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Today's discussion is going to be on adrenal stress syndrome. In this discussion, one of the first things I want to go over is this really a fact or fiction? What's going on in the healthcare system when it comes related to these types of patterns? The key thing to understand is that the term that's used in preventive medicine, functional medicine, nutritional medicine, like adrenal fatigue, adrenal exhaustion, adrenal syndrome is not really in reference to a medical condition. It's really in reference to a physiological state.

One of the problems that takes place with people as they get labeled with these types of conditions, they may go to their physician, their healthcare professional, and they go, "Nothing like that exists". Then, there's some level of confusion. What I want to do in this talk is really go over the difference in terminology that's used, talk about some of the research, and then talk about the physiological microbes that take place with chronic stress. The, discuss some of the lifestyle, nutraceutical dietary applications you can incorporate if you're dealing with a lot of stress in your system. Stress, as time comes along with the holidays and all the things that are happening, is something that we should all understand.

Basically, in 1950, there's a researcher, endocrinologist that named Han Selye and he published this paper that was called "Stress and General Adaptation Syndrome." This was published in the British Medical Journal. If you want to see that paper, it is available online. If you just type in stress syndrome or adaptation syndrome by Han Selye, S-E-L-Y-E, you can go to National Library of Medicine link and you can download the paper.

He was the first to really talk about when there is stress that there's physiological changes that take place. He's really considered the father of stress physiology, because of his pivotal work in that publication in 1950. One of the things that he was able to show is that there's lots of adverse physiological mechanisms that can take place over stress. Some people adapt to it and some people don't.

That kind of took on its own application in different circles. In the early '60s in the nutraceutical nutrition circles, people started to use the term adrenal stress syndrome and they were using things like adrenal adaptogens and herbs and nutraceuticals and even adrenal glandulars. That skimmed into different protocols. Different people were being treated for so-called adrenal exhaustion, if they had a lot of stress and all of a sudden fell apart. That's something that's continued to some degree to these days. That's kind of the nutraceutical application of Han Selye's original work.

In the medical community and in the research community, nothing really changed. It was just another physiological paper. Then, in the exercise physiology circles, they use the term metabolic overtraining syndrome for athletes that started to overtrain and have negative consequences of stress. In the classical endocrine disease world, Cushing's syndrome, which is a high cortisol pattern typically caused by a pituitary tumor or some type of ectopic tumor in the body that was causing the body to lose high amounts of

cortisol. That's your classical hypercortisolemia or excess adrenal hormone production of cortisol as a disease.

Then, there was also adrenal insufficiency as a medical condition typically caused by Addison's disease, which is an autoimmune attack against the adrenal glands. Those people need to be on cortisone replacement in order to maintain their normal health and function.

What we have is really the research world, a lot of Hans Selye being the father of physiology publishing this paper, talking about stress adaptations and maladaptation. Then, the exercise physiology, where you're getting into metabolic overtraining syndrome. Lots of researchers are studying stress and the physiology of stress. In the medical disease categories, there was just a classical Cushing's disease and Addison's disease. Nothing else really existed. That's kind of where we are right now.

When people walk into the preventive medicine, nutraceutical world, they can see someone who has like a chronic stress pattern. Maybe they've been under high amounts of stress or whatever the reasons are. Maybe they're not getting enough sleep, maybe they're overtraining. Maybe they have significant lifestyle stress. They're just exhausted and don't feel well. They're not functioning to their normal levels. They may get labeled as adrenal stress fatigue or adrenal exhaustion or adrenal depletion or adrenal stress syndrome.

Interestingly enough, it was really funny that there was a paper that was published that was titled, "Adrenal Fatigue Does Not Exist: A Systematic Review." This was published in 2016 in BMC Endocrine Disorders. This researcher actually went through the entire medical literature. Looked at 3470 articles and came up with the conclusion that there is no medical disease condition called adrenal fatigue. This is really funny that a person actually did this. This would be as silly as trying to go through the entire literature and trying to name something leaky gut or in the literature, just considered intestinal permeability.

Whether the terminology is used correctly or not used correctly, I think has led to some problems. At the end of the day, we do know without any doubt, in physiology studies, that there are some significant adverse effects from chronic stress that happens to people. Those have their toll on physiology. When they're working on something that is doing functional medicine, they may actually measure the cortisol levels throughout the day with additional cortisol test, or look at their ability to maintain adrenal functions like sodium retention from aldosterone, or their blood sugar stability.

This is where we get some differences and confusion with people. The first thing to really point out is that in conventional medical diagnosis, there is no adrenal stress syndrome pattern. It's really a physiological state. In the sports physiology world, they refer different exercises that causes chronic stress as metabolic overtraining syndrome. In the functional medicine nutritional world, they'll use the terms like adrenal

maladaptation syndrome or adrenal exhaustion, or adrenal fatigue. These are kind of just slang terms just like leaky gut syndrome is a slang term for intestinal permeability.

What happens when you have chronic stress? Let's talk about that, because that is very real. When you're under chronic stress and we're all designed to have stress. If we don't have stress, we end up with things like depression. Our bodies have to have some degree of challenge, emotionally, physically, to stay healthy. Stress is not necessarily bad. We have to have some degree of stress. We need to have some degree of physical stress, like exercise, to change your antioxidant levels, to increase your blood pressure, to increase your blood flow, which then has a counter regulatory effect of lowering of our blood pressure, raising your antioxidants throughout the rest of the day. Even though we're creating free radicals when we exercise but there has to be, let's say, physical stress caused by this.

If there's no psychological or cognitive stress at all, then people get massive depression. People who don't have anything to stress about, have nothing to do when they go into retirement. They can't find anything to push themselves to do, is not excited about anything. The fact that they don't have cognitive activity, they can get into psychological depression. You have to have some type of emotional mental stress as well in your life to stay healthy. We have to have some degree of physical stress. We have to have some degree of psychological mental stress for normal physiological functions.

There are times where there's just chronic stress. The chronic stress, maybe an athlete, for example, that overtrains and doesn't allow his body to rest. It could be a person that has workload or lifestyle strategies, but doesn't have the compensatory mechanisms of like sleep and exercise and social groups to talk to that then change them into adverse stress response. I think the best term is not to use like high stress or low stress, because how do you define that?

