# Dietary Considerations for Rehabilitation and Fitness Professionals

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- [Jessica] All right welcome everyone. Our presenter today is Jennifer Stone. Jennifer Stone is a pelvic heath and orthopedic physical therapist in Columbia, Missouri. She runs an outpatient hospital based clinic, oversees her department's pelvic health program, sees patients, and teaches in her spare time. Jennifer is the program director for Evidence in Motions Pelvic Health Certificate Program and teaches in that program as well. Thank you so much for returning to physicaltherapy.com, Jennifer. At this time, I'm turning the microphone over to you.

- [Jennifer] Perfect, thank you so much Jessica. All right. So, we're gonna go ahead and get started here. So, here are your learning outcomes. We're gonna go ahead and just go over these really quickly. Once we're finished with this course, the ideal situation would be that you would all be able to name at least three components of an anti-inflammatory diet, discuss the differences between soluble and insoluble fiber, and then also name at least three foods that fit into each category, and describe at least four supplements that may be beneficial for patients and discuss reasons that you might consider suggesting each of them for your patient or your client, I realize we may have some athletic trainers in here as well, so I apologize.

I'm a physical therapist, so my tendency is to say patient, but realize when I say that then I do also include clients in that sort of category. And then also describe the importance of proper hydration and discuss strategies for helping patients titrate their hydration if they need to. Obviously, we hope that you'll also get a lot more out of this, but these are our main learning outcomes. So just to introduce this a little bit, I want to start this with the caveat that I don't necessarily consider myself the world's end all be all expert in terms of nutrition. I will say that all of these recommendations in here should be taken into consideration in terms of the patient, and then also that just because you're learning about nutrition, you need to still know when to refer out to

someone who is a true expert. You know, no matter how much I learned about nutrition, unless I actually go and get a nutrition degree, I probably am not going to have that same level of expertise in this area. So, I have learned enough to help my patients and get them started, and then if it is complicated, will just go ahead and refer out. So, just some things to keep in mind as we go forward. I personally learned about nutrition because of my role as a pelvic health physical therapist. When I started treating more pelvic health clients, I quickly came to realize that the gastrointestinal system and the urinary system are very, very integrally involved with the musculoskeletal system in these patients, and so you really have to work with those when you're working with these individuals.

And then as I learned more and more, I realized, oh my goodness, I honestly really should have been incorporating this all along with my orthopedic patients and my sports injury patients, and so I think this is helpful information to some degree no matter what your practice area may be. So, a concern I hear voiced frequently when I take courses or when I teach courses or even just when I'm talking to individuals is that people say "Well is nutrition advice "even in my scope of practice?" Okay, so there's a few, the answer is it depends as unfortunately is often the case in rehab anything. The American Physical Therapy Association says yes it is, providing that your state allows it, and I've included some links here. So, if you actually want to go read these position statements, then you can certainly do so. They're quite long, so I didn't attempt to summarize them.

But the bottom line is it says, absolutely it can be. The National Athletic Trainers Association, or NATA, NATA, not sure how you all pronounce that, but either way, they say that yes it definitely can be, but they want you to practice within your own personal scope of expertise. The AOTA doesn't have a position statement, so they don't say that OTs shouldn't, but they just don't really address it one way or another at the national level. And then perhaps more importantly than this, state practice acts can really vary

significantly on this. And all of these organizations, aside from AOTA that doesn't really say anything about it one way or the other, APTA and NATA both say from a national standpoint, this is what we think, but your state practice act trumps anything that happens at the national level. So, I know there are some states, for instance, I have a colleague in Arizona who has shared with me that they are not supposed to give nutrition information there, and so you will want to consult your state practice act to know whether you personally are or are not allowed to give advice with regards to nutrition, and at what level that advice can be. All right, so, why should we care? Why do we care about nutrition?

Well to put it simply, nutrition impacts everything about the body's health. So, I mentioned the specific involvement with my pelvic health clients, but truthfully, regardless of what body part you're working with or helping your patients with, if you want to optimize performance, and I don't care if that means healing or if we're just simply talking about optimizing exercise or athletic performance, nutrition is crucially important 'cause fuel for the body is so important. So, here's a couple of statements from the position statements from APTA and NATA. APTA says, "Diet and nutrition are key components "of many conditions managed by physical therapists, "and nutrition can also directly "affect recovery and function "while the individual is under a physical therapist's care." NATA, I really like this statement.

They say that "dietary energy, or the energy from food, "not only supports their athletic performance, "but also sustains their life. "And following an athlete's participation in exercise, "whatever remaining fuel is left in their body "is used to support the body's metabolic processes. "Thus, when an athlete's body is not adequately fueled, "there's little energy left "to support the body's critical functions "following intense training such as recovery and repair." And I just think this is so important because again, regardless of if our patients are healing from an injury or again, trying to optimize performance, their body's ability to have the nutritional support to do that is absolutely critical. And

honestly, at least from a rehabilitative services perspective, probably nobody else who's involved in the patient's course of care is really talking to them about this. So, we have a really great opportunity here to make an impact with our individuals. Okay, so when should we refer out? I kind of mentioned earlier that, I'm not saying that by learning about diet and nutrition that you necessary replace the role of the dietician. For some of your patients, again, where it's fairly simple, maybe you do, but there are times when it's super helpful to have that person on your team. Okay, so when we should refer out. Some things to think about. Your personal scope of practice. So, how much do you personally know about nutrition and particularly nutrition as regards to your goals for this individual person, whether that's a client, patient, et cetera. Are there accessible resources out there with information you need that are reliable and good sources, obviously.

So, the internet is both our best friend and our worst enemy at times. So, can you access resources that you know are reliable and good resources? And I'll include some resources in this PowerPoint to help get you pointed in the right direction for some of these, but that's definitely something to think about. Do the needs of your client or your patient fall outside of your comfort zone in terms of what you know or what is easily available? Because if so, you shouldn't make things up. This is way too important to make things up or to fake it till you make it. So, you should refer out then. If the person needs a very individualized approach or a lot of real specific meal planning, probably they would benefit from someone who has more expertise than your typical rehab professional is going to.

And that's just simply because if they want generalized statements or this is usually helpful for people who blah, blah, blah, then we can help with that. But if they need someone to sit down with them and look at their situation and all these different factors and custom design something for them, I think it's probably best that they do that with a professional who knows a lot about that. And then, you know, again, if you want to

refer, or if you need to refer, if the person really needs something that's outside of your scope or practice, it's great to have someone sort of on your team that you can collaborate with and that you know that you can send patients to. But that should not keep you from providing sort of some generalized nutrition and wellness advice to your patients or clients. All right, so let's talk about some nutritional red flags. So, some of the big ones that I see, I'm certain that there are others that could come up, but some of the big ones I see are eating disordered behavior. There's a concept called the female athlete triad, and that's a combination of inadequate caloric intake, or anorexia, loss of bone density, and loss of menstruation. So, their body fat typically has dropped low enough to where they stop menstruating.

So, that is a big red flag. That's something that requires immediate medical attention. I will say that this is not only something that happens volitionally, it can be. So, sometimes this is something that the individual has entered into on purpose in a way because they are trying to have a body that looks a certain way or they think that they're optimizing their performance by doing this. But sometimes, it's honestly just that these young athletes, it's typically young athletes, although it can happen at any age, but sometimes it's just that they don't realize how many calories they actually need to be ingesting in order to replace what they are using in order for them to do their athletic event or their performance.

So, sometimes it's just a simple matter of education, of this is how much you should be eating, these are the kinds of things you should be eating, and then other times it's really is a serious situation that requires typically a multidisciplinary approach. But either way, that's something that needs to be addressed. Anorexia, bulimia, other eating disordered behaviors, in case you don't know what these are, anorexia is severely restricting your caloric intake. Bulimia is where somebody will do the sort of binging and purging cycle. Sometimes it's a big binge, like they'll eat thousands and thousands or tens of thousands of calories at once, and then purge by vomiting or

inducing, you know, a lot of bowel movements. Sometimes it's that they will eat sort of a normal amount but then purge afterwards. So, the binge cycle can look really different depending on the individual. Orthorexia is using exercise to purge essentially. So, to do a very large quantity of exercise, not really for the purpose of training usually, but for the purpose of burning off everything that they eat and then some. Binge eating, we kind of already discussed. That can look really different for different people, but it's often characterized, when it's called binge eating, it's often characterized as a rapid ingestion of a large number of calories. Overly restricting food categories. Overly restricting food categories is something that people sometimes will do to optimize performance in a way.

So, they may say, "Oh, I'm going to restrict sugar," or they may do it for reason of they may have an allergy or something like that, so they may say, "Oh, I'm not eating gluten "because I have an allergy to that." So, that's not necessarily considered an eating disordered behavior, but there's a level of it at which it can be, and a lot of that depends on the person's, emotional outlook and psychology and how they're looking at that. So, that's something that requires a little bit more question asking in order to determine if that is a problem. And then body dysmorphia which simply refers to when the person looks in the mirror, they don't see an accurate image reflected back at them.

So, you may have someone who has a very good body composition or a very slender body composition, and they think that they are huge or something like that. And then, another red flag would be abuse of supplements or pills in an attempt to get a quick fix either for the purposes of weight gain or loss or muscle bulking. Okay, and we'll talk a little bit more about that later. Okay, so I'm just going to go through some terms, and I apologize for those of you for whom this is probably a review, but given that we may have some folks watching this who don't know these terms, we're just going to go over them so that when I mention them later in the presentation, you'll know what I'm talking

about. A micronutrient refers to vitamins, minerals, and electrolytes, primarily. Macronutrient is protein, fat, and carbohydrate. And then I put a link on there where you can refer to some acceptable macronutrient distribution ranges, and we'll talk more about that a little bit later as well. If you see or hear the term nutrient dense, what that means is that it is a type of food that has a maximum number of nutrients for the amount of food that it is. That's usually calculated as number of calories just because that's easy to measure. Antioxidants are found in food and they defend cells from damage to free radicals. So, that's just again something we'll mention a little bit later. A calorie, since we've mentioned that term a couple of times now, is a unit of energy. And food calories are actually kilocalories, technically.

So, they're 1,000 calories. So, one food calorie is the amount of energy it takes to raise one gram of water by one degree Celsius. Blood glucose is the amount of sugar or energy that is available for quick use. So, when we use energy, we use it in the form of sugar, and so, how much sugar is quickly, freely available for us to use. Electrolytes are minerals that are dissolved in body fluids. The really common ones that we think about include sodium, potassium, magnesium, and chloride. And we will talk about these more later. So, just kind of store that away. All right, and then, sort of the last terminology that I want us to go over is just talking about some common diets. These are a selection of diets that are fairly popular right now, just to define them, so that if you have a patient or a client that says they're eating this way, you'll know what they're talking about.

