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Hey, everyone. This week, we're going to be going over how your gut gastrointestinal tract impacts energy levels. When you look at the gastrointestinal tract, there's so many different ways that it can impact human health and we're doing a lot of topics in the gastrointestinal tract because we developed an online program for people to learn how to go through and look at their gut health and how to improve the gut health which is called the Gut Health: Solving the Puzzle. If you go to drknews, D-R-K-N-E-W-S, dot-com, you can sign up to learn about the program and people that preregister, people on the signup waitlist, we'll get them greater discounts and better benefits if they do that now.

Any case, let's talk about the gastrointestinal tract and really how it impacts energy levels because one of the things that happen when you look at people having energy issues in healthcare is they have these undiagnosable issues why they have fatigue. It's very mysterious why they have fatigue. The reason why is when people have energy issues or fatigue issues, once you rule out things like a thyroid disorder or anemia or these other types of very obvious conditions and those things don't exist, most healthcare professionals don't really understand that just gastrointestinal imbalances can really impact energy levels and even subtle types of imbalances in the gut can really have a profound impact in energy.

Let's go over some of the research and some of the mechanisms involved related to these pathways. First of all, there's been an explosion of research in the microbiome. What they've really found is that the microbiome has a significant impact on how we process and use energy. This has mostly been done with research in obese versus lean individuals. Now first of all, when you look at obese individuals versus lean individuals, there is difference in, first of all, their overall energy levels and that's pretty obvious. People that are leaner tend to have much, much more energy than those that are obese. Technically, that shouldn't make sense because body fat is energy, body fat is this energy storage, right?

Theoretically, if someone has more body fat, then they should have much more energy, all this stored energy potential in their body, but they can't access it, they can't use it. There's a shift in physiology that has been clearly found with some of these microbiome studies where the microbiome and lean individuals are totally different than obese individuals. What they found is that their physiological pathways to use energy are impacted by this microbiome difference. The microbiome has major influences on some of these pathways. We'll talk about those pathways in a little bit, but when they had looked at these studies of energy and body composition, there's a clear difference between the microbiome of a lean individual and of an obese individuals.



Then in the initial parts of these studies, what they found was they would do these mice studies where they would do a fecal transplant. They would take fecal material or do a fecal transplant, meaning they take bacteria from obese mice and then implant it to lean mice. They take a gut bacteria from the lean mice and put it into obese mice. What they basically found was that there was a change in their body composition very, very quickly. The obese mice that were given gut bacteria from lean mice became lean and the lean mice that were given bacteria from the obese mice became obese.

This was then further evaluated in humans. There was a study that was published where they found the same thing, but the effects didn't last. It had a short-term effect for a few weeks and then they went back to the regular body composition and so forth, but it just shows you how impactful that the microbiome is. Now, we also know from research that when you look at pregnancy, and the change in the microbiome through pregnancy, several things happen. During pregnancy, when hormone levels fluctuate during the normal process of pregnancy, the microbiome of a pregnant woman changes to start to resemble the microbiome of an obese individual. This allows for a person who is pregnant to start to have their energy production change in such a way where they're storing more body fat.

Then once they give birth, as they breastfeed, hormones like prolactin are released and then that prolactin and other hormones that are released during breastfeeding change the microbiome in such a way that they use energy more efficiently and burn body fat more efficiently in order to produce energy to produce milk further for the child. We know that when you look at all this research for the microbiome that the microbiome has a profound impact in how we process and use energy from the foods that we eat. It's not just the whole model of calories and calories out is the only way is really outdated. We know that these different impacts on the microbiome that really have an impact on, energy production and how we use energy and so forth.

When you're looking at the gastrointestinal tract and you look at the research done with the microbiome, what they also realized is that the things that make someone have lots of energy versus someone that doesn't have lots of energy could be impacted by different bacteria species in the gut, but it's not just one type of bacteria. It's really related to a diverse group of bacteria. We also know that, for example, when a person exercises regularly that they end up with microbiome diversity, that exercise alone is invariable. It can change the bacterial species in the gut. People that eat lots of diverse vegetables, they have a major impact on their gut microbiome.

If you take someone, for example, who is sedentary, their microbiome diversity actually changes, unrelated to food, just from lack of activity. If someone eats a lot of processed foods, partially hydrogenated fats, lots of sugar, lots of unhealthy fats, their microbiome changes. They become less diverse and they get dysbiosis and then the gut bacteria starts to change into, what they call the microbiome of an obese individual, which



means they're less efficient using their food for energy and more efficient at storing body fat. We know that the microbiome is actually changing and this is why when someone just immediately cuts down calories to try to lose weight, for example, it may not have an immediate effect because it takes some time to change the microbiome.

Some people go in a low caloric diet and they don't have a very hard time doing it. Part of the reason could be because their microbiome isn't changing it. Their microbiome is unhealthy. These are the different things that are really involved with the research coming out and how energy is produced and how our body becomes more efficient or less efficient using energy. There's a strong relationship with the bacteria that we have in our gut and how diverse it is and the bacteria in our gut are involved with producing enzymes and signaling agents and neurotransmitter. The bacteria in our gut are very metabolically active and have a huge impact on our metabolism and our feedback loops and our physiology.

If you can give me about 15-20 minutes, I'm going to go over some of these pathways in more detail besides the microbiome and talk about how that really applies to real-life clinical issues and then we can take some questions for those that have joined us. Thank you for those of you that have joined us. If you take a step back and go, "Why does someone have fatigue?" there's a final common pathway that's involved and that final common pathway is they're not making enough ATP. ATP is adenosine triphosphate. The biochemistry of energy is you have to have ATP to have energy, and ATP as a molecule and if you have ATP, your cellular energy systems convert that ATP to triphosphate to diphosphate and that produces a lot of energy.