The key define is does a person actually have enough adaptive properties to deal with their stress load? For some people, running 15, 20 miles a day is no big deal for them. The body has adapted to that, as long as they're getting sleep, and they're nourished their long endurance athlete. They have no problems. For someone else, if they did that, they would totally fall apart because they don't have that degree of ... their body's ability to adapt to it.

The terms high or low is too subjective. It varies from person to person whether that's psychological stress or lifestyle stress or physical stress. It really comes down to, if you get into a state where you don't have enough adaptive mechanisms to deal with the stress, then you're in a so-called physiological stress response, right? That could be not getting enough sleep. That could be doing more projects than your body's used to doing. That could be like, again, overtraining.

When people get into a chronic physiological stress, where they don't have enough resilience to deal with it, then their cortisol levels can potentially go up. When the

cortisol levels go up, then that immediately starts to cause insulin resistance. When that happens, the person's ability to get insulin released properly for the foods they eat is dysfunctional. They'll search out more insulin and this will lead to sugar cravings and weight gain. Elevated cortisol, also, has been shown to cause intestinal permeability, leaky gut. Chronic stress responses, where a person doesn't have enough ability to adapt to it, can actually cause intestinal permeability. It can dysregulate immune system function. Autoimmune diseases can flare up.

People can end up having increased reactions to food or environment with the chronic stress responses. Chronic stress responses can shift also aldosterone so blood pressure levels can go up. They get hypertensive. They can get swelling. They get bone loss, chronic stress impacts. Things like T4 and T3 pathways. They may not convert as much T4 to T3. In that scenario, when this is happening, this is where the person is generally healthy. The degree of physical stress, emotional stress, lifestyle stress exceeds what their body is able to adapt to. They can gain weight and they can get swollen. They can have mood disorders. They can have all types of dysfunctions.

For other people, they have a chronic stress response. When you measure their cortisol levels, they just stop making cortisol as well. Their body's resiliency to produce cortisol on an ongoing period becomes compromised and they have these like, let's say, low cortisol patterns. The typical thing that happens when people end up with low cortisol patterns is the blood sugar drops all the time. They have to eat frequently throughout the day. They just end up with headaches and can't function and they crash and so forth. That's more of your low cortisol pattern.

We do know that there's physiologic response to stress. We'd also know that you can't say high or low, because it varies from person to person. That's very subjective. You have to really look at the person's maladaptation response. The biggest factors that will determine stress will be or their ability to respond to stress is, number one, are they getting enough sleep? If you don't get enough sleep, your resilience to stress immediately goes down.

Stressful events can cause some significant negative impacts on you if you're not able to get, let's say, the amount of sleep that you need. Then also, another question, what's the amount of sleep that you need? The amount of sleep that you need would be how much sleep do you need if you don't have like an alarm clock wake you up? Your body may recover in seven hours, may recover in six hours, some people need more. If you're not getting the amount of sleep your body functions with, which varies from person to person, your ability to adapt to a stress response completely goes down.

Another key thing is physical exercise. Physical exercise, you have to have some movement. Exercise has an immediate physiological response to dampen stress physiology, it burns off catecholamines, impacts the hypothalamus pituitary axis. Is the person getting some degree of exercise and physical activity to deal with their stress? Then, social support, social communities are really helpful to deal with stress, especially psychological stress. There's obviously things like meditation and so forth.

Some people get into a stress response where they don't have enough adaptation process, maybe not getting enough sleep, maybe not getting enough physical activity, maybe they're just overwhelmed or overworked with too many projects. Then, they actually further amplify that, because now that they're not feeling well, their cortisone levels are up, and they're sugar craving, they jump into eating more sugar. Then, they end up more insulin surges. Their stress pattern actually gets much, much worse. They just embrace not sleeping. They're just not sleeping at all. They have no time to exercise because there's a huge project to do and all those things that take place with it.

They may revert to alcohol or drug use, which then impacts their physiology in a negative way. What happens with some people that end up getting really chronically sick is they get into a chronic stress pattern, defined as the load that they have for themselves is greater than their body's ability or resilience against it, which involves sleep, exercise, social support, their just overall metabolic status. Then, they really fall into this vicious cycle of just eating bad, not sleeping, doing alcohol, and then there you go.

Autoimmune diseases flare up, chronic diseases express more. Basically, when somebody gets into it, a stress physiological response where their cortisol levels and the stress hormones are at high all the time that actually puts them into what's called a catabolic state. In a catabolic state, your body cannot recover and repair. This is why it's really hard to fix a leaky gut. If someone has a leaky gut issue, it's really hard to deal with immune dysregulation and multiple food sensitivities or environmental sensitivities. It's also why these things get worse. It can also disrupt neurochemicals. You can get chronic depression. Someone's depression could get much, much worse under a stress response.

That's the basic well-known understood physiology. Whether that's called adrenal exhaustion or adrenal maladaptation or adrenal stress syndrome is a slang term that's used. Technically, it's not a medical disease. Some people get labeled with that term and then there is some confusion with the patient themselves when they talk to other health care professionals.

Okay, so now, let's talk about the stress response a little bit more detail. When you look at the stress response in the adrenal glands, the adrenal glands really have two regions. There's the adrenal cortex, which is the outer part of the adrenal glands, and that releases cortisol, which we've been talking about. There's also an adrenal medulla, which is the inner part of the adrenal glands, which is really more of the autonomic nervous system than it is the endocrine system.

The adrenal medulla releases a hormone called adrenaline and catecholamines. Those hormones are what cause a person to have what's called a fight-or-flight reaction. It will cause the heart rate to go up. That causes their pupils to dilate. That cause them to have symptoms of anxiety and nervousness and maybe some trembling. There are people that sometimes get mislabeled as adrenal stress syndrome people that have autonomic dysfunctions. These are referred to as dysautonomias.

Dysautonomias can take place after traumatic brain injuries. Dysautonomias can take place from neurological autoimmune diseases. Dysautonomia can take place from conditions like post-traumatic stress disorder. These have nothing to do with an adrenal gland imbalance. That's another key thing to understand. Dysautonomias are not uncommon. Lots of people that suffer from them end up being labeled as having an anxiety disorder. They involve the adrenal medulla, not the adrenal cortex, which people call cortisol, the stress hormone. The hormone that makes people gain weight and so forth.

