as treatment with albuterol, which is what's used often times for kids when they go in with severe asthma attacks. Blood clots, the blood becomes thicker if you have less magnesium. You can have bowel disease because slower bowel function and poor enzyme function and lower hydrochloric acid. Bladder infections, the bladder goes into spasms and doesn't release properly and infections can happen. You can have diabetes and blood sugar imbalances because of the glucose transporting to the cells, it just doesn't happen as efficiently without magnesium. Fatigue, it's really important in the Krebs cycle and in glycolysis, the breakdown of glycogen. It's really super important to have magnesium or you can't make efficient energy.

Irritability and nervousness because of the effects it has on the nerve endings and the nerve function and then insulin resistance. What else? Other kinds of heart disease, heart contraction, even fatal arrhythmia's or heart attacks can be caused from magnesium deficiency.

Anytime you have somebody who presents and part of their family history, they're talking about heart disease in their family and that they had a heart attack at the ripe young age of thirty seven or forty two or whatever, then you might be suspicious that there's magnesium deficiency, among other things. Among things like blood sugar imbalances and all the rest. Hypertension, so somebody's got chronic hypertension. I have seen people go on magnesium supplements or high magnesium foods and have their blood pressure drop pretty quickly.

Insomnia, remember we said that magnesium was a precursor to serotonin or it's used in the metabolism to serotonin. Serotonin is a precursor to Melatonin so if we get insomnia with low magnesium and often times people will take magnesium before they go to bed to relax their body. It can lead to kidney disease and kidney stones if you don't have enough of it to bind the oxylates and pull them out of the system. It can be related to serotonin related migraines and muscle spasm related migraines. It can be related to fibromyalga, that's achy muscles and inability to sleep and et cetera. Muscle cramping and spasms, somebody who periodically, their calves either cramp up while they're sleeping or they get cramps in different parts of their body. Even vertigo can be impacted by magnesium deficiency. What else? The list goes on, this is a lot of stuff and I recommend that you keep track of these things and have this as a cheat sheet.

Make a magnesium in their history if they have a history of osteoporosis, Reynaulds, migraines and heart attack, then those are things that are stacking up for magnesium deficiency. Reynaulds is a condition where your extremities get really sensitive to cold, so if you go out in the cold, they end up turning red then white, then blue. Tooth decay, yeah. We think about calcium in tooth decay but magnesium's an important part of those structural compounds in the body. Complications of pregnancy, again, you're doing a history, that's why we do a thorough history and you start to see all these historical things. You go, "Oh my God, I think this person has a magnesium deficiency. She had preeclampsia in pregnancy," which is when the blood pressure goes super, super high and it's right before you're about to give birth and it's really dangerous.

That's a complication of premature labor is another complication. They say their mom and dad both had heart attacks young, a family history of it, they've got some tooth decay, they've got some osteoporosis and they had preeclampsia in three of their four pregnancies. You might be suspecting a magnesium deficiency. Someone with PMS and menstrual cramps. I've oftentimes upped the magnesium dose of somebody who had menstrual cramps like for a week before the period, right at ovulation or about a week after ovulation I would have them start extra magnesium and that could help with menstrual cramps. It can lead to mental confusion, people often call it brain fog. It can be a magnesium deficiency. Depression, which we already talked about.

Serotonin, which is important for keeping people from being depressed and then slow detoxification. It's because it's affecting a lot of those pathways in the methylation and all the other phase two liver detoxification, it slows down that detoxification. Let's have a look at some of the signs from our nutrient assessment chart. This assessment chart, it doesn't look like this with the picture, I just added the picture for visual effect on the presentation but in the nutrient assessment chart, you'll see it will say magnesium and then it will list these symptoms, so you can do check lists. We also have the nutrient score cards which you're welcome to model and get a forms generating program and put them in so that you can generate scoring on it.

These are some of the symptoms and we've talked about a lot of these. Anxiety we talked about, breast cysts, fibrocystic breasts in addition to iodine being important there, magnesium is important. Confusion, constipation, people a lot of times use magnesium as their laxative. They'll take it before they go to bed so they have a bowel movement in the morning. Chronic stress, cramps, dandruff, depression, excessive earwax, heart attack, hyper activity, insomnia, irregular heartbeats, irritability, irritable bowel, muscle weakness, nausea, nervousness, noise sensitivity, PMS, restlessness, spasms, twitching, sores around the mouth and breaking nails.

