THE MODEL HEALTH SHOW

EPISODE 493

7 Ways To Boost Serotonin Naturally

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SHAWN STEVENSON: Welcome to The Model Health Show. This is fitness and nutrition expert, Shawn Stevenson, and I'm so grateful for you tuning in with me today at a time when mental health and mindset is more important than ever. Today we're diving into a master class from a dual hormone and neurotransmitter serotonin. So, let's kick things off today, first and foremost, with the roles that it plays in our bodies.

First and foremost, serotonin is a well-established natural mood stabilizer in our bodies. It plays critical roles in modulating stress, anxiety, depression, and more. Serotonin also helps to regulate our digestion. It's released in the gut, stimulates intestinal motility and gets things moving along. Serotonin literally helps the ebb and flow of our digestion overall. We're going to talk more about that in this episode. Serotonin also plays a major role in memory formation, specifically studies published in the journal Neuron, and the journal Science and many others have detailed how serotonin influences our autobiographical memory. So, this is personal experiences with specific objects, people, events experienced at specific times and places, plus general facts about the world. So, this is kind of important.

Also, serotonin is well noted in the building of our spatial memory, which is navigating one's environment and remembering the location of specific objects and events. Serotonin also has multiple roles in helping to regulate our sleep efficiency. Serotonin is the building block, it's a precursor for building melatonin, which is a well-noted sleep-regulating hormone, and serotonin is kind of like the opening act for melatonin's performance. It's kind of like the hype man for melatonin's sleep-relating abilities. And also, within that, serotonin while sleeping helps to regulate and move us out of certain phases of sleep as well, so it has multiple impacts on our sleep efficiency. Very, very important.

Now, so these are some of the things that serotonin is well established to do that seem very beneficial, but like with all things, too much of a good thing can turn into a bad thing. And so, what happens when we have too much serotonin? Let's touch on that for a moment. Well, this is called serotonin syndrome, and typically it's brought on by medications that influence serotonin, which can cause a whole host of issues ranging from acute issues like nausea and headaches, to chronic issues like reduced bone density and osteoporosis. Too much serotonin can create conditions where we have low bone density and even osteoporosis, so that tells you right there that serotonin, this neurotransmitter and hormone has a big impact on our bone health, so really, really interesting stuff there. Also, we want to keep this in context because too much serotonin is not the issue for most folks to date. Oftentimes today, the issue is abnormalities with serotonin in the opposite direction, including serotonin deficiencies and inefficiencies, which low levels of serotonin in the cerebral spinal fluid, for example, is

associated with increases in violence, insomnia, excessive hunger, suicide, and more negative associations.

Partly because serotonin and its metabolite, melatonin, play a major role in mood, appetite regulation, the sleep centers of our brains and the regulating our sleep quality, and so much more. Now, this is just touching on how powerful this hormone/neurotransmitter is in our bodies, but it's important for us to always keep in mind that none of the compounds that the body creates operates in a vacuum. None of these things, if we're targeting just one thing, it's inherently going to affect everything else and everything else is inherently going to affect that one thing we're targeting. So, let's take hormones, for example. Hormones are chemical messengers that communicate and send messages throughout all the cells in our bodies, right? So, it's kind of like these metabolic DMs, these direct messages that are going from cell to cell, communicating these messages, giving instructions, signaling behavior, signaling needs, and when these DMs are starting to flood with a particular hormone, for example, that can metaphorically cause things to start to go to spam and down regulate the sensitivity of that inbox for that particular hormone. So, we have to keep that in mind.

Now, what if it's too low? What if the message doesn't make it? What if it's not whitelisted? All of these things happen, and it can influence every other cell in the communication that's happening within the body. So, we've really got to keep this in mind that if there's one hormone that is functioning abnormally, you can rest assured that there are other hormones upstream and downstream that are also functioning abnormally. Alright, so I want to give that caveat before we dive in deeper today to understand that again, even though we're targeting serotonin, none of these things operate in a vacuum. And so, we're inherently going to be affecting the entire endocrine system and the nervous system with the things that we learned today, but we're highlighting this impact that serotonin has, because again, oftentimes just coming along without an education when we talk about these different neurotransmitters and hormones, and although our hormones do not operate in a vacuum, serotonin has really emerged as a causative force and issues surrounding mental health today.

For example, in our pharmacological targeting with SSRIs, so selective serotonin reuptake inhibitors. So, these are drugs that target the functionality of serotonin in our bodies, with the overall hypothesis that it's a deficiency in serotonin that's causing so many issues. Not only that, so with the selective serotonin reuptake inhibitors can effectively keep serotonin more active in our system by manipulating certain pathways, but again, this is through a synthetic pharmacological intervention, and we've got to understand, these things are not operating in a vacuum. What is it doing with everything else? How is it affecting dopamine? How is it affecting GABA? How is it affecting our cortisol levels? How is it affecting our human growth hormone? The list goes on and on and on. When we're bringing in abnormal synthetic interventions, which can have their place, we often don't understand when we hear that list of

side effects, those are not side effects. Those are direct effects. Of bringing in a synthetic chemical that our body, the genes that we've evolved with, human DNA has never experienced throughout our entire evolution and then, bam, we've got this new synthetic intervention, we don't really know the long-term ramifications.

And so, although those things have our place, we want to look at what are the things that are clinically proven to enhance the performance and production of serotonin naturally, and that's what we're going to dive into today. First up, let's talk a little bit more about how serotonin is produced and stored within our bodies. Serotonin is primarily located in three areas in our bodies. One, within the central nervous system. Two, within the mucosa of the gastrointestinal tract, which is the largest producer of serotonin is actually in our gut. And three, within our blood platelets. Now, these are some of the places that serotonin is produced and stored within our bodies, but it has a total body impact of course. Now, what's the building block for serotonin? Well, serotonin is synthesized from the essential amino acid tryptophan, and it's called an essential amino acid because we need to get it from our diet. If we're not providing our body with the building block for serotonin, it can't make it. This is how important this amino acid is, and these are the things that are often neglected. Again, we bring in a pharmacological intervention and ignore like, "Okay, what is the building block to make serotonin in the first place? It's tryptophan."