So, the Paleo diet is a diet that is based on foods that may have been available during prehistoric times. It's based on this belief that the human body is really not evolved from a biologic perspective to match the foods that we currently have available due to farming practices, and then also food preservation practices as well. So, the things that most people are going to avoid on the Paleo diet are grains, any type of processed food, legumes, dairy, salt, sugar, and potatoes. And the amount that the person

conforms to this diet's gonna vary a bit based on the individual. A lot of people talk about being 80/20 Paleo, meaning they ate Paleo 80% of the time, and do other things 20% of the time, and then some people are all Paleo, or any other range that you could imagine. The ketogenic diet, or shortened to keto, is pretty popular right now, at least in the region where I live in the United States, which is sort of the middle of the country. It is low carb and high fat. So, the standard keto diet is 75% fat, 20% protein, and 5% carbs. There's also the cyclical keto diet which allows for periodic carb re-feeds, and there are a lot of different protocols, I guess, out there for that, so I didn't attempt to summarize all of them. You can easily google and find those. There's also targeted keto which allows you to add carbs based around your workouts.

And again, there's lots of different methodologies for ways to do that. High protein keto just drops the fat to 60%, and bumps the protein up to 35%, and still keeps the carbs at five. And then just to throw out there, Atkins is somewhat similar in terms of being low carb, but it doesn't have as specific of a fat/protein ratio. So, there are some people who will say, "Oh, Atkins is a form of keto," and then keto purists will say, "Absolutely, it's not," or at least not necessarily. So, just to throw that out there. And keto does not have the limitation on processed food that Paleo does. So, some people do eat very low processed foods on a keto diet, and others eat almost entirely processed foods. So, some other common ones, intermittent fasting, alternating cycles of eating and fasting.

Some popular methods include 16/8 and 23/1. So meaning, you fast for 16 hours and then eat for eight hours out of the 24-hour period. Or you fast for 23 hours and eat for one. That second one is typically not intended as a way that you're going to eat for the rest of your life. So much as a cleanse, or trying to lose weight quickly is typically why I see people do that. Another popular method is eat-stop-eat. So, you fast for 24 hours one to two days per week, and then eat sort of normally the rest of the time. Or 5:2, so five days a week you eat whatever your normal intake is, and then two days a week

you eat 500 to 600 calories and that's it. Now, intermittent fasting is often paired with another type of diet. So, somebody can be intermittent fasting and also following a keto plan or also following a Paleo plan. So, just kind of realize, or they may be intermittently fasting and just not necessarily following any particular plan, and they may be following the standard American diet. So, that doesn't by itself tell you anything. So you might ask more questions if someone tells you they're doing intermittent fasting. Protein shake replacements, this isn't necessarily a common diet, but it's a common feature of many diets and diet plans, in particularly the ones that have this very specific methodology for how someone would go about a diet plan typically with regards to weight loss. One reason I put them in here, there's also protein bars, and we'll talk more about these later, but they can lead to constipation and inflammation.

So, just kind of something to keep in mind with those. They don't for everyone, but they can. Weight Watchers is a common one that's been common for a very long time. My grandmother and mother, and perhaps people before them. They have a point-based system that is based on calories, and they do sort of this calculation to figure out how many calories the person needs to eat in order to either lose or maintain weight. They don't necessarily specify what the person eats, other than you can only eat adding up to this many calories. So, there are some people who will criticize this system based on the fact that it... Some people will say that it teaches eating disordered behaviors.

Others disagree with that, so, there's that for you. Weight Watchers does typically have support groups and group weigh ins, although there are online options now that may or may not include the weigh in. There are lots of different options for that. An elimination diet is something that people do as a diagnostic when they're trying to attempt to identify irritants. And we're gonna talk a specific type of elimination diet later. But really commons ones are to eliminate gluten, to eliminate dairy. There are some more

extreme elimination diets where you literally eliminate everything, and then sort of build back from scratch. There's a diet called The Zone, which has a goal of controlling insulin. That one, you typically eat 40% carbohydrates, 30% protein, 30% fat. There you go. The vegetarian diet. Vegetarians do not eat animal-based products, although they will with some exceptions. So, there's such a thing as a lacto-vegetarian, or a lacto-ovo-vegetarian. So, a lacto-ovo-vegetarian will eat dairy products and eggs, but no meat. A pescetarian will eat fish, but no other meat. So, vegetarian sort of has this rather wide range of definitions depending on the individual. A vegan does not use or eat any animal-based products of any type including, they won't buy self-care products that have beeswax in them, and that sort of thing.

The vegan approach is more of an ideological approach where they believe that animal products should not be used. That it's morally wrong to use them. Sometimes vegetarians feel that way as well, but often vegetarians are just simply eating that way because they feel like that's a better health choice for them. And it doesn't necessarily encompass other areas of their life besides just their diet. The South Beach diet is recommending avoiding foods based on a glycemic index which is based upon how quickly the food is digested or broken down and they have somewhat of a complex list of how that works. The Standard American diet I mentioned a moment ago, that's just kind of what, I guess, the typical America is thought to eat. It's often quite high in sugar and fried foods, and somewhat low in protein and fiber.

So, there are a lot of health related considerations to think about with this one, and sort of people who will talk about, oh the standard American diet has these problems, and it certainly does. Raw food diet means that food should be completely unrefined, completely plant based, and ideally organic, and 75% of that food should not be cooked. I don't see a lot of this in my area, but I have colleagues who live in other areas of the country that say it's quite popular where they are. That's what that is. All right. So, now we've got all of those fun, lovely definitions under our belts. So, now

we're gonna talk about in general how does the GI system actually work? How does digestion work? Because they think understanding the physiology helps set the stage for us to understand how we go about discussing and determining some of the nutritional advice that we will have. And I would apologize for hoisting all of my cute children on you, but that's just way too fun for me. Okay, so the upper GI tract is made up of the mouth, esophagus, stomach, and duodenum. It's main function is to break food down into digestible units. So, mechanical breakdown essentially, as well as enzymatic breakdown.

So in the mouth and the esophagus, the mouth will break down your food mechanically via chewing; I think most of us know that, hopefully. And then the saliva actually contains digestive enzymes. So that combination of the mechanical breakdown and then the enzymatic breakdown, or the chemical breakdown, helps to form the food into a bolus, or a soft ball, which we then swallow. And then, of course, the esophagus is simply a pathway from the mouth to the stomach. In the stomach, there's secretion of gastric juices which further breaks down. There's some further chemical breakdown of that food, and it turns it from that bolus into a liquid. And the liquid is then intended to be passed into the intestines for absorption. The stomach does have a sphincter at both the top and the bottom, and these are intended to be one-way valves, but they can reflux at times.

Both of them can reflux. I think we hear a little bit more about reflux at the top, just because that's the one that tends to cause symptoms for people, but it's possible for either to do that. The duodenum is that green part there that you can see, I'm sure is so clear to everyone. But that is basically the start of your small intestine. So, it receives secretions from the gallbladder, the liver, the pancreas, and that just continues that digestive process. So, we're breaking these food particles down into smaller and smaller units. We consider chemical digestion to be complete once the food has passed through the duodenum. And now we call this liquid that has been created and

sort of broken down into these really small units, it's called chyme. This is also where peristalsis starts. Peristalsis is simply the smooth muscle contraction that moves our chyme, food, broken down food, through the rest of our digestive system. This is not a process that's under our volitional control. This is something that happens automatically for us. Thankfully. The jejunum is the next section of the small intestine. It's about 2 1/2 meters long. Obviously that can vary a bit from person to person. And it has segmentations. So, this will be these localized contractions in the walls of the jejunum. And what this does is instead of just pushing that chyme straight through the jejunum, it actually circulates it, almost like food in a washing machine would be circulated.

And what that's attempting to do is allow for maximal contact with the walls of the jejunum which is where nutrient absorption takes place. And about 90% of our nutrient absorption does occur in the jejunum. So, it is important that we have that maximal contact so we can pull as much of that nutrition out of the food as possible. The ileum is the final part of the small intestine. There's not really a very defined point where it's like, oh, this is jejunum, this is ilium, but it sort of transitions through a zone. The ileum is about 3 1/2 meters long, and that remaining approximately 10% of digestion occurs in the ileum. The circulatory action does not happen here. It just kind of passes straight through somewhat slowly.

The terminal ileum is the end of the ileum, as I'm sure you could guess from the name, and it's right before the ileocecal valve. The chyme is stored here prior to being passed along into the large intestine. So, basically it stores until it reaches a certain point, then the valve opens, and it dumps into the large intestine. The large intestine's purpose is to absorb water and vitamins and then convert that chyme into stool. So, we're gonna be talking more about the large intestine because it comes in very important a little bit later on when we're talking about certain types of nutrition. Movement within the large intestine is primarily controlled by peristalsis, and peristalsis in the large intestine is

regulated by the speed of movement of the ileocecal valve typically. There are some things that can happen that can cause a different method of control, but typically it's gonna be somewhat regulated by the speed of that ileocecal valve opening and shutting and dumping that chyme in. It's typically gonna be slow and steady, but it can be much more forceful after a large meal or during a sickness, which is why you can feel, you know, if you're gonna have a tummy bug, you often will feel sort of like this churning, or cramping, or pain in your stomach. That's because your body is trying to get whatever those contents are out as quickly as possible and by forceful means, unfortunately sometimes. In the cecum, which is a portion of the large intestine, that earlier portion of the large intestine, good bacteria are mixed in with the chyme. So, these are bacteria that populate our intestine. And we'll talk about these more later also. These bacteria do digest the substances in the chyme that the human body cannot absorb. It turns them into stool and vitamins. So, vitamin B and vitamin K are both made bioavailable almost entirely by these bacteria.

So, if we don't have a good population of these bacteria, our bodies are not able to get vitamin B or K from our food or even from vitamins that we might take, because they need to be made bioavailable, and that only can happen by those bacteria. So within the large intestine, you've got a few different parts. You have your ascending colon, just as it sounds. So the ileocecal valve and the small intestine dump that chyme here, and then it goes up. This is where a lot of that bacterial digestion occurs, and then also some vitamin and water absorption. In the transverse colon, stool formation occurs here, and you have that segmentation again, so that circular motion, but this time instead of maximizing absorption, what it's doing is it's actually pushing the stool together and causing it to become more solid. And then, you do continue to have some vitamin and water absorption through here. And then finally you have the descending colon, which is your final location for vitamin and water storage, and then it allows for feces formation and storage, primarily that formation, not as much storage. Most of the storage actually occurs in the rectum, which is the final storage point before it exits the

body. So, this is where your body stores stool until it's ready to eliminate, and then once it has distended to the point where it needs to be eliminated, then the stretch receptors that are located in the rectal wall send a signal to the brain which then leads to an urge and therefore passage of a bowel movement. You didn't know we were talking about poop today, did you? Sorry, had to sneak it in there. Okay, so the GI system, a few red flags just to consider, and these are important to keep in mind especially if you are giving people any kind of nutritional advice to make sure that these are not happening. So, if there's any black or tarriness to the stools, that indicates blood, and particularly old blood. So, that is never a good thing. That always warrants at least being checked out, figuring out what's going on with that. If the patient has inability to pass stool for multiple days, that is not responding to methods to move that along, be that an enema or suppository, or whatever, then that is problematic and again needs to be diagnosed. I'm not necessarily talking about people who have chronic constipation, but if they have a new onset, or a much significant worsening of that constipation.