I read through this quickly and we've gone through some of those in more detail and I don't want to belabor the point, but these are all symptoms that you might see someone present with if they have a magnesium deficiency. I highly recommend you print out the nutrient assessment chart and you do checks on it for each person. Keep one in each person's file. How do we assess magnesium status? The serum is not real accurate because only one percent of magnesium is in the blood. Earlier in the presentation I said I thought it was under five, I overestimated, it's actually one percent. The serum isn't a good reflection of what's in the tissues. Oftentimes we do red and white blood cell magnesium. Red blood cell, also called erythrocyte magnesium is a test that can be ordered and it tests how much is in the red blood cell.

Some people prefer the red blood cells because there's more of them so it's easier to assess the magnesium status that way. There's a specific amount that we would expect to see in a healthy, functioning person if they have enough. If it's low then we suspect a magnesium deficiency. The white blood cell magnesium is used by specter cell and some others to look at the magnesium. Something called buckle smears, meaning cheek smears. You basically take some tissue, some cells, you just q tip them off and the cells and you send them off to a lab. They have a kit that you do that with, Intracellular Diagnostics is the name of the lab and they will give an assessment. That's supposed to be fairly accurate, it's not something I have experienced or have ever used.

The magnesium challenge and there's two ways to do a magnesium challenge, I'll tell you the one that most of us can't do.

Basically, you give an IV push of magnesium and then you collect twenty four hour urine before and after you do that, twenty four hours before and after to compare and see what your body's holding onto of that metered amount. That's a good way to measure but it's out of the range of most people and it can be expensive because you have to go to a doctor and get this IV and it's time consuming because you're there in the office for several hours. Another way to challenge it is an oral challenge and I would usually do an oral challenge by having people little by little increase their amount of magnesium each day by maybe fifty to a hundred milligrams more and then see how much they can take before they start to get gut reactions, before they start to have diarrhea and then they back off from there.

That's an oral challenge. Blood ionize magnesium is relatively new and it's not readily available but it's basically looking at how much ionized magnesium is in the blood as opposed to the whole magnesium because that's in the form that the body is using. The spectracell analysis measures magnesium as well as whole bunch of others. The Nutreval by Genova Metametrics that has a section for minerals and I'm not really sure what they do. I think they do white cells just like Spectracell but I'm not a hundred percent sure. Questionnaires in good history for signs and symptoms, this is critical. You can get so much, we don't have to test, test, test, test, we don't have too. We can use as much as we need, as much as we can, we can go from the signs and symptoms but know that we may miss something and if somebody is deficient in something and we're not seeing it in the symptoms, we may not help them to supplement with it.

However, all of this goes back to the importance of the foundations. The foundations being an excellent diet, loaded with high nutrient dense, antioxidant rich, high plant based foods that provide the rainbow and provide all the nutrients and then supplemented with some food based extras, green powders and things that have extras would be great but that foundation will clear up a lot of these nutrient imbalances. If somebody comes in and they're on the standard American diet and eating bacon and eggs for breakfast and hamburgers for lunch and pizza or pasta for dinner, and they have all these symptoms, I'm not going and running and tests on them because I know they're deficit and I know that a lot of that's going to clear up as soon as we get them on a better diet.

Nothing takes the place of good history taking, really knowing the symptoms and the signs, having it compartmentalized for yourself, using that assessments chart I gave you as a starting point but then going through some of these in the history things. Like the history of heart attack, the history of preeclampsia, having those listed for yourself so it's real easy for you to assess when someone comes in. The more you do it, the easier it gets and the more you get familiar with it, the less you're going to have to rely on those cheat sheets but cheat sheets are pretty darn amazing. Know that you can't make up for the foundations, you cannot make up for bad foundations with just supplementing and testing. It's crazy to do a whole bunch of extensive, expensive tests, Nuteval's like five or six hundred, Spectarcell's around there too.

A lot of these tests are expensive and if you know you've got to get this person on a good diet, then you test or you get them at least to the point where they're willing to go and when they're starting to struggle with the rest of it, you test to see and then you can oftentimes use the results of those questions to motivate them and to inspire them. Like, "Look, you've made all these changes. There's a few more I want you to make and I've just tested you and this is still low. I think if you make these changes that we talked about, that that could that clear up. In the meantime, we're going to get you on some supplements. If you don't want to be on supplements of the rest of your life, and having to spend the money and the time and everything, then how about we do some more of this work together?"

