THE MODEL HEALTH SHOW

EPISODE 467

How Fat Burning Actually Works & Nutrition That Impacts The Process

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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. I'm pumped about this episode. This is the education that I wish I would have received in my university nutrition and biology classes, in learning truly how our metabolism actually works. How does the process of fat loss actually work? How does it happen? Where does fat go, when you lose it? Does it go to another dimension? Is it going to the multi-verse? Do we need Ant Man to help us to figure all this stuff out? We're going to dive into that today and so much more. So we're going to take you through the process of metabolism, process of fat loss. Just a very rudimentary understanding of it, but it's going to put so much power into your hands to truly know how the process works. And also we're going to dive into specific nutrients and foods that actually assist in the enzymes and the hormones involved in the fat loss process.

The very first thing to understand right out of the gate is what are we actually dealing with here when we're talking about "burning fat". What are we dealing with here? So often in our society today we're trying to target and to get rid of something that we don't even understand what it is, we don't even know what it is that we're trying to "get rid of". And so the first thing that I want to share with you, and this is a very important understanding, is that body fat itself, your fat, is an organ, alright? Body fat is an organ. We tend to think about it like it's just scattered droplets of stuff throughout our body, scattered droplets of unhappiness sometimes, scattered throughout our bodies. But really your fat cells and your fat cell communities, which we're going to talk about, they work together as an organ. Much like your skin is an organ that really spreads and move throughout your body and is a big part of your nervous system, your body fat is a huge part of your endocrine system. It works together much like in organ.

And your body fat releases hormones and other substances to regulate your body's metabolism by communicating with other organs and tissues, such as your liver, your pancreas, your muscles. And this introduces a critical but overlooked point in how this process actually works, in that your body fat itself is largely responsible for regulating your metabolism. Your body fat itself is largely responsible for whether it's "burning itself". So your body fat can function kind of like a stunt man I guess, lighting itself on fire. But again, it's much more dynamic than that. But it's just the point that I want to bring forth is that your body fat itself is a major player in your endocrine system and regulating hormones and the communication with all your fat loss and fat storage-related hormones and neurotransmitters and neuro-peptides. It's this beautiful dynamic web, this beautiful dynamic picture and we're going to continue to unpack what that is.

Now, there are different types of fat cell communities. Just like any kind of civilization, there's different communities. You've got your suburban, you got your urban, you got your country community. There's all kinds of communities. Just like with our body fat, there are certain body fat cell communities. But first, let's unpack a little bit about the individual in the fat cell community, which is the fat cell itself. The fat cell itself, it's called a fat cell because of its uncanny ability to store fat. You guessed it. Fat.

And fat cells can actually expand their volume more than 1000 times their size. When we're born, we have a certain amount of fat cells kind of in our cards, in our genetic destiny. And as we go through childhood and adolescence, and once we get to the age of about 20, the number of body fat cells that you have are just about the same number that you're going to have throughout your lifetime. I know this sounds crazy, because we think that we're growing and building more fat, creating more fat cells. But what's really happening is the fat cells themselves, are just getting more filled with content. And again, it can expand over a thousand times its size. So these fat cells are like some hefty hefty Cinch Saks. They're like Santa's sack, Santa can stuff that sack full of gifts. It just expands, expands... I'm just thinking about a couple Christmas movies. Shout out to Christmas.

So that's what's really happening when we're talking about gaining weight and "growing fatter or growing fat". It's not the fact that we're just starting to have haphazardly create more body fat cells which that is possible and we'll talk a little bit more about that. But more often, we're talking about the fat cells themselves becoming filled with more and more storage, more and more energy, more and more potential energy to be used and packed away for a rainy day, because that's what the fat cells are designed to do. It's an incredible evolutionary adaptation that humans have developed that really enabled us to make it this far and to become the people that we are today. Its thanks in large part to our incredible fat, but we see fat as the enemy. But fat has enabled us to survive when food isn't around.