If they're vomiting bile or just vomiting out of control, they can't stop, that's again something that needs to be looked at. Sudden unexplained weight change is always worth looking into whether that's gain or loss. If there's any sharp or acute pain that does not resolve relatively quickly in the abdomen or the pelvis, and particularly pain that comes and goes in a cyclical manner. If the individual has a sudden lack of appetite, that's again not necessarily explained by an illness or something along those lines. And then if they have anemia that doesn't really have an explanation that's not responding to iron supplementation, that typically will indicate a GI bleed. I don't know that we are necessarily going to pick up on this last one, but just kind of so that you're aware that that is something that can happen in case you have someone with a history of that or who's currently dealing with that. Okay, so now let's dive into some of these specific aspects of nutrition that are super important, and I have, for this presentation, just selected some different ones that come up very commonly in my practice. This is

by no means a comprehensive list of things that you might want to consider talking to your patients about. That would not be possible in a two-hour lecture. But what we're trying to do here is give you some sort of big bang for your buck options and tools that you can use to help optimize your patients' outcomes in these areas. Okay, so, first we're going to talk about hydration. Water is critically important for life, okay. It makes up 60 to 75% of adult body weight, and also quite a lot of children's body weights as well. We get it in input from our fluid intake primarily, and then somewhat from our food intake. And then there's also some water that we produce via oxidation of macronutrients. This is not really a significant amount, okay. But just so you know there is some water that's actually produced during that digestive process, okay, in the small intestines, but it's primarily our fluid and food intake. Outputs for adults, or these numbers are for adults. These are outputs for everyone, but the numbers are for adults.

The evaporation through the skin accounts for around 450 milliliters per day, or so. Evaporation through the respiratory tract actually accounts for about 250 to 350 milliliters per day. Feces will contain around 200 milliliters per day. That varies a bit individually, but approximately, these are all averages of course. And then our largest output is from our urine. So depending on the individual, that can range from 800 to 2,000 milliliters per day. Because of this, often urine output is what is used to determine hydration status in studies, and then also medically. So, the functions of water, so many things. Like I said, it's important for life. Growth of anything, so this could be growth of a person if you're talking about a person who's still in the process of growing. But it also can include growth of a muscle or change in a muscle, or growth of new tissue if you've had an injury. So, any growth process that occurs in our body will be a function of water, will include water in it's function. Digestion, water's very important in digestion. It's a solvent for a lot of the ionic compounds that are part of digestion and are major in digestion, and then also allows for hydrolysis of macronutrients. And then also very involved in stool formation, and all kinds of other things. Water in our bodies is a carrier for nutrition and waste. So, if we are dehydrated,

we have much less ability to get the nutrition that we're ingesting to the important parts of our body, and also to quickly eliminate waste products. Thermoregulation simply means that because water is such a large percentage of our body makeup, it actually decreases how quickly our body can change temperature. So, we can't get very cold very quickly or very warm very quickly because that water helps us to thermoregulate. Okay, that's not the only thing, but it plays a role. Lubrication, and that refers primarily to lubrication of our organs and our joints. We don't always think about those things needing that lubrication, but they do. They need to be able to move, and the fluid that is in our body helps to cushion and support for that. I had a patient recently who actually came in for knee pain, and I was working on her, looking at her, and her knees were fine, I couldn't find anything. But I noticed that her skin was really dry. And so, I'm like, "Oh, Jennifer, don't make everything into a pelvic floor," not that hydration is a pelvic floor, but I started paying more attention to it when I treated that. So, I finally just asked her about pelvic floor.

Turned out that she'd been purposely really, really dehydrating herself because of the bladder condition that she was having. And so, actually all we really did, we did some just general global strengthening, but all we really did was work on bumping her fluid back up, and her knee pain went away. Now, that's obviously not the typical common cause of knee pain, but it was that loss of lubrication that really caused that for her. So, definitely worth considering. Shock absorption, so we move. We have impacts on our bodies with exercise or even with just life, and the fluid in our system is a lot of what allows for that shock absorption so that we don't have tissue damage, or we have minimal tissue damage when we do those things. And then all of our tissue function better if they're hydrated. So, our organs do, our muscles do, it optimizes performance, and so on. Okay, great, we know water's important. How much do we need? Well, as always, the answer is it depends. And so you will not really find a lot of very strongly supported exact amounts of fluids that are recommended across the board for everyone. And the reason for that is that there are a lot of possible variables that

impact how hydrated our bodies are at the cellular level regardless of how much we've had to take, or how much we've ingested. So, some of those are the activity level. Somebody who is moving more, sweating more, potentially, so sweat level is what you see down there, may lose more of that water than those averages that we talked about earlier. They may lose more of it through their skin. They need to replace more, or they will. Climate certainly plays a role. If there's a lot of heat, again with the sweating, or if there's a lot of humidity, there's this process that occurs that kind of pulls that water out of your body so you may need to drink more. Pregnancy increases fluid needs significantly, so does breastfeeding, potentially even more than pregnancy. Altitude plays a role, for sure.

Higher altitude tends to mean more fluid is needed. Illness, if we have a fever, our need for water goes up significantly, because we are sort of burning through the water that we have a little bit faster, which is kind of unfortunate because sometimes the last thing that one feels like when one has a fever is to drink. But that is definitely a factor. Age certainly plays a factor. Older adults often lose the sensation of thirst which is why you'll talk to them sometimes, and they'll say, "Oh, yeah I drink about "30 ounces of fluid a day," and they're not kidding. I can not imagine how terrible I would feel if I drank 30 ounces of water a day, but they have lost that sensation of thirst, or they've lost the recognition that that's what they're feeling. And then, what are your normal hydration levels like? So, if you are normally fairly hydrated, and you become dehydrated due to an athletic event or something like that, you probably won't need as much to catch you up as somebody who lives somewhat chronically dehydrated. Okay, so some recommendations for a starting point. There's so many different ones, so I put a few of the more common ones out here. These have been studied and shown to be helpful for sedentary adults, and then moderate activity levels, and then I liked that the Gandy study also told exactly what to add if the person is pregnant or breastfeeding. And then, the one that I tend to use just because it's easy is this Paraiso study that recommended half an ounce per pound of body weight. So, because I am not good at

mathing, an example of that would be a 200-pound individual would need to start possibly with about 100 ounces of fluid intake. That is where I will start with some of these recommendations. And then we titrate from there largely based on urine output, color, and volume. So, you can see that there's a chart there, and you really want the urine to be sort of a pale yellow. Some people will say clear. I don't know that I think clear is necessary. To me, to some extent, the difference between clear and pale yellow is simply how does the patient feel at that level, or how is their performance at that level. But certainly you want to avoid those colors on the bottom of the chart. Those are very problematic, especially as you get closer and closer to the bottom. But it's helpful to sort of start at these points that are recommended and then you can titrate up or down depending on urine color. Because again, everyone's body is so individual, and then everyone's circumstances are going to be so individual, and who knows if they match the ones that were there present in those studies.

So, you really do have to personalize it. So, what about other fluids? Patients ask me this all the time. Well, what about, what about if we drink juice instead, or coffee instead, what does that count for hydration? So, the most recent study I could find on this one was this Maughan et al study that was done a couple years ago, and they measured individuals who started out well hydrated, and they weren't particularly active. They could exercise, but they weren't athletes. They weren't doing cross-fit level workouts or anything like that. So, I think they said, they could have up to 30 minutes of moderate exercise per day. They found that the cumulative urine output really didn't change very much for cola, diet cola, hot tea, cold tea, coffee, orange juice, sparkling water or sports drinks compared to water. And urine output, which they defined as hydration, was actually increased on milk, interestingly, as well as an oral rehydration solution. No huge surprise there. Now, I will say some limitations of this study. They assumed that urine output correlated with hydration. That's not necessarily a safe assumption. Okay, 'cause they were just measuring ounces, essentially, of output, or perhaps it was milliliters. I don't quite remember off the top of my head. But either way,

they were just measuring amount. They did not at least document things like color or concentration of urine. They did make a note in the study that in the future, they would like to look at those things to insure that this actually represented hydration and not just fluid. But based on that study at least, it may not matter as much as we used to think it did. Now I will say from a nutrition and optimization standpoint, there are some concerns that I have with some of those substances that don't necessarily have to do with whether or not they hydrate you so much as other impacts they may have on your body. So, caffeine can be a bladder irritant, for example, as can citrus. So, there are more considerations than just how hydrated you are, but it may be that these other fluids don't necessarily not contribute as much as we used to think that they did. And it has never been true to say that these fluids actually dehydrate you other than that they can irritate your bladder and make you pee more. And then, if you're not drinking an adequate amount of water at other times, that's one thing that I will see as well.

So, some signs of dehydration to watch for in your patients or your clients. If they have dark output, especially if they have small volumes, although you can have dark output with a larger volume as well. It just depends on how long that person's bladder will allow them to store. Sometimes when people are dehydrated and the urine is really concentrated like that, it actually irritates the bladder, so it makes them go just as frequently. It's just a smaller amount, but for some people, that irritation doesn't happen, and so they just store, and they're like, oh they only maybe went once today, but it's a normal volume, but that dark output. So, keep that in consideration. Tenting of the skin, there is a really good picture of that tenting available at that link from the New England Journal of Medicine. So I'd encourage you to look at it. That represents something called skin turgor. It's something that happens when there is not enough fluid in our body because when we are not hydrated enough, our bodies will actually pull fluid to the important areas which will be our vital organs and our brain, and so, the skin is often one of the places, skin and mucous membranes are often the first places that you might see some signs. So therefore, that next one dry mouth or other mucous

membranes. Fatigue or confusion are just brain fog. It can be a sign of dehydration. Of course, they can be signs of other things as well, which is something to consider. Muscle weakness, our muscles do not perform as well if they are not well hydrated enough. Loss of the ability to sweat or produce tears. That's a relatively advanced stage of dehydration. So, if that has happened, that person needs to become rehydrated as quickly as possible. And same thing with sunken eyes. That's fairly progressed dehydration there. Thirst can be a sign of dehydration, but unfortunately, our brain is awfully smart, and so if you chronically dehydrate yourself a little bit, your brain will actually adjust to the point at which it feels thirst, and so unfortunately, you can't always rely on that for anybody, and as we mentioned earlier, for older adults especially. And then post exercise significant weight loss. I have a brother who actually has a sweating disorder, and he was a football player. He would typically lose between eight and 10 pounds in a single practice session, because he would lose that much fluid and become dehydrated even if he started really well hydrated.

So, if that is happening, that's something to consider, and again, you want to rehydrate as quickly as possible either orally or with an IV solution in order to prevent that person from having an impact on their body from that. Okay, so some medical conditions related to hydration. Diabetes and also some brain injuries can actually cause the sensation of thirst to be too progressed, and so, if that's the case, it's possible to manage it with medication, or you can just manage it behaviorally. Desmopressin is the name of the medication that's typically used. So, just to keep in mind, these are some things that you might not be able to go off of that sensation of thirst. So, you really might have to go off of a more regimented this many ounces, or how your urine looks. Hypertension, congestive heart failure, and renal failure are all conditions in which fluid overload is a concern. They do have medications, again, the class of medications is called diuretics that can help with this, but it can also cause an overwhelming output volume. So, just kind of keep in mind that if people have this concern, we really need to make sure that the amount that they are drinking is a safe good amount for them to be

drinking given that they have these conditions. Other things to think about with regards to fluid. Athletes may need to replace electrolytes and fluids due to sweat volume. Constipation is often caused by lack of fluid in the body because if you don't have enough fluid in your body, then it's really, really difficult to pull enough into your stool. So, that's something to think about. Even if the person thinks they're drinking enough that if they're constipated, they may need to bump it up some. Medications are almost all titrated and studied on the assumption that the person who's receiving the medication is appropriately hydrated. Therefore the majority of them don't actually work as intended if the person is significantly dehydrated, or significantly over hydrated. I just don't see that issue as commonly as dehydration. If the person is attempting major weight loss, appropriate fluid intake is a critical component of that, and it's easy for people to let slip by the wayside when they're not eating as much. And then urinary incontinence.

