**SIBO & The Connection to Sulfur – Eps. 5**

Hello everybody and welcome to Metagenics Institute's Personalized Lifestyle Pearls. And tonight we have Dr. Bridget Briggs. And I know Dr. Briggs from way back, I think it might even be something like probably seven to nine years ago that Bridget and I met for the first time. So welcome Bridget Hi, good to see you again, Deanna Likewise, and it's been nice chatting with you We had a little bit of some time behind the scenes to catch up on each other's lives for those of you who don't know Dr. Briggs, she is a seasoned functional medicine Practitioner she is board certified in family medicine. She has a thriving practice in Southern California. In fact, I was catching up on what she does in her practice. I mean, she's busy all the time. What I really like about her practice is that she's able to have an insurance-based model doing functional medicine. She actually gets to think about root causes behind things. Her patients really get the best of both worlds with standard allopathic care combined with the deeper thought process that goes into it. So, Bridget, it truly is a great honour and a treasure to have you here to share your pearls of wisdom. So thanks for being on. It's fun. Thank you. So thanks for being on. It's fun, thank you. So I know you can talk about a lot of different things and through the years I've come to know you as, you know, you've got this very leading edge streak where you start to identify patterns in your patients. I mean, you're truly boots on the ground, observing, doing pattern recognition, doing the timeline, looking at the matrix, pulling it all together. And so you could talk about many different things, goodness, you know, whether it's epigenetics, methylation, but tonight you want to talk about small intestinal bowel overgrowth and the patterns that you're seeing with sulfur metabolism. So it's an exciting topic. And first let's talk about SIBO, small intestinal bowel overgrowth. A lot of people talk about this. I first want you to define it for us. Talk about what is SIBO exactly and how do you know if you have it? So when we think about SIBO, or SIBO, excuse me, what we're thinking about is really the idea that bacteria from the colon are transmigrating past the ileocecal valve and kind of setting up an imbalance in the bacteria that's found in the small intestine. And so we traditionally say that because of the pH changes of the GI tract, certain bacteria are thought to propagate more so in the small intestines, and their job is really in the fermentation and the further breakdown of the food and the helping of the assimilation of the micro and macronutrients. And more of the colonic bacteria have a very different role, and so when those bacteria flora get mixed, we start to see patients who have a lot of similar symptoms of bloating, gas, and digestion and because it may correlate also with symptomatologies of leaky gut, many of them develop systemic systemic problems like joint inflammation, fatigue, feeling very viral or sometimes into that chronic fatigue fibromyalgia side of things. So you know in traditional medicine, I feel like we like to put the body into body systems and think that gastrointestinal symptoms would be all gut related. It wouldn't really connect to the joint or to fatigue or even to hormone changes or acne. So I see this as one of the core imbalances that many people are undergoing and so SIBO balance or restoring balance has been a great way to watch Little things inside the body get dramatically better without even knowing the connection But as you said Deanna, I like to watch patterns and so in the last decade I think there's been a dramatic rise in SIBO. I think that we have the ability to measure it now where in the past, maybe that wasn't really as well understood. So maybe we didn't know to call it SIBO. But now today with breath tests, for example, and they're done at very standard labs, they don't have to be done specifically at a GI clinic any longer. We can send people to Quest. Genova and other companies have tests that you can mail to your patients. So many patients are coming in with evidence-based studies like a breath test that can even delineate if the patient is a methane producer or hydrogen ion producer. And so as we do the studies, we're seeing bacterial changes relate to which type of side you get. So let's just back up just for a second, because you and I are on the same page when it comes to root cause based medicine, right? So how did the bacteria even get misaligned in the gut then? Like if we just go a bit further and say, well, how did we get into that state to begin with? Before we even get into the diagnosis and then the trends that you're seeing with sulfur, how did we get ourselves into that in the first place? I think the early research that really came to the forefront of our understanding was, for example, PPIs. We began to see evidence when patients were taking proton pump inhibitors, which next to cholesterol medicine seemed like everybody was prescribed some kind of a prescription for a heartburn. And what we began to see is that patients over a period of time after they were on a PPI had a much higher prevalence of the development of SIBO or SIBO. So as we're seeing some of that evidence, then came in the understanding of what other co-factors may predispose us to that. So we began to realize that that heavily processed foods, patients that are eating more foods in a package or a box, has a tendency to lead to some of the nutrients that are not completely well metabolized. Those nutrients that travel down too far down the GI tract change the pH again. And as that pH changes between the ileocephal valve, the small intestines, and the colon, we begin to see a valve that remains open. And then the transmigration of the bacteria. Next is high animal meat. Patients that eat a high animal meat diet, not blended with all those phytonutrients and that high concentration of plants and the fiber, these patients seem to have a lot more undigested protein moving down the GI tract, and then this tends to set up the changes in the bacteria. So I have a lot of different points on that. So if they're not digesting protein, they're probably not producing enough stomach acid, right? They have a chlorhydria or hypochlorhydria probably because of the connection, whether to the PPI or just through aging or other causes or even stress. And so is when we look at SIBO and some of the things that you can do, would one of the things be addressing the upstream cause, which would be in part looking at protein digestion and helping to replete with good stomach acid? Absolutely. So one of the things that we see all the time is in these advanced stool studies, we start to see patients that are having excessive protein metabolism, short chain fatty acids, or we're seeing the lack of some of those healthy short chain fatty acids, or we're seeing the lack of some of those healthy short chain fatty acids. So we can see evidence of fat malabsorption, protein maldigestion, and same thing with carbohydrates. So the beauty of those advanced tools is we can almost pinpoint people who seem to have a tendency of having the hypochondria. And most of the studies that, where they're going down to the pH probe, these patients with GERD, majority of them, eight out of 10, are actually developing hypochlorhydria, which again is shooting acid up and down the esophageal system because the pH is not becoming acidic enough to close the valves. And that's what I'm trying to tell you guys. Yeah, I mean, just the dots are all connecting, right? So if we don't have enough stomach acid, then we probably don't have good iron absorption or mineral absorption. We probably have H. pylori because we've got overgrowth in the stomach. So do you see that patients with SIBO have a whole host of different things going on and it's mainly Connected into this mechanism of action. I do completely Yeah Oftentimes an imbalance where they don't have enough the lactobacilli which that should be very fulminant we should have tons of the lactobacilli, but many of them are culturing negative for the lactobacilli and Many of them are culturing negative for the lactobacilli. And other bacteria like the sulfur producing and sulfur reducing types of bacteria are thriving in certain of these disease states, creating a lot of the symptoms. I'm wondering, rather than measuring the gases, and this is all very organic, by the way, everybody, Bridget and I have not rehearsed this, but I'm getting so intrigued listening to you and formulating all these other questions. So, you know, you did talk about the gold standard test of a breath test to measure these different gases. And based on the ratio of these gases, we can say something about the bacterial overgrowth in the gut. And I'm thinking, would it not make sense to simply be looking at hypochlorhydria as that first line of attack or maybe even in conjunction with because it's such an easy thing in functional medicine we talk about repleting stomach acid all the time and there's even a set protocol of how to do that. Yes and the irony Deanna is it feels like everybody flunks and I think that correlates with the vast array of patients that have GERD or heartburn is are we really saying to patients who have GERD you have too much acid or should we really be saying this is hypochlorhydria and using things like zinc supplementation or hydrochloric acid supplementation to enhance their HDL production. I mean how many patients come in the door and they're like, how come when I dilute apple cider vinegar, Dr. Briggs, I feel better? Well, they're restoring their own pH and it's just a old wives tale or actually, potentially does work. Well, I was just gonna ask you about that. So what do you think about apple cider vinegar? So you're saying that patients are coming to you and they've tried this on their own and you are seeing that they have some symptom improvement? Absolutely, all designed. Same thing with just diluted lemon juice. They wake up and they have this every morning and they're like, okay, all my heartburn is gone, Dr. Riggs, I don't need you any longer. And I'm like, congratulations, I believe you. So pH balance is such an important element of body health, whether it's in the GI tract or whether it's in the serum in the blood is pH is a critical mechanism for oxidation, reduction and all of that. So the GI tract is especially, especially