We're going to talk more about that as well. And so, within the gut, by the way, serotonin is produced by the enterochromaffin cells within our gut, and upwards of about 90% to 95% of our body's serotonin is actually produced and stored within our gut. So, this is another big revelation that's taken place in last few years, understand that we think that serotonin is associated primarily again with mood and regulating how we feel, we think it's a head thing, something going on within our brain, but so much of it is happening within our gut. There's a lot of action activity determining how we feel happening within our belly, it's a gut feeling. Now, I've mentioned this earlier, but I want to dive in deeper on this because this is a master class on this subject, serotonin functions as both a hormone and as a neurotransmitter. So, what does that mean? Hormones and neurotransmitters have some similar actions, and they also have some important differences. So, let's talk about how they're similar first. Well, first and foremost, both hormones and neurotransmitters function as messengers within our bodies. They function as messengers sending data, sending information, that drive performance, that drive activities. So, both of these hormones and neurotransmitters function as messengers in the body.

Also, both hormones and neurotransmitters strongly influence behavior. Both of these hormones and neurotransmitters strongly influence our behavior, and this is on the macro scale and the micro-scale. So, the macro scale is the things that we do in the world, the out-picturing of that. But on the micro-scale, it's the actions and activities that are happening

within the cells and tissues of our bodies, all the communication, all the activity and actions that are taking place behind the scenes. Also, both hormones and neurotransmitters are largely made of amino acids. This is how important protein is. These amino acids, these are the building blocks of protein. When we consume protein from our diet, our bodies break these down into amino acids that are then used to build our hormones and neurotransmitters.

So again, if we're not getting adequate amounts of the right types of these building blocks from our diet, we're going to be struggling, and this is a very, very foundational level, to make all of these compounds that our bodies need for us to have robust, balanced, powerful health. Now, those are a few of the similarities between both hormones and neurotransmitters. Now, let's take a look at how hormones and neurotransmitters differ. Number one, hormones are chemical signals secreted by our endocrine glands that go from there into the circulatory system, which convey regulatory messages within the body via that route. So, our endocrine glands, these hormone-producing glands within our bodies, are the home base and the production center for our hormones and then they're sent throughout our circulatory system. Neurotransmitters, on the other hand, are generated by the nervous system, and they send signals across a chemical synapse from one nerve cell to the other. So, these neurotransmitters are jumping from one nerve cell to another, that's their path, that's their mode of transportation, and communication is across the nervous system versus the circulatory system with what we see with hormones. Another difference is that neurotransmitters are generally transmitted much faster than hormones. This stuff is going at beyond the speed of light. This is like The Flash. This is like Quicksilver. Our neurotransmitters are very, very fast in their transmission.

However, the transmission distance of hormones is often further compared to that of neural transmitters. So even though our neurotransmitters can transmit quicker, endocrine released hormones, our endocrine system released hormones, are able to travel farther into more places within our bodies. Alright, so one of the difference we'll target here is that hormones regulate specific organs and tissues while neurotransmitters stimulate post-synaptic neurons, so they are all about that neuron activity. Alright... Versus our hormones really regulating targeted organs and tissues, but again, none of this stuff operates in a vacuum because our nervous system and our neurons are deeply influencing our organs and tissues, and our organs and tissues are deeply influencing our nervous system, so now that we've got some good background, it's foundational understanding about serotonin, about its behavior as a hormone and its dual citizenship as a neurotransmitter, let's dive in into seven clinically proven ways to naturally boost and support our serotonin.

Number one, one of the primary drivers of the production, mobilization and the performance overall of serotonin is a light exposure specifically from sunlight, our circadian rhythms are deeply tied to light exposure, and if we're talking about the circadian rhythms, this is

something very powerful, and where so much of science is looking at today and really analyzing this whole new field called circadian medicine. Light exposure again, is a huge influence on our circadian clocks within each and every one of our cells, our biological clocks are themselves functional genes and proteins that also influence and control other genes and proteins. Alright, so if we're talking about these circadian clocks within our cells, this is controlling so much about us and it's largely influenced by light exposure, it's a major controller of these circadian clocks, our circadian clocks control many things, including how we break down energy from our food and how we assimilate that food, it controls how strong our immune systems are, it controls a vast array of brain chemicals and Cognitive Behavior, cognition throughout the day, because that changes as time goes on during the day, and also it controls other substances that contribute to our mood.

So, those are just a few of the things that these circadian clocks are influencing. Now, human skin has an inherent serotonergic system, we have photo receptors in our skin that pick-up light and it helps to inform our internal organs, and again, all of the trillions of cells in our bodies are bacteria cells, which is trillions and trillions more, four times to even upwards of 10 times more bacteria cells than we have human cells. All of these are getting influenced by our skin... These photo receptors within our skin picking up light and sending data to the cells in our bodies and also our eyes have these photoreceptors obviously as well, but again, our skin can see and human skin appears to be capable of generating and triggering the production of serotonin, scientists at the Baker Research Institute in Melbourne, Australia, found that regardless of the season, the turnover of serotonin in the brain was affected by the amount of sunlight on any given day. And the levels of serotonin were higher on bright days than on overcast or cloudy ones. In fact, the rate of serotonin production in the brain was directly related to the duration of bright sunlight. That's powerful stuff. Again, if we're looking at how do we optimize serotonin, we know that sunny days and sunshine is commonly associated with a good mood.