When someone comes in or someone complains that they have very low energy and they're fatigued, ultimately what they're saying is the body has become inefficient in making ATP. Then you can work your way backwards through all the different mechanisms that are involved with energy production and go through one by one. Where it all starts with in order for us to have energy to be able to make ATP is we have to consume food. Our ability to break down the foods that we eat like proteins into amino acids and the fats into fatty acids in the foods we eat into minerals and micronutrients is really involved with digestion. There's lots of different pathways involving the gut.

Now, when you look at the gut and you look at the microbiome, for example, you can't just treat the microbiome directly. There is a concept that we talked about in the Gut Puzzle Program which is a very important clinical concept which is a north to south model, meaning the gastrointestinal tract, the microbiome can't be healthy unless it has the right pH, unless it has the correct environment to really optimize the development of bacterial diversity. For example, if someone has a gallbladder issue or someone has pancreatic enzyme insufficiency issue or someone has intestinal permeability and chronic intestinal inflammation, those mechanisms change the physiology of the



microbiome and if you just try to treat the microbiome with a probiotic, it's really not going to have much effect at all.

You're not going to necessarily change your energy levels by just taking a probiotic or taking a magic supplement. You really have to work on the system from north to south and figure out what's involved and how these mechanisms work. When you look at this north to south concept that we teach in the Gut Puzzle Program, you have, first of all, digestion. You have to have healthy digestion in order to break down foods into amino acids and proteins and fatty acids, so we can even have a chance with our cellular energy processes. Then those nutrients have to go into our tight junctions and get absorbed properly. We have to have healthy anti-inflammatory immune response to [inaudible 00:10:37] absorbs pathways. Then finally, it gets into the microbiome and that the microbiome, we want a lot of diversity.

Those are the things that are involved for everything to work well and for us to properly use the foods we eat to what we need to provide our system with substrates like micronutrients to do then make ATP. For example, if someone has inability to absorb B12, they may end up with a B12 anemia. That causes significant fatigue. They may not have enough B12 in their system to provide the nutrition to red blood cells they need, so those red blood cells can't carry oxygen, so they're anemic. Inability to really digest and assimilate your food and then eventually to create the environment for the microbiome to be as diverse can have a significant impacts on energy production.

Let's talk about digestion version. Now you have to realize, if you have mild digestion issues, meaning if you eat and you get heartburn, and if you eat and you get distended and bloated and if you eat, you're fatigued, and if you eat, you have immediate bowel urgency. If there's something wrong with your digestive process, you're going to be inefficient in making the substrates you need to produce ATP. It all starts first of all with digestion. When you look at digestion, you first start with enzymes and you work north or south. You first have to be able to digest proteins. Your body needs hydrochloric acid to digest proteins. People that have difficulty with digesting proteins and are averse, so they deviate from eating protein like, "I don't really want to eat a lot of protein. I don't feel well if I eat a lot of protein, that's really a red flag that there's a significant gastrointestinal issue.

It will have its downstream effects from north to south, all the way down to the microbiome. You have to be able to digest protein. People who don't want to eat a lot of protein and have symptoms and they don't want to eat a lot of protein because they have a lot of symptoms if they eat any proteins, it's a really red flag for energy production as well because you have to have amino acids to drive many cellular pathways to make ATP. Also, if you have people who can't handle carbohydrates or starches, that causes significant bloating or distention for them, they may have



pancreatic enzyme deficiencies. They have small intestinal bacterial overgrowth. Those will really lead to malnutrition issues.

People that can't tolerate any kind of fats like olive oil or can't even tolerate anything that's really fatty because they get bloated and distended, those are gallbladder issues. That will lead to decreased ability to make fatty acids and absorb fatty acids efficiently and fat soluble vitamins. They can have a tremendous impact ultimately making ATP. Digestion is really critical. Also, digestion requires a lot of energy. When you eat, your blood all shunts to your gut. All the blood goes into your gut to really supply fuel and oxygen and nutrients for your gut to be able to process that food and it's a very energy-demanding process.

If the gastrointestinal tract digestive pathways are inefficient, then it can cause significant fatigue. For some people that have significant digestion issues, have imbalance in digestion, they just don't want to eat because they get extremely tired and exhausted. Now, you can also get extremely tired and exhausted from insulin surges and too much sugar or carbs when you eat, but if someone's just eating lean vegetables and lean protein, they get really tired and it's really hard for them to digest and they can't really do anything for a period time, that's a really serious red flag because these mild digestion issues end up with significant metabolic and physiological issues downstream.

When you look at north to south and you look at energy levels, you have to be able to break down your food proteins and particles into micronutrients, amino acids and fatty acids from proteins, fats and carbohydrates that we eat them, right? That's all part of the normal response. That's digestion. Now as you work your way from digestion down, energy production ... By the way, there's some people who can't digest their food, they take digestive enzymes and their energy levels skyrocket. There's some people who fix their gallbladder issues and their energy levels skyrocket because now they're more efficient in breaking down their food into substrates that's required cellularly to make energy.

This is also why a lot of chronic fatigue and chronically exhausted patients never get diagnosed because they have the subtle digestive issues that gets overlooked. As you go from north to south, meaning your first step to digest proteins in your stomach and then you have to digest starches and carbs in the small intestine by the pancreas and digests fats by the gallbladder release of bile in the small intestine, you then get into the lower parts of the small intestine, especially the duodenum, where you have to have absorption of these nutrients, right? You have to absorb amino acids. You have to absorb fatty acid particles. You have to absorb minerals and micronutrients.

This is where you can have another issue with energy production because if you're not absorbing these things, so you can have some significant problems. This is where leaky gut or intestinal permeability comes in. If leaky gut, the intestinal tight junctions, they



should be tight and very, very close together, so only little micronutrients can cross. What happens in leaky gut is these guts get destroyed and these tight junctions open up. Now what happens when these tight junctions open up is proteins that are undigested and these are large molecular weights of big proteins, big lots of weight, a lot of protein, these large protein clusters get absorbed.