pH sensitive, especially when we remember Deanna that protein digestion primarily happens in the stomach. So when patients have inappropriate acid production in the stomach, pepsinogen is a pre-enzyme. It's not active. So the pH of the stomach drops below 2.2. Then it's converted to pepsin which is where we can chop up the protein. So these patients with low stomach acid have this undigested protein running down the GI tract and this is definitively becoming putrefactive, it's affecting butyric acid levels, it's feeding bad bacteria. So I think you hit it on the nail, which is address stomach acid and the stomach first. Yeah, and it's not such a hard fix in some ways as long as we can identify it. So you saying that makes me think that if we have undigested protein, what could happen then is number one, food intolerance or number two, further on to food allergies. So that's gonna take us into the discussion on sulfur because, you know, sulfur is part of our constitution. It's one of the elements that comprise us. So what you're seeing, well, tell us what you're seeing with patients with SIBO, small intestinal bowel overgrowth, and sulfur-containing foods, which are everywhere. I mean, that's like meat, dairy, eggs, even vegetables. We're talking cruciferous vegetables. So what are you seeing that they can't tolerate these foods at all? We have our unique genotypes that are out there for example your patients who have the homozygous CBS gene So we know that they are often your Europeans that come from colder areas of the world And so genotypically sulfur is the fourth most abundant molecule in the human body So if you're not going to eat it in the diet, let's say you're not growing up in an equator type of an environment and your only main sulfur vegetable is going to be cabbage. Well, you come to California with that type of Scottish genotype or Irish genotype and you're buying a juicer and you're eating broccoli, cauliflower, spinach and kale and they develop bloating and gas and indigestion. They're just over sulfur producers. So they may not have the GI issues with the hypochlorhydria, but they're hyper ingesting non-seasonal foods or through juices that their little bodies can't tolerate. So they end up getting a burden of histamine. And remember, how do we treat GERD? Early days, we used the Pepsid AC, the antihistamine families. And so they take the right PPI or the right proton pump inhibitor, and they feel like that's the treatment. But really it was the dietary connection to this massive ingestion in a sulfur-sensitive individual. So we have the genotypes, okay. Two, we have those that your body is not good at converting sulfites to sulfates. So we get this sulfate deficiency and that happens in people, for example, that are demineralized. So let's say I am eating a highly processed diet. I'm not getting adequate amounts of minerals that are traced like molybdenum. Molybdenum is the key mineral needed to activate the suox enzyme to convert sulfides to sulfates. So I can handle some of those sulfur foods as long as I can appropriately convert them to the sulfates, which have a critical role in detoxification, as you mentioned, Deanna, by the liver. It's important in hormone detoxification. So we see these patients with high estrone sulfates, Deanna, we see them with high DHEAS. These PCOS girls that have that androgenic acne, which we connect to the GI tract, the gut, or this endometriosis which we see has a bacterial component in OBGYN medicine to some kind of a pelvic change but we think it may be bacteria. So I think there's a hormone connection to the imbalance in sulfites and sulfates and sometimes simple mineral deficiencies that you and I can implement quite lovely and helping people to produce those good sulfates. So this is why you know our seniors, they feel so much better when you give them glucosamine sulfate, chondroitin sulfate. This is where prescriptions, you know, that we're using all the time in medicine that are sulfating our patients like albuterol sulfate for bronchoconstriction. We use plaquenil hydroxychloroquine sulfate for all this autoimmune disorders where magnesium sulfate musculoskeletal tension. These patients you sulfate them or you just give them a lignin and all of a sudden they come in and they're like I don't have chronic neck and muscle spasms. My GI tract is normal in three days on molybdenum because you're generating that biofilm, that nice booger layer that bacteria can now thrive. And lastly, yeah I think the connection to butyrate, calculophytes prevent the natural balance and health of the function of uterine. So if we don't have enough bacteria, number one, we're not making healthy butyric acid, that's like the miracle grow on the lawn of the gut. If I want my lawn to grow, I have to put miracle grow. Well, I need butyric acid to regenerate my gut. But yeah, they knock out that healthy butyric acid. So these patients have a leaky gut, they have oxidation, they have bad bacteria, and then all this protein, fat, carbohydrate maldigestion. Bridget, you said a lot over that two minutes or so, and I was jotting some notes because I want to play that back for everybody because you said so many great things and I don't want it to be missed. And by the way, for anybody that's on live and I see we've got a number of viewers, please type in your questions and we'll get them answered. We'll do our best. So let me just play certain things back. So first we talked about low stomach acid and its connection to small intestinal bowel overgrowth. And then we transitioned into talking about sulfur, sulfur metabolism, and one of the things that you said is that people from perhaps the northern European ancestry who have a SNP or a variant in a specific gene, Cystathion Beta Synthase, may have issues with sulfur. And that can be remedied by reducing sulfur in the diet and taking molybdenum. So I wanna ask a couple of things here. So first and foremost, I made a notation. Do you see a difference, I don't know if you've had your patients do this, between plant-based sulfur and animal-based sulfur? Because it's a different matrix, it's a different complex. And so first I'd like to know that. And then of course, I'm sure that most people online wanna know about your dose of molybdenum. Sure. Let's all say molybdenum. It's such a, Molybdenum. MB, it's such a, it's one of those trace minerals we don't hear a lot about. We hear about manganese and boron and the macro minerals, calcium, magnesium and iron and zinc, but now you're talking about a smaller and ultra trace. So two things. First let's talk about the plant versus the animal-based sulfur and maybe talk about some of the sulfur-containing foods and maybe interactions with histamine, and then talk more about dose of molybdenum. Okay. So yes, there's a big difference between plant-based sulfur foods, because generally, that is not gonna be as much methionine or cysteine. When you talk about animal meat, you're gonna really be ingesting methionine in high concentrations. That is an essential amino acid. You and I have to eat that. And then we can recycle it as well, but it is one of those essential amino acids that our bodies can now convert into cysteine through that methionine door. But preliminary, all animal meat, especially that red meat, the amount of sulfur is going to be one of the highest. The only thing that's really going to beat you in that department is going to be those apricots that are dried and things like that or in heavily processed foods that use the preservative sulfate or sulfites, which is always illegal and organic. So whenever you go organic fruits and vegetables, we don't have to worry about the preservatives and the pesticides. Now let's talk about the fruits and the vegetables. What we do, if you Google like the picograms, you'll see talk about the fruits and the vegetables. What we do, if you Google like the picograms, you'll see the darker the green, the higher the sulfur, but we're not going to get to the level of the animal meat, right? Nowhere near. And so first I want to make it critically clear, we all need sulfur. It is essential and we never want to tell a patient stop eating all your broccoli, cauliflower, cabbage, kale. Between the red meats the animal meat and the veggies we need those high antioxidants. It's really never pulling it out altogether, but really trying to eat it seasonally and According to like not a high concentration in one meal, you know, so and when we talk People tell me I just want to interject here quickly because some people might be thinking this as well, I've had a number of people tell me that they can't have garlic, they, not even a little bit on a pizza or, you know, a healthy pizza or even broccoli, just a serving of broccoli just bloats them and they feel so uncomfortable. So is there a remedy for them? Yes, well, first of all, we all know, even in beauty and in hair, that when we see people who have really curly hair, that is disulfide bonds. And so how do we break curly hair? We heat it. We break sulfur bonds by heat. Good analogy. Yeah, so whenever you're thinking about trying to help a sulfur-sensitive individual tolerate the Brussels sprout You can't steam it and serve it or the garlic. You can't serve it fresh It's a very high sulfur burden the more you cook it down and heat it you start to break down some of those sulfur bonds so they can do a Garlic clove in the oven when it's all cooked and mushy But they certainly can't do it super fresh and I I giggle, because my husband and I are the opposite. He won't touch Brussels sprouts unless they're killed. I won't eat them unless they're fresh, because I'm Latin. He's Scottish. Like, we can giggle about it, but we have a hard time meeting in the middle. And so this is where the more European they are, I'm like, stay with the blonder lettuce. The more you can tolerate the sulfur gravers, I want it dark and I want it fresh. And you will have these Europeans, they can't eat fresh salad, they just can't. The salad is the biggest trigger. But when they take the spinach and they cook it down, they have no problem. So we just need to find the mechanism to get it in our bodies that suits us. But molybdenum always helps. All right so what's the dose? Give us the magic dose for most people. Do you do it per body weight and how often? There's two transporters, one on the intestine and one on the kidneys. So molybdenum works in both, both in