Now we're looking at what are some of the behind-the-scenes mechanisms, what is some of the science behind why that is? Now, another Australian study measured the levels of brain chemicals flowing directly out of the brain, and it uncovered that people had higher serotonin levels on bright sunny days than again on cloudy ones, but that effect remained no matter how cold or hot the weather was. So, it wasn't about the temperature. It was about the light. Other autopsy studies found that people who died of non-psychiatric causes in the summer when days are longer, tended to have higher levels of serotonin than people who died in the winter when sunlight is scarce, that's just weird. Alright, again, who thinks to look at this stuff to see... And it's just, it really evolves from people asking questions, because that's what science really is, it's what it's all about, is having the audacity to ask questions, to put forth the hypothesis and then test, go and examine the data, and again, we find out that folks who pass away during

the winter months tend to have lower levels of serotonin than folks who pass away during the longer days of the summer months.

So, we know that sunlight has a direct impact on our body's serotonin production and performance. So, what do we do? How do we leverage this? Where is the most benefit? Well, the first thing that we need to look at is setting the pace or helping to optimize our body's production of these kind of cool daylight-related hormones and neurotransmitters and the production of the evening ones, and what it appears to be is that getting some early morning sunlight, so early morning sun exposure, and this can be, again, just sunlight coming into your home, ideally, if we can get some sunlight outdoors on our skin, in really the early part of the day between when the sun rises, maybe within that first hour or two to get some sun exposure for at least maybe 15 minutes helps to set the pace of the production and performance of all of our neurotransmitters and hormones.

Alright, so that early morning sun exposure really does set the pace with optimizing these circadian clocks. Again, these are clock genes located within just about every cell within our bodies, and it's regulated by our light exposure, what time of day it is, it's also regulated by our feeding cycles and many other things, but light is a major, major influence on this production, so it's helping to reset things, put it on pace for healthy ebb and flow of our production, so if we can get that early morning sun exposure, is the primary thing, if we're looking at optimizing serotonin and typically artificial light is also well noted to disrupt our circadian timing system.

So why is this an issue today? Well, research published in The Journal, Innovations of Clinical Neuroscience, revealed that exposure to sunlight during the earlier part of the day can significantly reduce cortisol levels at the end of the day, compared to being exposed to dim light or artificial light during the day. So again, that sun exposure helps to increase our serotonin, but also... And this is the cool part, it helps to reduce cortisol in the evening, which helps to induce and support our sleep quality, because cortisol is kind of an antithesis or... and a villain, going up against our sleep quality. Cortisol isn't a villain inherently of itself, but if it's produced at the wrong times and in the wrong amounts, it can definitely be problematic for our sleep.

And so, this is so important, it's one of the big take-aways, is that sun exposure during the day, not only does it increase serotonin during the day, but it helps to reduce cortisol in the evening, and also serotonin is a precursor for melatonin: That sleep regulating, powerful hormone, that again is associated with dark cycles. So, it really, again, is the opening act. It's the hype man, helping to bring melatonin on for great sleep in the evening. So, the issue today is that a lot of folks aren't getting that sun exposure, they're under artificial lights all day. Every day during the day, they're not getting natural sun exposure, and if they do, they're wearing sunglasses.

When they finally get some sun exposures to... "It's too much," to putting on sunglasses, which again, we have these photo receptors within our eyes, our retina, our lenses, we're taking in this data that helps to set all the pace for all these neurotransmitters and hormones, not to say that you can't wear sunglasses, but if we're not getting that adequate light exposure, our brains, our physiology isn't able to really sync up with nature. So, we're wearing sunglasses during the day and then we're on artificial light exposure through our devices in the evening. So, we've got so many things that are abnormal in our culture today, that have never existed before. If you've ever watched the show, Vikings, you never once saw Ragnar Lothbrok wearing sunglasses, it wasn't a thing. Nor did you see his brother Rollo on an iPad in the evening. They're too busy pillaging. But real talk, if you're looking at, again, human evolution, the things that our genes expect of us, we have these new implements that again, we get conditioned, we think they're cool and they are.

It's amazing, the things that we have access to today. But we have to keep in mind, what is this doing to our DNA? What is it doing to our production of hormones and neurotransmitters? We know for certain, again, if we're just looking at that relationship between serotonin being a precursor for melatonin, researchers at Harvard University found that, being on our devices in the evening, for every hour that we're on our device in the evening, we're suppressing melatonin for about 30 minutes. So, if we're on our device in the evening, for say three hours, melatonin is being suppressed from its production and its mobilization, its activity for about an hour and a half.

And we can be physiologically exhausted, but that doesn't mean that we're going to sleep effectively and efficiently, because if melatonin is not being produced properly and adequately, we're not going to go through our sleep cycles effectively. So again, somebody can get eight hours of unconscious time, but maybe they're only getting four or five hours of regenerative sleep quality, because they're not moving in and out of that cycle effectively, because of that evening, abnormal artificial light exposure and not getting that light exposure... Natural light exposure during the day. Alright, so putting all this together, serotonin release during the day appears to help build up... This term is called sleep pressure, which helps to nudge us to relax and to go to sleep, and this is according to scientists at Caltech, again, helping that activity to take place in the evening. So, in the evening, maybe this is the time to where the sunglasses or the blue light blocking glasses, is in the evening, versus during the day, which is a popular thing now. A lot of folks are doing that.

And we've got apps on our computers where we can reduce the blue light exposure, which is most signifying for our brain that, "Hey, I think this is daytime." These are more of the spectrums of light that we think about in association with sunlight, this white and blue spectrum. So it helps to cool the screen off, with apps like f.lux, F-.-L-U-X, for our laptops and desktops. On the iPhones, they've got these built-in, it comes along with iPhone phone now,

it's got 'night-shift' built in to help to cool the screen off and make it more of those kind of orange-ish, reddish hues that we would see through our evolution, because if we did have any light in the evening, it was fire. So that's reddish, orange-ish hues, and if you've got an Android, there's... Just even for the iPhone and Android, there's so many apps now for these things, there's Twilight and there's many others, that we can install and just set those things on automatic so we could set it and forget it, reduce that insult that this artificial light brings in the evening because it's doing something, we got to just be honest about it, it doesn't mean we can't chill out and watch our favorite show, or we can't do some work in the evening.

