

# **THE MODEL HEALTH SHOW**

**EPISODE 498**

## **Circadian Nutrition: The Groundbreaking New Science Of Meal Timing**

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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. On this episode, we're going to be diving into the amazing science of circadian nutrition, the amazing science of meal timing. And first and foremost, the circadian timing system is defined as the network of interconnected cellular structures that regulate the timing of physiological processes and behavior. Translation, every single one of our cells has a built-in biological clock that's controlling all of our physiological behaviors. Now, the term circadian rhythm or the circadian timing system might sound a little bit like a scientific urban myth. We can't really have clocks inside of ourselves, can we? That just sounds so outlandish, we can't really be synced up with all of nature and the environment around us, that sounds a little bit farfetched, but in reality, it is one of the most true things about human beings, and really all of life on the planet, we all have these nocturnal and diurnal patterns and we're synced up with nature.

But the thing about humans is that we can cause proactive disruption to these internal clocks. And let's dig in a little bit deeper and talk about what these clocks actually do. The circadian or biological clocks that exists within each and every one of our trillions of cells, number one, they control the release of a vast array of our hormones and neurotransmitters. Our biological clocks are determining when certain hormones and neurotransmitters are getting released in our bodies. So, the production and release of things like testosterone, of human growth hormone are heavily influenced by what time of day it is. We're going to talk more about all of these things in this episode. Also, our circadian/biological clocks control our digestive function, including the rate of nutrient absorption, speed of food transit throughout the gastrointestinal tract, elimination and more. Our digestive ebb and flow, the movement of our system, of food moving through our system is heavily influenced by what time of day it is.

This is why oftentimes we don't get urges to go and take a le deuce or a number two, or go poop during the night when we're sleeping, we don't have this driving need to get out of bed to go and release the kraken. That usually doesn't happen, and again, this is because the ebb and flow of our digestive system is controlled by these internal clocks in ourselves. So digestive function is also controlled by our circadian clocks. Also, the behavior of our microbiome itself is heavily controlled by our circadian clocks. In addition to this, we've got to understand that the trillions upon trillions of bacteria that we have in our bodies and on our bodies have circadian clocks as well, it's not just our human cells, we have upwards of four times or even more bacteria cells that live in and on our bodies that are controlling and influencing in abundance of different functions that bring us health. There's a symbiotic relationship there when things are in balance, but our bacteria cells have circadian clocks as well.

So, this is very important to understand. As a matter of fact, a recent study cited in the journal, Nature Reviews Endocrinology states, "Disruption of the circadian system can alter microbiome communities and can perturb host metabolism, energy homeostasis and inflammatory pathways, which leads to metabolic syndrome." So, disrupting our built-in biological clocks can disrupt our microbiome as well and lead to metabolic syndrome, metabolic breakdown. So, this is associated with things like insulin resistance, excessive body fat storage, the list goes on and on and on. Not understanding that a major corporate in our society today is the disruption of how our bodies and our eating times, our sleeping times are synced up with nature and how that can throw off the whole machine. Also controlled by our circadian clocks is our blood pressure, our blood pressure changes throughout the day as well based on what time it is.

Thermoregulation, so this is our body's management of our temperature, that changes throughout the day. We just know about this 98.6 degrees, that's where we're supposed to be all the time, that's not true our temperature fluctuates and changes dramatically throughout the day. And as a matter of fact, in the evening, we have a natural drop in our core body temperature that helps to facilitate our sleep quality. So, there's a natural shift and change in our body temperature that's regulated by these biological clocks. Also, our sleep itself, our sleep efficiency is controlled by the circadian clocks within ourselves. Also, muscular strength and reaction time. Our strength and reaction time changes based on what time of day it is based on these circadian clocks. Our reproductive cycles, and the production of sex hormones is heavily influenced by what time of day it is. As I mentioned before, testosterone for example, testosterone is one of those things that is really just going down throughout the day, unless we're engaging with some things that can give a little bit of a boost to testosterone, like lifting some heavy weights, for example.

But that testosterone is generally going to be dropping throughout the day, there's a rhythm to it, and when we go to sleep, it's like plugging in your electric car or filling up your testosterone gas tank, because that's when testosterone levels start to increase again. So, our circadian clocks are controlling our reproductive cycles, and the production of sex hormones. And if we think about this from a meta-perspective, we zoom out and see, where do we actually associate and agree? We have a social agreement that our sex hormones are influenced by the environment and the time on the calendar, the time of day, and where we are at in relationship to this so-called moon cycle, is with the menstrual cycle with women. We have a social agreement that this is true, but we just ignore the fact that this is really based on how we're interacting and connected to the environment and the world around us. It truly is influencing our hormonal cycles, it's literally called a cycle, and it's every month, this thing is happening on rotation, it's automatically lined up, but we can throw that off based on the way that we live

our lives, of course, and many women have experienced that where different things, maybe traveling, maybe stress...

Fill in the blank can throw off our cycle, the reproductive cycle, and I'm saying our because men have cycles too, it's just a much different version of what that looks like, because also it's not socially discussed about male reproductive cycles, but that is a real thing as well. And so, if we can just take a step back and start to connect with something that we can affirm, yes, this is a real thing, we are lined up and connected with nature, we have these biological clocks that are ticking all the time, instructing my body on what to do. And I don't have... I could just let it roll, my body is just going to do those things automatically, if I'm living in accordance with natural life, but again, the rub today is that humans, we can proactively throw off these clocks. I want to talk more about what that is as well in just a moment, but one other thing I want to share is that mental alertness, mental acuity, and so much more with our cognitive function is heavily influenced by what time of day it is, and some people might have noticed this that maybe your cognition, your mental acuity is heightened at a certain time of day, so for you, maybe it's in the afternoon, early afternoon, maybe it's first thing in the morning, maybe it's, you're more of a night owl, maybe you're with the hoo gang, and you have your time of cognition, your heightened cognition in the evening.