These are the RDA's, this is what the recommendation is. This does not take into account their weight so you can also look at the 4.5 milligrams per kilogram and calculate it. It's usually done with male, female based on usually size but you can have a female that's a lot bigger than a male. You can have a two hundred and fifty pound female and a hundred and sixty pound male so you can't necessarily go by this. These numbers do tend to be low when you think about all the factors in our environment and in people's diets that are impeding the absorption of magnesium and the utilization of magnesium and making the body need more. Sometimes people need to take a lot more than this.

Those from birth at thirty milligrams all the way up to above thirty one, it gets into four hundred and twenty milligrams for males and three twenty for females but again, that's going to vary based on their size. Obviously it goes up in pregnancy and lactation and teenagers need less but sometimes you look at somebody whose eighteen years old, they're fully grown and some thirteen year olds these days are fully grown and fully adult size so you can't necessarily think that they need a child's dose. The intake of magnesium in the US is abysmal. Fifty five percent of people are below the RDA, that's huge and we don't think the RDA's necessarily sufficient to make up for some of these interfering factors. Twenty five percent is at or above the RDA and twenty percent is significantly below so we're looking at a population where at best, twenty five percent of the population are getting enough magnesium and that's just they're above the RDA.

They may not be getting enough magnesium for their particular biochemistry, for their particular genetics, for their particular lifestyle habits. It's really critical that you're aware of this, that most of the people that walk in your office are going to be magnesium deficient so how are you going to deal with it? There's a number of methods of magnesium administration. We're going to go into a little bit of detail on all of these. Food and herbs and we love it if we can get it all from food and herbs and because of our soils, because of how deficient they may be, because of their impaired absorption, we may not be. That's our goal, is to move towards that. Oral supplementation, you can do magnesium to bowel tolerance, like a powdered magnesium or a magnesium in the capsules.

The liquid magnesium will not cause the bowel tolerance response because they will get absorbed into the bloodstream, assuming you take it, you squish it in the mouth even and then swallow it on an empty stomach. You have topical magnesium and that's as magnesium oil, but there's other ways to get it topically and we'll go into more detail. Intravenous and intramuscular, those are where you have to go to the doctor's office, it's more expensive, it's more invasive and in some cases, highly effective and highly necessary for certain conditions. Here's some sources of magnesium, I just listed the common ones that are easy for people to get, greens, and apples and apricots and avocados and these are not necessarily in any order except random order but when you get people, you look at this, a lot of people who are on the standard American diet aren't getting a lot of this stuff.

They're not getting a lot of fresh, whole foods, fresh vegetables and fruits. The greens tend to be much higher than the fruits and we'll take a look at a chart that WH Foods has used to rank them. There are herbs that are high in magnesium as well and so, getting people to use herbs more freely on their salads, on their soups, in their foods will increase their magnesium levels significantly. Some of these can be made into teas, like raspberry leaf tea is nice and licorice, assuming they don't have blood pressure issues. Lemongrass is delightful to put into foods. Horsetail is so amazing for bone health as well, it has silica in it in addition to the magnesium. These are all the herbs and I'll just read through them for those of you who are just listening and it will be a good reinforcement.

Alfalfa, Bladderex is not technically an herb but it's listed here as an herb, it's really a sea vegetable. Catnip, cayenne, chamomile, chick weed, often times grows out in your yard along with dandelion, eye bright, fennel seed, fennugreek, hops, horsetail, yarrow, yellow dock, lemongrass, licorice, mullin, nettle, oat straw, paprika, parsley, peppermint, raspberry leaf, red clover, sage and shepherds purse. Those are all really, really good sources and you can use, when you look at those herbs, you can look them up and say, "What other things might this be good for?" And choose the ones that may have other properties that your client is presenting with. Like yarrow, really good for injury repair and yellow dock, really good for iron, so if they also have iron.

It's really good for most minerals. Let's see, so you can look at that. Food sources of magnesium, these are ranked in order of how good they are from the left to the right and this is by WH Foods and I just took out some of their other columns and combined it into one chart. You can go to that page that's listed on the chart on the slide on whfoods.com and you can actually look at the full chart. I took this from their chart, of their top ranked foods for magnesium and it just tells you basically what the serving size is and then how much magnesium. You can see spinach is really high with one cup of spinach being a hundred and fifty six milligrams.