They're not supposed to be able to go through that tight junction when it's nice and healthy, but when it opens up, they can get through and that triggers an immune response and that triggers the inflammatory response. It also leads to malabsorption and micronutrient issues. Let me explain what I mean by that. When you look at particles, there's a weight to them, a molecular weight to them. Protein has a very large molecular weight and then a protein is then broken down to a little strands of protein called peptides. That has less weight. Then eventually, it could be called the middle molecular weight particle and then that peptide gets broken down to individual amino acids and those are low weight molecular particles.

If the intestinal tight junctions are healthy, then you only absorb these lightweight particles. Now, what happens in leaky gut is once the gut opens up, and the inflammatory response takes place, there's a lot of mucus from the inflammatory response to the destruction of these intestinal cells that is in between the space of these leaky gut areas, these opened up tight junctions. That mucus can trap light molecular weight particles like minerals and vitamins, but large molecular weight particles like proteins are heavy enough to go through the mucus. So that ends up with this paradoxical response where you get malnutrition, and then also, you get leaky gut.

You have proteins that shouldn't cross get through, but they've really low-weight micronutrients that would normally cross can't cross because all this mucus there from the inflammatory process of the tight junctions is breaking down. This was initially discovered when they were doing research with two sugars called lactulose and mannitol. One of the earliest research models for looking at leaky gut was researchers were having people ingest sugar called lactulose which is a large molecular weight sugar and a sugar called mannitol which is very small molecular weight sugar.

What they would consistently see with people that had intestinal permeability is that they would have these large molecular weight sugars in their urine a few hours later which shouldn't be there. That would only happen if their tight junctions open up, but they're mannitol, they're small molecular weight proteins wouldn't be able to get through, so they would have this paradoxical leaky gut where undigested protein get through but micronutrients cannot get through. Leaky gut can actually lead to subtle malnutrition disorders and subtle malnutrition disorders can have a tremendous impact on energy and overall health and function.

We know that people have intestinal permeability can end up with these subtle malabsorption issues and they end up with leaky gut. We also know that the



inflammatory response of leaky gut does something called mitochondrial uncoupling. Within your cells, you have an energy powerhouse called the mitochondria. The mitochondria is what's involved with making ATP. What happens with people when they get chronic inflammation is that chronic inflammation creates a process which is called mitochondrial uncoupling, which means that these energy powerhouse cells stop making ATP as efficiently. We know that chronic inflammation in the gut can be another major pathway when people have significant fatigue.

This is also why some people have leaky gut and you get them off inflammatory foods and you put them on a leaky gut healing protocol. We go over these in the Gut Puzzle Program, sometimes get a tremendous boost in their energy levels and their swelling and inflammation goes down because they're able to get their tight junctions that are injured healing again and then that decreases the mucus issues and the malabsorption issues, micronutrients that can actually start to absorb the foods they have and stop having an inflammatory response to regular proteins that they're eating. That's all related to this. As we go north to south, we go from digestive pathways to the small intestine and the tight junctions to the immune response, and eventually, we get into the microbiome.

The microbiome, we know has major impacts as we discussed earlier of how it impacts energy levels, but one of the main ways it impacts energy levels is by the different bacterial species that are there. You have to remember that bacteria are highly functional organisms and bacteria contain enzymes and these enzymes that these bacteria are contained can do many different things. Some enzymes in the microbiome will break down hormones into active forms. Some enzymes will be able to help metabolize fat soluble compounds that are toxic into water soluble compounds, so they can eliminate them, basically that's what the liver does on these bacteria in the gut, help clear out our environmental toxins or metabolites that need to be eliminated and excreted. These bacteria have these processes that are able to do that for us.

Now we also know ... By the way, when we talk about that, there's bacterial species in the gut, for example, that helped convert thyroid hormones, T4 into active T3 hormones. We know one of the extensions of the endocrine glands, the endocrine system, whether it's producing thyroid hormones or adrenal hormones or estrogen or testosterone is gut bacteria. Gut bacteria are highly metabolically active and they have enzymes in them to convert hormones into different hormone compounds. There's been research that shows gut bacteria convert, for example, estradiol to either a 2- or 4- 16-hydroxyestradiol and they have different impacts on cellular function.

Some of them have a very high estrogenic activity. Some have less estrogenic activity. Some of these have been ... These convergence in the gut microbiome to these different metabolites that take place in the liver and in the gut microbiome have increased risk for things like breast cancer, but the point is that these gut bacteria can



metabolize hormones. Whether it's thyroid hormones for energy production or testosterone or estrogen, the bacteria in the gut help convert hormones. This is the whole essence of having this very diverse microbiome because the more diverse your microbiome is, the more enzymes you have for the potential to balance things out and help you attain homeostasis.

When people have unhealthy bacteria, not unhealthy bacteria, but they lose their gut diversity, they have less potential to basically balance their own body out. This is important when it comes to energy production because many of these hormones, metabolites, that are produced by the liver and gut have a tremendous impact on activating energy pathways in ourselves. Now another important thing is that these bacteria have enzymes that can convert compounds that are, let's say, fat soluble to water soluble. Let's say you get exposed to plastics, bisphenol A. Bisphenol A has to be eliminated out of your body. The way it gets eliminated out of your body, it goes through a pathway called glucuronidation and sulfation.

Well, there are bacteria in the microbiome that have the ability to activate sulfation, adding sulfur group or activate glucuronidation, adding in glucuronic acid to BPA food you digested to convert them into a metabolite that you can actually eliminate out of your body. Gut bacteria are really critical for changing these metabolites. Now if these chemicals like BPA are not metabolized and cleared out of the body, these metabolites can become endocrine disruptors. They can bind to thyroid receptors, for example, and they can have an impact on energy production. The microbiome is critical in its biotransformation pathways as well.