Let me just kind of break it down. There's just a lot of information here. Let me try to put it together for you. When you look at the physiological response to the adrenal glands, the adrenal glands have a cortex that produces cortisol and adrenal medulla which produces catecholamines, which are like adrenaline, which causes the fight-or-flight reaction. That's a normal part of physiological function. Another normal part of physiological function, the general glands, which can become imbalanced and cause symptoms is an abnormal cortisol rhythm. When you look at normal physiology, the cortisol levels should be high in the morning and then it should start to taper down as the day goes on.

This is actually also a laboratory test that many people use in the functional medicine community and even many people use in research studies. What they do is they measure a person's cortisol in the morning, noon, afternoon, nighttime. Cortisol levels are very reliable, highly specific, highly sensitive way to monitor cortisol. The adrenal cortex hold on throughout the day. Cortisol has a rhythm, high in the morning and then it goes down till night time.

Melatonin has the opposite rhythm, by the way. Melatonin is low at nighttime and as you sleep, it starts to go up. These cortisol, melatonin rhythms are part of normal physiological function. Some people end up with disruption in their cortisol rhythms. If they have the disruption in the cortisol rhythms, then they start to have energy differences throughout the day. They may not be able to get a bed. They may have to push the snooze button to be able to function. They may have crashes right in the afternoon. They may have changes in their mood at a certain time of the day. If the cortisol levels aren't able to go back down at nighttime, they may not be able to fall asleep.

Part of that cortisol circadian rhythm, the release of cortisol throughout the day, involves also something called the cortisol awakening response. The cortisol awakening response is a part of the rhythm which is measured. You can do a laboratory test to measure cortisol awakening response, which involves how quickly cortisol levels go up within the first 30 to 45 minutes when you open your eyes.

As soon as you open your eyes and wake up, which would normally happen, is your cortisol level should go up the first 30 to 45 minutes by about 50%. If your cortisol levels are not able to go up by 50%, then you can actually have really hard time functioning first thing in the morning and waking up. That's a cortisol awakening response

disruption. In the literature that's been associated with mood disorders, sleep disorders, increases risk for certain chronic inflammatory conditions. There are some early studies that may increase risk for certain cancers.

Our rhythms are really important to us. They have far reaching effects in our immune system and our general health as well. That is the other part of this adrenal dysfunction. The question to ask is, so when someone gets labeled as having an adrenal stress syndrome, what are they referring to? Are they referring to they're putting out too much cortisol, not enough cortisol? Is their cortisol rhythm abnormal? Do they have an abnormal cortisol awakening response? What is it?

There's a lot of confusion out there and there's a lot of practitioners that are doing different things. They're all labeling it as, let's say, adrenal exhaustion. At the end of the day, let's talk about what really is important. In a clinical setting, the first thing is if a person has a medical condition like Addison's or Cushing disease that needs medical attention and those conditions, they're pretty rare. What's not rare is how people totally fall apart when they're under chronic stress responses.

This is the time of the year where people really have a lot of stress, where they're dealing with family and holidays, and all the things that come along with that. If you get into a position where your body cannot adapt to stress, you're going to have some significant symptoms. You may have cortisol levels go up. If cortisol levels go up, you may notice you're swelling, you may notice you're gaining weight, you may notice you're not sleeping well, you may notice your energy levels are changing throughout the day. For your catecholamines like adrenaline, you may have anxiety, your heart rate may go up.

If that's happening to you, then you have to try to reduce your stress. If you can't reduce your stress, then you have to try to improve your adaptation to stress. The biggest things you can do to improve adaptation to stress is to try to get some sleep, try to make sure you maybe go to bed earlier, try to make sure you actually make an effort to get enough quality sleep. You may need to get a workout in, and that's not the key thing. You might have to actually physically schedule time, make it happen to help your body's adaptation to the stress response if you can't do anything about the stress. That may be important.

People opt for meditation. Meditation, you've got to learn how to do. It's not something you just do easily, but those types of things, you know how to do it. That can be helpful as well. Then talking to people, social support can be really helpful. Be aware of getting into forums that really stress you out more. I mean, one of the ways you can maladapt to stress is you just go on Facebook or other social media forums and just get yourself even further stressed out, right.

You may want to remove things that really cause you some anxiety from your social media feeds or your YouTube channel, get rid of some channels that are constantly

giving you, for example, news that's making you have anxiety. If you're stressed at the point where it's too much, then you got to find a way to deal with it.

From a nutraceutical model, there are botanicals that have some degree of effect and it varies from person to person with a group of botanicals called adaptogens. Adaptogens are botanicals like ashwagandha, Siberian Ginseng, rhodiola, holy basil extract, and what they've been shown to do in some animal studies is reduce the adverse effects that take place with stress like the development of gastric ulcers or the development of insulin resistance when people or animals in most of these studies are under stress responses.

Some people use adaptogens, B vitamins tend to be important. When people have lots of chronic stress, the adrenaline has more B vitamins than the normal intake when they do find a stress. Good healthy B vitamin, vitamin C has been shown to be helpful to help the body's nutraceutical needs while they're under a lot of stress and then hydration. Those are the main things.

That's kind of like the summary of adrenal adaptation syndrome. The most accurate to actually know if your adrenal glands are dysfunctioning from a cortisol perspective is to run an adrenal salivary test. That's when you get a test kit or measure the cortisol levels throughout the day. In many of the adrenal salivary tests that are available include something called the cortisol awakening response where you measure cortisol for that first 30 to 45 minutes. Then, if those are abnormal, then you get a clue that your adrenalin medulla is off. I'm sorry, your adrenalin cortisol is off.

Unrelated to that, if you did just have anxiety for no reason, you get into a crowded room and you get anxiety, have nervousness, that's really more of autonomic issue, and that's really more dysautonomia. Taking adrenal gland supplements, adrenal gland nutrition is not going to be help for that. The last thing I want to add before I take questions here, that I do the Q&A, is that there's a lot of research now that is showing that these cortisol rhythms that are part of our ability to adapt to stress properly throughout the day, can be completely altered when an area of our brain called the medial temporal lobe, the hippocampus starts to degenerate.