A lot of patients with urinary incontinence try to limit their fluid significantly on the assumption that, "Well, if I drink less, I'll pee less." Which makes total sense, I see why they think that. Unfortunately, if you drink less, what you actually do is you hyper concentrate your urine which can irritate the bladder, and then you'll actually pee more. So, as counter-intuitive as it sounds, a lot of times the patients are experiencing urinary incontinence or urgency, one of the best ways to treat that is actually by getting them to drink more. That can be a hard sell, but it really does help. So, when you're trying to get people to add fluid to their diet, you wanna make sure you titrate it up relatively slowly. So, you don't want to take someone who says they're drinking 40 ounces a day, and say, "Okay, I want you to start drinking 90." Even if that's your goal where you want to end up, because if you do that, they will be living in the bathroom for the next two days, they will decide you're crazy, or that it's not worth it, and they will go back to drinking their 40. So typically, I will have people titrate by about eight to 10 ounces, wait three or four days, then titrate up another eight to 10 ounces, and we go on from there until we reach the amount of hydration that is most appropriate for them. It also is

helpful to tell people when you first start drinking more, it's not too uncommon to have to go to the bathroom a little bit more. We don't want it to be crazy as earlier mentioned, but a little bit more. And if that's the case, don't worry, your bladder will adjust. It may take a few weeks, but it will adjust, so you won't be going more frequently forever. That's helpful for people to know. There's bunch of tips and tricks you can give people with regards to how to add water. There's all kinds of different apps, there's even smart water bottles out there. I don't personally find those necessary, but they're super helpful for patients sometimes. Where they'll remind you, or a lot of people wear Fitbits or smart watches now, those can be set to remind you to drink. You can also tell them, "Okay, this 20-ounce water bottle, "I need you to drink this many." Sometimes it's helpful to encourage people to fluid load more towards the beginning of their day, in order to not have them urinating a lot over night. So, sometimes I'll tell people try to get half to 2/3 by lunch time, and then sort of drop down from there. And so, there's lots of tips and tricks that can be helpful. And then just reminding people again that a sense of thirst may or may not be the most accurate thing. Now, once your body gets accustomed to being hydrated, you will start to get that sense of thirst sooner.

But truthfully, by the time you get that, even if you're really good about hydration, you're already somewhat dehydrated, so it's best to not necessarily wait for that if you can avoid it. Alrighty, the next one we wanna talk about is fiber. So, dietary fiber is plant derived food that our enzymes can't break down. Some people will call it roughage. So, the recommended dosage is gonna vary a little bit depending on what study you look at. The studies do all agree though that the vast majority of people eating a standard American diet are significantly under this amount. So, you can say, well there should be 14 grams per 1,000 kilocalories that you're eating, or calories, food calories, or more simply 25 grams per day on aver for women, 38 for men. The most that the surveys suggest that people who are eating the standard American diet get about 12 gras per day, so less than half of the recommended amount. So, what does fiber do?

Well, it kind of depends on what kind of fiber we're talking about. So, there are multiple types of fiber. So, there's insoluble fiber that's poorly fermented. So, this type of fiber doesn't dissolve in water, a.k.a. insoluble, and it can exert a laxative effect. So, bran fiber would be one example of this. Essentially what that laxative effect is is that it speeds up the process of peristalsis in your large intestine primarily. Soluble, non viscous readily fermented. How's that for a mouthful. That one is completely gone once it's fermented. So, once it goes through that chemical digestion process, it's not there anymore. You see no evidence of it anymore. It's role is not super clear. We just don't know what that does. We think it does something, but we don't really know what exactly it does in the digestive process. Interestingly, one of the examples included is Benefiber, which a lot of patients take specifically to make their stools move faster, and actually that's not the mechanism that Benefiber exerts on the body. So, just to let you know that. If it's helping them poop better, great.

But if not, then they might wanna consider something else. Soluble, viscous, readily fermented fiber creates a gel once it's gone through that digestive process. And what it does is it increases the viscosity of chyme. So, it increases the amount that it sort of sticks to itself. This slows nutrient absorption and improves glycemic control, and it also lowers cholesterol. So, it just kind of functions as a stabilizer. Soluble, viscous, non fermenting fiber dissolves in water to form a gel, but it's not fermented, so it retains that gel quality, unlike the soluble, viscous, readily fermented fiber. It retains its gel quality all the way through the digestive process. So, what this does is it can help with stool consistency. So it can make stool that's too loose a little bit more bulky, or it can also make stool that's too firm a little bit less bulky. So, it basically, again, serves this in its balancing role. And then, it also helps with glycemic control and cholesterol. So, one example is psyllium. A lot of people know that by the brand name Metamucil, but psyllium is a grain, so psyllium husk fiber is what... Psyllium husk fiber created from psyllium husk is what that is. So, reasons you might want to consider suggesting fiber in your client or patient's diet. Constipation is one. This can be common in athletes

actually, and then also in the pain population, but honestly, this is one of the most common problems that Americans seek medical care for, across the age stand and across the United States. So, I can do an entire lecture on constipation, so I'm not gonna get crazy into that right now, but just realize this is really, really common. And an interesting thing with constipation is that if you ask people if they're constipated, they're relatively likely to say no, because they don't necessarily realize that they're constipated. Interestingly also, really, really large firm bowl movements, or sorry, larger bowel movements are associated with a lower risk of colon cancer, diverticulitis, and appendicitis. So, basically if patients are passing large amounts of stool at once as opposed to little tiny constipated movements, even if that's multiple times throughout the day, it actually contributes to bowel health. Cardiovascular health, a lot of the studies on fiber have actually been done with regards to cardiovascular health. It really, really contributes there, which we all want, I'm sure. If the patient is having difficulty with absorbing nutrients, fiber can really help with that because it can help somewhat slow things down or regulate and also increase the surface area available to help push some of those nutrients against the walls of the intestines.

And then fiber has actually been studied quite significantly with regards to weight. Patients who have a goal related to weight management may want to consider increasing their fiber. Adding fiber, so do we add fiber via supplements, do we add it via food? In general, I personally think that our bodies tend to absorb nutrition better when it's from food and goes through that whole digestive process. However, there are a lot of patients, and I particularly work with a lot of post partum women, so people who just don't have a lot of extra time on their hands, and they just feel very overwhelmed by the idea of closely tracking their food or their fiber intake. So, if that's the case for your individual, I think that supplements are certainly a very legitimate option to meet a lot of these goals including fiber amount and supplementation. You do want to consider that if they are taking a supplement, you wanna make sure that it is a type of fiber that's actually going to meet their goals. So, that's something to consider for sure. There are

a lot and lot of foods that contain fiber. They don't necessarily break them down quite so far as to go into the fermentable versus not. Really, they're usually broken down into soluble and insoluble. There's some examples here on the slide. The majority of them are grains or fruits and vegetables. But you can google, I mean, there are really exhaustive lists of foods that contain dietary fiber and how much for what amount. And is it soluble, is it insoluble. There is not really a very good recommendation right now on how much of your fiber intake should be soluble versus insoluble. We have a consensus that we need both, but there doesn't seem to be any high quality evidence as exactly how much of both, and you're gonna hear a lot of opinions about that. But bottom line is that they need both types. And then you may try to bump one up more than the other depending on exactly what you're trying to accomplish by adding the fiber. How you titrate fiber, so very similarly to water. You don't want to go from a very inadequate amount of fiber per day. So, if someone says, yeah, they're eating that 12 grams per day, that's average for standard American diet. You don't want to, okay, well, gentlemen are shown in the literature, they should be eating 38 grams of fiber per day.

So, we're just gonna go straight to that. If you do that, your patient will have awful gas, and again they'll think you're crazy, and they will not come back, or they won't at least comply with the suggestion. So again, you want to increase it somewhat slowly over time. I typically will try to increase by no more than maybe three to five grams per day, and see how that goes for a few days, three or four days, and then bump up again from there. Some patients will go up a little faster, some a little slower, but either way, the idea is that you don't want to go from zero to 100 with no preparation. I did also want to mention, so there are all of these bars and supplements that purport to contain fiber. So, you'll see cereals sometimes and Fiber One products. Fiber One is just the brand that I know of, but there are other products out there that are the same thing, and they'll say, "Oh, this contains a lot of your dietary fiber for the day." Sometimes that's just advertising. So, I always encourage patients look at how many grams of fiber there

actually are in that and then decide if that's a method that you want to use to try to get fiber into your diet. Often it's actually not a lot of bang for your buck. And then the other thing is, especially with Fiber One products, and I don't think this is the fiber. It's probably the other things that are in those products, but I find that patients really tend to get a lot more gas and GI upsets from those compared to either whole food sources of fiber or even like a Metamucil or psyllium type of supplement. That's just something to consider. But just encourage patients to actually look and see is that actually high fiber or is it just advertised that way, because unfortunately, advertising can't necessarily be trusted in anything, but particularly in food. All right. So, an anti-inflammatory diet. This can also be called a low FODMAP diet. So, let's talk a little bit about inflammation first just so you can understand why people might want to do this. So, the process of inflammation is that there are chemicals that are released from white blood cells. The chemicals are called cytokines.

They're released into the blood stream or into localized tissues to help stimulate an immune response. This is usually in response to illness or injury, okay, and so, it's not necessarily a bad thing. In fact, it's a good thing when it happens on an acute basis. However, there's also something called chronic inflammation. And this is chronic low level inflammation and can have a systemic impact. So, at this point, typically the inflammation is not necessarily serving a purpose. So, acute inflammation sort of helps break down whether it's old, bad tissue, dead tissue, or helps with fighting an immune response, and then also helps bring in healthy enzymes and chemicals, building blocks, essentially, that are needed to restore health of that tissue or of that person. Chronic inflammation doesn't do that. So, it has all the chemical markers of inflammation, but without sort of the healing properties from it. It is very stressful for the body. It's been linked to all kinds of diseases including, but not limited to, heart disease, stroke, and cancer. It can be triggered by any perceived internal threat and it doesn't actually matter if there's an actual internal threat. So, if your brain decides that there's an internal threat, it can trigger this and just kind of keep it going. It's very

linked to a lot of autoimmune disorders, but there's also such a thing as chronic idiopathic inflammation where we really don't have a good explanation as to why this person has inflammation, we just know that they do. You can somewhat diagnose it by testing for levels of something called C-reactive protein in the blood, but also sometimes this is a diagnosis that's based on symptoms and made clinically. Leaky gut syndrome is related to inflammation, or at least it's thought to be related to inflammation. It refers to increased intestinal permeability. Now, I will say that not all medical professionals, particularly physicians, recognize this as being a thing. So, you may get some pushback if you refer to it, but we do have evidence that hyper permeability exists, and we have some limited evidence on likely impact on the body. It's just somewhat emerging still, and so depending on the individual, they may or may not believe in it at this point.