So even though we're talking about these biological clocks, these biological rhythms, there is a bit of fluctuation from person to person because we're all unique, but what we're going to talk about today is where the vast majority of humans really fit into that pattern, and so I want to keep that in mind that you do have a unique metabolic and circadian disposition, but in general, humans, our genes have been wired a certain way for a very long time, but that fluctuation... We talked about that with Dr. Michael Bruce, on a classic episode of The Model Health Show that we'll put for you in the show notes, and so I just wanted to give those early tenets to talk about what are some of the things that this circadian clock... These circadian rhythms are actually controlling so that we can get more connected to how real it is and how important it is, because truly circadian medicine is the fastest growing field of science right now, because it's really starting to come to the forefront that it's controlling everything else about us.

And now we're going to move on and actually talk about who's leading the charge in this science and also what can we understand and take away on where do these biological clocks exist? What are they? Researchers at The Salk Institute for Biological Studies have really been leading the charge in circadian medicine, and they've actually uncovered that our biological clocks are themselves functional genes and proteins that influence and control our other genes and proteins. So, these biological clocks, they've actually identified, these are specific genes and proteins that are controlling what other genes and proteins do. So, these clocks are themselves genes and proteins, and a recent study published in the British Journal of Nutrition

provides an eloquent description regarding circadian nutrition, so how does our nutrition... Because we know about Nutrigenomics, Nutrigenetics, so these fields of nutrition that are looking at the influence and interaction that our food and our nutrition has on our genetic expression and how our genetics influence how nutrition... What type of nutrition even is going to be best for us as a unique individual?

And here's what they had to say. "The human circadian system anticipates and adapts to daily environmental changes to optimize behavior according to the time of day and temporally partition incompatible physiological processes. At the helm of this system is a master clock in the suprachiasmatic nuclei or the SCN of the anterior hypothalamus. The SCN are primarily synchronized to the 24-hour day and the light/dark cycle." So, we know that light has a major impact and we're operating on this 24-hour day clock. Now, listen to this, this is very important. They state, "However, feeding/fasting cycles are the primary time cues for clocks in peripheral tissues."

So, our feeding and fasting cycles are the primary cues controlling these biological clocks for our peripheral tissues. And so, we got the central nervous system, our brain, spinal cord, and we got the peripheral system, all the branching out of that nervous system that connects with everything from your pinky toe to your ear lobe, it's connected to everything else about us, and it's primarily controlled by our feeding and fasting cycles. Now to go on, here's a little bit more that they stated, "Aligning feeding and fasting cycles with clock-regulated metabolic changes optimizes metabolism," alright, and this is very important, "and studies of other animals suggest that feeding at inappropriate times disrupts circadian system organization, and thereby contributes to adverse metabolic consequences and chronic disease development." Wow, that's major. That's major. Very powerful... We're not looking at... Again, we've seen these epidemics of chronic diseases just skyrocketing in recent decades as we've gotten more and more out of alignment with nature and with normal light and dark rhythms, and the times that we're eating, the types of foods that we're eating, and wondering why it's happening, it's not an accident, but at its core, has so much to do with the circadian system being disorganized.

And so, we're going to dig in deeper and address this and walk away really understanding how can we sync up and take advantage of circadian nutrition and optimize our health as a result. Now, Dr. Satchidananda Panda, this is his real name. Dr. Satchidananda Panda... Let's be honest, this is probably the best name ever, alright. Panda, Panda, Panda shout out to Designer and Dr. Satchidananda Panda, professor at the Salk Institute, studies genes, molecules and the cells that keep our whole body on the same internal clock. So, Dr. Panda studies our genes, molecules and cells that keep our whole body on the same internal clock, alright. Has all synced up, we want everything synced, we want it in rhythm, right? Panda, panda, panda. His lab has

discovered that nearly 80% of our genes follow a circadian rhythm, so the vast majority of what makes us human follows this circadian rhythm.

And he's also... His lab has identified a pair of specific genes that help keep eating schedules in sync with daily sleep cycles. So, they identified genes that actually help to keep our eating schedules in sync with our daily sleep cycles. He often refers to the "Discipline of the clock." The fact that biological activity such as the production of proteins that help us to process food rises during our optimal waking period and slows down during our optimal resting period. This is very important. We don't really think about the fact that there are certain proteins that we produce, that we release, that help us and enable us to actually digest food in the first place, and those proteins being released are controlled by the circadian clocks within ourselves.

Alright, so we just think we put something in our bodies and the magic happens... Just some stuff happens. But everything is going to be controlled, is going to be either helped or hindered based on the time that we're actually eating those foods, because the production of the proteins that control and assist in the digestion of those foods are going to be controlled by what time of day it is. Circadian disruption has been shown in multiple studies to contribute to metabolic syndrome, insulin resistance and obesity. And a major reason for the impact shown in the data is the influence that our meal timing has on our genetic expression. A study published in the Journal of Applied Physiology determined "This lifestyle of constantly eating throughout the day collides with our genome, which was most likely selected in the late paleolithic era between 50,000 and 10,000 BC, by criteria that favored survival in an environment characterized by fluctuations between periods of feast and famine. The theory of thrifty gene states that these fluctuations are required for optimal metabolic function." These fluctuations between times of eating and times of not eating are required, keywords, for optimal metabolic function. Now, the question should be, do we as a species, here in modern civilization, does the average person, have this fluctuation between eating times and times of not eating? Eating times and fasting times.

So, let's look at what the data shows and how does it actually play out in the real world. A study published in a peer review journal, Cell Metabolism, tracked the eating habits of a group of adult test subjects to see how often the average person actually eats. The researchers discovered that not only does the average person not eat three square meals a day, most people tend to eat sporadically throughout the day, more of what would be considered snacking or snackilicious. The researchers found that the average time between the first bite of breakfast and the last bite of dinner or an evening snack or drinks at the bar was about 15 hours a day.