But we got to keep this in mind, if it's a regular behavior, this could be creating some major disruption with our important hormones and neurotransmitters like serotonin. So, we got to do this stuff more intentionally, respectfully, help to reduce artificial light disruption in the evening. Give yourself even a little bit of screen curfew time in the evening, would be a great idea, and also making sure that we're getting proactively, intentionally, a little bit more natural sun exposure during the day. Alright, so that's number one, is sunlight. If we're talking about naturally boosting and enhancing our body's production of serotonin, number one is sunlight. Number two, and this leans in deeper into the primary place that serotonin is produced in our body, which is within our gut. Number two, influence on our body's serotonin production is food. Again, upwards of 95% of our body's serotonin is located within our gut. Serotonin is produced, as we mentioned earlier, by the Enterochromaffin cells within our intestinal mucosa. And once it's released, it activates your system to increase intestinal motility. So, it actually, again, helps the ebb and flow of our digestive system, it keeps things... Gets things moving, this is why we have a tendency for most folks to have bowel stimulation during the day and not in the evening, not while they're trying to sleep, it's like, "You know, I actually... I know I'm sleepy, but I actually got to go and take a lil dump."

Because of this ebb and flows in the serotonin influence within the gastrointestinal tract. Now, scientists have uncovered that the human gut itself is made of a mass of neuro tissue filled with 30 different types of neurotransmitters, just like the brain. This is why the gut is often referred to as the second brain or the enteric nervous system. Technically, again, this incredible enteric nervous system consists of around 100 million neurons. This is in our belly, alright. This is in our gut. So, we talk about a gut feeling, we really need to give that a lot more credibility. And this is more than... What we find as far as the concentration of neurons in our gut is more than what you find in the spinal cord, and even in the peripheral nervous system itself. Really, really powerful stuff for us to really understand. So, what's going on and that gut, what's going into that gut inherently has a deep impact on the activity of serotonin, the production of serotonin, the related bacteria. Researchers at Caltech actually uncovered that, specific bacteria in the gut, communicate with the cells that produce our sleep-related hormones and neurotransmitters, our mood-regulating hormones neurotransmitters. This interaction is powerful, and so our food is a major player in this.

As we noted earlier, tryptophan is one of the nine essential amino acids, and it is literally the building block for our serotonin. It's a precursor to making serotonin. Data cited in the journal Nutrients detailed how the depletion of the precursor of serotonin synthesis, which is tryptophan, has been found to increase depressive mood in healthy subjects and subjects with prior history of depression. So, if there's a deficiency in tryptophan, it can cause depression in healthy subjects and people with a history of depression. So, both were analyzed clinically. Additionally, tryptophan deficiency has been found to create disruptions in our REM sleep. So, we talked about this regulation the influence that serotonin has, not just being a precursor of melatonin, but a regulator of our sleep efficiency. While improving tryptophan levels has been shown to reduce wakefulness at night and increase mental alertness after waking up in the morning. And all of this is according to a separate study that was cited in the journal, Nutrients. So, tryptophan has these incredible roles that it's playing in relationship to serotonin, in relationship to regulating our sleep quality, our cognition so much more.

Clearly, tryptophan is important in your body. This is the key; it needs copious amounts of this essential amino acid for optimal function. It really gets used for so many different things, so it can kind of get zapped from our system, we've got to be proactive and making sure that we're getting adequate amounts of tryptophan so your body can make the magic happen. Some of the best sources of tryptophan from our dietary sources include chicken, turkey, lobster. Just that song chicken, turk... Never mind. Chicken, turkey, lobster, eggs, cheese, tofu, chocolate is a great source of tryptophan, spinach, pumpkin seeds, peanuts and spirulina. Now, none of these foods... I'm not advocating for the foods, I'm just giving you some dense sources of tryptophan that are proven, and many of these foods are actually studied clinically to not only find the tryptophan content but also the impacts that it has on things like behavior, mood, sleep, and more. So those are some of the best sources that you're going to find the dense sources of tryptophan, many, many other foods, but that's just... I just... I want to have... We're always about proactive, like what can I do, what can I target, what can I intentionally add in or make sure I get a little bit more of. Those are some of the foods that have specifically tryptophan in there.

But here's a big key that's often not talked about, the relationship to tryptophan. It's not just you got tryptophan, boom, you got serotonin. It doesn't work like that. Tryptophan works with Vitamin B6 and magnesium and other micronutrients to actually synthesize serotonin. So, in order for that process, that magic to happen with the creation of serotonin and its ability to do things, other nutrients are involved, nothing operates in a vacuum. So, let's talk about Vitamin B6 really quickly. Also known as pyridoxine, Vitamin B6 is a critical co-factor in the tryptophan-serotonin pathway. Some of the best food sources that we're going to find Vitamin B6 in a natural form are going to be salmon, tuna, eggs again, chicken liver, chickpeas, spinach, sweet potato, yogurt and avocado. These are all viable sources of B6. So again, we need some

whole food, real food... Food first is the premise, because again, we're looking at what do our genes expect from us. We don't want to just target isolated compounds and synthetic supplements. We want whole food... If we're using supplements, we want whole food concentrates and have a plethora of these different nutrients and co-factors that again, work together synergistically.

So, we want to make sure we're getting adequate amounts of tryptophan, B6... And what about magnesium? Magnesium is responsible for over 650 biochemical processes that we know about. So that means there's 650 things that require in your body, your body's metabolic performance requires magnesium for them to do. If you're deficient in magnesium, your body literally can't do almost 700 processes or do them efficiently and effectively. The human body is incredible in doing patchwork jobs and finding a way to survive. But if we're talking about thriving, magnesium is incredibly important. One of the major roles that magnesium plays is in that conversion process with helping to create and regulate the activity of certain hormones and neurotransmitters. That's why magnesium is so valuable, specifically, in serotonin synthesis. Excellent dietary sources of magnesium include avocados, pumpkin seeds, almonds, dark chocolate, leafy greens, tofu, black beans, fatty fish, and spirulina. Now, if you notice, some of these foods have multiple of these precursors, right? So, spirulina, if we're talking about specifically great source of tryptophan and of magnesium as well.