When that starts to happen, cortisol rhythms become abnormal. One interesting thing about that is these are also the areas, same regions of the brain, that are involved to stress response that are the first place, it's degenerate with Alzheimer's disease. Alzheimer's disease starts in this same region of the brain, the medial temporal lobe, and it's also involved what's called declarative memory or ability to have long-term memory.

They've done studies where they've tracked patients that have early dementia and looked at their adrenal cortisol rhythms. If their adrenal cortisol rhythms are abnormal throughout the day, they can see correlations with their mental status and cognitive function going down over time. We know that some of the research is showing these

abnormal cortisol rhythms, their cortisol levels are all over the place may actually be an early sign of brain degeneration.

We also know that some of these people that have chronic dysautonomia where their heart rate goes up and they get anxiety being in a crowded room or like flashes of light really have a brain related issue, not necessarily an adrenal gland issue. Those are patients that really have, let's say, early Alzheimer's disease that have adrenalin issue and they take all these adrenal supplements doesn't help, become like the weird hard adrenal patient to treat.

Then patients that have brain-based dysautonomias where their catecholamines rise and surge all over the place are the ones that also get adrenal support and they don't seem to respond to them because it's really a brain-based issue, not necessarily adrenal cofactor or nutritional issue.

Okay, so with that, I can see a lot of people joined us more. Thank you. My lovely, wonderful wife Dr. Reyes is here. She's going to help me go through these Q&As.

Yes, okay. **First one is [Suey 00:26:52], what dietary changes can be made to help with adrenal fatigue? It's almost like dietary changes.**

Again, how we define what adrenalin fatigue really is. If adrenal fatigue is, you started to make low cortisol. Unless you do a cortisol adrenal salivary test, you make low cortisol. The biggest indication that your cortisol levels are low also is that you have a tendency to be hypoglycemic, your blood sugar drops all the time. In those cases, the most important thing you can do is to eat frequently, to not let your blood sugar levels drop.

If you're getting shaky, lightheaded, and irritable, that means your cortisol levels are probably low. If you continue to crash and get shaky and lightheaded and forget to eat, it's going to actually aggravate your stress response and can make you worse. It's going to be impossible for you to recover and get your cortisol levels back to a normal level when you're looking at these adrenal salivary measurements.

In those cases, eating frequently is really important. Obviously, diets that are high in salt can be helpful for you. If you have very low cortisol function, your blood pressure is very low, you may need to actually salt your food a lot. That's a person that has low cortisol. Remember, some people have stress responses and they don't end up with a low cortisol but with a high cortisol. The biggest clue that that's happening is that they're gaining weight. They're craving sugar all the time.

In those scenarios, the best dietary thing to do is really control insulin, which would mean get off, to dramatically limit high amounts of carbohydrate foods and sugary foods, because those foods cause the highest insulin response. When you're in a stress response, your cortisol levels are high, it's much, much more difficult to control insulin because cortisol itself dysregulates the insulin receptors, so your body puts out more and more insulin.

The more insulin your body puts out, insulin prevents your body from burning body fat for energy. It also helps your body store fat. It's really important when people get into like a physiological stress response and it's pretty serious and they can't get out of it and their cortisol is high. Sometimes they may have to go to an extreme low carbohydrate diet or even a ketogenic diet, so they can adapt to the stress response without having all the negative things happen.

Okay. **Mirabelle is asking, "Is potassium and sodium deficiencies confirm adrenal fatigue? If you have potassium and sodium deficiency, does that confirm you have adrenal fatigue?"**

No, not necessarily. Potassium and sodium or essential minerals, and there could be some arguments for it. I can see why people have used it as a diagnostic window is because the adrenal glands also produce a hormone called aldosterone. Aldosterone is involved with sodium regulation. Sodium, potassium regulation, well sodium retention mostly. Sometimes when you see someone with a very low sodium or potassium levels that could be chronic aldosterone issues.

It does occur with people that have chronic adrenal patterns, chronic stress patterns, but it's hard to diagnose the condition from it. It still would make you suspicious of it. In any case, there's just people who just don't get enough minerals. There's just people who just don't get enough sodium and potassium, that may not actually have any significant adrenal issues altogether. You would always certainly suspect that if sodium potassium levels were low, and you definitely should supplement with both to restore that function.

Okay. Susan is asking, **"For those who plan to ask their doctors for testing, can you please clarify the difference between the adrenal salivary panel and next and, CAR, cortisol awakening response version?"**

Okay. First of all, depending on what kind of lab test you ask your doctor for depends on what kind of doctor you're working with. If you're working with a general physician, general practitioner, they're just not going to even know what a general salivary cortisol test is. It's not really a test for disease, it's really a test for function. They're not really concerned about physiological patterns.

Asking for an adrenal salivary cortisol test to measure cortisol throughout the day, which is a functional measurement is probably going to be something that they're going to not understand because it's not part of their routine daily functions as a family physician trying to identify disease and refer people to wherever they need to go.

If you're working with endocrinologists, they're definitely not going to really care about a cortisol profile. They're really just focused on dealing with true metabolic endocrine diseases like Cushing's syndrome, Addison's disease which are life threatening and cause serious health problems. They don't really care about a physiological change in cortisol that may impact someone's sleep or energy levels throughout the day. They're dealing with bigger issues.

If you're working with someone who is more inclined to preventive medicine, lifestyle medicine, functional medicine, which could be any kind of professional. It could be an MD focused on preventive medicine, it could be in naturopath, it could be DC, it could be acupuncturist, it could be highly trained nutritionist. Then, the test you want to look for is called an adrenal stress index, or adrenal salivary test, and that's where they basically collect saliva samples throughout the day.

There is absolutely no question at this point in the literature, if this is a valid test. It's been shown in several hundred studies to have high degrees of sensitivity, specificity and reproducibility. It is a very accurate test, that it accurately measures cortisol levels throughout the day. It's not necessarily a test to find disease, it's just a test to compare your cortisol levels throughout the day in a rhythm compared to the rest of the population. If that's imbalanced, it doesn't mean you have a disease. It just means your adrenal glands are not physiologically functioning, physiological parameters for other people, which is common.