That increased permeability is thought to allow bacteria and toxins to leak back into the bloodstream, resulting in a systemic inflammation response. And if somebody has this leaky gut syndrome, it's not really typically something that comes and goes, so it's something that is thought to represent damage to that intestinal lining from various causes. And so, it is thought to lead to that chronic low level inflammation that we were talking about a moment ago. The cause is not known definitively. Associations, but again these are correlations. At this point, they are not necessarily causations, or they're not proven to be causations. So, just to kind of throw that out there, we don't necessarily know that piece of this yet. But some known associations include excessive sugar intake, excessive alcohol intake, which of course has a lot of sugar in it, really long-term NSAID use, nutrient deficiency, particularly prolonged nutrient deficiency, overgrowth of candida which is a yeast that's naturally found in our body, and when it's in balance with everything else it's fine, but it can overgrow and cause this, or long-term stress, even long-term low level stress. Because those hormones, including cortisol that are released during stress, can have this impact on the gut. Some known associated diseases, again we don't have a cause/effect with this at all,

but some known associated diseases include diabetes, particularly poorly controlled diabetes, celiac disease which is an autoimmune disease that includes gluten allergies, so not gluten sensitivity, but a true allergy. It has other impacts as well, but I think a lot of people sort of know it from the gluten allergy standpoint. Crohn's disease, which is another autoimmune disease that is certainly linked to stress, but again, we don't necessarily know everything about why this develops, irritable bowel syndrome, and then also any type of food allergies, particularly food allergies that are not controlled by avoidance of the food the person is allergic to. There might be neural cross talk, which leads to pelvic pain, abdominal bloating, and so on. So, basically when someone has leaky gut, it's thought that that can be associated with pelvic pain, pelvic floor disfunction, abdominal bloating, because a lot of the neurons that basically take sensation and information to and from the gut also take information to and from other structures in the area, and so you can have impact even in slightly remote structures just because of that shared neural pathway.

So, ways people may eat, or ways you might suggest people eat if they think they're having a problem with this. Ginger has actually been reported to have an anti-inflammatory effect because it inhibits inflammatory chemicals. The specific ones that have been proven to be lowered by ginger ingestion are listed there, but that's just what's been shown in literature. It also has been shown to have both an anti-inflammatory and an analgesic effect in the following populations that are on this slide. There is a lot of anecdotal information out there that it has an analgesic effect in people with other pain conditions, but these are the four that have been actually proven with enough studies to where we can say yes, this definitely has an analgesic effect. The most effective way to ingest this is too essentially fresh grind a ginger root, but certainly dried ginger can be an option as well, if that is something people feel is more accessible to them. All right, so back to our low FODMAP diet, now that you have some of that background. So, a FODMAP is a fermentable oligosaccharide, disaccharides, monosaccharides, and polyols. So, these are all short chain

carbohydrates, essentially. So, it's a component of food, and the short chain carbohydrates are thought to promote inflammation. Now, the research we have does not necessarily definitively say that these foods cause inflammation in everyone. It does suggest that some bodies, due to body chemistry or whatever other factors, don't absorb these foods well, and that this leads to inflammation, including gas and extra fluid in the gut. And also systemic inflammation, but in the gut specifically is where most people are concerned about when they are talking about following a loW FODMAP diet. This is considered a diet that is considered a medical intervention. So, it has two phases to it. The first phase is that you completely eliminate, if possible, FODMAP foods, or significantly reduce them. A lot of people who talk about the FODMAP diet will say if you continue to have some of these in your diet, even if it's in small amounts, you completely negate the purpose of trying it.

So they really encourage totally cutting it out. For a fairly short period of time, which depending on the individual, may range anywhere from a couple of weeks to a couple of months. But it's not necessarily intended for these foods to be completely absent forever. Phase two is that you would reintroduce the foods that you had eliminated one at a time if you wanted them back in your diet. Some people decide they're good with never eating fill-in-the-blank type of food again, but if you're going to reintroduce them, you do so one at a time with nor more than one food introduced every three or four days. And then you watch your body's symptoms essentially to determine whether that individual person reacts to that individual food. Because the tricky thing with nutrition in general is that everyone really does react to foods a little bit differently, unfortunately. So, again, these foods are considered to be poorly absorbed in the gut. They are osmotically active, and what that actually does is it increases the liquidity of contents of the gut. So, it doesn't allow for things to be absorbed as easily, and they're rapidly fermented which creates a lot of gas, and can be loose stool as well. Sometimes people don't have those GI symptoms, so just because they don't have the symptoms of loose stool or bloating and gas doesn't necessarily mean that they don't have issues

with FODMAP foods, but often those are the sort of symptoms that lead people to try the FODMAP diet or the low FODMAP diet. So, I put a link there so you can look at a fairly comprehensive list of foods that are allowable on a low FODMAP diet and not allowable. In general, the research has shown the most irritating foods for our system are coffee and tea, which is probably the caffeine in those, as well as the acidity, soda, alcohol, citrus, tomatoes, spicy foods, and sweeteners. So basically, acid, spice, sugar are the ones and caffeine. The least irritating foods are generally thought to be water, milk, vegetables, animal proteins, and then bland carbohydrates. And then, the categories that they usually want you to avoid entirely are nightshade vegetables, which there's a lot of those, so again, refer to the list, or google for yourself to see a full list of those. But there's a lot of nightshade vegetables. Processed foods period, sugar, dairy if possible. That one sort of varies because as you notice, probably above milk is considered a less irritating food, so some low FODMAP diets proponents encourage avoiding dairy, others encourage keeping it.

When they encourage avoiding it, it's not so much based on gut irritation of the milk, it's more so thinking that people don't necessarily breakdown the milk or they may have a sensitivity or an allergy to it. Grains are to be avoided, and then typically they want you to avoid fruit as well, and particularly any fruit that has a stone in the middle of it, and then also legumes and alcohol. And again, this is strict for a short period of time, and then you somewhat try to add things back in. So, people who might want to consider trying a low FODMAP diet, or any other elimination diet for that matter, irritable bowel syndrome, anybody who has an autoimmune disease, someone with chronic pain due to the possibility for that low level inflammation from chronic pain, someone with issues with digestive problems, and then someone who knows they have food allergies, but may not know what they are. Obviously you can also do blood test for food allergies, but some patients prefer to do sort of this trial and error elimination thing as opposed to getting tested. So, implementing the FODMAP diet. This is just one method. Like I mentioned earlier, there are others that include a much

longer period of time to follow the low FODMAP recommendations, but this is one that I see most commonly implemented when physicians are telling patients to use this diet. So for a week, they don't change anything about their normal diet, they just write down all their foods and then the symptoms that they are experiencing everyday. Then for two to four weeks, they follow the low FODMAP recommendations very, very specifically, and very faithfully and still continue to track their symptoms. And then they start that process of reintroducing foods one at a time with at least three days in between, and just, again, continue to track their symptoms and see if they get a change. In an ideal scenario, they get a decrease in their symptoms while they're on that two to four week so strict recommendations, and then they're able to easily see, "Okay, if I added tomatoes back in, "all of a sudden I got this jump in symptoms, "I might want to avoid tomatoes for the long-term." So, issues that we see with a low FODMAP diet are the, as you can probably imagine, it is really difficult to implement because of how strict it is, and how much these foods are in everything. You really have to have a patient who's ready to truly commit, and probably who's able to essentially do all of their cooking from scratch, at least for that period where they're following the stricter recommendations.

Patients who have a history of an eating disorder are usually not good candidates for any very, very food restrictive diet like this because it can trigger them back into their eating disordered behaviors. So, certainly before you would suggest that someone look into this, you would want to be certain that they did not have that in their history, because it is generally speaking, thought to be worse to trigger an eating disorder episode again, versus maybe not eating perfectly ideally for their body's condition. All right, so now let's talk about supplements. I get so many questions from patients about supplements. And here again, there are more supplements than what I'm sharing here with you today, but I'm going to share the most common ones that I see or that I get asked about and then encourage you to continue doing your research about any others that come up. So, a supplement is a convenient way to add nutrients that might be

deficient in the person's diet. One thing to consider is making sure that there's actually a true deficiency. There's a lot of people out there who say, you know, the whole supplement industry is a really big money maker, which it is, and a lot of people think, oh well, you know, really all we're doing is giving people really expensive pee. What they're saying is that they think the person has enough of these nutrients and so all they're doing is taking a pill which then gets dumped into their pee because they don't need this much extra so it just gets eliminated with their water. So, we do wanna make sure that we have a reason to think that there's a true deficiency if we're actually going to suggest these. Nutrients in general can be water absorbed or fat absorbed. If it's water absorbed, you have no concern for toxicity because again, your body will just eliminate it in your urine. But if it's fat absorbed, then you do want to make sure that you're monitoring for any signs that somebody might be taking too much because that can store and just build up in the body. Also be aware that some supplements might interact with medications that a patient is taking. If in doubt, they really should talk to their pharmacist or their physician to make sure that the supplement is okay with their medication. And sometimes it's fine to take it, but you just have to take it with specific timing. So, magnesium is a really common one that I suggest for my patients.

The amount that we eat typically has dramatically declined, and honestly the reason is because we don't eat enough dirt anymore. I know that sounds crazy, and I tell patients that all the time, like I know I sound crazy, but hear me out. So, you know we used to eat a lot of our produce direct from farm, whether it's our own garden or purchasing directly from farmers. Now, the majority of us eat produce that has been power washed with chemicals usually for the sake of aesthetics in the grocery store. So because of that, we have lost some of the nutrients and minerals that we used to ingest by eating produce. So, most people think that the majority of folks who are eating a pretty typical diet, or even not a typical diet, but mostly getting their foods from the grocery store are somewhat magnesium deficient. So, impacts that magnesium has on the body are listed there on the slide. There are a lot of them, everything from bone metabolism to

hormone regulation for the parathyroid to anxiety, cardiovascular events, blood pressure, and nerve transmission. Magnesium is definitely a substance that our body needs and uses a lot. Individuals who have cardiac arrhythmias should not take additional magnesium, at least not without discussing with their physician. Magnesium does absorb equally well through the skin as through the GI tract. So, some folks will choose to eat their magnesium, some folks will choose to take a supplement orally, some people will choose to take an Epsom salt bath, there's a reason that our grandmothers all wanted us to do that, because that's what's in Epsom salt is magnesium and salt, of course, as well, and some people will choose to take a magnesium-infused lotion and use that as well. So, there's lots of different ways that one could increase the magnesium in one's body. There's a list of foods listed there that has a high concentration of magnesium. So, if people are really conscious, they certainly could get an increase in magnesium by eating those foods. But again, there's a lot of different actual supplements for magnesium.