So, this would be one of those foods, like we can knock multiple things out in one go. And also, spirulina is rich in B vitamins and rare compounds like phycocyanin which has been found to stimulate something called stem cell genesis, so the creation of new stem cells, the list goes on and on. Really, really potent superfood. When you use the term superfood, I use that very conscientiously and carefully. I don't use that for a lot of foods, but when it has so many different compounds like this, and also spirulina is a rare plant source that's a complete protein as well. It's actually the most protein dense food ever discovered, it's about 71% protein by weight. So, spirulina, but if you combine spirulina with chlorella, which is also a dense source of chlorophyll, that's where it got its name, which is rich in these amino acids as well if we're looking at tryptophan, we got AFA, blue-green algae, list goes on and on. But spirulina and chlorella specifically, remarkable. And for me, these are not necessarily easy on ramps for people going from McDonald's fries to here's some spirulina for you.

But this is why I love the green juice blend from Organifi, is that number one, it tastes good. Number two, it's built on these incredible superfoods like spirulina, like chlorella, like ashwagandha, and it actually tastes good as well. So, we get this infusion of all these different nutrients, it's why folks tend to feel so good when they're utilizing Organifi's green juice. So, if you've yet to get Organifi's green juice or if you need to re-up, you get a 20% discount off their green juice formula, it's incredible. And it's organic. This is the key as well, because you don't want to get these incredible superfoods that come along with pesticides or herbicides or

rodenticides and things that can throw off this serotonin pathway. So, head over there, check them out. It's organifi.com/model, that's O-R-G-A-N-I-F-I dot com/model, and you get 20% off everything that they carry. Their green juice formula is definitely a must.

Now, something really interesting that I found in the data is that eating something that is carbohydrate dominant after a multi-hour fast, so when somebody consumes something that's carbohydrate dominant food, it has been found to increase the entry of tryptophan into the brain. But here's the key, adequate tryptophan has to be present in the first place for it to do this, because as soon as protein is consumed, the tryptophan boost going into the brain and correlating serotonin goes back to baseline. So having a little carbohydrate treat, this might be one of the reasons the driving forces behind that, is that it gives an instant uptick in tryptophan getting into the brain and triggering serotonin production, again, this feel-good vibe.

So, I want you to put that in your back pocket because that might be a reason why we're attracted to little treats and things like that, but we also want to keep in mind that this is not a sustainable thing to do very often. Because again, tryptophan has to be there in the first place. This is why we want to have a overall strong dietary performance and overall strong dietary view, and then utilizing little things like this when we need to in different contexts. Because everything is an option, but now we can start to give a little bit more sense and credibility to the feel-good aspect of folks wanting to have a little treat, a donut or a muffin or a pancake, or whatever the case might be, some chips. So going for those carbohydrate foods could be to get that little instant feel-good vibe that can be a potential out-picturing from that. But again, it's not necessarily a sustainable thing to do because we want to get our bodies in homeostasis where we have a good ebb and flow of serotonin production, and the primary building block of that is getting healthy high-quality sources of tryptophan.

Now, here's something else really interesting, is that serotonin itself has been found in some specific foods. Using highly specific radioenzymatic assay, it was determined that fruits with a notable serotonin concentration include plantains, pineapples, bananas, and kiwis. Then a few foods in the category of nuts were found to have notable amounts of serotonin as well, including butter nuts, not to be mistaken with butternut squash, but there are some nuts called butter nuts, black walnuts, English walnuts and pecans or pecans, depending on how boujie you are. Alright, so those foods actually have serotonin within them. Now, here's the key, does this actually the ingestion of these serotonin-containing foods, does this have an impact on our serotonin levels? Well, in the study, ingestion of these fruits and nuts resulted in an increase in urinary 5-hydroxyindoleacetic acid excretion with no change in platelet serotonin concentrations. So, we did see that there was more excretion of a by-product of serotonin, which is interesting, but there were no changes in platelet serotonin concentrations, but again, serotonin can be measured and found in many different ways. So, I

would say that this is a little bit inconclusive but it's interesting again to keep these in our back pocket that these specific foods contain some serotonin, really, really interesting.

The best bet again is eating plenty of foods with the serotonin precursor tryptophan and its co-factors and letting your body to do the rest to actually make the magic happen. So that's number two on our list of seven natural ways to enhance our production and performance of serotonin. Let's move on to number three. Number three on our list of the seven ways to naturally increase our serotonin is exercise. Many people are aware of the mood-enhancing benefits that exercise delivers. From endorphins to the endocannabinoids, our bodies can respond to physical activities in ways that decrease pain and increase pleasure, both physically and mentally. If feeling good as a by-product of exercise, then it would seem likely that serotonin would be in the mix somewhere, but how does it work? Well, according to a collaborative study from scientists at multiple universities titled “Neuromodulation of Exercise”. It appears that aerobic exercise specifically increases tryptophan's chances of crossing the blood-brain barrier. And so, this is one of the major reasons that exercise has the potential to increase serotonin in the brain. Now, to dig into this further, a pilot study, and this was published in 2013, set out to see if the serotonin-boosting effects of exercise could show up, notably for women with fibromyalgia.