Which is nearly the entire time most people are awake. Throw in some sleep to round out that 24-hour clock, and that might not seem like a big deal, but to our genes as we've been

discussing, this might be one of the biggest deals ever. Now, the scientists in the study decided to see what would happen if they simply shortened the window of eating for some of the test subjects. This is very important, listen to this, there were no other dietary restrictions given. Nothing. No restrictions on calories, no restrictions on what types of foods they were eating, no restrictions on macro-nutrient ratios or anything else. They simply had to study participants to reduce their eating period from the sporadic 15 hours a day, that was typical, to a period of 10 to 12 hours a day instead. To just take their eating window and just condense it by a few hours, from 15 hours a day to... About 15 hours a day to between 10 and 12 hours a day. And here's what happened, after 16 weeks without any standard dietary restrictions by simply shortening their eating window by a few hours, the study participants lost an average of over 7 pounds.

The study volunteers also subjectively reported that they were sleeping better and having a lot more energy, which goes in alignment, goes back to what we've... Are already unveiling about the impact that our circadian clocks have on all other biological processes. So, they were experiencing this, having more energy and sleeping better by simply compressing that eating time. An analysis of their diets also uncovered that they naturally reduced their calorie intake by about 20%, even though there were no calorie restrictions placed on them. They just naturally did that. They were losing weight, eating foods they enjoyed and experiencing a lot more energy. Now, this might sound too good to be true, this sounds like that marketing ploy to follow a new diet, or this next fad or this exciting new exercise program to get all these results. All they did, without any other restrictions, was simply shortened their eating window from a sporadic 15 hours a day to 10 to 12 hours a day. Very, very simple change. Now we're going to dive in deeper and actually look at what are the metabolic changes that are taking place so that we can understand in a very, very visceral way, why they were getting these benefits.

We're going to talk more about that in a moment, but I also think it's important for us to understand and to take a little bit of time to look at, where did we go wrong? What's happening? What is happening in our society right now? How did our shift take place to where we are eating 15 hours a day, and where did our modern-day eating patterns come from? Because something happened, something changed along the way.

So, it's important for us to understand that for the vast majority of human history, there wasn't any concept of waking up and immediately eating something, for example, and food historians have reported that breakfast is a recent invention made in a deliberate effort to get people to change their eating habits in accordance with industrial work obligations. Alright, so the invention of breakfast was under the guise of getting a high energy breakfast to go and work at a factory or to go and work in agriculture, or whatever the case might be, to go and work... And put in that time, you better get yourself a high energy breakfast, because if you're going

to survive in this change in the way that humanity is structured and operating, better get some snacks in and from this place, I was taught... In my conventional university education, all the way back to all these different certifications and things of that nature, that breakfast is the most important meal of the day, if you don't eat your breakfast... This is one of the things that was passed around another urban legend that's different from the urban legend of these circadian clocks, but this one actually is much more gossipy, that if you don't eat breakfast your metabolism isn't getting turned on, and that's just like... Now that I'm looking back on the things that I was taught in a university, it makes no sense, how is my metabolism not on?

If my metabolism isn't on that means I'm not alive anymore, so now I'm in the middle of a ghost movie, suddenly I'm Patrick Swayze, and I'm here trying to operate and have a good time and everything, but my metabolism isn't on because I'm dead. That's the only way our metabolism isn't on, it's just not true. It's such an over-simplification.

Now, eating certain foods can invoke thermogenic effects, but it's based on the types of foods that we're eating, how much that process happens and to what extent, and also what are the ramifications of that process, because we might eat something to bring about increased metabolic rate and the increased thermoregulation, thermogenesis, but then we might have downstream effects of a reduced resting metabolic rate, reduced metabolic rate from throwing some stuff haphazardly into our body based on the type of food, and we're going to talk about that as well, because there's also a macro-nutrient equation here that we're going to get to. So again, food historians have reported that breakfast is a recent invention made in a deliberate effort to get people to change their eating habits in accordance with industrial work obligations. The records of intentional eating and fasting rhythms date all the way back to the ancient Egyptians. Alright, Walk Like an Egyptian, shoutout to The Bangles. This concept of breakfast has never really existed anywhere until much more recent generations. According to food historian Caroline Yeldham, the people of ancient Rome didn't eat breakfast either, they believed that it was healthier to eat their first meal at mid-day around noon.

As you likely know, the Romans had a substantial influence on many other cultures around the world with their very physical culture and admiration of the human body and the kind of expression of its potential, and so them having built into the culture that folks just aren't getting up and throwing food into their bodies, it just wasn't a thing yet. Now, cut to the Middle Ages, when monastic life largely shaped when people ate. This is likely where the word breakfast initially hit the scene, because people were still not necessarily eating first thing in the morning, unless it was a hard laborer, unless it was somebody who was ill or the elderly, as eating before morning mass was frowned upon, but after mass, around 10:30 or 11:00 AM, people would break their overnight fast, right, so breaking their fast and have their first meal of the day. Another historian Ian Mortimer suggests that the Tudors invented the timing of breakfast as we know it in the 16th century as a side effect of popularizing the concept of



employment. As people increasingly came to work for an employer rather than working for themselves on their own land, they lost control of their time, so they lost control of when they eat. A big breakfast allowed them to work the long, uninterrupted days, often without additional nourishment.

Now, this is for laborers, but also well-to-do folks began to join in the breakfast escapades as they were able to sleep in and enjoy the fruits of other people's labor. So, getting together, having some nice branches and breakfast soirées, rock and see who's got the best wig, who's got on the best high heel shoes, everybody had the heels on with the buckle, shout-out to Benjamin Franklin with the buckle shoes. And also, in actuality, there was a real statute that was established in the year 1515 that insisted craftsmen and laborers would actually start work at 5:00 AM, it was a statute created in society and continued work until 7:00 or 8:00 PM between mid-March and mid-September when they had the most daylight, they wanted to milk as much energy out of these folks as possible, and they were allotted 30 minutes for breakfast, 90 minutes for a lunch, so they better get it in. This is your opportunity to get food in, it doesn't matter about your circadian rhythms, none of that stuff. The basic design of humanity and what our genes expect of us, doesn't matter. Get to work, you better get some snacks in. And yes, the work hours, the workdays were a little shorter and more flexible when the days were shorter, but when the industrial revolution took place, along with the advent of the light bulb and the ability to light up factories, this is when systemic yearlong work hours came along.