And I apologize, I think I forgot to put this on the slide, but there are different types of magnesium that you'll see out there, and the different types have different bioavailability. So, magnesium glycinate, G-L-Y-C-I-N-A-T-E, is the one that is the most bioavailable. So if you have someone, and you want some of these systemic effects, so something along the lines of anxiety regulation, blood pressure regulation, hormone regulation, or muscle activity, you actually probably want glycinate or something that is well absorbed. Magnesium oxide and magnesium calcium are less bioavailable, so they tend to have most of their impact in the GI system itself. So, they can help with motility of the GI system so helping with constipation, essentially. Just so that you know what some of those differences are. All right, calcium, another really, really important mineral for us to have. It can be combined with vitamin D for treatment of bone density issues or non healing fractures, either one. Or just for health, okay. So it should be taken in small quantities at any given time. So more than about 500 milligrams will not absorb at the cellular level. So, you can take more than 500

milligrams, but it won't do you any good. So for maximum absorption, you need to take small quantities of 500 milligrams at a time separated by about an hour until you have the amount that has been suggested for you to take. Again, if you have cardiac issues, the physician should be involved in determining whether calcium is a good fit or not a good fit. The two main kinds of calcium that are available as supplements out there are listed in those charts. Really, it's not necessarily that one is much better or not as good as the other, aside from calcium citrate being better for those with inflammatory bowel disease. But aside from that, it's truthfully just whatever the person finds more convenient or easier to take. Vitamin D, again, a vitamin and nutrient that often individuals are deficient in. It's actually not super present in most types of foods. So most people get the majority of their vitamin D from the sun, from being outside. If you have insufficient amounts, it does not allow your body to absorb calcium as well, so you have all kinds of issues that are related to lack of calcium. Vitamin D is fat absorbed, so it is possible to have vitamin D toxicity. That's not likely if you are just getting it from food and then sun exposure, but it is something that is to be monitored in individuals who are taking therapeutic doses of vitamin D as a supplement. And this is typically something that's prescribed.

It's a much larger amount than I would ever suggest for someone to just take as a supplement, but there are people with vitamin D deficiency that have health issues from it, and they will sometimes be taking a prescription form of vitamin D, and they need to be monitored and have blood tests to make sure that that is titrated correctly. Individuals who have bowel dysfunction of any kind or issues with vitamin malabsorption are at risk for deficiency. That's probably not a surprise given that the bowel is where those vitamins are made bioavailable to us. And then, the Institute of Medicine says that if the person has vitamin D deficiency, just normal vitamin D deficiency, not necessarily something that's considered a major medical issue, you can replace it if you increase it by about 20 milligrams per milliliter per day. And again, this is typically something that people are working on with their physician. High dose

vitamin D may also improve immune function. So, some people choose to bump it up during sickness season. Prebiotics are food that the human body cannot digest, and they serve as food for probiotics, and then also surface area for beneficial bacteria. So, remember those bacteria I mentioned way back when that are helpful for vitamin absorption in our gut? They live on these prebiotic surfaces often. They also do improve calcium absorption, and there's some early studies that say they might reduce the risk of colon cancer. Those are not definitive yet, though. They are found in fiber rich foods. So, there's a few listed there on the slide there, more than usually so. I usually just encourage people to go and look at what the prebiotic foods are, and then decide what they would like to include in their diet. Because these are non absorbed food substances, it's not usually as effective for people to try to take a prebiotic capsule. Probiotics, which eat the prebiotics, are tiny living microorganisms including both bacteria and yeast.

They're found in fermented foods, and then a lot of people do chose to take probiotics in some type of a pill form, so supplement form. They should be ingested one to two times per day, and then if you're going to take it in pill form, you typically wanna start with about 30 to 50 billion CFUs in that pill form. And CFU stands for colony forming units. Okay, so what you're trying to essentially do with these is seed your gut with to support the proliferation of your healthy gut bacteria to help with vitamin and water absorption. The benefits that we see with probiotic usage is digestive health benefits, especially after antibiotic use. Antibiotics unfortunately wipe out our good bacteria as well as the ones that are making us sick, and so it's often helpful to support that re-proliferation after you've had to take antibiotic for any period of time. It also helps a lot with re-proliferation if the person had a GI illness that has caused really, really rapid loss of stool for a prolonged period of time, because that also can deplete our gut bacteria. Many bowel-related syndromes actually are shown to improve if we just add prebiotics. Oh sorry, probiotics and prebiotics. They do also usually help alleviate symptoms of depression, and there are immune system benefits. Now I want to

mention that there are a lot of foods out there, again, that will claim, and I usually see this on yogurt, but they will claim they contain a lot of probiotics, and so patients say, "Oh yeah I do probiotics. "I eat yogurt everyday." The amount of yogurt that you would have to eat, unfortunately, to get an adequate number of probiotics would make most of us very ill. So, just keep in mind that you need to ask more questions, and if they truly are eating a lot of fermented foods, drinking kombucha, for example, and then maybe also eating some sauerkraut, or some other things like that, that's one thing. But if they're thinking that they're getting their probiotic needs met by eating a cup of yogurt per day, they're not. Okay so some main components of probiotics, and again, remember those are for bacterial support. There's these three types of components. So, lactobacillus is primarily for the small intestines. It helps a lot with digestive support and immune function, as well as helping with depression and anxiety. Bifidobacteria lives in the large intestine, and it's absorbed by the body to help with insulin regulation, and it's also been shown to help prevent colon cancer, control body mass, and reduce inflammatory bowel disease.

And then saccharomysis is just yeast, and what it does is it helps protect the gut lining. So, it can help rebuild the gut lining if the person's having that leaky gut syndrome that we mentioned earlier. Probiotic supplementation is not one size fits all. And in fact, there are certain types of autoimmune disorders, Crohn's being one of them, that have shown worsening symptoms if they are not using the right probiotic. So, if it's somebody who has an autoimmune disorder, I would encourage them to work with a nutritionist or their physician to determine probiotic selection. Patients who've had a history of SIBO, or small intestinal bacterial overgrowth, or candida, either one, are not good candidates for probiotic use, which should make sense to everyone. And then signs of intolerance of a specific probiotic supplement include bloating, constipation, or diarrhea, especially if those things stop if the person stops taking the probiotic for a few days, and then also anxiety. Okay, so if any of those show up, the person should switch to a different probiotic. In general, a good probiotic will contain live or active

cultures. Usually it will need refrigeration. There are a couple that claim stable shelf life, but not for a long period of time. So, if you see something that says, oh, it doesn't need to be refrigerated and it's good for three years, that's probably not a good probiotic. If you can find one that has numbers in the millions for those CFUs, that's ideal. And then you want to look for diversity of strains as well. And then in general, there's lack of control in probiotics that are available on the market, so, if you look for a professional brand, or a brand that sells to health care providers or chiropractic offices, there's better control there and you're just going to get a more reliable product. Also, you'll probably pay a little bit more, but you might as well be actually getting something from it. Fish oil is used to increase omega-3 fatty acids in the diet which helps with lowering blood pressure, decreasing triglycerides, which are the bad kind of cholesterol, slowing development of arterial plaque, decreasing the likelihood of abnormal cardiac rhythms, and reducing likelihood of cardiac disease. Up to three grams per day is considered safe, but if the person eats fish regularly or has other sources of omega-3s in their diet, it's not necessary for them to get an additional three grams per day.

People should not take more than that recommended amount because it might increase risk of bleeding, and this is a particular concern in someone who has any other reason why they might be at risk for bleeding. So, there's certain medications that increase that risk. And there are some possible side effects that are often undesirable, such as a fishy smell or taste to the breath. Some people get upset stomach, or loose stools, or have nausea from them. So, if that's the case, they shouldn't necessarily push through those. They should find another way to get those omega-3 into the diet. There are a lot of nuts and seeds that include good amounts of that as well. Folate is a water soluble B vitamin. It's also sometimes called folacin or vitamin B9. So, those are just all the same thing. Folic acid is the fully oxidized form, or the synthetic form, and then it is converted by the body into usable form. But there is a genetic variation. Some people would call it a mutation, but it's really a variation. It's present in between one and 2/3 of the population depending on who you ask, called

MTHFR. And people who have MTHFR are not able to convert folic acid into folate or a methylated version, methylated folate. And because they can't do that, the folic acid itself can actually build up to toxic levels in their body. So, if the person has MTHFR, they need to take a version that is already methylated. So, that will typically be called something like methyl folate or methylated B9, or something like that. Folate is found in foods, though, too, so. It's found in leafy green vegetables. It's found in beans, peas, and lentils, fruits, including bananas and melons, but there are more, and then also eggs. So, it certainly, as with most of these, is possible to get your folate needs met via food, and not end up actually having to take a supplement at all. One thing for people with MTHFR to be aware of, too, though, is that most wheat products, so noodles, flour, anything that's made with flour. Flour that is enriched contains folic acid. So, that's synthetic form. So, people who have MTHFR, there's a varying degree of expression, or symptoms that they can have from it, but sometimes they are not able to eat foods that are enriched as well.

So, just something to be aware of. Folic acid supplements, if you choose to take a supplement, and this is actually true of folate as well, the methylated version, they are much more easily bioavailable if they are not taken with food. So, just separating it from eating by half an hour to an hour is best. Isolated folate deficiency is really rare in the US, but the symptoms of it are there. You probably will not see that at all, but that's what it is. And then, the recommended amounts of folate to be ingested are listed there on that chart for you. Glucosamine and chondroitin are structural components of the joint cartilage. Our body makes them. Also, it's not something that we eat normally, it's something that our body makes. But there are supplements that contain them, and they're usually taken because people believe that they help with their joint pain usually from arthritis. They do possibly interact with blood thinners, though, especially warfarin, so if the person is taking blood thinners, not a great idea to take glucosamine and chondroitin, or at the very least, they should talk to their doctor. There's not any research that really says that these actually help with joint cartilage production.

Anecdotally, a lot of patients tell me they think they do help. I sort of stand there saying, well, you know, it probably doesn't hurt anything provided there's not that blood thinner component, so if they think it helps, great, more power to them. But I don't necessarily suggest it for people just because there's not that evidence out there. I'd rather go with something like hydration that has evidence behind it. All right, so we're gonna do a little blurb on athletes and nutrition. A lot of this honestly applies to more than just athletes, though. So, even those of you who are not working with athletes probably will find information here that's helpful to your patients that you are seeing. So, the nutrition of athletes, it really needs to address the fact that athletes are putting increased energy demands on their body, and they're also damaging their muscles by training. And that's not necessarily that the muscle damage is bad, damaging muscles is actually how you build them and increase their ability to do their thing, but we do need to recognize that we're having this tear down of muscle fibers that's occurring, and so we need to support the rebuilding of stronger muscle fibers.

When you're determining a nutritional plan, you have to consider the type of athlete,. Is this an endurance athlete, is it a power athlete, is the athlete trying to increase something, decrease something, what are they wanting to do? They do need to eat an adequate amount. So, we mentioned that female athlete triad earlier. I have it here again just to remind us all that athletes can have lack of nutrition just as easily as they can accidentally be overeating or eating the wrong thing. So, we need to make sure that they're aware of how much they're using, and what they need to really support their body through that process. This is especially a consideration in sports where there's a desire or pressure for a certain body type, and women are especially at risk for this, although it can definitely happen with male athletes as well. All right, so let's talk about those macronutrients. If you remember way back to the beginning, we said those are kind of the key components of food, or the main building block of food that we need in our body. So, carbohydrates are the primary source of energy during high demand activities. So, during their event or during training, they're primarily using

nutrients from carbohydrates. That is the reason that a lot of athletes will carb load prior to an event or prior to a heavy training session, or sometimes they will carb load in the days leading up to that event. Healthy sources of carbohydrates include fruits, vegetables and whole grains. Dietary fat helps with hormone regulation and also long-term energy needs. So, this is more of a slow burn fuel. Very, very important, though, for them to have this, because this is one of the things that really helps provide that nutritional or energy background for some of the muscle rebuilding and repair and growth that they need to do. The healthy sources of dietary fat include avocado, nuts, and olive and coconut oils. There's others, but those are some of the main ones that are easily accessible. Now protein also plays a key role in muscle repair and growth because protein provides the building blocks that you need for muscle repair and growth. So, fat provides the energy, protein provides the components, so to speak. That's a little simplistic, but more or less that's how it works. Healthy sources of protein, lots of them out there, meat, eggs, dairy, and legumes.