Now, if I make a smoothie and I put spinach in it, I might be using three or four cups or five cups of spinach and so it's really easy to get a lot of magnesium that way.

Spinach also has oxylates in it so it's going to bind some of that magnesium but not all and pull some of it out of the system, so you're not going to get the full repertoire in foods that are high in oxylates. Swiss chard is also high in oxylates, beet greens are also high in oxylates. It's interesting that the foods that are high in oxylates are also the highest ranked in magnesium. Pumpkin seeds are a very good source at a hundred and ninety milligrams in a quarter cup. That could give you a really significant amount if you're sprinkling some pumpkin seeds on your salads or making a pumpkin seed pesto. I'll often make a pumpkin seed pesto where I'll use spinach and kale and basil and lots of garlic with the pumpkin seeds and that's real easy to get that good quantity.

Soybeans are high but I don't really recommend soybeans unless they're fermented like Tempe or nato. Sesame seeds, sesame seeds are a good source again, not quite as high as pumpkin seeds, but they're there. Your beans, like black beans are a good source of magnesium and that's a reasonable serving, a cup. Those that don't digest them well should stay away from them. Quinoa is a good source, cashews, sunflowers seeds, you can see there's a lot of really good sources. I'm not going to read the whole chart, it's available for you to take a look at. You see broccoli's in there, broccoli is thirty two but when I eat broccoli, I usually eat probably three or four cups of it at a time or I blend it into a soup, three or four cups, so I get a lot more.

When you eat in a more whole foods, plant based high green vegetable based diet that we're promoting here, you get a whole lot more of this. Like a cup of kale is only twenty three but my smoothies have at least four cups of kale and then I might do kale chips and whatnot. You can get too much obviously, but there's some really good sources listed here. Let's take a look, we'll shift from food and herbs, let's shift into supplementation. If you do have to do magnesium supplementation, what do you want to do to get the best absorption because the oral magnesium supplements vary from four to fifty percent absorption. Let's look at it. There's three different categories, one are the mineral salt forms that are not the best. THey're the not the most bio available.

Bio carbinite, carbonate, chloride, hydroxide, oxide, phosphate and sulfate, those are the kinds that are not as well absorbed. Oxide being abysmally low at the bottom of four percent and that's the one that's in most of the supplements that you'll get at Walgreen's and Costco and other places that provide people with cheap supplements. It's usually magnesium oxide, it's only four percent absorbed. Then on the next level, they're complex with acids, some sort of acids.

They're called organic salts although they're not organic in the sense of organically grown, et cetera but because the zincs been compounded with an organic compound, something with hydrogen, nitrogen, carbon, oxygen, not nitrogen because those are the amino acid keylytes so ascorbate, it's mixed with Vitamin C, buffered ascorbate, aspertate, citrate, fumarate, gluconate, glutomate, lactate, malate and pydolate which I've never heard of before I found it listed on a study.

Aspartate and glutomate can break down into neurotransmitters that if they're not bound to other amino acids can be neuro toxic, so I would stay away from the aspartate and glutomate unless you really know what you're doing. Ascorbate's a good form, citrate's a good form, gluconate is a decent form. A lactate, some people do well with lactate and malate is actually good when people have fibromyalgia, so it's bound to malic acid. It just depends on what's going on for the person, which one might work but if you just stick to the most common ones and the most studied ones which would be the ascorbate, citrate, malate and those are the ones that I would stick with. I've used some lactate in some cases, there's a standard process one that has lactate in it that actually works for certain situations and then there's the amino acid complexes.

You also see them called kelytes and they're the most expensive because they're keylated, they're bound to particular amino acids. Glyconate is bound to glycine, glycinate is bound to lycine, oratate and then taurate. Some people do really well with the taurate, especially people with sleep problems because its' bound to taurine and taurine's a precursor to gabba so that can be really good. People who have a tendency towards herpes might do well with lycinate because it's bound to lycine. Glycinate is the most suited and the most commonly available and it tends to be a really good form that you'll see in a lot of the companies that have good quality supplements. The oxide is the one to stay away from. The other way to do it is ionic magnesium.