Now the microbiome also has a significant impact on blood sugar stability and there's been a tremendous amount of research done on how the bacteria in the gut impact blood sugar control. It's very clear that patients that have obesity or patients that have diabetes have a different microbiome than individuals that don't. Individuals that were obese and diabetic that then normalize their blood sugar control and become healthy have a change in their microbiome. Now in the gut, especially in the lower gastrointestinal tract, there's two different types of cells. One is called gastrointestinal K cells and another group is called gastrointestinal L cells and they released gut peptides. One is called GIP and one is called GLP1.

GIP and GLP1 are these hormones that are released by these intestinal cells that then control blood sugar levels. In the field of diabetes research, what they've been able to find is that there's this phenomenon called the incretin effect. Incretin means secretion from within. They've done studies where they had given individuals the same amount of glucose load either through oral ingestion, that then impacts these gut pathways or through an IV. What they found is that if a person is getting the same amount of glucose orally as compared to an IV, the oral ingestion of glucose has a two to three-fold greater efficiency of modulating insulin control than if they were taking it through the IV



response. We know that the intestinal microbiome has a huge impact on the efficiency of how these K cells and L cells work in the gastrointestinal system.

A lot of blood sugar stability has to do with the gut. I think as the field of diabetes research expands more and more into prevention and diet and lifestyle and medicine, trying to optimize the health of the microbiome may be a critical piece of really managing diabetes, blood sugar stability issues. At the end of the day, when you look at the gastrointestinal system, and we'll take questions here in a second, let me just finish this one section, but at the end of the day, when you're looking at the gastrointestinal system and how things work, you've got to realize that bacteria in the gut have a major influence, the microbiome has a major influence, but the microbiome doesn't have the ability to become efficient unless it's healthy north to south. You have to have proper digestion, you have to have proper enzyme release, you have to have proper absorption, you have to have proper assimilation.

Then those factors with a very diverse diet and all those things that change the microbiome, then there's a microbiome becomes healthier and it becomes more diverse, then you have all these different pathways intact to really optimize energy levels. If there's any defect anywhere along that gastrointestinal access, from hydrochloric acid to pancreatic enzymes, to gallbladder issues, to intestinal permeability, to microbiome lack of diversity, then you have tremendous impacts on energy function. We also know that people, once they restore their gastrointestinal tract, they have some tremendous benefits in their energy system.

What I'd like to do is I'd like to move in to questions and let's go through some of these things. One of the questions that's coming up here is, "Can stress impact the gut?" Yes, stress can have significant impacts in the gut. Stress has the ability to do a few things. First of all, the stress response has the ability to break down intestinal tight junctions. When you actually get into a physiological stress response, your body ... Let me clarify, there's acute stress and chronic stress. Acute stress can impact blood flow and distribution to the gut for a short period of time, that has some of its impacts, but chronic stress is what we're really worried about.

With chronic stress, what takes place is you start to release high amounts of cortisol for an extended period of time and cortisol is catabolic. A cortisol has an anti-inflammatory effect. It's great when it's released, when we need to dampen inflammation, but when it's released ongoing for a long period of time, it creates a catabolic effect and these catabolic effects, meaning tissues break down, they don't have the ability to recover, that prevents the tight junctions from restoring and healing, that prevents bacterial species and populations from becoming diverse. Stress is definitely a key factor in why you can't bounce out the microbiome. I have my wonderful wife, Dr. Reyes here ...

Hi.



... to help with answering some of these questions.

Hi.

Hi.

How's it going?

Good.

Well, good. Mary's asking, "Can you talk about H. pylori please?"

Sure, H. pylori is the most common infection worldwide. Most people will have H. pylori infection at some point in their life. There are several effects of H. pylori. One of the effects is it actually shuts down hydrochloric acid production. It can create maldigestion issues. When people get H. pylori infections, the bacteria, [inaudible 00:29:59] lining of the stomach, it actually has suppressive effects on parietal cells which release hydrochloric acid because this organism can't survive in an acidic environment. It needs the pH to be more alkaline. It actually shuts down pathways so it can survive, but that allows people to digest the proteins very well and hydrochloric acid has this downstream of ... Not having enough hydrochloric acid has a downstream effect where you also end up with inefficiency of releasing pancreatic enzymes and bile from the gallbladder and you change the pH of the gut and you change the microbiome. It has these very diverse effects.

H. pylori is one of these things that can create symptoms or not create any symptoms at all, so they have asymptomatic and symptomatic subgroups. These symptomatic groups are the ones that have ulcer-type symptoms like reflux and burning and those symptoms will usually have someone, maybe if the physician tests them for H. pylori to see if they have this infection, but there's a lot of people that have silent H. pylori and the only symptoms they have or lack of hydrochloric acid, they don't have the burn and reflux, so they get totally ignored in the healthcare system.

Now, H. pylori has been shown to be a major risk factor for causing injury to blood vessels. Just like hepatitis C can damage the liver as a virus, H. pylori as a bacterium can start to damage blood vessels and they look at atherosclerotic plaques. They see that these silent H. pyloris are a major risk factor for people that have cardiovascular disease. If you have ongoing need for hydrochloric acid, meaning that you just feel like you can't digest proteins or if you especially if you're younger, you're in your 20s, 30s, 40s and you feel like you have to take digestive enzymes like hydrochloric acid, you may actually have an H. pylori infection.

Now our enzyme production levels get lower as we age, just like our muscle mass gets lower abundance, that it gets lower as we all get older, especially as we start to hit like 60 and older. We start to produce enzymes less efficiently. One of the most common infections of the elderly is they get H. pylori infections as well. As you get older, you're



inefficient making hydrochloric acid, and if your stomach acidity is more alkaline, it's very easy to get exposed to H. pylori or getting infection. If you have a very acidic stomach, you may get exposed to H. pylori and never get the infection because the acidity prevents the infection from taking its hold on GI tract lining.

Lots of people that get older, they get a vicious cycle. They start producing the hydrochloric acid, they get the H. pylori infection that shuts down the parietal cells. Now they can't digest foods. Now they get reflux and then they get put on antacid. Now they shut down their digestion north to south dramatically and they end up with lots of chronic health issues and energy issues and digestive issues. They really can't diversify the microbiome because this north to south model has already been broken right from the very top.