Now the rub is that today food is always around. For most people here in this civilization, we've got 24 access to food. Even though I grew up on food stamps, and we were getting food from food pantries and charities, and we were on the WIC program and all these different places to get food, we still had a lot of food, a lot of calorically-dense food. Now please preface, if you don't know this part of the story, make sure to listen to the episode or watch the episode where we did breaking down the history of the calorie and the epigenetic controllers of calories, because calories are not the tip of the spear, when it comes to metabolism and regulation with food. Alright? So make sure you listen to that episode.

So I'm just going to take it into consideration you've already got that piece locked in, and of course we'll also put it for you in the show notes, if you happened to have missed that episode. It's very important to understand it, because when I went to my private expensive university I

was taught, very first day of nutritional science class, that calories were king, calories are the tip of the spear, if you can control your calories and manage calories you can manage your metabolism.

And that story is more one-sided than an elephant sitting on a see-saw, with a chihuahua. It's way out of balance. So make sure to check that out. But to dive more into this component of it, we know that the fat cell is storing a lot of energy, a lot of potential energy, to be used for a rainy day. Our fat cells are just really, really good at doing its job. It's just so good at storing fat, because that's what its role is. And it's also good at releasing that fat for energy when things are in balance and when it's needed. It just has to get the signals to do that job.

And again, we're going to keep drilling down into what that looks like. But I just wanted to give you a brief summation of what's happening when we think that we're "gaining weight" or "gaining fat", what we're really doing is just filling the fat cells themselves with more content. Now, let's unpack, and... Or should I say pack, what is actually going into the fat cell, what is actually getting stored in the fat cell, enabling it to store energy and/or grow. And what's getting packed into our fat cells themselves... And by the way our fat cells, also called lipids, sometimes they're called adipocytes, they're mainly packed with or composed of these tiny packets of stored energy called triglycerides. But they're also known as triacylglycerols. That's another name for it, or TAGs is a short for that, like, "Tag, gotcha, you fat."

Shout out to tag. Do you remember tag? First, you start with the basic tag, which is like you tag somebody and run, then you get more evolved and you get to that freeze tag. Do you remember freeze tag? Somebody tag you and then you like you frozen, you like, "Billy, come unfreeze me." It's just incredible, good times. Do you know that tag has actually been banned in some schools? True story. But that's for another day, that's for another day. But triacylglycerols, that's not the name that we're going to use, 'cause I think it sounds a little bit provocative. Triacylglycerols. So triglycerides, that's what's actually getting packed into the fat cells, enabling them to grow.

And triglycerides each consist of three fatty acid molecules, attached to a single glycerol molecule. So these fatty acids, three of those with one glycerol, that's why it's called a triglycerides, or triacylglycerol. Now what's really crucial to understand is that our fat cells literally join together in fat cell communities. So now we know what's actually getting packed into the cell, now we know the role that the fat cell is playing, because it's really based on survival, it's just doing the job it's program to do. But our fat cells function together in communities, just like any communities here on the planet.

You've got different types of communities who do different things. And so the first community we're going to talk about are, when we're talking about "burning fat", we are largely targeting

and talking about what are known as storage fats, okay? Storage fats. And the first type of storage fat we're going to talk about is subcutaneous fat, alright? Subcutaneous fat. Now, subcutaneous fat is the fat cells that are stored just beneath your skin. It's the fat cell community just below your skin, and it's able to store caloric energy, padding your muscle.

So the fat on the back of your arms, on your thighs, on your booty. Padding your muscles, if you've ever taken a fall, if you've ever fallen on your rump shaker, you got subcutaneous fat to thank for a little cushion. So this is a type of subcutaneous fat, and it also helps to regulating your body temperature and also serving as a pathway for your nervous system and blood vessels moving throughout your body, from your skin to your muscles, and all that communication. Subcutaneous fat is incredible, it has an incredible job and incredible intelligence.