The test should be an adrenal salivary index test. Now, some labs that do adrenal salivary index tests have the option for what's called a cortisol awakening response. If they have that option, it will require you to collect a saliva sample immediately when you first wake up, and then collect the saliva sample within that first 30 to 45 minute window and then they'll have you collect the saliva sample like at noon time then in the afternoon, and then right before you go to bed, and they will map out cortisol levels throughout the day. That's called an adrenal salivary index, or adrenal salivary cortisol profile. There's different names by different labs, but it's basically a saliva cortisol measurement throughout the day.

Okay. **There's a lot of questions on the HPA axis dysfunction is what you're referring to also called, HPA axis dysregulation, dysfunction?**

Yeah. What happens a lot of the marketing people out there have re-termed all this stuff to make it seem like they're something new. HPA axis dysregulation is another term people are using, hypothalamus-pituitary-adrenal axis.

State it again slower because [inaudible 00:33:37], HPA axis.

Yeah. I'm sorry. HPA axis is hypothalamus-pituitary-adrenal axis. Technically, your hypothalamus is going to signal your pituitary. Your hypothalamus is going to release something called corticotropin-releasing hormone to stimulate the pituitary to release something called, ACTH, adrenocorticotropic-stimulating hormone and that's going to stimulate adrenal glands to produce cortisol. CRH to ACTH to cortisol. This is a feedback loop between the hypothalamus to the pituitary going down to the adrenal glands.

That's a normal response to produce stress hormones. Some people have just labeled that as HPA axis dysregulation. I think it's better to be more specific. Is it a cortisol rhythm issue? Is it a cortisol level issue? Is it an adrenal medulla issue? Is it a cortisol awakening response issue? The term HPA axis dysfunction ...

Or dysregulation.

... or dysregulation is some people's term that they're using for any kind of abnormal physiological stress response.

Okay. **Jim [Quillo 00:34:49], I think is how you say it, "What does it mean if cortisol is normal all day, but high at night on a salivary cortisol test?"** I'm sorry.

Okay. The question is, is that an adrenal salivary index test, the cortisol levels are normal throughout the day, and then it's high nighttime, right?

Mm-hmm (affirmative).

It goes up and he's probably not sleeping, probably not enough sleep. It means your rhythm is abnormal. That's a rhythm issue. In those cases, where the rhythm comes off doesn't necessarily tell you what the mechanism is that's causing that for you. Some people have a spike in the afternoon, some people have a spike in the morning, some will have a spike at night. Sometimes, you get some clues of what's happening to that person.

If your levels are spiking right at night time before you get to bed, you may want to make sure you can do some things like exercise a little bit earlier in the afternoon and try to burn off some of your stress hormones and see if that helps.

Just for some people, the biggest cause for any rhythm issue is just the blood sugar issue. You could be having way too many carbs at night and that's causing a huge cortisol response. You could be eating foods you're sensitive to. It's not very specific to the fact that cortisol levels are high at night. It just means that you have a rhythm pattern and you still have to go back and look at your adaptation pathways, social support, meditation, exercise, foods, and see if there's anything happening with those.

More than likely if it's nighttime anywhere from like 2:00 to when you go to bed is where you may have some shifts and challenges to some degree. Sometimes, there's nothing new with that. Sometimes, it's like you're just waking up and the things you're doing in the morning are actually affecting your nighttime cortisol levels. It's hard to say if it's morning or nighttime, what the pathways are. It just tells you that there's some kind of rhythm dysfunction.

Some people with early Alzheimer's disease, unrelated to their diet and lifestyle. There are parts of the brain are degenerating, will show up with just early nighttime cortisol spikes or early morning spikes. There's no specificity to exactly tell you that this is what you have to do if it's just a nighttime elevation.

Okay. **A lot of people are asking, can you please talk about ways to treat dysautonomia.**

Dysautonomia. I can tell you in my clinical practice, I've worked with a lot of dysautonomia patients.

Which is?

Which is abnormal autonomic function. They'll come in, I'll see their eyes are dilated. I'll check the heart rate, I'll take a pen light, flash their eyes. Also, the heart rate jumps up 20 points. I have my heart rate monitor, I'll clap, the heart rate goes up by 20 points within a very short period of time. I have to throw all my lights off my office to do a history because they have significant stress responses that makes it feel better being in darkness.

There were sound cancellation anywhere they go like. These are paths to dysautonomia. Dysautonomia is something's wrong in the brain. Definitely it is not something you're going to fix with a nutritional supplement. It's not a mineral deficiency. It's not a nutrient deficiency. It is dysfunction in areas of the brain that are controlling autonomic function. Some of those people will have a psychological induced PTSD. They may need to do neurofeedback or neurocognitive therapies, or other types of treatment protocols to help them change their brain, so they can deal with their PTSD.

Some of those patients have demyelination. They have early patterns of MS they don't even know yet. Some of those patients had a head injury, their brain hasn't healed, and there's an aftermath years later from pathways degenerating from where their injury started. Those then really required a personalized, comprehensive approach just to figure out what areas of the brain are causing dysfunction in pathways that are impacting the autonomic system.

It's impossible to tell you how to treat it. To be honest with you, they're not easy to treat too, but there is hope for them. Some people have some very clear pathways that are causing dysautonomia and if they can improve them, they can really change their physiology. Lots of dysautonomia patients get misdiagnosed as adrenal exhaustion patients, adrenal stress syndrome patients, and it has nothing to do with the adrenal glands.

Your biggest clue that dysautonomia is taking place is changes in things like heart rate, inward trembling, pupil size, from trivial degrees of input, then that is really a brain related issue and not an adrenal issue.

Okay. **Shawn is asking, "Can dysautonomia appear in children with ASD and ADHD?"**

All the time. Dysautonomia can take place with children that have any kind of neuro development issue. If the brain is not developing properly, they may not have enough connectivity, enough plasticity in areas of the brain that modulate autonomic function. There are lots of children that have ADD, ADHD or other types of autism or barriers of the autism spectrum, where they have dysautonomia, because of lack of brain connectivity, plasticity to areas that control autonomic function.