Now, where things get really interesting is at the turn of the 20th century, when breakfast itself was changed, because prior to this time, it was typical for people to have for breakfast, foods that was left over from the night before and/or plus some eggs or bread and butter, hot grain dishes like porridge, even in many instances you'll find, if you dig around into the research, folks were having a little bit of Mead, a little bit of beer as well for breakfast, but just stuff that they had kind of put together, lying around, porridge, some eggs, bread and butter or left over food from the night before, but this changed in the 20th century, thanks to a man named Dr. John Harvey Kellogg, who invented the first cereal.

The very first breakfast cereal. And Kellogg, the name should sound very familiar, he was Dr. John Harvey Kellogg, invented the first breakfast cereal in an effort to improve mental health, improve physical health and to suppress sexual desires. One of these things is different from the other, that doesn't fit in, that comes out of left field, like wait, to suppress sexual desires with our cereal. Well, we talked about this in depth in a recent episode, this was episode 412, The Wild History of Cereal in Public Health. So, make sure to check that out and to dig in and understand because it's a phenomenal wild story about the invention of breakfast cereal. But just in summation, Dr. John Harvey Kellogg was very concerned about the health of United States citizens and believed that a big problem plaguing people's health was rampant sexual

desire and masturbation. He thought that was destroying our youth, destroying humanity. In his book, Plain Facts for Old and Young; embracing the natural history and hygiene of organic life... And I actually went and read these old fangled writings, I actually went and read it, it was an adventure, for sure, just reading that.

In the book, he listed some of the symptoms of masturbation, and these were things that people could acknowledge with themselves or also acknowledge with their teens, they can keep an eye on and see if they've got any of these symptoms and know that they're in there, double-clicking their mouse or... You'd fill in the blank. But he also listed the symptoms to be, for masturbation, poor digestion. "Oh, you got a tummy ache, Suzy? Mood swings, bad posture. Clearly. Impaired vision, not so clearly. Paralysis of the lower extremities and even seizures. Wow. So, when these symptoms would take place, these were symptoms of masturbation that he attributed to. Now again, basically, when I read that part of the book is basically everything, every symptom that you could imagine was a symptom that somebody is probably masturbating too much. And in his opinion, one of the biggest culprits stimulating people's uncontrollable desires, that's giving them bad posture because they're just beating... Sorry, they're just doing their thing so often. What caused these uncontrollable desires he felt was rich, spicy, salty, sweet and intensely flavorful foods. Come on!

While plain foods like bland grains could reduce those strong sexual desires. So, with this in mind, he set out to create a breakfast food that could help people to stop these impure desires. And his golden moment was when he accidentally left out some cooked grains that ended up getting stale, and he, along with his brother Will, decided to roll the stale grains out and found that they had a nice crispy flaky consistency after they were baked in the oven, he tinkered with the formula a bit and found that corn was the best base, and it was also anti-masturbation-approved food, and they set out with the first ready to eat breakfast cereal, that's when it was born. So happy birthday to Kellogg's Corn Flakes. But if you're wondering, how do we get from this anti-masturbation cereal to getting Lucky Charms, getting lucky, you see, anti-masturbation and getting lucky, shout out to Pharrell. How do we get there? Where is the bridge?

Well, a big part of that, that we have to thank is Dr. Kellogg's brother, Will. Because apparently, Dr. Kellogg wasn't very kind to his brother Will, and he stole the processing formula, and then he on his own, struck out and added salt and sugar, molt, got a nice formula going to invent the Kellogg's Corn Flakes that then took over the store shelves, it just went bananas, it just skyrocketed, it took off and became incredibly popular. So again, we talk more about this history in the Wild History of Cereal in Public Health on episode 412 for you in the show notes, make sure to check this one out, I don't want to spend too much more time on this, but just look at even the shifting of what we're eating to start the day as a culture, is new, this is a new invention and it's become normal, we've normalized this. We go down to cereal... I know, I still

do it, it's just... It's so nostalgic, it's so attractive, and there's a reason for that. We also talk about the marketing that's done specifically, targeting children, there's many studies that are done on this by breakfast cereal companies to get them in early, create lifetime customers. That's the goal, is so abnormal, is so abnormal.

And this is why we've got to take back control of our mind, take back control of our biology, start to understand how we truly are a part of nature. We are a part of the environment, we're a part of the world around us, we are truly here together in this giant snow globe, this earth bubble, we're just like cells in the Earth's body in a sense, all interacting and engaging with everything else of the whole. And so, it's so powerful, we are a powerful part of the whole. We need to acknowledge that, we want to be as healthy, resilient and robust, and a big part of that is getting in alignment with life itself here on this planet. So again, definitely check out that episode, but let's dive in a little bit more here and talk about some of the clinically proven benefits of circadian fasting, specifically, what I talk about in my book, Eat Smarter, smart intermittent fasting, smart intermittent fasting, it's different from the cookie-cutter approach to intermittent fasting, which can be a little bit excessively restrictive and also haphazardly, throwing windows upon people without any real guidelines for flexibility or for understanding your unique metabolic fingerprint.

So, we're just going to talk about some of the benefits seen through smart intermittent fasting, but definitely if you don't have a copy of Eat Smarter yet, make sure to get a copy, dive in deeper and talk about... Eat Smart is an acronym, so S-M-A-R-T intermittent fasting, giving us the clinically proven parameters to support intermittent fasting, circadian nutrition, so that... It should be something that feels good, that's not incredibly restrictive, that's not something that's hard to do, that we have to even necessarily try to do because we're just getting back in alignment with what our bodies are driven towards, and also we've got to understand too, breakfast isn't necessarily bad, it's not that breakfast is a bad guy, but we've got to keep in mind that what we're bringing in for that first meal matters, the timing of that first meal might have a big metabolic impact with our insulin sensitivity, with our body fat storage, with our cognitive functions, so many things, these are things for us to experiment with and have fun, and if we enjoy breakfast, so be it. It's all good.