One thing to consider is that if you have an athlete who is also a vegetarian of the type that doesn't eat meat, you can get protein from plant-based products, but in order to get something called a whole protein, you have to eat them in specific combinations. I'm not gonna try to go over that today because it's a little bit more complicated than we have time for, but just realize that the concept of eating a whole protein is always important, but especially important if the person is using plant-based nutrition. There are a lot of resources out there on that, so that's easily accessible if you wanna read more about it. We mentioned hydration earlier, but just wanted to reiterate, that even a 2% drop in hydration status has a measurable impact on muscle performance. So ideally, we're drinking prior to the training or event, not necessarily immediately prior, but in the hours leading up to it. And then if it's possible or practical, having four to six ounces of fluid every 15 minutes of heavy exercise or so is great. That's not always possible or practical, even just in a training event. But just keeping in mind that that's about what they would need to replace the fluids that they're using, and so then to

hydrate as they can at an appropriate level depending on the time interval. And there's quite a few studies, actually, that show that hydration status the day before an event actually impacts event performance even more than day of. So, a lot of times the recommendation is for people to fluid load the day before the marathon, and then, yes, hydrate during the marathon, but you don't have to stop every 15 minutes during your marathon provided that you hydrated well the day before. And then you need to rehydrate after, of course, always. All right, so if an athlete is injured, or honestly, if anyone is injured, these are some good things to think about. So for injury recovery, your goals with nutrition are to help decrease the inflammation. We're going to have some, and we want to have some, but we want to allow for that process to go through its work in the body and then leave, as opposed to turning into chronic inflammation. We want to provide the nutritional building blocks that are needed to heal whatever tissue has been injured. And then, we wanna actually minimize muscle atrophy while we're waiting for this process to occur as well.

During the first 48 hours, sometimes nutrition is the last thing on your mind because you've just been injured, you're going through all these procedures or tests, or whatever. But it's really important to know that trauma, and especially if there's a surgical procedure afterwards, may cause that individual to consume up to 20% more calories than whatever their baseline is. No, they're not working out, but they are consuming a lot of calories and energy to cope with their body's processes as they undergo that trauma or that surgery. If they're having to use crutches, that actually requires double to three times as much energy as walking. So, that's helpful to keep in mind. And if their nutritional intake falls to 80% or less of what's needed for the first 10 days especially, it can actually delay muscle synthesis by up to 20%. So, that first 48 hours, and that whole first 10 days, but it's just critically important to make sure that they are getting adequate nutrition, not just in terms of adequate calories, but also in the type of nutrition that they are consuming. So, when we're talking about muscle preservation, I'm sure we all know this, but muscles can atrophy due to immobilization,

or even just because the person is forced to take a break from their training to allow their body to heal. Unfortunately, muscles very much operate on that use it or lose it principle, and muscle atrophy can happen fast. It takes less than two weeks to get measurable muscle atrophy, unfortunately. And then it can take six or more weeks to build it up. So unfair. In order to try to minimize this as much as possible, the recommendation is to increase protein 1.6 to 2 1/2 grams per kilogram of athlete weight essentially per day. And then, you want to have them consume foods that are high in leucine. Leucine is an amino acid, and that helps to combat anabolic resistance, which is essentially the process of muscle breakdown due to lack of activity. Some healthy foods that are high in leucine are listed there on the slide for you. And then, if they possibly can, sort of break this protein in leucine ingestion down into lots of little opportunities to ingest it throughout their waking hours, that's better than loading it all at once because that provides a steady stream of nutrients for that muscle building process that's occurring during healing.

Now remember that there's gonna be inflammation. We want some inflammation, but we don't want it to get out of control. So, in order to help support that and help support our body moving through this process and not staying stuck in that inflammatory phase, you want to encourage people to consume foods that are high in antioxidants. There's also some studies that show that high antioxidant ingestion may decrease adhesion or scar tissue formation after surgery. So, that's also beneficial because that helps make sure they keep as much mobility as they can. There's so many foods that are rich in antioxidants. There's a few there, but there's more than this. Essentially, whatever the individual feels like they are up for, they want to eat, go for that. There's herbs that have been shown to decrease inflammation. We talked about ginger earlier, but garlic and tumeric are also shown to have that impact. And then you can eat anti-inflammatory fats, which are things like olive oil, avocado, fish, and fish oil, too, flax, nuts, and seeds. And then pro-inflammatory fats are fried food, canola oil, vegetable oil, and processed meats. So, you want to not ingest a whole lot of those

pro-inflammatory fats, and try to eat the anti-inflammatory ones instead. That fat intake is really important for energy again, but you wanna make sure that it's the right type of fat. So, some specific types of injuries. The recommendations for if you have a concussion are that you wanna have a calorie and protein rich snack as soon as possible, and that's to hopefully help jumpstart the healing process in the brain. And then during recovery, you wanna take even a little bit more than that normal intake of omega-3 fatty acids, assuming that you don't have any concerns about bleeding, or problems with bleeding. For bone injury, no shock here, we wanna increase calcium and then also the minerals and vitamins that help support calcium absorption. Soft tissue injury, we already talked about protein and leucine. It's also helpful to increase the intake of copper, and then when they return to training, especially right at the beginning, it's helpful to consume a mixture of 15 grams of gelatin and 50 milligrams of vitamin C about an hour before training. And what that does is it helps minimize the amount of muscle breakdown that occurs during training, and promote muscle bulking and building instead. Now, there are so many dietary supplements that are sold, marketed towards athletes. Okay, they're usually called ergogenic aids, or they can be that anyway. They're marketed to improve exercise performance in some way whether that's endurance, tolerance for intense training, recovery from exercise, et cetera.

They're really, really commonly used by athletes, and that's at all levels, recreational all the way up to professional, especially in endurance and muscle bulking sports in the United States. They're sold in so many different possible forms, but the common ingredients that are in them are amino acids, protein, caffeine, and then also creatine. Do they help anything? There's really mixed evidence, honestly. The studies that are out there have really short durations and vary low end, so, it's hard to know if it shows that they help if they really do, and it's also hard to know if it shows that they don't do anything. Well, is that just because there's not that many people in the study. So, essentially we really need more studies looking at this to have a definitive answer as to whether they do anything. And another limitation is that so far a lot of the research is

just focused on an individual component. So, they say, okay does creatine help. Does caffeine help. But we don't actually have any research that I could find that is looking at these things in combination, which is how a lot of these supplements are sold. It's not that you're just taking caffeine supplement, it's that you're taking a supplement that has all these ingredients in it. Now, they do seem like they're the most helpful when they add to proper hydration and nutrition. Basically, they don't replace proper hydration and nutrition. No shock there to us, probably, but that's helpful to tell patients, because they may not realize that. There's an awesome evidence summary available at that link, so I'd encourage you to go look at it. It basically breaks down each individual component and talks about all the studies that are available and what they show, what they don't show, and bottom lines of that. So, that's super helpful to look at. There are some safety concerns. Again, we don't have research telling us what those components do in interaction with one another. There's a lot of products out there that are adulterated. So, they don't necessarily contain what they say they contain.

They either contain less or more ingredients than they say they do or in different quantities. This most commonly occurs in products that are marketed for muscle building. And then our athletes who are college or professional level, the concern with that is they may contain some substances that are considered illegal for their use. So, just something to think about. There's just, unfortunately, not a lot of regulation of these products. And then there's also possible interactions with medication. So, commonly, I will see this, any supplement that contains iron can decrease the bioavailability of medication that's used to treat hypothyroidism. So, I actually have a coworker who has hypothyroidism, as do I, so we talk about it quite a lot. And all of a sudden, her thyroid meds weren't working. She had low energy, weight gain, all the things that you associate with hypothyroidism, and she found out that her pre-workout drink that she was drinking contained iron, and she was taking her thyroid medicine and then immediately drinking that pre-workout drink, and then going to exercise. And it was

decreasing the bioavailability of her thyroid medication, and so essentially, she was making it to where it was as if she wasn't taking that medication. And she actually ended up having, at least for a period of time, to go up on her overall dosage of thyroid medication. She reversed that. So, just something to think about. We do probably have a lot of patients or clients who have hypothyroidism and who also are interested in these products. All right, anabolic steroids are illegal for college and professional athletes, but a lot of people ask about them, talk about them. Some people use them when they're not in those categories, so, I thought I would include them here just so you know what they are. They're androgens, so, testosterone and related hormones, and they are known to increase the protein that's available within cells, and that leads to faster muscle bulking, which is why people want to use them. They'll use them for bodybuilding, sometimes, whether that's just for visuals, or for the amount that they can lift. It does increase the functional muscle mass, too. So, it does increase your strength as well as the appearance of the muscles.

They are sometimes used therapeutically, typically to treat low appetite or muscle wasting from disease or cancer treatment. They can also be used to induce puberty in people who have issues with human growth hormone, and other things that are not allowing for that puberty process to occur. And they are also used for transgender individuals as well to provide treatment if they're wanting to transition to male. There are some long-term negative side effects that have been shown with long-term, again, use of anabolic steroids. They can change the cholesterol levels, they can cause acne, they can increase the blood pressure, they can cause liver damage because that's where they're processed. They can cause cardiac damage, they can reduce the size of the testicles, and then they can cause masculinization of females, meaning females can develop essentially male secondary sex characteristics. So, facial and body hair, and so on. Which is sometimes the reason that they're taking them. And again, this isn't necessarily to say they're never of use therapeutically, but just that those are some of the long-term side effects you will see. All right, so, speaking of hormones, let's talk

a little bit about the impact of diet on hormones. So, there has been some study of calcium, magnesium, and female hormones in patients who are primary dysmenorrhea. So, this is people who have really painful periods. So, interestingly this study that's listed here on the slide shows that calcium or calcium plus magnesium actually decreased menstrual pain, and then also the resting length of the pelvic floor muscle, and then, oh also decreased the need analgesics. So, decrease their need to take medication. And that effectiveness was greater compared to taking just calcium... Calcium and magnesium together was better. Fiber and estrogen both have a potential impact on people with endometriosis. So, soluble fiber actually binds to estrogen and can remove excess estrogen from the body. Because of that, it may not actually be good for people who are already low in estrogen, which is primarily menopausal, or post menopausal patients, maybe also postpartum patients, though. It can be beneficial if people have excess estrogen.