So, this is a situation of chronic pain where it's very hard to target what is the underlying mechanism here. But with this study, the researchers split the women into two groups. One group was instructed to walk for exercise three times each week for 20 weeks. While the other group was instructed to do three sessions of stretching each week for the same 20-week period. Now they measure the participants serum levels of serotonin and its main metabolite, 5-Hydroxyindoleacetic acid or 5-HIAA or 5-HIAA. After compiling the study data over the course of the study, serum levels of both serotonin and 5-HIAA, change significantly in the aerobic exercise group during the 20-week course of therapy. While the stretching group was observed to have no statistically significant change, so something's happening here, something really good is happening. Additionally, the aerobic conditioning group also showed improvement in emotional and psychological aspects of their condition, where stretching did not. In the same study subjects pain reduction was more responsive to the aerobic activity, than to stretching, so their pain was reduced. Their emotional and psychological stress and struggle was reduced as well by implementing some simple walking a few times a week.

The scientists in the study noted, "It appears that the Serotonergic system may be an important modulator of the neuroendocrinological mechanisms through which aerobic exercise can reduce pain, reduce anxiety and depression." They also noted some benefits with other exercise implements as well, during the study. The researchers stated, "It was demonstrated that patients with chronic lumbar pain, that spinal stabilization exercises produce an increase in serum serotonin levels, which could help to explain the positive results

of this type of exercise in the management of chronic back pain." So, they're seeing doing these stability exercises for their core, increasing serotonin and also decreasing symptoms of back pain. So, this is really fascinating data, again, more needs to be done, this was just a pilot study, but it's very encouraging, and these are things that we all know. Again, what do our genes expect us to do? Right, walking is one of the most human things that we can participate in. It's what we're designed to do, and so to see these benefits with reducing pain, having a healthier disposition with our mental health, the list goes on and on. Seeing through walking should not be a surprise, but it's just another way that we can target and naturally increase our body's production of serotonin. Because the bottom line here, does exercise defend against issues like depression that are commonly tied to serotonin expression?

Well, a massive meta-analysis and this was published in Frontiers in pharmacology determined that exercise is often just as effective as antidepressants in reducing the symptoms of depression. The researcher stated, "Based on the present review, which examined most, or all randomized controlled trials published in 1999 through 2016, and most are all meta-analysis and systematic reviews published in 2009 through 2016. It can be stated that exercise is an evidence-based medicine for depression." Why is this not being prescribed? And when it is, that's the exception and not the rule. Again, the data should be... It should be Captain Obvious, that exercise would make us feel good.

Many folks who are struggling with mental health challenges, and this is something that has ties within my own family, and people that are very close to me growing up. People that I've lost from issues related to this. These things are not added to the equation very often, they're not propped up, again, when we talk about a study like this showing that is just as effective as antidepressants. And then there's other data here that antidepressant, along with exercise, you would see that the anti-depressant effects would be on point or working or advantageous up until the exercise is complete, just post-exercise window but then the depression would... The symptoms would come back... Come back forward would make their appearance again. So again, even the studies had found when they're looking at anti-depressants versus exercise, even when they're put together, we see that the exercise has a power that the synthetic implement does not.

So, we've got to keep that in context because again, what is the synthetic implement, what are the ramifications? How is it? Because nothing is operating in a vacuum, the side effects that we see, for some people, it's appropriate if we're talking about just the context of an SSRI, for example. But we've got to do the things first, these should be the first cards to play, not down the line and not as an adjunct. The first thing should be, how do we get our systems back in balance? How do we achieve homeostasis? How do you provide your DNA with the things that is required for the healthy expression of your cells, with the healthy expression of your endocrine system? Your organs, your tissues, your genes expect you to do these things. And

when we are removed from these things like movement, like walking, like exercise, we put in this category of exercise, that's just life. We call the exercise it's just living because we naturally would be employed in what we call exercise through our evolution: With the procuring of our food, with taking care of our children, with hunting, with creating shelter and all these different things that would be a normal part of our lives. We don't do that stuff, so we got to replicate it in different ways. We hit the gym to try to replicate the things that these inputs that our bodies would be looking for, whether it's a squat or whether it's a hip hinge, and all these different things.

But again, the most important tenet here, if we're talking about exercise and serotonin, we've got data on walking. We know that it is an effective adjunct here. Alright, so that's number three on our list. We're going to move on to number four on our list of seven ways to naturally boost our serotonin levels. Number four is massage. A meta-analysis conducted by researchers at the University of Miami School of Medicine revealed that massage therapy boost serotonin by an average of 28%. In addition, they noted massage can also reduce cortisol levels by an average of about 31%. We know it feels good, we know a good massage... Again, I think we all can agree that after getting a good massage, we don't have feelings that are geared towards negative outcomes, wanting to fight somebody or just feeling discombobulated. It tends to bring us back into balance, it tends to be very relaxing. We know some of the underlying mechanisms now are reduction in cortisol and increase in serotonin. Now, a massage therapist is great, but it's definitely not the only way. Human touch itself is a powerful inducer of this feel-good hormone/neurotransmitter, serotonin.

Another randomized controlled trial published in 2004 analyzed the effects of massage on 84 pregnant women with depression. Versus standard prenatal care that did not include massage. The women in the massage group received 20 minutes of massage therapy from their significant other twice a week. Now at the end of the study, this was a 16-week study, the women in the massage therapy group had significantly higher increases in serotonin levels and lower levels of cortisol. There it is again, and here's the key, what are the out-picturing of these things? What did it contribute to in their lives? Well, the women in the massage therapy group reported lower levels of anxiety and lower levels of depression, and they also experienced less leg and back pain, and their babies had lower incidents of prematurity and low birth weight. That's the power of touch. It's the power... Again, serotonin is just one of the mechanisms that we're looking at here, so how do we take advantage of this? Book yourself a massage. Things are different now, here as this is getting recorded, coming out of the lockdowns here in the United States, or maybe we're in between them. I don't know.

But there was a time where if you was trying to get a massage, the therapist, she's got the double gloves on, she's got the mask, you're trying to get a massage, you got the mask on and your face is into the little face tube and you got a mask, so you're basically choking and trying

to get a message at the same time. It's just not a good look. And I don't know how the plastic would feel with the rubbing either, but anyways, you can book yourself a massage, a normal massage now, I think, depending on where you live. Or recruit your family members. Give and receive, so even your kids, get your kids to work. Massage your... Get a nice shoulder massage, foot massage, massage your arms, wherever. If you got multiple kids, you turn yourself into the king of the world or the queen of the world and have those little ones get to work.