Breakfast is a new invention, but so is showering. And shout out to taking showers, our bathing regularly. This is a new invention too, it doesn't mean that's necessarily bad that breakfast is a newer invention, but we have to keep this stuff in context, because even with bathing and showering for example, we can do that to the extent that we're starting to wash away layers of our protective microbes, for example.

So, for maybe showering, I don't know, three times a day or something, I don't know. But we got to keep this washing our hands, for example, 20 times a day, 40 times a day, 50 times a

day, which is not abnormal today, in our culture, people are constantly, constantly washing their hands and seeing that it's increasing the risk of infection because they're breaking down the protective coating, the protective film with our skin, epidermis and also the microbes that live on our bodies, the symbiotic nature. So, we can take anything too far, is my point, not to say you shouldn't take a shower, because a choice like that is going to affect your relationships a little bit. So got to just keep this stuff in context. But let's dive in and actually talk about some of the clinically proven benefits of circadian fasting, circadian nutrition, specifically the window when we're not eating. First and foremost, smart intermittent fasting improves metabolic function.

One of the most incredible things about Smart intermittent fasting is that it initiates hormonal changes that make stored body fat more accessible. Data published in the peer-reviewed journal, *Obesity* states that employing intermittent fasting is like flipping a 'metabolic switch' that shifts the metabolism from fat creation and fat storage to mobilization of body fat in the form of free fatty acids, and fatty acid-derived ketones to be used for fuel. So, this process is enabling our body to actually access the reserves that most of us here in the United States, we've got about 242 million of our citizens are overweight or obese, that we're carrying around a lot of reserves already, and we're constantly bringing food in, our bodies don't get a chance to go and use those reserves and break that down. We talked about this with Dr. Sylvia Tara in a classic episode of the Model Health Show, really looking at the science of fat and digging in on that subject as well.

Now, if we understand this, that we're able to now access our stored body fat more easily, this highlights another study here, this was conducted by researchers at the University of Copenhagen, and they found that intermittent fasting is able to quickly reduce insulin resistance and nullify the effects of insulin created roadblocks that stopped fat from being released from the fat cells. And their study also revealed that intermittent fasting has some significant effects on our vital satiety hormones. So again, this shouldn't be hard for us because it's just getting in touch with what our genes are expected to do, what we've been doing for centuries upon centuries upon centuries as human beings. And so, it has a lot to do with our satiety hormones, and us feeling good, even when we're not eating. Research published in the journal, *Endocrinology* reports that intermittent fasting can improve the function, satiety-related hormones like neuropeptide Y while supporting fat loss and retaining lean muscle mass. This is the big one, this is the big one. Because a startling percentage of people who lose weight through conventional calorie restriction regain their lost fat and find it exceedingly harder to lose weight over time.

And a huge metabolic player in this conundrum is the loss of their body's valuable lean muscle mass. So, to say lean and muscle mass is a repeat, because muscle mass in and of itself is lean tissue. But we've got to understand that when we lose muscle mass, muscle is very expensive

for our bodies security, and it really is this kind of metabolic machinery that we carry around, and muscle is also a reservoir for a very potent hormone that help to regulate our metabolism, and the list goes on and on and on, on the benefits of having more muscle on our frame, but the more muscle we're carrying, the more caloric expenditure that we have automatically, our resting metabolic rate is going to be higher for this version of ourselves that has a significant amount of muscle mass versus a version of ourselves that has 20% less, 25% less muscle mass, we're going to be just burning more calories at rest, and when we're doing stuff. But multiple studies now are really affirming this and sharing this data that haphazardly, cutting calories is caloric restriction paradigm that we have, and not understanding the quality of food, circadian rhythms and all these other aspects, sleep and how our sleep affects our metabolism, just haphazardly cutting calories we're losing a significant amount of our muscle mass when we do that haphazardly.

But a way that we are able to retain our body's muscle mass is through circadian nutrition, circadian fasting. So, improving our metabolism overall, improving fat loss, but also retaining our lean muscle, that's the key. This is why folks find it so difficult to keep weight off after crash diets, is that we're losing muscle, which sets us in a disadvantage, a metabolic disadvantage. So, we want to retain our muscle mass, and we know that this circadian fasting, smart intermittent fasting is one way that is clinically proven to do that, but also during that fasting window, we'll just say again, the researchers had folks go from 15 sporadic hours a day of eating just to 12, for example. So that's just maybe you finish your last meal of the day at say, 7:30 PM, and then you have your first nutritional intake, your first meal at 7:30 AM, that's 12 hours, that's not even that big of a deal if you think about it, because our fasting window also includes our sleep.

And there's a growing amount of data now also demonstrating how eating late into the evening... Because this is one of the things that, again, seems a little bit like fitness and nutrition gossip, but eating late in the evening is going to prevent weight loss or significant weight loss, it's not always 100% the case for sure, there's nuance here, but in general, what's happening is eating late into the evening creates some significant disruptions to our sleep quality, alright, sleep efficiency, which our sleep is a major controller of our metabolism, and if we're already in a state where we're overweight or obese, when we eat a meal, we're getting a significantly higher increase in cortisol levels, because there's a little bit of a stress associated with eating food because your body has to be top line, your immune system is primarily located in your gut, about 70% of our immune system is located in our gut, and so they have to be front line interacting and working on, "Is what just came into our body, safe? What do we do to get everything where it needs to be?" It can be a stressful event, but it can also be beautiful when things are in balance. So, we know that there's a higher propensity towards higher cortisol levels when we eat, if we're overweight or obese.