For those people by the way, their cortisol levels can look totally normal. You can see adrenal salivary cortisol tests that looks normal. They're all surprised because they're

expecting since they have anxiety and hurried all the time and stressed all the time that symptoms of stress all the time that the cortisol should all over the place and they're totally normal many times, because it's not a cortisol issue or a rhythm issue, it's an adrenal medulla issue, which involves autonomic centers of the nervous system and not the adrenal glands itself.

Okay. **Just to clarify, again, Shawn's asking, so, "Okay, 1% is the adrenal stress index pattern abnormal with an abnormal spike in the evening, can that point to a specific brain region impacted?"**

For sure, if the rhythm is off, the specific brain region that's impacted is the hippocampus.

The entire rhythm, not just the spike.

Yeah. Hippocampal degeneration, which is involved in cortisol rhythm to be asking about the brain component, can cause any kind of cortisol rhythm abnormality. It's not specific to just the night or morning, or levels that don't go down throughout the day. Any kind of imbalance can be caused or degeneration in the middle temporal lobe.

By the way, if your medial temporal lobe is degenerating, you're going to know because you're going to have problems with declarative memory. Declarative memory is recall. You may have a hard time remembering phone numbers, you may have a hard time remembering what you did the day before, you may have a hard time remembering corrections. If that is getting worse with you over time, or degenerating, that's letting you know that maybe your cortisol rhythms are associated with that. In those cases, you may really want to take approaches to help your brain function.

Such as.

Such as.

You're having a brain ...

Such as going after all the methods to improve your brain functioning and things like Huperzine could help with acetylcholine function. We have an online program called, Save Your Brain at our website, Dr. K News, D-R-K-N-E-W-S.com.

Right.

Save Your Brain, where we take people over seven weeks, teach them how to look at dietary lifestyle factors to improve the brain function. Those strategies could be very useful for you if you're worried about your brain health. Whether you have dysautonomia or cortisol abnormalities that you think may be early Alzheimer's types of dysfunctions.

I wrote a whole book called, Why Isn't My Brain Working? Where we review the entire literature for all the different mechanisms that can cause the brain to have early neurodegeneration like neuroinflammation or dysglycemia or oxidative stress patterns

and gut brain access connections, and so forth. In those cases, if you feel like your cortisol rhythms, or if you have an abnormal cortisol adrenal profile, and you've taken every single adrenal gland nutraceutical in the planet and nothing is helping, and you're the weird adrenal patient, and you notice your long-term memory is getting worse, your visual memory is getting worse, and that's progressing, then you really need to maybe change the focus on your brain health.

That program is really good.

Yeah. Thank you.

You're welcome. It's good. Okay. **Lauren's asking, "Since catecholamines can help to activate the prefrontal cortex, have you found low adrenal output in some of your ADD patients? In that case, would helping the adrenals also help the prefrontal cortex operate better?"**

Technically, there's definitely truth to that. Catecholamines are called adrenaline, noradrenaline. They're also known as epinephrine or epinephrine. What they do is, they activate your receptors and there's lots of these receptors in the frontal cortex. The frontal cortex is really our focus attention, concentration.

With people who had ADD, ADHD, what happens is their frontal lobes are not fully developed. They're having some developmental delays there. They have issues with focus, attention and concentration and then when they're given stimulants like Adderall, which is basically adrenaline like compounds, stimulants, they tend to have better attention, focus and concentration, but they're constantly being stimulated.

The question is, are you actually having these people have low catecholamines? Here's the problem. We don't have a good catecholamine test. There's serum catecholamine measurements that are there, but the ranges are so broad, because they fluctuate so much throughout any given day, that we don't have a very good way to know if that's really happening.

There are certain tumors that can raise catecholamines like in the gastrointestinal tract, or even in the lungs that can really spike up high amounts of adrenaline. That's also another diagnosis with people with chronic anxiety disorders, but it's pretty rare. There isn't a good way to measure total catecholamine levels with people to determine if that's impacting their, let's say, brain function symptoms. Just because they have low cortisol, let's say an adrenal profile, it doesn't mean they have low catecholamines.

You're looking at two different issues even though they're part of the same gland, there are two different feedback lobes, two different glands all together. The adrenal medulla and adrenal cortex are under different controls even though they have some synergy within each other.

Okay. **Hi, if you have low cortisol that craves salt and are autoimmune, what would you take on salty food be?**

If you have low cortisol and?

Yeah. Low cortisol crave salt and autoimmune.

Crave salt, yeah. I think this question is coming up because there's been some recent research that shows that salt can increase autoimmunity and high sodium diets have been shown to flare up autoimmunity and then they've actually discovered the specific immune pathways where salt activates T cells and turns on autoimmune diseases through what are called T8 17 pathways.

That's for people that, let's say, don't have low cortisol, low sodium patterns like, if you have low cortisol, you probably have very low and especially if your blood pressure is low, and you crave salt all the time, you may need to absolutely take salt even if you have an autoimmune disease. In my practice, I find that to be very true with my patient's responses, I find that to be very true.

For people that have very low blood pressure and autoimmune disease, and this whole low cortisol pattern, they will actually feel better consuming salt. Even when they consume all this salt that they can and salt everything, you can barely see a rise in their blood pressure, you can barely see a rise in their sodium levels. The problem is because their adrenal glands are not making enough aldosterone in those cases, and they don't have the ability to retain the sodium that they're consuming.

If you don't have healthy aldosterone levels from the adrenal glands, you can't retain sodium. I will also point out that there are a lot of people that have chronic adrenal stress syndrome patterns that actually have subtle adrenal gland autoimmunity. Adrenal gland autoimmunity is called, Addison's disease. In order to be diagnosed with Addison's disease, you have to have the autoimmune disease destroy more than 90% of the adrenal glands for the person to actually show up with patterns of low cortisol adrenal hormone output, low cortisol output to get diagnosed.

There are people that have adrenal gland autoimmunity measured by adrenal antibody blood levels that may only have 30% adrenal gland disruption. They'll have issues with salt and cortisol and their adrenal hormones and they're not able to be effectively those when they're measured, but they never fit the criteria of full blown Addison's disease where they need cortisone replacement therapy.