But also, of course, giving that massage as well for your significant other and just the people that you care about. Human touch is critical. It's one of the things that our genes expect from us. Alright, so let's move on to number five on our list. Number five on our list of the seven ways to naturally increase our serotonin levels, number five is laughter. A 2015 peer-reviewed study titled "Effect and Path Analysis of Laughter Therapy on Serotonin, Depression, and Quality of Life in Middle-aged Women." This study detailed how laughter directly increases our serotonin production, and in fact, participants with the most severe cases of depression had the highest increase in serotonin from the laughter therapy.

Now, you might be wondering, "What the hell is laughter therapy?" Well, the participants were given a variety of different forms of laughter therapy, ranging from smiling exercises to laughing actions without making a sound. That's probably weird and that can just be funny in the first place, to laughing while saying affirmations, laughing meditations and more. And the thing is, laughing meditations have been utilized for centuries. It's another thing that my mother-in-law taught me many, many years ago, she's been teaching meditation for decades, and so many different forms of meditation that she's gifted me with, and one of them is a laughing meditation, and the funny thing about it is that laughter has immense benefits that are noted. It's one of those things that we feel, and we experience, and we feel good, but this also has some scientific affirmation now that we now understand. Laughter also improves brain connectivity, whole brain learning, whole brain patterning, where the two hemispheres of your brain are communicating and integrating better. Also, we see improvements in not just serotonin, but also boosting endorphins and also improving the cardiovascular system. Laughter has so many different benefits. This is why, again, it's one of those things that our genes expect from us. It feels good, and it drives so many positive behaviors in our systems.

Now, the question is, and I want you to ask yourself, how often do you laugh? How often do you spend time with people who make you smile and make you laugh? This is something that you deserve. You deserve to have relationships like that, that keep you smiling, that invoke laughter. And laughter, the thing about it, is that it's also clinically proven, which it shouldn't be just a clinical proving for us to understand this, laughter also has been found to strengthen social bonds and connection. Alright? Again, that would seem obvious, but it's like a primal wiring that takes place. And this is one of the reasons that laughter is contagious. If you see somebody who is truly caught up in the rapture of a deep laugh, like a deep belly laugh, it's

funny. It's just kind of like, you laugh and giggle as well, just like, "What the hell are they laughing about?" It's funny. Right? So, it's contagious. It's one of those things our mirror neurons are watching, like, "Ayy, I feel you. I see where you're at. You're caught up in the rapture, you're in that bliss. I see you." Alright? So, employing this and taking advantage of this, give yourself permission to hang around with people who make you smile and make you laugh more often. You deserve that. Give yourself permission, write a permission slip, write an intention, create that for yourself. You deserve it.

And also, how else can you employ this a little bit more often, just in your day-to-day life? You could make it an intention to follow people who make you laugh on social media. Watch funny movies. There's... Tends to be a big helping of very serious things. There's a lot of true crime, there's a lot of serial... People love the cult documentaries, the serial killers, all of that. You got to laugh too, alright? Because that ain't funny, alright? But seriously, just having some healthy dose... Not to... See, by the way, I know some people listening are like, "I'm totally into the cult things. Shawn, you have no idea." That's all good. You could be into the cult documentaries, but now you can just make an intention to also add in some stuff that makes you laugh, alright? Maybe it's some retro stuff. I was just with my friend, Bedros Keuilian, he's been a guest on this show, and his wife. And they were talking about their kids now, 13 and 15, have just been binging Office, The Office. They're just obsessed with The Office. And you could be... Some retro stuff like that, like stuff that maybe you used to watch back in the day that you really loved and enjoy, or just different movies. There's so many different comedy series, stand-up comedians, we've got stand-up entertainment on tap today, if you got YouTube. Also, you can make it a point to go to a comedy show.

Buy some tickets as well. The funny thing is... The funny thing. You hear me? The restaurant that we went to just last night was actually attached to The Improv here in California. So, it's just like... And I saw people going in, I'm like, "Okay." I was feeling that vibe 'cause I knew I was going to do this show today. Like, "Yeah, they're about to get that serotonin boost." So, that's it. And also, of course, a big tenet that we could take into our lives overall, lighten up. Lighten up. See more of the humor in life itself, because some of the greatest comedy is just coming from things that aren't necessarily funny, but just funny observations within them. So, lighten up. See through the lens of a little bit more humor. And these are all things that we can employ to bring about higher levels of serotonin, more laughter, more happiness. Alright. We're going to move on to number six here, on our list of seven ways to boost serotonin naturally. Number six, and this one's really interesting, is caffeine. Caffeine has been found to increase the receptors in our bodies, receptors for serotonin, upwards of 30%.

Caffeine appears to increase serotonin sensitivity. Now, this is huge right here. Caffeine appears to increase serotonin sensitivity. When serotonin sensitivity is increased, it's sort of like installing a bigger satellite to essentially catch more of the existing serotonin signal. It's

that dish network, so it's a bigger dish to catch the signals that serotonin is already expressing. Now, this is one of the ways that coffee has attractive benefits that we often... Most folks don't even realize that this is why, and this is happening underneath the surface, but there's diminishing returns with this as well. You're not just going to be guzzling java, and then getting these serotonin uptakes, and then it's all fine, and then you just keep doing it and doing it and doing it. Because this intake of caffeine from coffee and other sources, can also block the performance of other neurotransmitters like GABA, for example, that plays a critical role in maintaining homeostasis. So, it's just keeping things in balance.