Now, our ability to store subcutaneous fat, again, it's an evolutionary advantage that has enabled us to store energy that can be used during times of food scarcity. So that's the first type of storage fats, is subcutaneous fat. Any of these fats can get out of hand. So number one, subcutaneous fat. The next type of storage fat is called visceral fat, alright? Visceral fat. Also known as omentum fat. Omentum, which is derived from, I believe it's the Latin word, meaning fatty apron, fatty apron. Who knew? Visceral fat has been found... Now, this is the type of fat that unlike your subcutaneous fat, which you can have subcutaneous fat on your belly as well, that's the stuff you can pinch, the visceral fat is that deep abdominal fat, it's the fat that's really pressing upon and putting pressure on your internal organs.

So it's like really cramming up space with your guts, with your pancreas, with your liver, that deep abdominal fat. And the most important piece here that I want to talk about with visceral fat is that it's been found to contribute most often, of the different types of fat cell communities that we're talking about, visceral fat has been found to contribute more to diabetes and insulin resistance than other types of fat, by far. And this is based on data published in the Journal of the American Heart Association, affirmed that carrying extra visceral fat substantially increases your risk of heart disease and having a heart attack as well. So it's no joke. Visceral fat, if it gets out of hand it can be problematic.

But again, it's an adaptation that we developed to store energy that we can use in times of need. So we've got subcutaneous storage fat, we've got visceral storage fat. Now another one that a lot of folks don't know about... And when I was in school, again, I was taught that fat and muscle are dichotomous, like you're just trying to burn fat, build muscle, burn fat, build muscle. That's the marketing. So you're led to believe that these two things are dichotomous, but they're really intersecting, but they're really attached, but they're really working together. And this is highlighted perfectly in this next type of storage fat, which is called intramuscular fat, alright? Intramuscular fat. This is our third major type of storage fat.

Intramuscular fat is used as on-site energy by your muscles for you to do basic movements. So even when I just moved my arms just now, thank you intramuscular fat. It's being used as on-site energy to move our bodies. It can also really act as your muscles' right-hand man, and seemingly though, this fat, even though it's kind of a right hand man, it can get back up dancer syndrome too. It can want to steal the show a little bit, and shout out to the background dancers who made it. They hooked up with the lead artist. Shout out to Cris Judd. What happened to Cris Judd? He married J.Lo. Like, Kevin Federline. Kevin, Kevin, where are you, man? I hope you're alright. He locked up Britney. Alright. He's a back-up dancer, made it to the foreground. Alright, so this muscle can try to steal the show as well, and boy, they stole the show for a minute there. But again, this type of fat is also incredibly valuable and helpful when it's in balance.

Now, researchers at the Boston University School of Medicine affirm that notable increases in intramuscular fat lead to measurable decreases in insulin sensitivity. Alright, this is bad news. When we get into how this process of fat loss is actually working, in the conversation of insulin coming into it, you're going to understand more why this is problematic. So intramuscular fat, same thing. If we were storing too much energy there and that muscle is becoming abnormally functional, we can start to run into some overall problems with our metabolism. Alright, now to summarize. The three previous fat cell communities that we covered, subcutaneous, visceral, and intramuscular are all fat communities that store energy. They store energy, and they're all in a class called white adipose tissue, white adipose tissue. Or WAT. Alright, whereas, when we get to our next community that we're going to talk about, you're going to learn about a type of thermogenic fat cell community that doesn't store fat, it actually burns it, and that fat that's really become headline news today is brown fat or brown adipose tissue or BAT. In the dark of the night. Sorry, somebody hit the bat signal.