absorbing the appropriate amount of sulfur, but ideally converting to sulfate, and it works on the kidneys to make sure you pee out excess. So about 600 micrograms twice a day in patients that are the most symptomatic with sulfur. Now, for people like myself, Deanna, I don't need any molybdenum. I am a sulfur craver. I don't want to eliminate any excess And in fact, what's really interesting is if you use too much molybdenum You actually start to break sulfur bond. So I start getting really flexible You can actually start pulling pull my hand to pull me out of joint like don't Don't know. Yeah, it's interesting because sulfur is notorious for strength and twisting right disulfide bonds help with turning and twisting Which is why we see the curls. This is involved in your tendons, which is why your tendons can stretch so people who have tight tendons and tendinitis bursitis plantar fasciitis When you give them a little bit, I'm like, why did that just take my plantar fasciitis away? So it it really you have to kind of feel the body out and find your sweet spot. So, I get hyperflexible. The next person, they're like, wow, I don't have all my muscle tension and my tendon issues. So, it is a benign mineral, but you still have to feel your body. Does anything happen to hair? It gets straight. I've been notorious to straighten people's hair. So, you know, I always warn everybody, if your locks get a little bit less straight, sorry. Because I do love it. So, what you're saying is, for people with the CBS snip, and people can get that snip by getting your genes tested through a qualified health practitioner, somebody who knows a bit about genomics, right? Somebody like you. So then you see whether or not you've got the CBS sniff, and if you do, it might be worthwhile to be on a dose of, I like how you call it Molly. It's so much easier than molybdenum. And you get 100 micrograms twice a day, right? Excellent. So, gosh, talk a little bit about histamines too before we close, because you did mention that by way of sulfate. So what's the connection? Because we're hearing so much about people being very sensitive to histamine-containing foods. Yes, absolutely. So what we have to remember is every time the body produces sulfites, whether we're eating sulfites or whether our body's producing it through that transulfuration pathway, the natural byproduct of sulfites is histamine. They go hand in hand. So if I eat a high-sulfur diet, I'm going to have more histamine, which means I'm gonna have more histamine. We don't tend to have the rosacea the flushing the itching The the heartburn because that's the histamine so Want to help patients neutralize histamine things to remember Methylation you can use histamine d-methyl E to break down histamine we can use vitamin C to break down histamine We can use quercetin to break down histamine. We can use vitamin C to break down histamine. We can use quercetin to break down histamine, nettles, and then I love off-label sulfation. So when you give somebody mag sulfate, their crazy itching and their tinnitus and their ringing in their ears is incredibly improved. And often in these sulfur sensitive individuals, you have to put them on a low histamine diet. So that's like avocados, corks, citrus, pineapples, strawberries. There's an overlap of these sulfur and histamine foods. So it's pulled back a little bit, but many times these patients are aware. They know if they eat pineapple or if they eat citrus or if they eat strawberries, they either tend to be more hyper excited They can't turn off at night. You can't sleep. They wake up normal as the day goes on. They get a little bit more Excitotoxic that's the histamine. It's a powerful excitatory neurotransmitter. And so when you pull them out, they're like I sleep better I'm less itchy. I'm less agitated So, you know, yes the Molly molly helps to lower the burden, kind of getting that sulfite out as quickly as possible, and then using a lower histamine diet so they don't get that kind of combination toxicity. Excellent, low histamine diet. And I would think that, you know, methylation, you mentioned methylation before, and you've been known for your work on methylation. And so I'm thinking that it's all fitting as part of this big web, right? mentioned methylation before and you've been known for your work on methylation. And so, I'm thinking that it's all fitting as part of this big web, right? And if we had the biochemical pathways, we would see how transulfation connects right there with methylation. So, really, what we're talking about here is proper detoxification, helping the body to do its job of excreting the toxic load better. So, and you know the power of food, as I listen to you talk about following a low histamine diet and watching that we're getting the sulfates and not the sulfites and making sure that we have that conversion. It's so important. Bridget, as we close, top five foods that you think are wonderful for people with SIBO. Maybe you can leave us with something around food. What might be the top five that you think would be healing for the gut for these folks? Great question, Deanna. So because we know so many of the patients that have SIBO, one of the big complications is this lack of protein digestion. So this undigested protein kind of feeding the bad bacteria. And because the protein has such a high concentration of sulfur, it drives that sulfur producing cytoplasm. Does that make sense? So I'm really going to be talking about one of the subtypes of cytoplasm. These are the people that have a lot of the sulfur sensitivity. So they're going to do really well on a low sulfur diet and what's called the fail safe diet, which is the low histamine diet as you're trying to recover from. While they're doing that, they're taking their probiotics, you're putting your good bacteria in, you're going to be using some of that molybdenum and I like manganese. I like 600 micrograms of molybdenum twice a day and about 10 milligrams of manganese twice a day, because that's clearing the ammonia byproduct, right? The breakdown of protein is always gonna release an ammonia. So that helps the brain fog and all of that. And we're gonna start looking at, well, what are low sulfur foods and low histamine foods? So it's things like in your vegetables, it's your cucumbers, it's your carrots, it's your celery, it's your green beans. Those patients begin to feel like, well, what do I eat in terms of vegetables? And then the blonder lettuces like the butter leaf or the romaine and things like that. When they're looking at fruits, like there's a list of high sulfur and salicylate fruits. And you'll see like if I eat a golden delicious apple, it's not very high in the histamine sulfur pathway but if I eat that dark green granny it's higher. So we try to give our patients the handout of which foods are gonna be really dominant and which ones are gonna be really low in the sulfur family. So we're getting all of our fruits, our vegetables and you're gonna find a lot of the spices become a problem too, so we're like, going back to the basics, like salt, with a little bit of pepper, but not tons of all those fancy spices when you're cooking, because they tend to be activating. This has been excellent, what a wealth of information you are, and really on a hot area of talking about gut health, you know, it's been said that it all begins in the gut. It all starts there in terms of our healing process. And it makes so much sense. And then backing up even further, really looking at how food ties into that and how much we can do. Yes. Bridget, thank you so much. You know, it's been a delight. We've had a number of viewers on. We still do. We haven't had any questions, but I think that if people continue to post on this thread, we'll do our best to get back to you with answers. Any parting comments for the audience, Bridget, as we leave them? BRIDGETTE SCHRAMMER I feel like as those of us who have played with methylation, we've had these patients come forward that maybe they didn't have SIBO and we gave them SIBO. So just to remember to know your pathways that you can give people too much methylation like you're European and all of a sudden they're like, why am I all of a sudden getting the bloating and the gas and you may think methylfolate and what have you doesn't cause gut issues but it does. So you just have to remember there is a connection between the methylation pathway and the transsulfuration pathway, and that's the function of the methionine gear. It's gonna activate either transsulfuration or methylation. So be careful with hypermethylating people and creating uncomfortable vets. Good, and everybody can get those biochemical pathways. Just Google methylation map or methylation pathways. Bridget, I'll start trying out the molybdenum on myself and I'll let you know about my hair if it straightens or not. Wonderful, thank you so much. Again, it's been a delight to talk with you. Take care everybody. Thanks for signing up. Thank you so much. Bye-bye. Bye. Bye. Bye. Bye. Bye. Bye. Bye. Bye. Bye. Bye. Bye. Bye. Bye. Bye. Bye. Bye. Bye. Bye. Bye. Bye. Bye. Bye. Bye. Bye. Bye. Bye. Bye. Bye. Bye. Bye. Bye. Bye. Bye. Bye. Bye. Bye. Bye. Bye. Bye. Bye. Bye. Bye. Bye. Bye. Bye. Bye. Bye. Bye. Bye. Bye. Bye. Bye. Bye. Bye. Bye. Bye.