And then that just kind of creates a vicious circle because cortisol is sort of an antithesis of melatonin. If our cortisol levels are getting pushed up, it's going to push melatonin down and inherently that's just one way it's going to affect our sleep quality and plus just by the nature of eating a meal, a lot of energy has to go there into digestion, it's a very energy-intensive process of taking food because you got... This is a really powerful like aha moment. When you eat something, it's going to become you, it's going to become human tissue, it is a very complex, amazing process, we don't even fully understand yet, but we know that it's the biggest energy demand for the average person is to digest that food that they've eaten, alright, so it's taking energy away from rest and recovery from our sleep, so having a little bit of some barometers there with not eating too late into the evening. It doesn't have to be 100% of the time either. That's the other part.

So, it's giving us some flexibility and some freedom and not being neurotic about it, but at the same time, what is going to be best for us overall, but in addition to that, during that fasting window, that doesn't mean you can't have anything... There's an entire section that I have in Eat Smarter talking about some of the fasting mimicking nutrients and foods that actually help the benefits and encourage even more benefits through specific foods and nutrients consumed during your fasting window. And one of them is an effective adjunct to intermittent fasting because it's particularly able to support fat loss while protecting muscle mass, as documented in a recent study featured in Clinical Interventions in Aging, and what I'm talking about is the absolutely prized and storied tea, fermented tea, Pu'er, Pu'er, P-U-'-E-R, so Pu'er.

A recent study published in the peer review journal, Nature Communications, uncovered that a unique compound called theabrownin found in traditionally fermented Pu'er has some remarkable effects on our microbiome as well, so not just being protective of our muscle mass, but also improving the health of our microbiome which again, our microbes have these internal clocks too. It's not just our human cells, but we have these biological clocks, these circadian clocks within our bacteria cells as well. The research has found that theabrownin in Pu'er positively alters gut microbiota that directly reduces excessive liver fat and reduces Lipogenesis. The creation of new fat, but always as always, the sourcing of where we're getting these incredible super foods and super herbs, these incredible teas, matters more than ever. You want to make sure that you're getting it from the right place, because today, the supplement industry, the food industry, the regulations, the supply chains, we've talked about this multiple times in the show with some of the leading experts in it, it's a bit sketchy, so we want to work with companies that have integrity, that are sourcing things the right way, that go the extra mile to make sure that you're getting high quality foods and supplements without any nefarious things that come along with it, because liver damage from haphazard supplement use is one of the things that's on the rise.

And this is why the fermented Pu'er that I drink is from Pique Teas, P-I-Q-U-E because they use a patented cold extraction technology to actually extract all these bioactive compounds in the Pu'er, and also they have a triple toxin screening process for one of the highest levels of purity testing for pesticides, heavy metals, toxic molds that are common in tea, it's common, they're making sure that this stuff is not in there, and also it's wild harvested so it has even more concentrations of polyphenols that create all these great benefits that we're talking about with the microbiome. Alright, definitely check them out. One of my favorite things, go to [piquetea.com/model](http://piquetea.com/model), that's P-I-Q-U-E-T-E-A.com/model and use the code Model at checkout, and you get an exclusive 10% off. Okay, that's [piquetea.com/model](http://piquetea.com/model), use the code Model at checkout for 10% off. And I love their Pu'er, also their ginger tea is one of my favorites. And with the Pu'er, I like a little bit of emulsified MCT oil along with that. It's one of my favorite things.

Just love it, love it, love it. Alright, so now when talking about smart intermittent fasting, it's not just the metabolic domain, it's also in the health of our brain and cognitive function as well. Intermittent fasting, smart intermittent fasting can stimulate the production of new brain cells, and this is according to data published in the Journal of Molecular Neuroscience.

Not only does intermittent fasting stimulate the creation of new brain cells, it also makes the neurons that we already have work better. And numerous studies have revealed that intermittent fasting increases our levels of something called brain-derived neurotrophic factor, BDNF. Which BDNF is a powerful assistive force in the healthy development and survival of our brain cells. We don't get that many. We know that we do have neurogenesis processes today, and primarily this is seen in the hippocampus, the memory center of the brain, but many different areas of the brain, we are not just on a win creating new brain cells, we really need to take care of the brain cells that we have. And so, this is another way that intermittent fasting is found to increase the production and release of brain-derived neurotrophic factor to help to protect the survival of our brain cells. It's also been shown to improve neuroplasticity, enhance cognitive function and protect our brains from a myriad of diseases.

So again, we talk even more about this in Eat Smarter, and it's a critical part of our overall health and performance, is understanding these things that anything that's going to be good for our metabolism is also very likely going to be good for our cognitive performance, pretty likely going to be helpful in slowing down the aging process, helping to prevent diseases, and so much more. So, let's talk a little bit about that as well, because one of the most amazing benefits of smart intermittent fasting is the impact that it has on inflammation, for example, we just did a master class episode really breaking down how inflammation works and the mechanisms that... The offshoots of those mechanisms. So, number one, how does inflammation work? What is it? The impacts that it's having downstream, and actually how can we address reducing inflammation. Well, smart intermittent fasting is one of the ways that we

can directly reduce inflammation. A study published in the journal *Annals of Nutrition and Metabolism* show that a daily 12-hour intermittent fast was enough to significantly reduce levels of homocysteine and C-reactive protein, which are both major markers of heart disease and systemic inflammation.

And in addition, research at the Department of Immunology and Microbial Science at The Scripps Research Institute found that intermittent fasting has a profound effect on autophagy throughout our entire body. Also, of course, including our brain. This cellular cleansing is triggered by intermittent fasting and it's accelerating the removal of metabolic waste products, enabling our cells, tissues and organs to work more efficiently. And also, smart intermittent fasting is found to consistently boost the production of human growth hormone. So again, the release of human growth hormone is on that circadian timing system, so having that window of smart intermittent fasting increases the production and release of HGH or human growth hormone. Intermittent fasting can increase blood levels of human growth hormone by as much as five-fold, and this is according to scientists at the University of Virginia Medical School. So much powerful information to behold here, and the benefits that we see just by getting an alignment with circadian nutrition, circadian fasting and allowing our bodies to engage in autophagy and cleaning out metabolic waste and just making room for new growth and development. So, this is what our genes expect from us, and this is the power of taking advantage of circadian nutrition. Now, circling back to our overarching topic of circadian nutrition, this study is amazing, let's do this.