Alright, now, brown fat is actually the subject of many studies right now because of its profound impact that it has on the metabolism. It's one of these evolutionary adaptations. Babies have a lot higher ratio of brown adipose tissue because it helps to really insulate the body, regulate temperature and protect against hypothermia, keeping us nice and warm and cozy, but as we get older, our ratio of brown fat diminishes. Again, this is a type of fat that burns fat for energy, and on a human adult, most of our brown fat is primarily found around our neck, our collar bones, our shoulder blades, upper back region, down along our spine. That's where we're going to have our pockets and spots of brown adipose tissue, but again, it's really a potent energy-burning source, and it accomplishes this partly through a special protein called thermogenin. Now again, as we get older, our ratio and activity even of brown adipose tissue can dramatically decrease, but there are certain things that we can do with our nutrition and lifestyle to increase our ratio of brown adipose tissue.

Now, one of the big takeaways here, and this is published by the Garin Institute of Medical Research, and this is in my book, Eat Smarter... All of this stuff that we're covering today is in Eat Smarter, so make sure if you have not read Eat Smarter, USA Today national bestseller, what are you doing? You need to get this book like ASAP. Also the audio book is available as well. This study was published by the Garin Institute of Medical Research found that once activated, just a tiny amount of brown fat, 50 grams, just 50 grams of brown fat could burn an additional 300 calories of energy in a day. Simply upping your body's ratio by just 50 grams, this teeny tiny little amount, instantly changes your metabolic rate and increases your body's ability to burn 300 more calories in a day. These are these really interesting dynamics of a metabolism that was not taught to me in my conventional university education. And also how can we actually influence our brown fat ratios? How can we influence the activity of our brown fat? And these were simply things that were not taught to me.

And one of the most powerful takeaways about brown adipose tissue is the fact that it's brown. The reason that it's brown is that it's so dense in mitochondria, it's so dense in mitochondria, which is really an end point for this process of fat oxidation or "fat burning", which we're going to talk about more, but I want to give you the heads up, that brown adipose tissue is so dense in that end destination where fat is actually getting burned. It's one of the things that makes it really remarkable. Alright, so that's another fat cell community.

And we're going to share one more here on this angle of potential of what this fat cell community is actually doing, this one's a little bit different. And this fat cell community is a variable fat, it's a variable fat that can actually do different things. And it's called beige fat, alright? Beige fat. Now, beige fat is the answer to the question, "What if my white fat could get a tan, what if it could become a little bit more brown and do some different things, do some of the jobs that brown fat does?" And beige fat is fascinating in that it actually appears to have the flexibility to act like either brown fat or white fat. Alright, so it's flexible, it has that ability to pivot between two things like Van Damme, hittin' that split, alright? It's able to do that, to bridge that, to have that flexibility and variability.

According to scientists at Georgia State University, beige fat has potent potential to fight obesity in much the same way as brown fat, by burning fuel rather than storing it. But beige fat is genetically distinct from brown fat. Brown fat cells are born from stem cell precursors that also produce muscle cells. Beige fat on the other hand forms within deposits of white fat cells from beige cell precursors. And again, this is coming directly out of Eat Smarter, and there are certain things that we can do with our nutrition and our lifestyle that influence the browning of these beige fat cells and also the activity of our brown fat, which we're going to get to a little bit later in the show, but first we've got to understand how this process of fat loss actually works. But to understand that piece we first got to understand how the fat is getting stored in the fat cell in the first place.

Now, a lot of folks don't realize this, but the average lean adult male stores about 130,000 calories in fat on their frame. 130,000 calories in fat stored on the average lean adult male, that is enough energy to sustain life for the average person for approximately 65 days. 65 days. Now, excessive fat storage obviously can be unhealthy, it can be problematic, this can bump into issues with performance and with confidence and all these other aspects of psychology that come into play, but most importantly, we're talking about health, and having that foundation of health, seeking to be healthier can have an out-picturing of changes to our body composition and the things that we would attribute towards having a healthy physical culture. Now, with that said, once we start to venture into obesity, we'll be storing hundreds of thousands more calories in fat on our frame.