Efren's asking, "If you can't digest fats, how do you know if it's because of the lack of bile or is it you have significant bile, it's just clogged up? Is there a way to tell or test to know more?"

If you can't digest fats, it's not necessarily that you don't have enough bile. It's really because your bile is congested and this is called gallbladder sludge. Gallbladder sludge is a conventional term that they use on imaging studies. Gallbladder sludge is the bile in the gallbladder is all sludged together or clustered together. It's about to form a stone, but it's not really a round clear gallstone yet. What happens when people have gallbladder issues, they go from gallbladder sludge formation to gallstones. When those mechanisms start take place, when fats get into the small intestine, that triggers the release of the gallbladder to contract to release bile, but if the bile was all congested and sludged together, there isn't enough of it released to help break down the fats.

Then if those fats are not able to break down, people can significant distention and bloating when they eat any type of fat. It really isn't a deficiency in bile. It's just that the gallbladder has sludge. Now, there's lots of lifestyle factors, nutritional factors that can change that. We go over that in the Gut Puzzle Program, but let me give you some important ones. Interestingly enough, coffee has been shown it's really helped to thin out the bile. Despite all the negative things coffee is associated with, coffee has lots of flavonoids, lots of antioxidants and it has a very beneficial impact on thinning out gallstones.

Now, you probably don't want your coffee if you have hypertension. You don't want to do your coffee if it causes you anxiety or symptoms, but there's some benefits of drinking coffee with the gallbladder. They also find very clearly sedentary lifestyles like lack of movement causes gallstones and people who exercise start to have their gallbladder function improved. Exercise has an autonomic effect on the vagal system. It makes it more efficient. It starts to contract the gallbladder. The gallbladder is not moving and contracting. It's going to sludge up, just like if you look at those cement trucks. In order to keep the cement from sticking together. They have to constantly



move it. It's the same thing. When the gallbladder is not contracting and moving regularly, it's very easy to have sludge formation from a mechanical point of view.

Now there's biochemical things that can cause gallbladder sludge too, but from mechanical, you have to have activity. Exercise tends to increase vagal tone, sees greater contraction invariably, that's really important. Then sometimes people will have to take different botanicals to help thin out their bile and get off fats for a period of time. Things like milk thistle, things like dandelion root can be very effective. Trimethylglycine can be effective and help thinning out the bile. Beet extract can be very helpful in thinning out the bile, but there's a point where it really is about gallbladder sludge.

Now if you don't get rid of the gallbladder sludge, they can form into a gallstone. Then you can get a gallstone obstruction at some point, but all the way through that process, the initial symptom is where you can't digest fats, and if you can't digest fats, then you probably won't be able to absorb fat soluble vitamins very well. You may end up with a vitamin D deficiency that you have on bloodwork that never normalizes no matter how much vitamin D you take. Really see, that's really common. You may have vitamin A deficiency. Vitamin A deficiency's one of the most common signs is night blindness, which means you don't see as well at nighttime when you try to read or drive.

You can end up with vitamin E deficiencies that really impact your skin health, your nail health, hair health and so forth. When you have distention and bloating, eating fats, it's a big issue. It's impacting your entire digestion north to south, will impact your microbiome and you'll end up with less efficient fat soluble absorption despite what you take. That can lead to a whole bunch of health problems. It's so important to fix them. Next question.

Mina is asking, "Is the presence of flatulent gas always an indication of gut issues?"

Listen, everyone's going to have some type of flatulent gas sometimes because here and there for various reasons. If you traveled to a new area and you get exposed to new bacteria, your gut is going to react and you have some bloating and distention. That happens. Sometimes you eat a meal, much higher in certain fibers and starches than you've had before and you get some distention and bloating. It's normal to have some occasional distention and bloating, especially with the change in diet, change in environment, but if you have bloating, distention every time you eat, that's a problem. If you have bloating and distention when you eat proteins, that's a big sign that you have probably inefficient hydrochloric acid.

If you have bloating and distention every time you eat lots of carbs or starches, that could be a pancreatic insufficiency sign. If you have bloating and distention when you eat fats, that could be a gallbladder sign. If you have bloating and distention anytime you eat anything with sugar or fiber, you may have small intestinal bacterial overgrowth.



If it's occurring with the same type of food every single time, it can give you a clue to figure all these things out. We go through the thought process and the valuation process in the Gut Puzzle Program exactly. If you have distention and bloating, which of those pathways there are and then which enzymes you take. That's pretty much what we just went over, just with more detail and recipe ideas and things to really help you understand the concepts, but that's the basic premise.

To answer your question, no, it's not normal. Everyone has some distention and bloating here and there, but if it's with every type of meal or specific or it's all the time, then that is an issue and should not be overlooked. Now a lot of people, once they finally get their gut healed and fixed, they go, "Oh, my God, I didn't know we're not supposed to have bloating and distention after every meal." You shouldn't have bloating and distention after every meal, but some people just don't know that because they end up with slowly having a gut problem creep up on them and they expect people to understand it every time they eat or it's like they have reflux every time they eat and have taken antacid. Those are not normal.

Right.

Don't confuse what becomes common to you as normal.

Exactly. Great point. Speaking of that, Matthew is asking, "Do you teach how to implement protocols in your new training?" I guess in the new course.

Yeah, the Gut Puzzle Program, the whole process of it, the whole goal of that is we're learning as you can only do so much with books. When you write books, people read them and they're not really sure what to do and it really seems like the technology we have these days, the only way people really get to learn how to implement information to the real life is through a step-by-step process where they have video, have notes, have a workbook, have recipes and a step-by-step process and have a forum where they can communicate with and work through it.