If you have a chronic adrenal gland issue and nothing's ever helped, your cortisol levels are always low, your sodium is a little low, you may need to get some testing for the adrenal glands. The most popular and common test to identify your own autoimmunity is called, 21-hydroxylase antibodies.

Okay.

Next question.

Yeah. **Susan is saying, "I want to take Apex's NeuroO2 supplement to help with poor circulation, but I've been having brain fog from lot of high histamine foods**

and I'm worried the Cayenne extract it contains might be an issue. Does an extract have the same histamine reactivity as the whole food?"

It depends on what part of the extract you're reacting to. If you want to increase your blood flow, but you're worried about a supplement that may have Cayenne in there, just take Ginkgo biloba by itself. Ginkgo biloba will increase your nitric oxide levels or just take Vinpocetine as a nutraceutical supplement. Just follow the capsule recommended dosage. You have to experiment the dosage that works best for you. Usually start with one capsule and then go from there and then see what level really makes an impact for you.

You can just take Ginkgo biloba or Vinpocetine. The Ginkgo biloba is very effective and very popular so you can find it everywhere. Vinpocetine, V-I-N-P-O-C-E-T-I-N-E is not as popular so you may not have an easier time finding that. Nowadays everyone's going online anyways so you should be able to find both fairly easy.

Okay. Kelly is saying, **"Is low DHEA indicate adrenal dysfunction?"**

No. Low DHEA is just a metabolic factor, and DHEA levels do fluctuate to some degree. You can see low DHEA with adrenal imbalances. The adrenal glands are also involved with making DHEA. Again, you can't determine adrenal cortex function just by DHEA because female's ovarian tissue still makes some DHEA. There's some DHEA synthesized in the liver from other hormones. There's DHEA synthesized actually in the brain, the brain makes some level DHEA from glial cells.

DHEA is made by men in the testicular tissues so, it's not specific just to the adrenal glands. You can't have abnormal DHEA levels, let's say, low DHEA with someone that has cortisol response issues and whether it's like low or high cortisol, but DHEA itself is not enough.

Okay.

It's not specific enough.

Yeah. **Okay, Kelly's asking, because you're talking about trouble with cortisol high at night assuming, "Are there any problems caused by taking melatonin at night to help with sleep?"**

Right. Are there any problems? It depends on how you look at it. Melatonin will definitely help you sleep ... I shouldn't say help. For most people, melatonin has an effect in improving their sleep quality. As you take melatonin, it helps your brain to get into your REM sleep and so forth. Normally, your melatonin levels are low and they eventually should go up at nighttime and when melatonin levels go up, cortisol levels actually get suppressed. They have this antagonist effect.

Melatonin goes up, cortisol goes down, cortisol goes up, melatonin is low. Sometimes, the best approach to take melatonin is just to get your cortisol down by improving your stress adaptation responses like sleep, exercise, proper nutrition, because your blood

sugar is stable. If you do take melatonin and some people may need to do it if they just can't find any other way to get their system under control.

The problem with is that you can actually throw off your melatonin rhythm over a period of time. There's also melatonin can activate the immune system and flare up. Some people have autoimmune, immunoactivities, melatonin, it's priming T cells. There's all these variables just not knowing a patient's history about one thing or another, but those are all the factors that's involved.

Okay. **Sean is asking, "Is there a direct correlation with abnormalities in one's adrenal stress index and circadian rhythm disorders?"**

One more time.

Is there a direct correlation with abnormalities in one's adrenal stress index and circadian rhythm disorders?

Yeah. The adrenal stress index is a cortisol rhythm measurement.

Circadian rhythm.

Yeah. The adrenal salivary index is the measurement of cortisol throughout the day, the rhythm. They're one and the same.

Okay.

Yeah.

Okay. I'm sorry, **"How accurate is Ragland's test in involving stress response abnormalities, the blood pressure?"** Remember, Ragland's?

Oh, yeah, orthostatic hypotension.

Yeah. Yeah. Yeah.

It's not, it's not. Okay. The Ragland effect, this positional hypotension, response, so you measure someone's blood pressure lying down and have them stand up and see if it drops. That was the classical test that was used to determine if a person has a physiological response that's proper to getting a blood pressure up. The truth is there haven't really been any studies done on it. It's been a theoretical model for all this time. They haven't done studies to correlate that with cortisol levels throughout the day and so forth.

If you're looking for evidence based model, we don't really know. If you ask clinicians, some clinicians will say it's great, some clinicians will say, it's the best thing in the world. I can tell you, especially on that test. It varies all the time. It may have nothing to do with your adrenal glands. Autonomic functions can change your blood pressure responses. People who have, for example, cerebellar disease will have that normal response. They can have vertigo or vestibular issues, they can have the abnormal responses when they

change their blood pressure up and down. I'd say it's still an experimental test. Okay, next question.

Okay. Mira, **"There are adrenal cocktail recipes floating around that include ..."**

Really?

"... I guess, you know about this. It include orange juice, Celtic Sea Salt, collagen, coconut oil, that kind of stuff. How do these," as far as the adrenals? She's asking how did they affect the adrenals? The adrenal cocktail.

Oh, I don't know. You can have a lot of these cocktails or I don't know. How do you know? I mean, obviously, salt is going to be something that most people feel cortisol response with. Whether it's like, listen, orange juice for a lot of people will feel terrible because it will cause them to have a blood sugar drop. Okay, what else?

Okay, let's see.

What's in the drinks? What's in the drinks?

Oh, orange juice. There are adrenal cocktails. I don't [crosstalk 00:54:01].

Okay. Yeah, right. Yeah.

The adrenal cocktail helped to boost the adrenal and support.

Yeah. First of all, all types of stuff or in different forms. The form itself can't be held responsible for what information is accurate and inaccurate. I would say for the most part, there's so much theoretical stuff out there on adrenal glands and everyone's got their theory, and everyone's got their protocols, and some people will just diagnose it just from a Ragland test with blood pressure. Some people just look at someone's eyes and go, "Oh, their pupil response, they're having an adrenal issue." Who knows, somebody will do all types of stuff to diagnose it.