Tremendous amounts of energy, and again, an average adult male, that's 65 days of energy. Just imagine how much energy is stored once we venture into that domain. And coming up from the environment that I lived in, most of my family was obese, and this is just what was a norm, coming from where I'm from. And part of the reason that I do this work that I do is that I love my family. And there's so many good people. We just didn't know. We didn't have this education, we didn't know how any of this stuff worked. The distance of our knowledge would range from our eyes to the television screen telling us to do a Slim Fast shake if you want to lose weight. Shake for breakfast, one for lunch and a sensible dinner.

What is sensible? What does that even mean? Sensible for who? There's a lot less sensibility today. But that's the scope of our education, we don't understand how these processes work, and I want to empower people to understand how our bodies work and how powerful food is in driving and controlling these processes. And so this brings into the conversation, the conversation that we had with biochemist Dr. Sylvia Tara who was on the show, and we'll put her episode in the show notes, a while back, and she talked about thinking about your body's use of energy, of storage of fat, just like we think about money, and just as currency is used for every exchange in our economy, energy is needed for every transaction in our bodies. Now when we eat food, when we eat food, when we put food into our system, we instantly get some instant glucose cash on hand. We've got some instant currency, some glucose cash on hand, and it's in our blood stream for easy access, to get to it easily and quickly, to run processes to pay for metabolic things to happen, your metabolic Gucci store, your metabolic Target, it's getting paid off, when that food comes in, instant glucose cash on hand.

Now, an excess of glucose, however, is not safe to be having around on hand. It's sort of like you're suddenly acting like your Floyd Money Mayweather, carrying around a brief case of rocks, you're carrying those rocks around unnecessarily and you don't got the bodyguards. You don't need all that money, you'll get robbed. Alright?

So you need to store some of that glucose cash when an abundance of glucose comes into the body. And it's also from a... If we're talking about Biology, having so much "sugar" in our blood stream, having a tremendous amount of glucose in our bloodstream is dangerous, it's dangerous, it can literally start to tear things up, especially for very sensitive capillaries. This is why we can see with insulin resistance and diabetes, losing the loss of circulation and function to the things that are in kind of the extremities, the toes and even our vision, those areas that are sensitive, those blood vessels that are very sensitive to damage, it can really start to get broken down by having an excess of sugar roaming around in our bodies.

And so storing that excess is a high priority of the body, so we got glucose cash on hand, but when there's an abundance your body actually deposits that excess in your internal checking account, in the form of glycogen in your muscles and liver. So this is your body's metabolic checking account, and if you need it you can still access it relatively quickly, you just got to take the time to write a check.

Okay? Do you remember checks? What happened to checks? I know checks are still out there of course, but checks were the thing for quite a while there, and if you happen to go to the grocery store and it's somebody... They're writing a check, it's going to hold up the line, alright, it's going to take a little bit of time.

Now you've got cash on hand and your checking account is full, it's a good idea if there's still excess to store some of that energy away for safekeeping as a certificate of deposit. And this is when your food currency that you brought into your body gets stored as fat. It can hold a lot more energy in reserve. I already mentioned, hundreds of thousands of caloric energy in the form of fat can get stored in the body, and it's there when you really need it, but it's not as easy to get to as a glucose cash on hand, the glycogen in the muscle and liver, and then the stored body fat.

So your body goes through this hierarchy of utilization, and the process of withdrawing the energy from your fat to use it as fuel is often referred to as lipolysis, alright? Lipolysis. And the process of storing fat in your body is often referred to as lipogenesis, alright? Lipogenesis. Now remember, with excess energy coming in you are generally not making new fat cells, you are filling up the fat cells with more and more moolah to use if the situation ever called for it.

But the big takeaway from this is that your body works on a hierarchy, it's kind of like accounting. So another class from college that I took that bared out in different ways, but it's going to bare out for me beneficial, not from what I thought it would, but in the realm of nutrition, there was LIFO, FIFO, last-in, first-out and first-in, first-out. And with your body fat, it's working on a hierarchy of needs with the utilization of energy. The last in is the first thing

to get used. What's already stored is stored body fat, and that's what we're typically targeting, we want to just use some of this energy that's hanging around in my body.