The goal of the online programs, and we're doing several of them this year, and the most important one I think right now is the gut one, because that's the fundamental area of health, is to really teach you the process. For example, the concept of north to south is a really fundamental process of how really to heal the gut. This is why, if you just search the internet, you end up taking one probiotic and one supplement for one, but it's not really an efficient way to manage it. In the Gut Puzzle Program, the goal of it is to have you learn to look at what's individually unique to you, understand the connection between different gastrointestinal symptoms and different mechanisms and then implement them for yourself to help support you.

I really think there's a big future for these types of programs because the technology is there and books are great, but they can't have the same effect of this, the design program. Also, there's just a lot of people that don't have access to really good



functional medicine practitioners that can walk them through the steps. The goal is that this Gut Puzzle Program is a way to help people get the information they need to help improve their health. If you go to drknews, Dr. K, N-E-W-S, dot-com. You can sign up for it and you'll have some ... When we release the course and things in a couple weeks, you'd get some discounts and so forth. Next question.

"Do you recommend bile salts for gallbladder issues? Do they help with digestion? Do you take them with meals? What do you do?"

One of the supplements that you can take in a nutraceutical world if you have gallbladder issues are bile salts. Now bile salts can absolutely thin bile. There's been a couple of case studies published in the literature, but you can definitely see bile salts change pre and post with an ultrasound. The problem with bile salts is bile salts have an aggressive impact on receptors in the gut that can increase motility. If you take too much of them, you can have severe diarrhea and bowel urgency, so you can be very careful with the dose. They can be very effective, but you got to be very slow with how you take them. You definitely don't want to take them long term.

You just want to get into the point, if you're taking bile salts just for the gallbladder, you won't take them to the point where your gallbladder is functioning where you can start to digest fats without having to take them and then lay off of them because bile salts also can be metabolized by unhealthy bacteria to compounds that can be proinflammatory over a period of time. They're not something you should take all the time but to use them for a four-to-six-week period to thin out bile at the dose that doesn't cause diarrhea, can be very effective.

"Can you please talk about intrinsic factor in B12 and how gut bacteria impacts that?"

Sure. In the gastrointestinal tract, there's a carrier compound called the intrinsic factor. An intrinsic factor is what carries B12 across the intestinal wall, so you can absorb it. There's a form of autoimmune disease called pernicious anemia where a person makes antibodies to this intrinsic factor protein, so they can't carry B12, so they end up with long-term chronic B12. anemia. The way they treat that is with giving them B12 shots. The B 12 gets right into the bloodstream because their intrinsic factor that transports that B12 across the gut lining isn't there. It's being destroyed by the immune system.

By the way, if you've ever been diagnosed with pernicious anemia, the actual diagnosis can only be done if you have intrinsic factor antibodies. Not all B12 anemias are autoimmune, but if you have pernicious anemia, you have an autoimmune disease and you probably have other autoimmune reactions as well. You just need to look for them. For example, people who have pernicious anemia, a large percentage of them actually have Hashimoto's. Many of them end up with lupus-like conditions or have lupus. It could be a red flag for you. Now the gut bacteria don't have the tremendous impact of



intrinsic factor. Intrinsic factor is independent, so we don't see like dysbiosis impact that, but I will say your gut bacteria or your main sources of how you produce folic acid.

Folic acid has to work with B12 to have its efficiency. When you have decreased gut bacteria or have dysbiosis, you actually can change your action, your own intestinal folic acid reduction. Those are the main connections, but for the most part, gut bacteria or dysbiosis doesn't necessarily impact intrinsic factor. It can just impact folic acid. When you see the key pathway concerned with intrinsic factor and causing B12 absorption issues, it's really when there's an autoimmune response against it. Those are identified with bloodwork called intrinsic factor blocking antibodies.

These people are saying, "Your gallbladder is removed. How do you manage bad digestion if bile salts should not be taken long term?"

If you have a gallbladder removed and you can't take bile salts long term, you can take lipase. It probably is a good idea for you to take lipase which is the digestive enzyme to break down fats. If you've had your gallbladder removed, your cystic duct bulges up to a gallbladder and you can still store some bile there. Then you just may not have as efficiency of bile. You may never be able to eat as much of a fatty meal as before, just because you just don't have that. That's not there. In those cases, you really want to just take lipase, for example, as a digestive enzyme to help break down fat. Bile salts again are used to help thin out bile, but sometimes, especially if you have a gallbladder removed, you may need to take lipase.

More importantly, you still have to work north or south. You may need to just take hydrochloric acid and pancreatic enzymes and lipase with it to really optimize efficiency, but you're always going to be vulnerable to your fat digestion intake anytime you had your gallbladder removed and you may need to start taking enzymes regularly if that's taking place and make sure that it contains lipase.

Dr. Kharrazian, Barbara is asking-

Next question. You got to speak up.

"Does north to south really start in the brain?"

Yes, north to south does start in the brain. We talked about that, but just not in this context. Actually north to south starts with the minute you smell your food. The minute you see and smell your food, you're actually getting a neurological response which then impacts acid production. Then in the course, we actually start with swallowing, but just to make things simple for the context of managing production, we're taking the brain out of it, but you are correct, Barbara.

Good job, Barbara. Shawn, "How do you accurately diagnose a silent H. pylori infection if there are no symptoms?"



The way to diagnose a silent H. pylori infection is by lab test. Basically, there's different ways to measure H. pylori infections. You can do a breath test. It's called the breath urea test. It has 98% specificity sensitivity. Any conventional lab can do that. You can also do H. pylori stool antigen test, also greater than 98%, 99% specificity sensitivity. Conventional labs do that. You can measure blood antibodies for H. pylori. The only problem with blood antibodies for H. pylori is antibodies for H. pylori can circulate in the bloodstream for up to two years after the infection is gone. It's not the best test. If you suspect that you have a silent H. pylori infection and want to rule that out, the test to do would either be an H. pylori breath test or an H. pylori stool antigen test.

Vanessa is asking, "Can leaky gut lead to high glucose?"