This study was published in *Frontiers in Nutrition*. They found that when there is a misalignment between the endogenous rhythms in physiology and environmental inputs such as feeding during the inactive phase, the body's ability to maintain homeostasis is impaired. The loss of phase coordination between us as humans and the environment, as well as internal misalignment between our tissues can produce cardio metabolic diseases as a consequence. The timing of food intake is highlighted as a powerful environmental cue with the potential to destroy or restore the synchrony of circadian rhythms and metabolism, those are strong words. Destroy or restore. It's like Megatron saying, "One destroy Prime." And then Optimus Prime is like, "Restore, Autobots roll out." So, these are very strong words, destroy or restore based on when we're eating and creating increased risk of cardio metabolic breakdown by eating at abnormal times. And in an eye-opening 10-day ward study conducted by researchers at Harvard University, altering the fasting/eating cycles and sleep/wake cycles of 10 healthy study participants, this was five women and five men, to mimic typical shift work to see how throwing off their eating and sleeping patterns, what direct impact does it have in just 10 days?

They received very strict iso-caloric meals to maintain consistency. But over the course of the short study period, their circadian misalignment of when subjects ate and slept, systematically decreased the leptin, increased their blood glucose levels, increased insulin levels, disrupted



their daily cortisol rhythm, increased their blood pressure and reduced sleep efficiency. That's not good, that's a lot of problems, that's a lot of drama happening to our biology when we're throwing off our eating cycles and our sleeping cycles. Again, this happened in just a matter of days, all of these detrimental effects. The scientists also noted that the circadian misalignment induced a pre-diabetic state in several of the study participants, which these were healthy men and women to start.

So that quickly can put them into a pre-diabetic state. So, the science around circadian nutrition is just going to continue to grow. And this is one of the most important things for us to really start to think about the process and to evoke in our own lives. And one final component that I want to share with you is the timing specifically of certain foods, certain macro-nutrient ratios. What kind of impact does that have on our bodies? Because now we've got some really sound data on this. And so, this is something highlighted in Eat Smarter as well, and it was a study conducted by researchers at St. Louis University in my hometown, and published in the International Journal of Obesity, and it sought to discover what happens with fat loss when you eat a high carbohydrate breakfast versus a high protein/fat breakfast, when the calorie count of the meals is exactly the same.

The researchers did have the study participants decrease their overall caloric intake by 1000 calories a day in this study, but had different people use different macronutrient ratios just for their first meal of the day. And here's what they found after the eight-week study period. The study participants in the lower carb breakfast group showed a 61% greater reduction in body mass index, a 65% greater weight loss, a 34% greater reduction in waist circumference and a 16% greater reduction in body fat percentage. All this based on the macronutrient ratio, the dominant macronutrient that they had in their first meal of the day. This study demonstrates another important point and a huge key to circadian nutrition that the timing of your carbohydrate consumption matters. If the goal is fat loss, then loading up on carbs to start the day is probably not a good idea. The data shows that a higher ratio of carbs at your first meal tends to lead to storing more fat and having a bigger appetite.

A study published in the peer review journal, Appetite, appropriately, found that study participants eating a higher carb breakfast ended up being hungry again sooner after their meal than test subjects eating a lower carb breakfast. Now, we've got to keep in context that the type of carbohydrate is not being addressed here necessarily, because our diets have shifted so heavily towards these heavily refined processed carbohydrate foods to start the day versus real whole food versions of carbohydrates and the proteins and fats. Because in that study that I mentioned that eight-week study, the carbohydrate that they used was a bagel. Alright. And the protein/fat food was eggs. So, one is pretty heavily refined and processed, one is an egg, whole eggs. And the carbohydrates are not necessarily the issue, it's the type of carbohydrate, so these aren't like low glycemic fruits and non-starchy vegetables, because the

inclusion of those for our first meal of the day actually has a myriad of different health benefits with increasing satiety hormones, increasing even things like cognitive performance. So, we don't want to just black and white, be like carbs are bad to have first thing in the morning, it's not that, it's what is the type?

And by the way, a little fun fact, the word bagel is derived from a word meaning bracelet, alright, and ring as well. So clearly. But just imagine if somebody got that as a gift like, "Put this bagel on your wrist, girl." But anyways, if you've ever wondered why bagels have a hole in it, it's because of apparently, when they were invented a couple hundred years ago, it enabled them to be cooked faster, and also, they can use something like a dowel and you can stack a bunch of them up for easy storage, being able to have a lot in one place. So, they're just slinging out bagel bracelets back in the day, so that's why they have a hole in them. Just weird stuff, I know. Anyways, we're going to move on, we're going to talk about our final component here, because it's just like, "Well then, when can I have more of the tasty types of carbohydrates rather than just kicking the day off with dessert?" Because that's really what it is in our culture. We're having cake for breakfast, many of us, literally tens of millions of adults here in the United States have cake for breakfast. And it sounds weird, it's like, "No, but who does that?" What is a muffin? It's a little cake. It's a little cake without the frosting.

What is pancakes? Cake is literally in the name, alright. Let's not lie to ourselves. Not to say, I'm a fan of pancakes, I think pancakes are phenomenal. That's when we can actually take something and upgrade it, creating protein pancakes, for example. So, it's not just, again, this black or white phenomenon, but maybe partitioning our carbohydrate to another time of day based on circadian nutrition, we can see some benefit. And in fact, a study published in the peer review journal, Obesity took overweight test subjects and put them on either a general reduced calorie diet or a reduced calorie diet where the majority of their carbohydrates, about 80% of their carbs were eaten at dinner. At the end of the six-month study, the study participants who ate most of their carbs at dinner lost more weight, had greater reductions in waist circumference, and had an overall greater reduction of body fat mass compared to the conventional calorie-restricted dieters. Plus, the night carbers also had greater improvements in their fasting blood sugar, better insulin sensitivity, improved cholesterol ratios, reduced inflammation measured by C-reactive protein and improved levels of leptin and adiponectin.