It's a liquid form. These are three of the brands, there are others. I've used these three brands which is why I put them up there but there might be plenty of others. Ionic magnesium is in a form that's easily absorbed readily into the system without having to go through the stomach acid, go through the digestion, so you can swish it in your mouth and get some absorption. You can take it on an empty stomach and then don't eat for fifteen minutes and get absorption. The ionic magnesium from Good State, very clean, very pure, no preservatives in it. The Remag, same thing. The Remag is from Caroline Dean, Doctor Caroline Dean who's done magnificent study on magnesium and this is in, what she calls it, a peko size. It is a lot more expensive than the ionic magnesium from Good State and I haven't compared them, compared parameters to see which one might work better.

I've tried both, I don't really see much of a difference between them but it's very tiny, tiny, tiny, tiny particles so it's supposed to be absorbed much more effectively, much more quickly. The magnesium from Trace Minerals research, I put it up there.

At one point, they used to have sodium benzoate in there and sodium benzoate, we talked about how that combines with an acid to form benzine, not good. I looked online as I was preparing this presentation to see if that was still the case and I didn't see it listed in the ingredients so if you have an old bottle of this, check the ingredient list and see and just be careful and make sure that you don't get any that contains sodium benzoate. Let's look at topical magnesium.

There's a number of ways to actually absorb magnesium through the skin and it's highly effective. You can get magnesium oil which is generally magnesium chloride in a solution and it has an oily consistency although it's not technically an oil. One teaspoon of that gives you five hundred and sixty milligrams of elemental magnesium. That's huge in one teaspoon so if you were to want to get that extra dose or even if you wanted half of that, half a teaspoon, you would just rub it into your skin. You can just rub it over your whole body, or you can rub it into areas where you tend to get tight. The other thing is magnesium chloride bath flakes and a cup of that has about fifteen grams of elemental magnesium and a cup in a bath of water is supposed to be phenomenal for that absorption and you can actually get it absorbed into the skin, they don't have to take it and it's great.

The other one is Epsom salts, which is magnesium sulfate and that usually takes two cups dissolved in fifteen gallons of water. I wasn't able to actually find anything that showed me exactly how much magnesium was in that, but two cups dissolved in fifteen gallons of water, which is an average size bathtub, is said to be enough to create the relaxation and to help. I know that that does because I remember early on in my career, I remember one of my colleagues saying, she had been working with somebody who was magnesium deficient, had all these cramps, muscle spasms, wasn't really making progress with oral magnesium so she told her to try an epsom salt bath. She did the epsom salt bath and immediately all that stuff started to melt away and that's because she had impaired digestion and absorption.

You have to not just go and band aid the solution by getting it in a different way, not to say that it's really a band aid to take epsom salt baths, it's awesome to do it, but you also want to say, "What else is not being absorbed, that is not going to be given in that epsom salt bath that's impaired because of the problems that she has with the magnesium absorption are probably similar to other minerals." It's really important, we're always looking for root cause. Another way to get magnesium is neutralizer and this is great for people with asthma or other lung problems or infections. In 7.5 grams of magnesium, that's a lot, per a hundred liters of distilled water has been shown to clear out pulmonary infections and lung problems so that's really cool.

Nebulized magnesium sulfate has worked in acute asthma, they actually did studies where they compared it's effectiveness to albuterol. Imagine if instead of having to rush a kid to the hospital with an acute asthma attack, if the parents could have a nebulizer at home and know the solution to use to make the kid get rid of that asthma attack. Wouldn't that be awesome?

It's a really great way to go. That's it for magnesium, we do have some resources. Again, our textbook, the Advanced Nutrition in Human Metabolism. The Magnesium Miracle is loaded with great information and studies by Caroline Dean. Another book I enjoyed was the Magnesium Factor from Mildred Selig MD and Transdurmal Magnesium Therapy.

I will say, I haven't made it all the way through that, it's a very thick book but I go through bits and pieces and look and pull things out. The other places I found good magnesium information online, the Linus Pauling Institute. Ancient Minerals website, Ancient Minerals is a commercial website, they sell the magnesium salts and all that, so they naturally are going to be biased towards magnesium but they have an amazing compendium of research out there. It's worth checking out. Then there's a detailed article on magnesium function that I've given you on the slide that's a PDF and it just goes through a lot of great stuff about magnesium. This concludes our magnesium presentation.