**MSM: The Mineral Essential for Health**

Good morning. Everybody hear me okay? I just want to welcome you guys today to our lecture on Good morning. Can everybody hear me okay? I just want to welcome you guys today to our lecture on MSM. For those of you who are new to the Reardon Clinic or for those of you who are joining us online, I'm Dr. Ann Zotterer, and this is Dr. Ron Huntenkake. And we love giving lectures together. We affectionately refer to it as geeking out together. And so we're real excited today to talk a little bit about MSM, just because this is kind of, in my mind, an oldie, but a really good remedy. And so as you'll see as we go through the presentation, that it's good for just about everything. And so just a few housekeeping items. You guys have information there about upcoming lectures, upcoming events here at the Reardon Clinic. There's also a survey. Those are really helpful to us. If there's any topics you want to learn more about in the future, definitely write that down. And we will actually, even at the end, we'll be collecting those and we'll be raffling off a book on MSM, a really great book, The Miracle of MSM. And so if you don't mind filling those out as we go, we would appreciate it. So we'll go ahead and get started. I was telling Dr. Ron before this that I'm going to kind of lead with the punchline in terms of this lecture, because when you ask the question, what is MSM good for? The easy answer is it's needed for healing in the body. So anything that needs to heal in the body, which is pretty much everything, MSM is good for. And so we'll talk a little bit more in detail about why that is, but that's the framework you can kind of think of is MSM is needed for healing in the body, both structurally, detox, you know, there's a lot of biochemical pathways that sulfur is needed for in the body. So, I, Dr. Ann was asking me, when did I get interested in MSM? And I've been at the Reardon Clinic for 31 years, and for those of you that are not familiar with how we work, we oftentimes see the patient who has been to just about every other doctor and every other specialist, and they haven't gotten the results that they really wanted because more often than not, they have a complex medical history. And so part of this tied into the fact that my wife, Anne's mother, she had severe fibromyalgia even before we came to the Reardon Clinic, but she's always has told people that she was my number one guinea pig, which I would have to say is partially true. It's not quite the right way to put it. But she had multiple symptoms, and along with vitamin C, MSM turned out to be the nutritional support product that did the most good for her. She had very, very severe osteoarthritis in her neck. She had injured it in middle school doing gymnastics. When I was practicing in Salina, my partner had done her x-ray and said it was the worst looking neck arthritis that he had seen in a woman as young as she was. She was in her 30s at that point, still had severe osteoarthritis. And so in order just for her to control the pain, I had her start taking a mixture of vitamin C powder and MSM powder in a quart of water. She would take it to school with her and we kept gradually increasing the dose and so people can get results at 500 milligrams three times a day but this was like five thousand milligrams three times a day but over the course of two years up the pain went away she was able to sleep much better are everything improved in terms of her health and her energy. So it was almost, it and vitamin C alone helped her get over most of her fibromyalgia. So it was a pretty important lesson to me that there's something very powerful about this substance. So what we want to do is show you how it does that, because a lot of times you hear a testimonial from someone like that and you say, well, that was just that person. But Noah, once you start looking at the chemistry and the history of where this comes from, you'll understand that it's a very fundamental way to improve your overall health and functioning. So what is MSM? So MSM is actually organic sulfur and what's unique about this in particular is not only is it a sulfur molecule of mineral, but as you can see in this picture that sulfur group has both two oxygens and two methyl groups attached to it, which if any of you have listened to any of our lectures before, methylation is a very common theme that we talk about. And so MSM not only acts as a sulfur donor, but also a methyl donor in the body, as well as providing oxygen, you know. So it's kind of this, you know, this holy grail of, you know, critical minerals and nutrients that the body specifically needs. And it's also important to understand when we say organic sulfur, it's different than when you talk about organic vegetables and fruits. That means they're grown without the use of pesticides and whatnot. This means that it involves carbon. Carbon-based chemistry is the chemistry of life, and so this is very much a molecule that is necessary for optimal carbon-based chemistry within our bodies. So minerals, typically we get minerals from the soil. So minerals, some of the more common minerals that people know about are calcium, zinc, selenium. These minerals are not only important for plant growth, but we as our biochemistry, our human biochemistry is dependent on a lot of these minerals. And so minerals truly are essential for our wellbeing. In addition to that, minerals also make up our electrolytes. So a lot of the chemical signaling at the cellular level is determined by your mineral level. So minerals like sodium and potassium and chloride. And so minerals really are essential to health. And as we'll talk about, sulfur is the fourth most prevalent mineral in the body. You know, and many people thinking of health and nutrition would probably, vitamins would probably come to mind first as being important. But you know, without minerals, vitamins can't work. Without the minerals, the enzymes in your bodies could not function properly. So think of minerals as literally the foundation of good health. Mr. Met, yes. So, purpose of minerals, you know, so we use minerals for both structure and function, as I mentioned. So, structurally, you know, some of the more well-known ones are the calcium, phosphorus, and boron for bone health, silicon for collagen. Sulfur is needed for protein configuration in tissue structure. And the reason this is, is all of our collagen has kind of a basement foundation of proteins that are held together by disulfide bonds. So sulfur is quite literally the mineral that helps hold the structure and maintain the shape and the matrix of collagen. So it makes it both strong, so it gives it tensile strength, but it also gives it elasticity so that it doesn't kind of get brittle and wear out, as in the case of osteoarthritis. But minerals are also needed for function. As we mentioned, they are enzyme cofactors. A lot of our biochemistry needs these minerals like zinc and magnesium to signal and to act as cofactors for those enzymes. As well as muscle function, you need calcium for muscle contraction, magnesium for relaxation, and then anything electrical in the body pretty much is relied upon minerals. So nerve transmission, cell signaling, all of those are reliant on healthy levels of minerals. You know the original name of the Riordan Clinic was the Center for the Improvement of Human Functioning and Dr. Riordan's insight was that a lot of modern medicine dealt with making a diagnosis and using a drug to treat the symptoms of that diagnosis. But thinking deeper, in order for the body to work, in order for healing to occur, you have to provide the building blocks of what makes the body work, the structure and the function within the body. So in order to improve human functioning, you have to make sure you have adequate amounts of the basic ingredients of life. And so it just turns out that sulfur is one of those very, very important minerals that without which you cannot build the chemistry of biochemistry of good health. And so what I hope you'll see as we go through the lecture is that this has application in just about every chronic disease you can imagine. There was actually a really interesting study, an equine study done on horses where they looked at the mineral makeup of the collagen of these horses. And what they found is that the horses that had degenerative osteoarthritis had a third less sulfur in their collagen. So they weren't able to heal. That collagen got damaged more easily, which led to inflammation and degenerative changes. So in terms of cofactors, I know this is a little bit hard to see up on this big screen. We put this up here not to only, you know, anybody who knows us knows we're big nerds, and so we love the biochemistry. And so this is just a little picture of, you know, a few of the minerals and all the different places in our biochemistry that these minerals touch. And so, you know, Dr. Reardon used to always say, you know, what's the most important nutrient to take? What's the most important nutrient to take? What's the one you're deficient in? And so all of these, your body, your biochemistry is meant to adapt. But you'll start to stress certain areas and certain pathways more if you're missing some of your key nutrients. And as we'll talk about here in a second, one of the major pathways that is affected by sulfur is our detox pathways. So production of something called glutathione, these are what are known as your sulfation pathways because they are so dependent on sulfur. And so, but all of these minerals work together to overall help with proper biochemical. This is also a picture of methylation. And as time has gone on in the last 10 years, we're realizing how incredibly important methylation is to just about every function within the body. It has a really important role to play in genetic expression. And it's necessary in terms of our neurochemistry and our detoxification, as Anne was talking about. And what's so interesting about MSM is it's two methyl groups, so it's a methyl donor. It's a very inexpensive, easy to use methyl donor that gives you the added benefit of providing sulfur to your body. So it's really a dual purpose kind of molecule that asserts its importance in all the various functions of the body. So we'll talk specifically now about sulfur, you know, because sulfur as we mentioned, that's the core mineral in MSM. And you know, I don't know what comes to mind, you know, when we say sulfur. I know for me, you always think of stinky, stinky sulfur. It smells like rotten eggs. What else might come to mind are sulfur baths, sulfur springs. These historically, people travel all over the world to visit these areas where there's naturally occurring sulfur in the water because it's great for skin. It's great for healing. It's anti-aging. And what is aging? It's wrinkles. What causes wrinkles? A lack of healing in the body, a lack of adequate collagen production in the body. And so all of these can be tied back to sulfur. And so as we mentioned, it's the fourth most plentiful mineral in the body, which is amazing it doesn't get more press. You know, I'm always surprised nobody, people, you know, doctors are real big about talking about calcium for bone health, but what about sulfur, you know, for joint health and for skin health? And so... Epsom salts is magnesium sulfate. And so when you take an Epsom salt bath to detox or to relax your muscles, yes, it's the magnesium, but you're also getting sulfur from it as well. So just a few kind of fun facts, you know, about sulfur. It's a pale yellow, brittle, bitter, non-metallic