But even though we've got all of this caloric energy, this stored energy in the form of fat, your body is going to... In comes another meal, in comes another source of nutrition, in comes another source of glucose, it's coming into the body, it's going to be the first thing to get used because it's easier, your body is working on that hierarchy.

Once that's not coming in, then it can shift over and start using some of that stored glycogen, and then it can finally start to just burn through some of the stored body fat. So it sounds like an arduous process. Now, keep in mind there are ways to supersede and get to that stored fat faster that's all in Eat Smarter as well. But these are different things through our nutrition and our lifestyle that enable your body to go and snag up some of that stored fat a little bit quicker. But most importantly, if we were looking through the lens of prevention and not storing excessive fat in the first place, it always makes the process easier. So I want to empower you so you understand how all of these steps work. So if we want to get to that stored fat and that stored energy, we've got to have processes in place that encourage the process to happen, and also if we feel nourished and we're not constantly putting more food in, because you think about it, if we're storing hundreds and hundreds of thousands of calories and fat on our bodies, so much energy that we can survive for months, on paper, on paper, why on earth would we still be hungry? Why would we still be hungry?

And one of the big takeaways that you find out as you go through Eat Smarter is that chronic nutrient deficiency leads to chronic overeating. Chronic abnormal activity of your hunger and satiety hormones leads to chronic overeating. These are all things that need to be accounted for that are controlling your behaviors that are controlling what these metabolic processes are doing. It's so much bigger than this calorie-focused paradigm of nutrition that has largely failed our society today. And so again, we're putting the power into your hands now, you understand how this process works, getting a fat bank account basically. And now that we know how the energy is getting stored in the fat cell, let's talk a little bit about how we're going to move the fat out of the cell.

Now in Eat Smarter, in order to understand how this process of fat loss works in a really digestible way, pun intended, big pun intended, shout out to Big Pun, "I don't want to be a player no more." But to understand how this process really works in a digestible way, in a way that makes sense, it's really getting to the really powerful tenet of education, which is taking something that we don't know and connecting it to something that we do know. That's what learning really is. It's taking something that we don't know and connecting it to something that we do know. And so what I use is an analogy, to understand how the process of fat loss works, is going to the movies, or going to see a play. And we use this paradigm of a metabolic theater

where all of this action is actually taking place. Now in this metabolic theater, in this domain of the fat cell itself where you're watching your favorite movie or you're watching your favorite comedian or favorite stage play, it's all happening in the fat cell itself, it's where some magic is happening.

Now in order for the fat cell to get stored with energy and that process of ushering in energy into that cell, there's a couple of key enzymes that are involved in all of these processes. So we talked about the process of what actually constitutes the stuff that fat cells are getting store with, which is the triglycerides. Three fatty acids combined with one glycerol. And so those are getting shuttled into the cell by the boss in charge of all the ushers, telling everybody "The theater is open, come on in, have a good time", and that's insulin. Insulin is opening the doors to the metabolic theater and allowing that fat to get stored, with the assistance of certain enzymes, these enzymes like lipoprotein lipase that are involved in moving fatty acids around to different domains. But in particular now, when talking about fat loss or ushering the fat out of the fat cell, we're talking about the enzyme called hormone-sensitive lipase, or HSL, hormone-sensitive lipase.

Now, hormone-sensitive lipase is like the little usher that's there to help move fat out of your cellular theater after the show is over. And again without them, without hormone-sensitive lipase... And there's others as well, there's mono-glyceride lipase, there's adipose triglyceride lipase, but hormone-sensitive lipase is kind of like the leader of their little... Within any little click at a job, there's like somebody's kind of like the leader. Even though they don't got the title necessarily.