Knowing that serotonin can aid in intestinal motility, again, the ebb and flow, the movement of our digestive system, this could also be one of the primary reasons that coffee stimulates bowel movements for many people. And if you think about that aspect of it as well... So that's another little interesting hypothesis. As a matter of fact, a study published in the European Journal of Gastroenterology and Hepatology, uncovered that caffeinated coffee stimulated movement in the colon about 25% more than de-caffeinated versions of coffee, so there's something there to the caffeine helping these move... It's not just the coffee itself and the compounds there, but the caffeine is a role player. And so, not only do we see the benefits with the increase in serotonin, which is really interesting that I don't think a lot of folks realize with coffee. Again, the important thing here is the sourcing. You don't want to have something that enhances serotonin, but also the intake of pesticide residues.

Most things that can suppress and damage these pathways, your serotonin and receptors, and the list goes on and on because a lot of folks don't realize pesticides are often estrogenic or neurogenic. Alright, so they're operating targeting our endocrine system or our nervous system. That's what the pesticides do, they're designed to do that. Alright, so with that said, make sure that it's organic, and for me, I want to take it to another level, so I enjoy organic coffee along with medicinal mushrooms that have proven cognitive benefits like Lion's Mane where folks at the University of Malaya, these researchers found that Lion's Mane can actually help to increase neurogenesis, stimulating the creation of new neurons in the brain. Remarkable. My organic coffee and Lion's Mane combination is from Four Sigmatic, who do a dual extraction of these medicinal mushrooms to actually get the triterpenes out, to get the beta-glucans out, to get all the compounds that do all these cool things.

So, if you're not utilizing Four Sigmatic, you are really, really missing out. Head over to foursigmatic.com/model, that's F-O-U-R-S-I-G-M-A-T-I-C.com/model, and get their organic Lion's Mane Coffee. And also, they have a Lion's Mane elixir itself if you're not a fan of coffee, so everybody's included here. And they also have a coffee blend with cordyceps, which has many benefits for the cardiovascular system, for stamina and performance. Head over there and check them out, foursigmatic.com/model. You're going to get a special discount, 10% off,

15% off, depending on how many of their products that you get. Pop over there, check them out. Very, very special, foursigmatic.com/model.

Alright, we're at our very last one of our seven ways that are clinically proven to increase our serotonin and number seven is fasting. A study cited in the peer-reviewed journal, Neurology International, sought out to see if fasting had any impact on neurotransmitters like serotonin and neurotrophins like BDNF or brain-derived neurotrophic factor. As a control, the scientist tracked participants' levels of these neurochemicals prior to a structured sunup to sundown fasting during Ramadan. With their baseline numbers in hand, participants' levels of vital neurochemicals were then measured at day 14 and at day 29 of their fast. By day 14, their serotonin levels jumped up by over 33% on average. And by day 29 of their fast, serotonin levels jumped up a total of 43% higher than at their baseline pre-intermittent fasting levels. Not to mention... So, we see this impressive increase in serotonin during this time of fasting, but not to mention there was also an almost 50% increase in brain-derived neurotrophic factor by day 29 of their intermittent fasting from sunup to sundown. And brain-derived neurotrophic factor, we're looking at something that increases, again, the production of new neurons, new brain cells, specifically if we look at the hippocampus, the memory center of the brain. This is like Miracle-Gro in a sense for our brain cells.

So, the continuous ability for our bodies to make these compounds helps to keep us younger longer, helps to keep our brains younger longer, and also this association with serotonin is incredibly powerful because intermittent fasting is one of those big implements today that many folks are talking about. I know I've been studying probably for about 10 years now all the different clinical benefits, but in this context, we're talking about a potential improvement in cognitive performance, in mood, in overall behavior, and just that, again, more positive disposition that's associated with serotonin that we might be able to access with a little bit of intermittent fasting.

So, does this have to be something super regimented and structured and if you go outside of your eating window or fasting window, everything is just thrown out the window? Intermittent fasting window, eating window, thrown out the window? You feel me? No, we don't want to be neurotic like that. So, a simple 12 hour fasting window has been shown to have some really interesting clinical benefits. So simply ending, we'll just say, for example, we have our last meal, and we finish eating by 8:00 PM and then we have our first nutrition implement, if we're talking about caloric food intake, at 8:00 AM the next day. But in-between time, you can even get up and have some green tea, you can have some coffee, and that doesn't pull you out of that intermittent fast. So again, there's many different ways to employ some intermittent fasting. There's certain forms of intermittent fasting where folks consume food one day and the next day they have a limited caloric intake, so they're going from day to day or just the regimented eating and fasting windows each day. Some people do a structured multi-day fast and they eat

other days. Many different ways to go about it, but for me, I want to go with what's most accessible, with what has the most grace and also the most science behind it as well.

So, this is one of the tenets that I talk about in my latest book, Eat Smarter, and if you don't have a copy yet, you're really, really missing out. So, it's a national best seller and we talk about something outside of the normal paradigm of intermittent fasting and we dive in on what smart intermittent fasting is and all those tenets. And we dive even deeper into the science because we're just looking at the benefits here with serotonin. We can get into the conversation about autophagy that we talk about in the book, the conversation around metabolism, how does that impact issues like weight loss and the elimination of body fat? So much more to behold there, so definitely check out Eat Smarter if you get to do so. And again, I'm really, really grateful for you tuning in to the show today. It's such an honor to be able to create these masterclasses for you. I hope that you learned a tremendous amount about this powerful neurotransmitter/hormone, the implications that it has in our lives, and also some clinically proven ways that we can increase the production and performance of serotonin in our bodies.

We've got some powerful masterclasses and incredible guests coming up for you very, very soon, so make sure to stay tuned. Take care, have an amazing day, and I'll talk with you soon. And for more after the show, make sure to head over to themodelhealthshow.com. That's where you can find all of the show notes, you can find transcriptions, videos for each episode, and if you got a comment, you can leave me a comment there as well. And please make sure to head over to iTunes and leave us a rating to let everybody know that the show is awesome, and I appreciate that so much and take care. I promise to keep giving you more powerful, empowering, great content to help you transform your life. Thanks for tuning in.