This is profound. It's absolutely profound, and it's counter to a lot of things that we're taught that you want to bring in your carbs to start the day, called carb load because you're going to burn off that fuel. And that's looking at the interaction with calories and metabolism through tunnel vision, whereas, if we're going through the day and we're not leaning heavily on carbohydrates and or even eating that early in the first place, we can... If we're using an analogy of a car, we can utilize a fuel we already have in the car and then top it off at the end of the day, replenishing the liver glycogen, and muscle glycogen by adding in our carbs at that later

portion of the day. Now, just to be clear, this is going to still be based on our own unique metabolic fingerprint, none of these things are black and white, this does not mean that you having carbs, your heaviest dose of carbs in the evening is going to be best for you.

It's all going to be based on you as a unique individual, and that's what Eat Smarter is really about, is educating ourselves on that and all these different components, and having the tools for us to experiment and to have some joy and some more flexibility, and not getting so caught up in the dogma around nutrition, but also honoring what are the things that our genes expect of us? What are the things that humans have been doing the longest that have gotten us to the place we are today, prior to the decline, the rapid decline in our health in recent decades, which again has just really thrown a major spiked monkey wrench into our metabolism with our abnormal sleep cycles and abnormal eating patterns. So having these things as tools, but this doesn't mean we can't have a late-night snack, this doesn't mean that we can't have breakfast, it's just being empowered to, let's tinker with some of these tools, some of these insights and find out how it works for us because from what the data shows, the...

What I bring forward here in the Model Health Show. What does the majority of evidence show? Because there's always going to be something counter, that's just the nature of reality because we're so unique, but what does the majority of evidence show that's going to help the majority of people? And in summary here, scientists at the Salk Institute for Biological Studies gave three recommendations regarding circadian nutrition based on their years of assessment and study of our biological clock genes. Number one, they recommend avoid eating for at least one hour after waking up. This is a great time to get up, get hydrated, you can have some tea, have some pu'er, for example, some green tea. This is a good time to do some journaling, maybe a little bit of fasted exercise, maybe a little bit of meditation. For that first hour of the day, they recommend not eating.

Number two, they recommend that we not eat at least about two hours before our bedtime, that seems pretty reasonable, and they recommend between two and three hours. And I don't think that's a big stretch from where many of us are today. Number three, they recommend that when traveling, especially by plane, to actually fast a little bit more on those days, to give our metabolism, our microbiome and our cells to really recalibrate and get adjusted. Now, here's a little tip for me to add on top of that for you, there are several nutritional compounds that actually have robust effects on the circadian rhythms. Take caffeine, for example, we now have clinical evidence that caffeine can speed the synchronization to a new time zone after experiencing jet lag.

So, having a little whack of caffeine the next morning after you wake up in a new time zone can actually help to get things synchronized a little bit quicker. And hopefully you know that the quality here again, it really matters. And we want to make sure if we're using coffee, for

example, pu'er is a caffeinated tea, but if we're using coffee, for example, which for me... Literally for years, I travel and I bring along with me my Four Sigmatic coffees, Four Sigmatic organic coffee, that is combined with lion's mane medicinal mushroom. And the lion's mane has some really profound neurological benefits stimulating the production of new neurons and also protecting our neurons, our brain cells, and so much more. And this is from the University of Malaya, research is out of the University of Malaya, found that lion's mane has some really, really profound effects there. So organic coffee, so you get that caffeine source and all this benefits there, and the antioxidants plus lion's mane, organic lion's mane, dual extracted, so we actually get the nutrients out of the medicinal mushroom.

So, go to [foursigmatic.com/model](https://foursigmatic.com/model), that's F-O-U-R-S-I-G-M-A-T-I-C.com. And you get a special 10% discount off of their organic mushroom coffees, their mushroom hot cocoa, as well as my little son, my youngest son, Braden, that's his favorite thing. And they also have just elixirs, if you don't enjoy coffee, they have lion's mane elixir cordyceps, reishi, so much good stuff there. Go to [foursigmatic.com/model](https://foursigmatic.com/model), that's F-O-U-R-S-I-G-M-A-T-I-C.com/model. Alright, now these general guidelines seen here in the data, most folks in our culture have no idea about circadian nutrition, circadian medicine is really on the cutting edge, but they're also not as cemented in stone somewhere as a universal law that doesn't have any flexibility, so we want to keep that in mind. And what we went through today is just a portion of the information that's found in my new book, "Eat Smarter," and also something else that I have coming up that is very, very powerful and transformative for you is Eat Smarter University. This is the most in-depth, most cutting-edge nutrition program ever compiled. It's going to be releasing very soon, and it truly is a university training.

So, if you are in the healthcare profession, and it's also not just that, but also being something that is a transformation program for ourselves as well, and if you just love nutrition, if you love health and wellness, you're going to want to be a part of this course as well. And if you go to [eat smarterbook.com/university](https://eat smarterbook.com/university), you can actually get on the early list for registration when the program opens up and it's coming very, very soon. There's a major, major need for this right now, there's a major need for you to be as healthy and as influential as possible to help to transform our society, but it starts with us. So, getting this education right now to help to not just counterbalance what's happening in our society right now with poor health being an epidemic, but to shift this, to create a tipping point to where we can start to make health the norm.

And so, we need more people to be the representative of that, to be a model for what's possible. And this is why I'm so passionate about this and put so much into Eat Smarter University, and I think it's really, really going to blow your mind and to be a part of that community, part of that course, that training it's just nothing like it in the world. So again, go to [eat smarterbook.com/university](https://eat smarterbook.com/university), and we've got some powerful guests coming up here on

the Model Health Show very, very soon, world-class experts, and also some more powerful master classes on a myriad of different subjects for health and wellness to keep pushing this culture forward. Culture of health, the culture of inspiration, and the culture of empowerment. I appreciate you so much for tuning into the show today, 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](http://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.