mineral. Like I said, it smells like rotten eggs. So it doesn't, MSM, interestingly enough, does notmetallic mineral. Like I said, it smells like rotten eggs. So it doesn't, maybe, MSM, interestingly enough, does not smell like rotten eggs. We'll talk about that here in just a second. But it's a component of gunpowder. It's historically at highest concentrations around areas of volcanic eruption because it's actually a mineral that tends to be deeper in the core of the earth. So in areas where that volcanic ash or the volcanic eruptions occur, that's where you tend to find higher concentrations of sulfur. Even like I said, the naturally occurring hot springs, which are a natural source of sulfur from deeper in the Earth's core. And life is thought to have begun around these volcanic vents underneath the ocean and so sulfur has played a role in the early and the origins of life. So it's more important than what people realize. So where do we get sulfur from? You know, so sulfur, typically algae algae convert inorganic sulfur to an organic sulfur molecule called dimethyl sulfide. That gets released into the ozone where UV light actually catalyzes the reaction that forms something called DMSO. Did you want to talk a little bit about DMSO? Well, DMSO is, we could do a whole other lecture on DMSO. The veterinarians really use it a lot and it helps with inflammation. But it's a huge detoxifier and we're beginning to use DMSO again now as a biofilm disrupter because a lot of the chronic infections that people suffer with, like in their sinuses or in the bladder or certain places, is due to a disruption or a overconcentration of these biofilms, which hides the infecting agent such that the immune system can't get to it. So when you use DMSO, you disrupt that biofilm and you expose the infection to the immune system and it helps you get over these chronic infections. So MSM actually falls to earth in rainwater. So when it falls in rainwater, five parts per million of MSM in rainwater gets concentrated in plants. So kind of like all of our other minerals, we should be getting this in our diet, you know, if we're eating a vegetable-based diet. Unfortunately, with, you know, modern agricultural practices, there's a lot of, there's a lot of, you know, a lot of these minerals have been kind of chelated, been pulled out of the soil as well as a lot of irrigation, you know, used. And what was your statistic on the irrigation? Well, yeah, I was talking to a farmer. you know, if you really want to find out about, you know, soil, talk to your farmer. And we were talking about, he was telling me, we were talking about MSM and the importance of sulfur and how MSM comes down in rainwater. And he said, oh yeah, he said, there's an old saying that one inch of rain is worth three inches of regular irrigation. So it's the MSM, and there's also other things in rain like peroxide and whatnot that really makes it help the plants grow better. Now, if you want to prove that to yourself, you can make yourself up, when you go to water your houseplants, I would suggest putting in a quarter to a third of a teaspoon of MSM powder into a quart of water and maybe a little bit of hydrogen peroxide, like a teaspoon of hydrogen peroxide. Shake that up, put that on your plants, and get ready for exuberant growth in your houseplants. It's just pretty amazing. So as Dr. Ron mentioned, the MSM is an organic, the sulfur is an organic mineral. And so in chemistry, you know, organic chemistry is different from regular chemistry. And organic chemistry is the study of molecules that have carbon in them. And so because MSM has those carbon molecules, the methyl groups attached to it, it is defined as an organic mineral. And so because it's bound, the way that it's bound, it's much easier for plants to absorb and they, as Dr. Ron mentioned, utilize it very well for growth. So MSM as a supplement is a very safe supplement to take. And how you dose it kind of depends on the individual needs of the person. And so, but Dr. Stanley Jacob was the one that heated and crystallized DMSO, because if you've ever encountered DMSO, it is another great source of sulfur, but it smells horrible. And so, he created MSM that is, it's an odorless, tasteless, pretty much tasteless powder that you can add to your drinks. And it's because it can disrupt the GI system, it is best to drink it slower rather than doing it one big dose all at once. But slow absorption throughout the day helps with it preventing the GI effects. I'm not even sure if it disrupts the GI as much as it detoxifies the body. And when people feel nauseated when they take too much MSM too fast, it may be because their liver is being overwhelmed by increasing detoxification. So you want to start with low doses and build up gradually. I mentioned my wife taking, she was actually taking about 15,000 milligrams per day. Most people start at about 500 milligrams three times a day, but if you build up slowly, there's almost no toxic dose. And it really is best in the powder form because MSM actually has a pretty short half-life in the body. It's only what, about 10 to 12 hour half-life in the body. And so I've noticed, my personal experience with MSM is for allergies, chronic sinusitis, that when I worked up my dose high enough, went away by 80 to 90%. But what's interesting is I notice if I miss a day or two, I'll start to get some of my symptoms back. So it actually comes back fairly quickly for me. And so it's not clear how well sulfur is stored in the body, and because it has a short half-life, it's best to kind of consume on a regular basis, spread out throughout the day, rather than one big dose all at once. So food sources, you know, some of the best food sources should be from plants, you know, and animals that eat a lot of plants. And so, you know, especially some of your cruciferous vegetables, you know, those are higher sulfur containing foods. You know, those tend to be a good source of MSM. But even some animal proteins, our sources are a great source of sulfur. Because a lot of the sulfur is used to build certain amino acids in the body. And so animal proteins are a good source of sulfur as well. The cruciferous vegetables, there's a phytonutrient called sulfur, sulfurophane. Sulfur you're, oh, phane, I can't even say it. But it's sulfur based and it's really important in terms of its ability to help you detoxify. And so in terms of regulating hormones within the body, especially excessive hormones, cruciferous vegetables are wonderful and it's because of their sulfur content. Alright, so the difference between sulfur and sulfa, because some patients come to us and they say, hey, I've got an allergy to sulfa, sulfa drugs, sulfa antibiotics, is it safe for me to take sulfur? And so, you want to talk a little bit? Well, yeah. Sulfur is a pharmaceutical agent. It's an antibiotic. And there was many, many years of discovery to even find the form of sulfur that worked against bacteria. But it does include sulfur, but it's not the sulfur mineral. And so people who are allergic to sulfur typically do not have a cross reaction to sulfur. If they do have a reaction, it's because they're detoxifying too fast, not because they're allergic to sulfur. It's almost impossible to be allergic to sulfur. As a matter of fact, sulfur is the antidote to allergies. So where do we find sulfur in the body? Half of the body's sulfur is found, actually stored in muscles, skin, and bones. It's present in keratin. You know, so keratin is what gives your hair, skin, and nails kind of that healthy strength, as I mentioned, that tensile strength. It's needed, as we mentioned earlier, for collagen production. So collagen is not only needed for healthy joints, but also healthy skin and healthy repair in the body. Aging really is just when your breakdown in the body starts to outpace your body's ability to heal. When you look at young kids, the reason their skin is so beautiful is not because they are breaking down those skin cells any slower, it's just they're repairing a lot faster than any adult. But as we age and as our body's production of stem cells goes down, our ability to heal also decreases. And so as we age, there's a higher need for some of these minerals like sulfur that aid the body in healing some of these tissues. So MSM really could be classified as an anti-aging nutrient. Of course, all nutrients to a certain extent are that way. One of the things that I see more and more often is people are coming in with osteoporosis or osteopenia, and very seldom does any doctor mention MSM as an important component of bone repair. Everyone thinks in terms of calcium first, but what does that calcium, what does it build itself around? Think of a sidewalk or a driveway. You want to put rebar in to make the concrete strong. So it's the collagen, it's the fibrin within the bone that really makes it strong, not the calcium. You can take calcium until the cows come in, as they say, and it's not going to do you near as much good as MSM will do, and vitamin C, in terms of building collagen, is the basis of truly strong bone that is resistant to fracture. People who take a lot of calcium will actually show some improvement in their DEXA scan, but the actual fracture rate is not improved by just calcium alone. You really need these components that help with the structural component of bone. So as I mentioned, it's the disulfide bonds that hold this connective tissue together. There's a basement called glycosaminoglycans or GAG, you know, GAG molecules that are held together by these disulfide bonds. And that is what gives, as Dr. Rai mentioned, the strength to the collagen. So it's strength, but also it gives it that ability to bend and to move and to heal. And so, you know, we also have a little bit of sulfur in our blood, so you can't actually measure a blood level. There's some doctors that measure ratio of what you're excreting in your urine versus what you have in your blood, which is if you're interested in your sulfur content, you can measure that. A lot of people, just with the world we live in, minerals are some of the most common deficiencies we see at the Reardon Clinic. Magnesium, selenium, zinc, all of these minerals, because of the way our diet is shifting and because minerals are also harder to absorb. If you've got any propensity toward leaky gut, it makes it harder to absorb some of the minerals in your diet. Which is why MSM is kind of a beautiful remedy, because