So, hormone sensitive lipase. And it's responsible for the mobilization of free fatty acids from adipose tissue is triggered, this process of lipolysis, by hormone-sensitive lipase. And it's easily acted upon by hormones that we... It's called hormone-sensitive for a reason, hormones that we can influence, can help hormones-sensitive lipase to do its job more efficiently and effectively. And moving onward, if we have excess fat that we want to lose, we want hormone-sensitive lipase and his buddies to be clocked in on the job and ready to put forth their best efforts.

And now, even though hormone-sensitive lipase is the head usher in charge of getting fat out of its seat, there are some other bosses who actually write their checks, and these are the managers of their departments, and their bosses are the twin brothers, insulin and glucagon, not identical. And they're both from their loving mother, miss pancreas.

Now, even though they're brothers they have two very different personalities. Insulin is more calculating, careful, always wanting to save up and stock pile, because you never know when you're going to need it. It's all about safety and security. And he wants to keep the attendees

in the seats, keep the fat cell theater full, and out of the aisles by the way, which is the blood stream, alright, out of the aisles in the fat cell. And glucagon, on the other hand, is really more of a free spirit in many ways. It believes in minimalism, "We just use what we use, we just have what we need and that's what we need." Glucagon knows that there's more than enough to go around, that's when he really kicks into action and doing its job.

Now, just to be clear, according to the Journal of lipid research, glucagon does have some influence on activating hormone-sensitive lipase, but hormone-sensitive lipase is primarily activated when insulin just sits its butt down. That's the primary trigger for hormone sensitive lipase to do its job, of getting folks out of the theater, is when insulin goes on break, goes and takes a nap somewhere, it just goes and relaxes. That's when hormone-sensitive lipase is actually able to kick into gear. Glucagon is more specifically there and primarily producing and promoting hepatic fatty acid oxidation. So, oxidation of fat in the liver. So that's its primary job that it's doing, what's noted in the data. So glucagon, so many of these things we're just beginning to understand, but many of these things we've had data on, but it's just becoming more and more expansive.

Again, insulin glucagon and hormone-sensitive lipase all take proactive jobs at managing the doors of the cellular theaters, in allowing fat in or out of the cells. And one of the biggest takeaways from today, and something that really allows the mobilization and activity of hormone-sensitive lipase to do its job, is glucagon's close friend, he can pass off the keys to, named adrenaline. Adrenaline, also known as epinephrine. His teachers at school called him epinephrine, that's his proper name, but his friends called him adrenaline.

I just thought about Fast and Furious, it was the Vin Diesel, "Adrenaline, one quarter mile at a time." Adrenaline loves to get fat out of the cellular theater, loves to get everyone cleared out so they can go and kick it at the after party when the show is over. Hormone-sensitive lipase and other ushers are really motivated to get fat out of the cell once adrenaline is around, but again, the primary activator of hormone-sensitive lipase in ushering the triglycerides out of the cell, lipolysis breaking these fatty acids down to be used for energy, is simply by allowing insulin to stop roaming around. And insulin is going to be on guard, on job, whenever food stuff is coming in.

Particularly sugar, particularly high-carbohydrate-based foods, just gets insulin, being like that helicopter parent, that passenger seat driver, that overbearing manager, just hovering over, constantly working too much. So as we move away and to employ some of these practices that we'll talk about, and also again, much more in-depth in Eat Smarter. Even this cellular theater is much more in-depth, we talk about it in the book, but I'm just giving you the rudimentary understanding of how this process is working. Okay, now that hormone-sensitive lipase is able to do its job, adrenaline is able to trigger and support doing this job, which again, adrenaline,

aka norepinephrine, we think of it as just in this terms of being this "stress hormone," but stress is not... This term "stress" is universally considered to be bad, but it's not.

Stress is a part of what makes us human, and it allows us to grow and to thrive and to survive. We're experiencing stress just by being here on this planet, gravity is constantly putting pressure on our bodies. This is why if you've ever seen that movie or read the books around the story of John Carter, I believe Disney did that movie, but when he went to another planet all of a sudden he's light as a feather, he's bouncing around, he's able to do all these crazy things, his body's been exercising, getting stressed by gravity, just the nature of being here on this planet, and the stress of movement and all these processes taking place, the stress even of exercising, which is incredibly beneficial for our metabolism, all these things are hormetic stressors, so to say stress is bad is a really terrible oversimplification, and...