Can leaky gut lead to high glucose? Well, here's the thing. It's not that direct. That association, like if you did an association analysis, it's not going to be very strong. It's possible if you keep going down mechanisms, meaning that intestinal permeability can disrupt the microbiome and that can impact the efficiency of K and L cells, but the association directly is weak. We do know that the microbiome has a major impact on insulin signaling with the pancreas and glucagon signaling with the pancreas and liver pathways and also with HP axis function. More and more of that research is coming out. I don't think the associations are quite that linear, but there's some mechanisms that overlap with each other.

I messed up the name. Someone says, "I've heard keto helps with ATP, but a dairy-free keto???"

When you look at ketogenic diets, they could be very beneficial in the circumstances you want to use them in, meaning not all diets are right for every situation. Ketogenic diet is definitely a diet that works really well when people want to get their insulin levels down dramatically like a diabetic ketogenic diet or to lose weight. Ketogenic diets are very effective if you're trying to deal with seizure disorders. Ketogenic diets are very good for inefficient brain function. What happens in ketogenic diets is your body starts to use ketones for energy versus sugars based on limiting your carbohydrate intake and increasing your healthy fat intake.

The biggest problem we see with people that don't do well with keto is they just consume a lot of unhealthy fats or inflammatory fats. Dairy is an inflammatory fat. A lot of times, people go with keto and their source of fat is cream and milk and cheese all day with every meal. That's great for that part of keto, but it's very proinflammatory. We don't recommend that. We actually have a protocol. We call a Ketobiotic Program where we encourage, and this is in the Gut Puzzle Program, people if they needed to go on a ketogenic diet for various reasons to really do it in a way where they support the microbiome. You have lots of vegetable diversity and also be dairy-free to have the best impact on reducing inflammation and still being in ketosis.



The biggest mistakes people make with keto that ends up the ... keto, but they feel worse is lots of fried food, lots of unhealthy fats. They're eating fried bacon everyday with cheese and they're wondering why their body's inflamed. Keto should be done with anti-inflammatory fats like avocados and olive oil and in those good fats versus the bad ones, they proinflammatory ones. Whenever I do keto with my patients, we do what's called a ketobiotic diet which we talked about in the Gut Puzzle Program which is no dairy and healthy fats instead of healthy fats.

That's a good question. Dorothy is asking, "I need a tiny form of HCL because I have a hard time swallowing. Any idea?"

Hard time swallowing is actually north to south. It's a brain issue. When we actually talk about north to south, swallowing is a function of the brain. If your swallowing has gotten worse over time, it's a red flag for actually a neurodegenerative disorder. One of the things that starts to show up with early parkinsonian diseases and other neuro diseases, your swallowing gets more and more compromised over time. Well, just various degenerative even things like MS can impact swallowing. They call it dysphagia. If you can't swallow very well, first of all, it's a red flag. Secondly, it's a red flag for neurodegeneration. Third, if you're trying to get around that, one of the things you can try to do is to take apple cider vinegar and help digest your food that way.

Now, if you take apple cider vinegar and you have burning, that's a sign that you may have a pre-ulcer issue. Then in those cases, you might want to get tested for H. pylori and you might want to do things like deglycyrrhizinated licorice to heal your gut for a period of time and then try the apple cider vinegar again.

Can you repeat the deglycyrrhizinated licorice?

Deglycyrrhizinated licorice. DGL. If you just type in DGL, you'll find lots of supplements available for that.

Shawn is asking, "If one requires significant Betaine HCL to digest protein, but test negative for H. pylori, what are the potential causes of the lack of HDL production?"

Most common is age. If you're over 60 ... If you don't have H. pylori, and you still have hypochlorhydria issues, the most common one is age. Just realize, if you're starting to get past 60, you're going to be prone to digestive enzyme potentials, just because the cells we have can't always produce the same amount of output as we get older. Aging process, in essence, that's part of it. Outside of that, there's lots of other things that can do that. You could have brain-gut pathway issues that do that. Hypothyroidism can do that. Just overall intestinal inflammation can be a factor there. Those are the most common ones. Sometimes you just can't find the cause and you have to treat what you're doing and sometimes H. pylori test is inaccurate. Be wary. For the most part, it's



usually still undiagnosed H. pylori issue, the test is not there or it's underlying hypothyroid issue as the key mechanism or just aging.

Someone's asking if floating stools are a sign of gallbladder issue. Sorry, I lost the question, but that was the question.

Also back to H. pylori really quick, I'm sorry.

That's okay.

Another common thing you'll see is people that have just intestinal inflammation where they just constant ... Because remember, I'd point out a couple things, digestive enzymes like pancreatic enzymes and even hydrochloric acid, they're involved, especially pancreatic enzymes, in the anti-inflammatory pathways. You can have a person that constantly feels like they need to take HCL and they actually have gluten sensitivity and they get off gluten and dairy for a period of time and they have no more need for HCL. That's actually another common one, is people that have just a dietary protein sensitivity, the most common ones being gluten and dairy. If you've done everything and you test negative, you have been on a strict dairy-free diet, you definitely want to try that. Now the question was an undigested stool?

I'm sorry. The feed went too fast for me. The question was basically, "If you have floating stools, is that a sign of a gallbladder issue?"

If you have floating stools, it's definitely a sign of maldigestion. It could be a gallbladder issue. It could be you can't digest proteins very well, the fats. You see that again with people that have celiac or gluten sensitivity, but the most common thing is you can also have an increased transit time. If your smooth muscles and your gut are contracting way too fast, your food can get through the GI tract without being properly digested, so you can have some floating stools and that can be due to things to small intestinal bacterial overgrowth. If the bacteria in your gut are producing high amounts of hydrogen more than normal, that can increase your transit time, so you have all these undigested tools, but it's not related to gallbladder.

If you do have a floating stool, it's definitely a sign that you have maldigestion. Pancreatic enzymes, gallbladder function, hydrochloric acid are all possible because they're all involved with getting the pathways involved to break down fat. Increased transit time is also another major possibility for that to happen. You need to figure it out because it's a red flag. Remember, floating stools mean you're not having proper digestion, which means you're not having proper nutrient assimilation that's far reaching effects in your health over time.