as we'll talk about here in a little bit, it's also great for leaky gut. Because guess what holds the lining of your gut together is sulfur. So it helps with not only the leaky gut, but it also helps with absorption of all of your other nutrients. Almost all of the autoimmune diseases, which are perhaps the number one fastest growing category of chronic illness in America and Western civilization today, all of that begins with leaky gut and poor digestion. And so that's an area where MSM really shines because it helps to connect those endothelial cells that line your gut so that they have tight junctions. Without the tight junctions, the food will leak into the body before it's fully digested, and then that allows the immune system to form antibodies and you start getting food allergies. And then that can then cross-react with the various organs within your body and you end up with thyroiditis or colitis or lupus or some of these, rheumatoid arthritis. All of these are autoimmune diseases that go back to leaky gut. And so MSM is a fundamental way to help with that. Sure, you want to do probiotics and prebiotics and digestive enzymes, but don't forget the MSM. All right. So MSM and amino acids. Amino acids in the body are what you get when you break down proteins. And there's two different types of amino acids in the body are what you get when you break down proteins. And there's two different types of amino acids in the body. There are what are known as essential amino acids and non-essential. And the difference is, is the essential amino acids we have to get in our diet versus non-essential amino acids can be built by the body. And guess what is at the core of a lot of these amino acids? Sulfur. Yes. And so there are a number of amino acids we're going to talk about here. In some of these, you'll probably recognize, these are amino acids we talk a lot about in connection with other things in the body, like methylation, like detox, like building of our neurotransmitters. But at the core of these is sulfur. The nice thing, just as a little bit of a sidebar, the nice thing about MSM compared to some supplements is it's almost impossible to overdose on. There have been quite a few studies where they've tried to find a lethal dose of MSM in mice studies, and they just haven't gotten there. And so it's very safe to build up. The only thing you have to be cautious of is pushing detox too fast. So you can do too much too fast, but overall, your body has a mechanism for excreting excess sulfur. And so you might have stinky poop, you know, if you take too much, it might smell like rotten eggs, but it's very, very hard, very, very difficult to overdose. And, you know, that's why the dosage of it can vary so much, you know, among patients because somebody like my mom, you know, who had probably been deficient for a long time, needed a higher threshold, a higher dose, to rebuild what was needed and repair her system, whereas somebody might not need that high of a dose. But the good thing is, it's almost impossible to overdose on. By the way, it's excellent for constipation. So anyone that's dealing with constipation, keep MSM in mind. All right, so some of the amino acids we're going to talk about. Methionine, has anybody not heard of methionine before? Or has anybody heard of methionine before? So if we go back to the methylation chart that Ann had showed earlier, that's all about methylation, but one of the key cycles, there's three major cycles in methylation, but one of the key ones is the methionine cycle. And you need methionine in order to make homocysteine. You need methionine to make all of your energy molecules, like CoQ10 and carnitine and creatine. And you need methionine to make your neurotransmitter. So a lot of people who have so-called mental illnesses or imbalances in their neurotransmitters, they would do very well to take MSM. And a lot of people find that they feel calmer, they feel better, they sleep better, they snore less when they take MSM. Some of that is due to the fact that the methyl groups are utilized to make SAMe, and SAMe is a really important antidepressant nutrient that's fairly expensive. MSM is really much, much less expensive, and the beauty of it is that the body can decide how fast to use it. Some people are worried about taking SAMe too much too fast and causing problems with methylation. MSM won't do that. Your stomach will tell you if you're getting it too fast. So for those people who are having cognitive problems or psychiatric problems or stress problems, think MSM. Cysteine. Cysteine is also another amino acid that is connected to our methylation cycle. So if you're familiar with the amino acid homocysteine, homocysteine gets converted down as it's going down towards your sulfation pathways into cysteine, which gets converted into glutathione, which glutathione is needed for detox. As Dr. Rahn was mentioning, sometimes we give patients glutathione, and even at small doses of glutathione, they react to that because they're detoxing too quickly. What's nice and the beauty of MSM is it's helping your body build glutathione. So you're working more with your body's own feedback loops to figure out how much you need and how quickly you need it. And so cysteine is another sulfur amino acid that is dependent on sulfur in our diet to make formaldehyde. By the way, if you were to have a Tylenol overdose, be really careful about Tylenol. A lot of people think it's just, you can just take a ton of it, but it's very, you can create liver toxicity very easily with it. If you do become liver toxic and your liver is starting to fail and you go to the emergency room, what they'll give you is N-acetylcysteine. They'll give you cysteine as the antidote to Tylenol toxicity. So my advice is don't get toxic in the first place, but use MSM and that will help you maintain your cysteine levels. Alright, another major one is called taurine. Taurine is another one of our amino acids that's important for detox. It's also important in the brain for producing our inhibitory neurotransmitter called GABA. You know, GABA is what kind of calms us down. You know, if you're that type of person that can't shut your brain off before bed or you can't fall asleep, you know, that tends to be a low GABA state. type of person that can't shut your brain off before bed or you can't fall asleep, that tends to be a low GABA state. Taurine helps with the conversion of glutamate into GABA. It's important for also our mental health and for people who tend to be that what I call wired and tired, where you're wired all day long, but then you can't fall asleep at night. A lot of times that's a low GABA state. And so taurine is an important amino acid to help with that, the production of GABA. There's a real interesting little paradox here in terms of how you take your MSM. If you take too much right before bed, it will stimulate your adrenals and you'll be kind of awake. But if you take MSM through the day and help your body make more taurine, which helps you make more GABA, GABA will shut off the GAB-iness of your brain at night so that you can sleep more soundly. So people will notice that it definitely does help sleep, but don't take it too late at night because then it could interfere with sleep. All right, so sulfur is also important in terms of some of our biochemistry. And we've talked about some of these. And so, but we'll kind of just review a little bit, but sulfur is also important for detox. Glucosamine is, you know, you've probably heard of glucosamine and chondroitin for joint repair. Homocysteine for cardiovascular health. Lipoic acid for detox and blood sugar, and then coenzyme A for energy. And so we'll talk a little bit more about these. So glutathione is three amino acids put together. It's part of these sulfation pathways that we have. And glutathione is our body's own natural detoxifier. So if you eat, for instance, tuna that's got mercury in it, glutathione, it takes what, two molecules of glutathione to detoxify one molecule of methylmercury. So if everything's working as it should, when we get exposed to something in the environment, the body should upregulate production of glutathione to help us chelate out or to get rid of any of these environmental toxicants we get exposed to. But what's happening in a lot of the chronically ill patients that we see is this pathway is so overloaded and their body's been shunting so much down to make glutathione that they end up deficient in other areas, in other minerals, and in other amino acids, and in sulfur. So keep in mind that glutathione, which hopefully you've all heard of it, is probably the most important intracellular molecule in your body. But if you try to buy it or try to take it as a supplement, it's very expensive. A lot of it is not absorbed very well, and you really need a lot of it. And so MSM, by contrast, is very inexpensive. It's just a matter of taking enough for whatever your level of need is. But it is a very effective detoxifier. And in the world we live in, none of us realize how toxic a world we live in. Toxins are everywhere, but everything looks nice. But under the surface surface we have chronic illnesses escalating at incredible rates because of environmental toxicity. That alone should be a reason why you should think about taking MSM on a more regular basis because of just helping your body to detoxify as well as slow the aging process, as well as help your immune system, help your brain, neurotransmit. So you start to see that this little molecule is incredibly important for our health. One of the things whenever you start talking about toxicants in the environment, you can always feel the stress level go up because it really is impossible to avoid everything that we get exposed to in our world. It can be very stress-inducing to think about what you're drinking, what you're breathing, what's in all of the food. I always encourage people to, as much as you can, and for as much as you can control, try and eliminate the toxins in your environment. Filter your water, filter your air, buy organic food, stay away from preservatives, and stay away from processed foods. And then the flip side of that is do whatever you can to support your body in what it does have to detoxify, because you can't eliminate everything in your environment. But what you can do is you can help your body to up-regulate some of these pathways that will help you detoxify. Glucosamine. So, as I