The accepted way is to do an adrenal salivary index test, to look at cortisol levels throughout the day is the most reliable and evidence based way to look at these functions. As far as nutraceuticals and cocktails go, to be quite honest, there isn't much evidence on any of this, not because it doesn't work. It's just because no one studied it. There's not a bunch of researchers that are excited to ... that can get grants to look at an adrenal cocktail and see if it works or not for people.

There's a lot of anecdotal information, but if it helps the person feel better and definitely, something with lots of salt and minerals, a good nutrition can always help someone's physiology and technically their adrenal gland or physiological response to stress.

You have a little bit of cocktail [inaudible 00:55:21].

Yeah.

Is it fair to say that biggest nerve dysfunction can lead to issues with both adrenal medulla and cortex?

Why did you find vagus nerve dysfunction? That's another term that gets thrown around all over the place. Like, what does that mean? How are you assessing vagus nerve function? What's your diagnostic criteria? There's like all these theories now in vagus nerve, just because it becomes the cool term to use out there now. A lot of them are totally ridiculous and made up and just based on symptoms and have nothing to do within.

People with dysautonomia can have, to these categories, people will have frontal lobe injuries can include these categories, people who have PTSD can include these categories. It's really hard to answer that question. For the most part, I think the question is, can a vagal response impact autonomic? Yes. If you have dysfunction in your autonomic function, your vagal integration, then the part of the vagus integration is that it dampens the sympathetic response. It's kind of checks. It's like a seesaw effect. Parasympathetic activity when it goes up, dampen sympathetic, and then when sympathetic activity goes up, it dampens parasympathetic.

Okay. Perfect. **Catherine is asking, "Is the DUTCH test also a good way to measure cortisol levels and patterns?"**

It's yet to be determined. I think DUTCH is a great urine lab. I like all the people there. They're doing I think some of the best urine testing for hormones. The gold standard is still salivary. There's too many papers published in saliva testing to question that using it. It's like if you're going to use the gold standard test, it is still saliva.

As time will change, maybe more studies will come out on its impact on urine, and those studies being published by people, not the lab itself, but by independent people that can show that response, but I would still consider saliva the gold standard and the one to use.

Okay, Steve Sterling. Thank you, Steve. "Adrenal cocktail, 4 ounces of fresh squeezed orange juice, vitamin C complex, make sure the minerals noted get in to the liver, a quarter teaspoon of cream of tartar for potassium. You can also use classic bicarb, quarter teaspoon of fresh ground sea salt for sodium." That's what ...

Oh, okay.

... for the cocktails. Yes. There's so many of them.

It sounds nutritious.

Yeah.

It might be very helpful, because it has lots of key things. The key thing is less of sodium, less of potassium. That's great. I'm just worried about the orange juice causing

a glycemic spike because there's a lot of people that have cortisol adrenal issues, they can't handle a shot of pure orange juice or any fruit juice like that so that'd be my only concern.

Yeah.

Yeah.

Ezra is asking, "What is your approach to manage real adrenal issues?"

Approach to manage real adrenal issues? By real?

That's your kind of stuff, what's your approach?

My approach? My approach is do a thorough personalized workup. This is the problem with Facebook is we can only talk by generalities and not talk about it individual, in the individual responses. In a real clinical setting, there's patients that have adrenal imbalances, and you do nothing for their adrenal glands. You fix other areas, like fix their brain. You may fix their diabetes, get that under control first. You may fix patterns that are causing them to have chronic hypoglycemia shifts throughout the day. You may have underlying infection.

I would say, in the majority of cases, even people who have adrenal cortisol rhythm abnormalities, direct adrenal gland treatment is something that I rarely do, but I may use an adrenal cortisol salivary test as a baseline and compare to it over time, even though we may have not done anything directly for the adrenal glands. When I teach healthcare professionals, when I was teaching healthcare professional all the time, I used to always say, okay, there's an adrenal stress response that's abnormal, maybe more cortisol rhythm.

Your next clinical question is, due to what? What's driving force? Is it lifestyle factors? Is there underlying immune issues? Autoimmunity itself can dysregulate adrenal gland function because it causes significant physiological stress when there's those immune responses. Those are all the real life, I guess, with adrenal issues.

Okay. Two more. **What lab do you trust to use for adrenal salivary testing?**

Here, I don't want to be commercial, but I will tell you this, just make sure that they are a CLIA, C-L-I-A certified lab. If they're a CLIA certified lab, then you're good because they are going through standard operating procedures and validation that determines that they are valid tests. Just go to their website and see if they are CLIA lab certified, C-L-I-A.

Okay. One final question. **Susan said fixing her blood sugar issues fixed her adrenals.**

Yeah. That's actually the most common thing. The most common thing with people with chronic adrenal issues like they're hypoglycemic, they keep missing meals then, until

they stop missing meals all throughout the day and having tea and honey as a meal or smoothie as a meal, they don't have a chance to fix their adrenal glands.

Another common cause of high cortisol patterns is people have insulin resistance. They just don't get enough physical exercise, eat way too many carbs and sugar and no matter what their cortisol won't go down until they can exercise more and reduce their carbohydrates. Those all work.

Okay. Hassa, **"Can 21-hydroxylase antibodies be present while the total salivary cortisol levels are still at low reference range?"**

Yes, 21-hydroxylase antibodies just means the immune system is attacking the adrenal glands, depending on how much progression destruction has been done against those tissues, adrenal levels could be normal, they could be low, and even in some cases, there's enough attack but there's a physiological response that's higher than it's high.

All the antibodies tell you is that there's some immune attack against those tissues. The cortisol levels can be all over the place because the levels of cortisol are not just based on the antibodies against 21-hydroxylase. Okay.

Okay. I have one request, can you please remind people that you are doing ...

Oh, right.

... I'm so sorry.

Yes, we're doing an anxiety summit.

Thank you.

We have information on our Facebook page.

Susan's going to post it.

Susan's going to post it. If you guys who are actually in anxiety and different people talking about in the summit, please follow the link in our site for that as well. I think Susan has already posted it. Anyways, thank you all for joining me. I hope you found some information that was useful to you and ...

Any suggestions for next week?

... let us know if you have any suggestions on topics. I really appreciate your support. Follow us on Facebook and check out our website, Dr. K News. Thank you, everyone.