Right. Linda's asking, "How about celery juice or fermented cabbage juice which are all pretty trendy right now? What do you think about those?"



I don't know. I know that celery juice has become really popular. I don't know. I wish things were that simple. That celery juice and cabbage juice have flavonoids. They've been shown to help heal the gut, especially cabbage juice for the stomach lining, but I don't know. Nothing's ever that simple. I think it's very attractive for people to follow a very simple model and have that be the key thing to do and then you-

Maybe that helps them.

Maybe it helps them. I'm sure we could do a high ... Acai cures everything and we start having [inaudible 00:56:44] with acai, "Yeah, there's health benefits to it." Come on. It's more than that.

Shawn is asking. I don't know if this is [inaudible 00:56:51], "Can you please elaborate how the gut converts T4 to T3 hormone and what inhibits it and how to improve it?"

There's an enzyme called Five di nice. And there's different subtypes of this enzyme called 5-deiodinase and there's subtype enzyme called 5-deiodinase, type 1, type 2 and type 3 and they're found in different cells throughout the body. There's a group of 5-deiodinase enzymes that are found in bacteria in the gut. When T4 ends up in the gut, the 5-deiodinase enzymes that are in the bacteria convert T4 into T3, thereby increasing metabolic activity of thyroid hormones. It's just an enzyme and the gut microbiome has some of these 5-deiodinase enzyme that allow that T4 to T3 conversion to take place.

Sandra is asking and a few people are asking, hers is about spinach, but she's saying she had a food sensitivity test. "I haven't had any food, any of that, for at least three years." Will she ever be able to eat it again? Are these tests valid? Are they accurate? Are they sensitive? Are they-

Right. The food sensitivity is a very important topic. This year, we actually created two programs, one is the Gut Puzzle and one's the Food Sensitivity: Solving the Puzzle. In that course, I laid out all the different concepts of food sensitivity, allergic food sensitivity and different reasons to get food reactions unrelated to allergy. We get into that a lot of detail. I think that's one of the things we are offering people who'll sign up for a course early is we give them the Food Sensitivity course for free when they sign up on the Dr. K News for the Gut Puzzle Program.

To answer your question, there's different types of immunoglobulins or allergy, IgE and some more sensitivity and those are IgG, IgM or IgA. If you show up with IgE, that is a different immune response. With IgE allergies, it's very unlikely you'll be able to eat those foods again. If it's an IgG, M or A, those are sensitivities and those can change over time. As your gut system gets healthier, as you remain tolerant, you get healthier, you should be able to eat those foods.

So you need to know what type of test, what it was testing.



Yeah. Look at your antibody response. Say if it's spinach, see if it was IgG, IgM See if it was IgE or the other ones. If it's IgE, then that's an allergy test.

E as in elephant?

E as in elephant. I slur my words, so thank you. E as in elephant. The other antibodies G as in goat, M as in mom, A as in apple.

Sorry.

Those are delayed sensitivities.

Good job. Sorry, there's another question to that. Sorry. [inaudible 00:59:41] a little bit. "Can you explain what immunoglobulins are?"

Immunoglobulins is another word for antibody. When you get a protein into your body that's foreign, that means to make antibodies against it. Bacteria have proteins. Viruses have proteins. When they enter your body, our immune system recognizes those proteins and then works on making antibodies to them. Those antibodies attach to the foreign invader and marks them, so then immune cells called T cells and natural killer cells come in and destroy them. We make antibodies to all the different proteins. Our immune system can make antibodies to food proteins, especially when the immune system starts to dysfunction, dysregulated and lose what's called the loss of dietary protein tolerance and they start to react to lots of foods, which happens with people that have autoimmunity or people that have intestinal permeability.

Their main systems starts to become overzealous and start to really react against food proteins, instead of just pathogens. Immunoglobulins are antibodies. What distinguishes allergy versus food sensitivity is the antibody that's produced against them. IgE binds directly to mast cells and causes a histamine response and it's immediate, whereas IgG, IgM, IgA, immunoglobulins or antibodies don't have the same effect. They're delayed.

Perfect.

One last question here.

Sure and then I have a comment. This is a little off again, Catherine, "If one is hypothyroid and has leaky gut, high zonulin despite gluten-free, it's best to add hydrochloric acid even if no digestive issues?"

No. I think the point is ... It's not that simple. There isn't just this, this equals this. It's hard to give direct advice. Hypothyroid, you have 100,000 different variables of treatment, based on an individual. Same with intestinal permeability. I can't say what the next step is. I'm not sure if I understand the question, but that's the main thing is it's not that simple. You basically have to do your individualized gut evaluation, whether you have Hashimoto's, non-Hashimoto's or so forth, whether you have gluten or not. I would just tell you, remember, if you have gluten sensitivity, you have to also avoid dairy, that



Gut health and fatigue: How your gut impacts your energy levels – Facebook Live (January 28, 2021)

there's no really such thing as gluten-free, it could be gluten and dairy-free because gluten and dairy have very similar amino acid structures.

One of the biggest reasons people never fix their leaky gut when they have gluten sensitivities, they also don't get dairy-free and there's also many grains that cross react with gluten, so you have to go grain-free and that's why auto and paleo is effective for a lot of these people because it removes food proteins that are very similar to the gluten. We talked about that in the Food Sensitivity Program as well. Is there any comment?

I do. Susan is asking, "If you can please remind people about the Adrenal Summit that starts February 1st?"

There's an adrenal summit on February 1st if you guys are interested in it. Susan will put some links on our site. If you haven't linked to follow us, please follow us. We have these talks all the time and you'll be notified about them. We try to do this every Thursday. We have lots of articles, information at Dr. K News. Thank you all for your time and I hope you found information today useful and see you guys next week. Thank you.