mentioned, glucosamine is typically paired with glucosamine and conjordain, and this is incredibly beneficial for helping to heal joints and collagen. And so a lot of times in MSM supplements, you'll actually see it combined with glucosamine, you know, because the two work synergistically for helping to heal and repair joints. Chondroitin is nothing other than chains of glucosamine. So ultimately, glucosamine and MSM would be the two ideal things you want to have in your arthritis supplement. Yeah, it's providing the raw materials to repair and then the sulfur is what combines those together to help, like we mentioned, have a healthy collagen system. Homocysteine, you want to talk about homocysteine? So homocysteine used to be that the cardiologists would always measure your homocysteine used to be that the cardiologists would always measure your homocysteine level because it is known to be a marker for higher risk of heart attack. It's also a marker for higher risk of Alzheimer's. We use it as a marker for just methylation in general. And it's interesting, you can have too high of a homocysteine, but you can also have too low. And where this happens is when you're so toxic that you're drawing all of your methylation down towards glutathione to try to neutralize all the toxins. And so you actually end up with a low homocysteine. So people who have low homocysteines are under-methylated. In kids, we commonly see it. Dr. Ann sees most of the kids, but we commonly see low homocysteines because our children, all of their reserves are being used to detoxify their bodies of all the things in the modern world. That is then pulling methylation away from their ability to make normal amounts of neurotransmitters. Is it any wonder that kids are having trouble with autism, attention deficit disorder, depression, sleep disorder? All of that can be due to the fact of overexposure to toxins and under availability of detoxifying molecules for the body. If any of you have heard us speak before, when we talk about supplementation with B vitamins, we talk about taking the right form of B vitamins. The correct form, the most bioavailable form of B vitamins are your methyl folates, your methyl cobalamin, so methyl B9, methyl B12. The reason these are important is they are important methyl donors. The problem is you can only build those up so high before you hit that threshold of B vitamins that people need or that they can tolerate. What's beautiful about MSM is you're not only just donating one, you're donating two methyl groups as well as sulfur to the body. What's beautiful about MSM is you're not only just donating one, you're donating two methyl groups as well as sulfur to the body. And so it's an amazing methyl donor. So in that way, it can support methylation without over-reving methylation. Because with the B vitamins, both the B vitamins and the methyl groups will push methylation and you can actually flip into what we call an over-methylated state where you're turning too fast. With MSM, I have not seen that happen where you're just basically donating the raw materials for the body to methylate, but it'll use it in the way that it needs it. Keep in mind also, remember this molecular shape. There's a sulfur, two methyl groups, and two oxygens, one above and one below the sulfur. So it's a great source for oxygen. And so oxygen is another incredibly important molecule, not only just to oxygenate our cells, but it's an oxidant and you can use oxidation to fight infection. And I think we don't hear that much about MSM as being an effective tool to help your body fight infection, but I really think it is. People who have chronic infections do very well with MSM, just like they do with DMSO. DMSO, you can give it IV, but it has an unpleasant odor. MSM, you can take it orally, it's cheaper, and it will give you the same benefits in terms of helping you fight hidden infections. it's cheaper and it will give you the same benefits in terms of helping you fight hidden infections. Lipoic acid, again, another important, another important amino acid that you need sulfur for. It's especially important for detox as well as lowering blood sugar. What's interesting is most of our detox occurs in the liver and it's not a coincidence that a lot of people eating a high processed, high refined diet have not only elevated blood sugars, but they also have elevated lipid levels, elevated cholesterol, elevated bad cholesterol, the LDL cholesterol. Well, the liver is what makes 80% of our cholesterol. And so as you start to stress the liver more and more, that could be a potential symptom of your liver being under stress. And so lipoic acid, because it helps with both detox, it can also help with lowering blood sugar for those who tend toward a higher blood sugar. Yeah, and if your children are hooked on pop, most of the pop is fructose-based, and a lot of the sugar that's used these days is fructose-based, and the fructose is metabolized through the liver. And the fastest-growing liver disease in the country now now in the world, is non-alcoholic fatty liver disease. And that's where the fructose is overloading the liver with fat. And so one of the things that MSM can do is at least help you detoxify that and heal that. Of course, the good thing is to stop using all this fructose, this corn-derived fructose. I know we kind of keep circling back to this, but MSM is really also, it's beneficial in terms of prevention because you can see all the number of different things that it touches and your body is going to use it in the way it needs it the most. And so in terms of building all these nutrients, if you can get the body to do something on its own, that's way better than having to take, you know, alpha lipoic acid, to take glutathione, to take all these other supplements, you know, these nutrients, you know, if you can get a high enough dose of MSM and you're in a relatively healthy state, it can hopefully help with maintaining the levels that your body needs of some of these amino acids. Coenzyme A, you want to talk a little bit about that? Well, it's a really important nutrient in the mitochondria. And so next to autoimmune problems, the other major problem that we're seeing in chronic illness is what I call the fatiguing illnesses, whether you have fibromyalgia, depression, Lyme disease, people are tired and it's because their mitochondria are not working very well and you need the sulfur drugs, you need this coenzyme A as an important part of the Krebs cycle, which is part of the ability of the mitochondria to generate ATP and energy. So MSM is an energy molecule. Just throw it all in there. So we'll talk a little bit more specifically about some of the benefits in the literature as far as MSM specifically. And a lot of these, as I mentioned, go back to the punchline in the beginning. A lot of these have to deal with repair in the body. MSM helps with repairing, especially there are certain cell lines in the body that are rapidly turning over. So your gut cells, your enterocytes, those will be replaced pretty much every four to seven days. You have a whole new lining to your gut. Your skin cells are constantly sloughing off, you know, and that's an important process of healing in the body. And so giving your body all the tools it needs to rebuild those in a healthy way is important. And so a lot of these that we'll talk about deal with healing connected to MSM. So collagen, again, we've talked about this. You know, MSM, you know, Dr. Rahn mentioned that my mom drank, you know, a drink that had both MSM and vitamin C in it. I have taken that up one more level and added magnesium, and I call it the anti-stress drink. But I have put a lot of my patients on MSM, vitamin C, and magnesium just to kind of help get you through the day. It's great for managing adrenals, managing stress. You know, both vitamin C is also needed for collagen production, and so the two work very synergistically. Yeah, it's actually been said that MSM without vitamin C is not as effective. So really, if you are going to do MSM, be sure you get your vitamin C or the new 216 that we have, which will help your body make more vitamin C. You can even apply MSM topically. So there's lotions and creams you can use. As Dr. Ron mentioned, even doing an Epsom salt bath has both magnesium and sulfur. Get in the bath, get one of those, what are those called, the brush your skin so you can kind of— Skin brush. Yeah. I don't know. So you can—and then sit in a bath of Epsom salt, you know, and I tell people, you know, put two, three cups of Epsom salt, you know, in the hot water and that will also be absorbed, you know, through the lining of your skin. If you're worried about all the stuff that they're talking about now, the junk that's in sunscreen, take MSM. You don't even have to use sunscreen, because MSM will prevent sunburn if you're taking it in adequate amounts. So detox, skin detox. I don't know if any of you have experience doing an Epsom salt bath, and you just start profusely sweating. At least I do. Even if the water is not terribly hot, it induces a bit of a detox reaction. Our skin is one of the largest detox organs in the body. Initiating that detox through the skin is extremely beneficial. Acne, so again, I don't know if you want to talk about, but acne in terms of really any skin condition that is repair modulated would do well with MSM. And acne is associated with overproduction of testosterone, but that's not the only problem. It's under metabolism of testosterone in the liver. When adolescents get their acne, it's because, yes, they're making a lot of testosterone, but their liver can't keep up with it. If you were to give them MSM, not only would it be better for the skin and prevent the infection in the pustules that acne can cause, but it also helps reduce the excess testosterone by improving liver function. Happy hair, healthy nails. So again, hair, skin, and nails repair. So many women complain of their nails breaking or they have split nails or whatnot. This is a perfect antidote for that. Very safe. How many people have heard of taking biotin? Biotin for hair, skin, and nails. Biotin is hair, skin, and nails. Biotin is sulfur containing. So, you know, so it's a B vitamin, but again, it goes back to, you know, repair in the body and kind of the key component to all these things that help with repair. Digestion. This is something I can speak personally about. You know, as I mentioned, I started