So, that would be individuals who have endometriosis, or other health conditions that are related to too much estrogen in the body. Okay, so sometimes bumping up that soluble fiber and take even beyond the recommendations can be helpful. Fiber does also sometimes bind to and remove calcium, so that is a consideration, where if you're using it to try to decrease the estrogen in the body, it's probably smart to bump up calcium ingestion when you do that. Phytoestrogens are plant derived compounds, so they exist naturally in foods, and plants specifically, and they're thought to mimic the effects of estrogen in the body. Now, keep in mind this research is very mixed, so there's not really, really strong information available out there about this right now. But at the moment, touted health benefits suggest that they may decrease the risk of osteoporosis, heart disease, breast cancer, and menopausal symptoms. So, the idea is if people are post menopausal or in other ways estrogen depleted, they may consider increasing the amount of these compounds that they are ingesting in order to try and combat that somewhat. Now they are considered an endocrine disruptor, too, though, so they may suppress the estrogen that's actually already present in the body, and so

for individuals who are not estrogen depleted, it may actually interfere with their development or cause a decrease in bioavailable estrogen. And it may also suppress sexual behavior or cause aggression. So, it's just one of things where everyone's response is going to be different, hooray, thank you hormones, and so you really just have to monitor individual response. A lot of researchers say, you know the amount that's in food is really probably not going to cause this significant systemic effect, and then others say, oh no it absolutely does if the person is sensitive enough. Okay, so, lots of ideas out there. Some different sources of phytoestrogen are found there on the slide. So, again, these are foods that have chemicals that somewhat mimic the effects of estrogen in the body, not that they contain estrogen themselves. Foods that can be used to boost testosterone.

So, unlike estrogen, where those phytoestrogens are chemical compounds that mimic estrogen, if you wanna try to boost testosterone, what you're going to do is eat the precursors to testosterone. And then your body creates testosterone from those. The main ones are vitamin D and zinc. And then, no surprise here, but you would want to limit your intake of any food that contains a phytoestrogen so that you're not causing kind of, so that you're not shouting out your testosterone precursors with the estrogen-mimicking compounds. Some possible options are listed there on the slide. Those are the common easily available ones.

There are also other foods, of course, that are rich in vitamin D and zinc. Interestingly enough, it doesn't seem like the effect or the testosterone boosting effect happened if you take vitamin D and zinc as oral supplements. It really seemed in most studies to be only if you ingest foods that are rich in these substances. All right, so we mentioned thyroid earlier and again, this is one of the most common hormonal imbalances that we see at least in the United States. So, for thyroid support, if the individual has low thyroid, which is by far the most common... So, hypothyroidism, Hashimoto's is one type, anything like that. And just by the way, this is not necessarily to replace thyroid

hormone supplementation. This is just to support as ideal of thyroid functioning as this person can possibly have. So, things that you would want to eat are foods containing iodine, things are listed there, foods containing selenium, and foods containing zinc. You would want to avoid goitogens, which are just foods that suppress thyroid. And it's not that you have to avoid them entirely, it's that you don't want to eat large quantities of them. So, soy containing foods, some fruits, particularly the more starchy fruit like bananas can be problematic. Gluten, only if there's autoimmune issues or celiac, because if you have thyroid issues, you really want to avoid inflammation in the body if you can. Highly processed foods, in general. Honestly, I think that's a good health recommendation for everyone, but particularly for people with thyroid dysfunction. You want to avoid millet.

This is a grain that I don't really see very much in my region, but I've been told that it varies regionally and in some regions people eat more of it. So, that should be avoided. And then if you have too much caffeine, it can actually inhibit thyroid function. If your thyroid is already inhibited, you certainly don't want to inhibit it anymore. If the person has an overactive thyroid, or hyperthyroidism, Grave's disease is one, but there are lots of different types. Some things that they would want to eat are foods that are rich in calcium, antioxidants, vitamin D, healthy fats, and protein. And then cruciferous vegetables, which are again, in that goitogen category, and soy that's in that goitogen category, so, it's somewhat opposite of what you want to eat when you have hypothyroidism.

And then you want to avoid caffeine. Yes, it can suppress thyroid function, but in someone who has an overactive thyroid, the concern is not necessarily suppressing of the thyroid, but the fact that caffeine can cause an increase in metabolic processes, and these people are already are having metabolic processes that are happening too quickly. And then you also still want to avoid any foods that the body has a sensitivity to, because again, you really want to not promote inflammation. All right, so, that's a

whole lot of stuff. So, it's like, okay, great, awesome. Now, how do I personalize this for my patient versus just handing them a copy of this PowerPoint, right? Okay, so there is... I think my favorite way to do this, to establish a baseline, is just to use intake and output diaries to establish baseline and look for triggers. Now these might be triggering to people who have a history of an eating disorder. So, just keep in mind you need to ask people if this is a good fit for them. You can use paper to do this. The form I use I put a screenshot there for you. There are lots of apps; there's a few listed there. But basically what you want to do, is you want to get an idea of what people are actually ingesting so that you have that baseline and then you can also look and see if you see any pattern. This is an example food log. I apologize that the picture is not really clear. But just the idea here is the person is listing what they're eating for all their meals and then they list all their symptoms over here. This is an example of fluid log. So, this person is only logging fluid and continence. This is somebody who is having urinary urgency, basically, and what we were looking for was what in here is possibly triggering those symptoms. And then this one is an example of an intake and output, which does include both fluid and foods.

So, this is again, this is a different person who was having issues with incontinence at night, and we were trying to figure out if that was a muscle control issue or a bladder irritation issue. We ended up deciding by looking at this that it was actually a bladder irritation specifically to dairy and citrus, which are both really common bladder irritants. And so, we had her work on cutting those out and caffeine as well. Okay, so just to give you some ideas and some examples. And then once you have that baseline, you wanna consider what is the person's overall health status and what do they want. What is their desire with nutrition. And all these things can be considered, and then remember you always can refer to a nutritionist if they want that. And I always encourage them, "Tell me how it's working. "If it's not working for you, we're gonna modify." Here's some awesome additional resources that I really like, so those are there for your reference. And now, I'd like to take some questions 'cause I know this is a lot

of information thrown at you really quickly. So we'll take some questions for at least a few minutes. And I would like to... Just go ahead and throw them up there, and then I'll read them as I see it. So, we have one person who's saying that they have a question regarding diet related to diabetic dementia. She has read some information that diet can play a role in exacerbating dementia in the geriatric population. That is certainly true. Honestly, fluid is one of the big things that can play a role in exacerbating dementia, and that's tough with diabetic dementia because you don't wanna overly fluid load them, and that can be a challenge. But making sure that they have appropriate fluid intake, and then what helps a lot with that too, is just nutrition consistently throughout the day somewhat independent of what they're actually eating. But just making sure that they are eating consistently throughout the day. And then overall, you're gonna have to work with that individual person to see what they're eating, what are they willing to eat, especially if they have dementia, that can be a real challenge.

But trying to get that balance of macronutrients and make sure that they're getting all those nutritional sources. And if they're not, that's probably a good population to consider supplementation. Jessica is asking if there's a probiotic brand that I recommend. Honestly, there's not, because they change so much. So, what I look for is those characteristics that I mentioned earlier in the lecture with the, you know, the millions of CFUs, and also having the variation, and not too stable of a shelf life, and then I just look at products that are marketed towards healthcare professionals and also towards chiropractors. That's also really helpful 'cause those ones tend to be just monitored a little bit more closely. All right, any other questions? This is my favorite family photo of all time because it characterizes life with small children. Nobody is looking at the camera. We've got a finger in a nose, a finger in an ear. Always fun times. Okay, so Brandon's asking for my thoughts on bone broth or collagen supplementation. So, truthfully there's not any better evidence out there for those than there is for glucosamine and chondroitin supplements. So, the tricky part with this, too,

I always think is, well, honestly our evidence in the field of nutrition is, it leaves much to be desired. Lack of evidence doesn't necessarily mean it's evidence against. In general, ingesting something in a food form is better absorbed than ingesting something in a pill form. So, I would prefer for people to use something like bone broth or collagen if they want to try that.

And again, it's one of those things where it's really not gonna hurt anything. It may be really, really helpful, and so I always tell people, try it. If you have any kind of negative effect from it, then obviously stop, or if you don't think it's doing anything then you might as well not waste the time and money. If they're going with bone broth particularly, if they're not making it themselves, then I always encourage them to look for something that's the least processed as possible. Just because some of the chemicals that are used in that processing and for storage may not have the best effect on the body. Okay, so I have a question that says, have I seen much on the concept of dietary and caloric restriction on longevity. I don't think that those studies have really been done aside from in countries that have true famine conditions.

So, I don't really think there's a whole lot on just like... What I think you're asking about is just people who restrict calories trying to control their body size. In general, the concern I have with significant caloric restriction, aside from the concern for eating disorders and eating disordered behaviors is that people may not be getting the nutrition that they need if they're ingesting that few calories. You can have something like, oh, I only ate 600 calories today. But did you... Kind of regardless of whether that's adequate from a metabolic standpoint, is it possible for someone to get as much protein as they needed, as much of those macro and micronutrients. And it might be possible, but it would be really hard, and I think a lot of people... Just with our culture that is very, very targeted around body size, I think sometimes all they're thinking about is what makes my body smaller. And that's not necessarily the thing that by itself, that promotes ideal health. There are a lot of individuals who have various body sizes that

are actually living in a state of chronic nutrient deficiency. And so, really a lot of times I'll tell people the goal here is smart eating, not necessarily just decreasing your calories, or hopefully not just decreasing your calories. I've got a couple questions saying they're not sure they're clear on examples of insoluble fiber. There's some examples on the slide. I can see if I can go back to it. It's pretty far back here, but there's some examples on the slide of both soluble and insoluble fibers. Just to keep in mind, this is not a comprehensive list by any means. There are lots of easily google-able sites that will have even more, but I will go back to the slide just so that people can see it. I apologize, it's kind of a long way back here. But feel free to continue asking questions. I'll take a couple more if anybody has any, oops. Sorry, I passed it.

Got a little too excited there. Whoa, way too excited. Oh my goodness, all right. Sorry, it is back in that fiber section. Honestly, you guys will probably find those faster than I will because I got a little too happy with the clicker here. But anyhow, there's a table on that slide that I just flew through that shows some examples of both soluble and insoluble fiber. Psyllium husk fiber has both. All right, so there's some foods that are high in both soluble and insoluble, and then foods that are just high in insoluble fiber. All right, any other questions out there? I don't want anybody to feel like they have anything major that's left. Mark is asking if I can throw out an example of a nightshade vegetable, yes. Egg plant is a nightshade vegetable. Some of the cruciferous vegetables are, so, like broccoli, for example, and then tomato I've seen mixed feedback on if tomato is a vegetable or a fruit, but that's considered a nightshade also. All right. Very good. Thank you everyone for your attention and your time today, and I will turn the mike back over to Jessica.

- [Jessica] All right, thank you so much, Jennifer. We really appreciate you sharing your time and your knowledge and all of your expertise with us. This is just a plethora of information on diets. So, I know everybody really enjoyed this. This does conclude

today's course. Thank you everybody for joining us. Please join us again for future courses on physicaltherapy.com. Make sure to like our Facebook page, and follow us on Twitter for our latest courses. You can also see a list of upcoming live courses on the physicaltherapy.com website. Everyone enjoy there rest of your day. Thank you.