MSM for allergies, and it helped decrease those symptoms, and that was the primary reason I was taking it. But all of a sudden, I've had a whole lot of food sensitivities. I've reacted to foods my whole life, and all of a sudden, I wasn't getting bloated like I was before, you know, after eating certain foods, it wasn't affecting me quite as much. And so it can actually help heal the lining of your gut and help with digestion. Yep. Just like we talked about earlier. And I also, one other thing, you know, too, and as you can see, because sulfur is kind of the core of a lot of these, these different, you know, nutrients and amino acids. One thing I always tell patients too is that MSM helps everything you're already doing work better. So you can add it in addition to some of the nutrients you're already doing and everything is going to work better because MSM is such a great foundational molecule for a lot of these processes in the body. Yeah. One of the distinctions I have patients think about is that we all tend to be reactive in our lives. We wait for problems to occur and then we react. But if you're proactive, you're thinking ahead and you're saying, what can I do to avoid wrinkles? What can I do to avoid indigestion? What can I do to avoid Alzheimer's and high homocysteine and all the things we're talking about? You know, you could probably take, we have MSM in a 1000 milligram capsule, or Caplet, if you took one twice a day, frankly, I think that would be a tremendous anti-aging, anti-disease program as long as you're taking some vitamin C with it. As Dr. Rahn mentioned for constipation, MSM is great for constipation. And this is the one thing that I do have a number of patients that they report that if they increase their dose too quickly, you know, they do have an increased frequency of bowel movements, which is probably not a bad thing. You know, you know, you know, know, it's better out than in. And so, stimulating the bowels and detox will increase the frequency of your bowel movements. Allergies, as I mentioned, allergies, both not only seasonal allergies, but also food allergies. Taking MSM, healing the gut, because it is such an important repair molecule, it will help with reducing the effects of seasonal allergies. I went from, I called them my histamine attacks. I went from probably about 15 to 20 histamine attacks a day down to about 2 to 3, taking MSM in a very short amount of time. I had gone the allergist route. I had tried everything, and then lo and behold, my dad was like, well, why don't you try increasing your dose of MSM? And I was like, well, how high? And he's like, well, how high do you want to go? And so I got up to a dose of about 12,000 milligrams and that was when my symptoms started to abate. Like mother, like daughter. I got it somewhere. Parasites, so MSM has demonstrated the benefit of being great for ridding the body of parasites, in addition to also healing the gut. Predicting the weather. This was kind of a funny one. Because a lot of people, they say they can feel in their joints, their arthritis, they can feel the barometric pressure changes. Because MSM is important at the cellular level, it improves cellular membrane functioning. And so sometimes it's the swelling that causes the extra pain that triggers people to be sensitive to weather changes. I think we have found something bad. You'll no longer be able to predict the weather when you start taking MSM. And then arthritis. This is probably what MSM is most well known for, is helping to relieve arthritic pain. But even as a preventative molecule, there's some great research that suggests that athletes, young athletes, if you take MSM prior to working out that that will help with recovery time. You know, it'll speed up your recovery, your muscle recovery. And so, you know, so as we mentioned, you don't want to wait until, you know, until it's already inflamed before you start taking it, but preventatively you can aid and repair before you even, if you know you're gonna do a tough workout or you know you're gonna be especially active, take some extra MSM and you'll heal better. Let's see if we can kind of wrap up for questions. So muscle soreness, as we just mentioned, lung dysfunction, again, all of this goes back to cell membranes and maintaining that proper cellular functioning. Oral hygiene, so it can help with gum inflammation. That's a big one because gum inflammation or hidden abscesses in your mouth can actually give you a heart attack. And so MSM could prevent a heart attack that way. Snoring, you know, one research suggests that, you know, that taking MSM on a regular basis, you know, 3000 milligrams can reduce snoring, sunburn, as Dr. Ron mentioned. And then dosage, you know, so, you know, so as we talked about, it's very safe to take, you know, it's very hard to overdose. You can only do it too quickly. You can only build your dose too quickly. And so what you want to do is start with 500 milligrams three times a day. If you don't see any lessening of your symptoms, whether it be your arthritic pain, your muscle soreness, slowly increase your dose until you start to see clinical changes in your symptoms. And that dosage is different for everybody. All right, and you can take it in a capsule form, you can take it in a powder. As we said, we like the powder just because you can sip on it, you know, throughout the day and so you're gonna get more of a slow release. Because it has such a short half-life, it is good to kind of get that release throughout the day. So, in conclusion, it really truly is kind of the miracle nutrient, it's good for just about everything, it's very safe, almost impossible. The miracle of MSM. Almost impossible to overdose on. A number of patients here at the Ring Clinic have used it very successfully. That's why we have our powder form. It's a two-pound jug up there because the people who get on it get hooked because it does help. And it can help with a lot of different functions in the body. Can you just be the mic? If you have a question, raise your hand and Dr. Ann will come to you and we'll try to field some questions. Yep, any questions? Okay, so when do you know the max, I mean, what is safe for the maximum? You're going to start three times a day at 500. Is 15,000 the max you should go for serving? So as far as we know, I think, did everyone hear that? What is the maximum dose? As far as we know, I would say it's the dose at which you achieve symptom control. But my advice is to start low and build it up gradually so that you don't get into this detoxification stuff. The liquid form, making your drink and sipping on it throughout the day is a really good way to do it. I will mention that MSM powder I think dissolves fairly quickly, but granules don't. So you'll have, it depends on what you, what brands you get, how fast it dissolves. But if you make up your solution and keep a little chart and gradually increase the concentration until you get symptom relief, that will be your dose because probably everyone has a little bit different need. Would blood tests also show if you're low on it? I have not found a really, other than we see so many people that are under methylated, like a high homocysteine or some of the B vitamins being inadequate. But to my knowledge, maybe a hair analysis, but I've watched the hair analysis and even that's not necessarily a good marker. So- I think conventionally, it's mostly a plasma level, which is not a great picture of storage since over 50% of it is stored in your muscles, unless you were doing like the study on the horses and doing an actual tissue biopsy, it is hard to know exactly, yeah, how much you have. All right, so if I'm taking MSM, can I give up my Bs, glucosamine, amino supports before a workout, and then C? Or is it like, is it kind of keep those, keep taking those? Or is that all in some of this stuff? I think that would be, you know, again, what the the element that when you listen to a lecture like this you forget that healing takes time. And so even MSM, it takes some time for it to work. It's not like a medication where you take it and an hour later your pain is gone. So I tell people start low, build slow, and then if things are working well, if you remember what we talked about, yes, I think you could start reducing some of those nutrients that your body can now make on its own. And then you said something about it prevents sunburn, but will I still be able to get a tan? I don't want to be too white. Yeah, the sunlight will still stimulate melanocytes. And so yes, you'll still get a tan, but you'll be, now you can still burn. Don't be crazy about this. And it depends on how much MSM you're taking. I remember the first time that I was taking a lot and went golfing and forgot to put on lotion. And I was surprised at the end of the, that was three or four hours out in the sun, no burn. I thought, wow, this is weird. And it was just MSM. Then I found out later it protects against burns. I see that you can mix MSM with toothpaste. There may be some companies, you know, can you mix it with toothpaste? There may be some companies that do that. I don't know. I haven't seen it on the market, but you could probably do it on your own. I don't know how. MSM is not wonderfully tasting. Let's just put it that way. If you get it well dissolved with some vitamin C, it's not too bad and people acclimate to the taste, but I don't know about brushing your teeth with it. Probably wouldn't hurt. You wouldn't hurt anything. You know, the best, if it's already incorporated into a toothpaste, it might just work a little bit better, you know, but I don't think it would hurt anything. Yeah, MSM lotions work well for arthritis. They're a little hard. I've had trouble finding them here lately, but they can help with arthritis and joint pains, and so they probably would help with your teeth as well. Any other questions? All right, well, thank you, everyone, for coming coming today and we hope you have a great summer and good luck with working with this wonderful substance. Thank you. Just as a teaser, it's not in there, but in October we will be adding a lecture on vitamin D and the safety of using higher doses of vitamin D. A lot of new research on high dose vitamin D. Yeah, we will come around and collect, if anybody who filled out the survey, and we'll do a drawing for this book. We also have this book available upstairs for purchase, and you should have a coupon there at your place.