Just to be clear though, stress can really mess you up, excessive stress. But we need stress in order for our body to do all the cool stuff that it can do, it just needs to be in balance.

Alright, now, this is very important. When we're talking about burning fat, when we're talking about "burning fat", we still... We just talked about lipolysis, that's the freeing of the fatty acids from the fat cell. That's lipolysis that is not "burning the fat". Lipolysis is a process of freeing the fat from the cellular theater, but it's actually burned for energy by your mitochondria at the cellular snack bar, that's where it really goes down. Your mitochondria are really the energy powerhouses of your cells, and the universal currency that your body is using called adenosine triphosphate, or ATP, is what your mitochondria is making when it's taking that fat and "burning it". That end destination of the fat being freed from the cell, the free fatty acids being freed and actually leaving our system, "burning fat" happens in the mitochondria. It's a process called beta-oxidation, because lipolysis, just breaking down fat to use as fuel, that's not enough. That's not burning fat. The majority... Listen to this, this is incredibly important. The majority of fat freed through lipolysis is reabsorbed.

Lipolysis isn't it. Of course it's important, it's a step in the process. A study published in Endocrinology and Metabolism covered that 70% of released fatty acids are reabsorbed. They're reabsorbed, who knew? This process of re-esterification is when the free fatty acids recombine with the glycerol and it's going to get stored in a fat cell. It's going to get stored and used for later energy. And it says, "70% of released fatty acids are re-esterified at rest, and this value decreases to 25%." So we go from 70% of fatty acids getting re-absorbed to only 25% of freed fatty acids getting re-absorbed within the first 30 minutes of exercise.

When you exercise, it's unlocking some magical power, seemingly, in actually moving the fat out of the system. In exercise, more than one-half of the increase in fat oxidation could be attributed to the reduction in the percentage of reabsorption. Okay, so it's not just you're

burning fat through exercise, you're not re-absorbing the fat that's already been released. So I hope that made sense. Now, these mitochondria are powerful, these are mighty, mighty entities in our cells. You can have hundreds, even thousands, of mitochondria in a single cell. As a matter of fact, just a little fun fact for you, approximately 10% of your body weight is mitochondria. What?

Alright, right? That's a tweetable right there. That's a tweetable. Your mighty, mighty mitochondria. And truly, a big part of this process is supporting the function of these metabolic Biggie Smalls. These metabolic Biggie Smalls are a huge key to supporting your cellular theater. Now, there's other bosses, there's other entities involved in this metabolic theater, like your thyroid gland for example, and the thyroid is producing hormones that control your metabolic rate, the rate at which you burn energy. And the thyroid gland is closely connected to the brain and the gut. And so what's going on with those two things deeply impacts the function of the thyroid in signaling all of these different things to happen. And so we dive into that a little bit deeper in Eat Smarter, but I wanted to give you an overarching understanding of this metabolic theater and how this process actually happens. And once the fat makes its way to the mitochondria to be used as fuel and burn through beta oxidation, where does it go?

Where oh where has that little fat gone? Let me share this with you guys. I think the closest approximation that people can think about, just rationally what we kind of see in the world, in thinking about fat being evicted from our bodies, is through the appearance of sweat. That's what we think, that our fat cells are having a good break-up cry, and they're just leaving our bodies and it's a sad experience, they're sad to go but you're happy to see it. So are we losing our fat through sweat, or is there something else happening? As mentioned, when we attempt to "lose fat", what we're really attempting to do is to metabolize these triglycerides. And triglycerides are comprised of just three types of very simple atoms. Three types of atoms, carbon, hydrogen and oxygen. Again, triglyceride are comprised of three types of atoms: Carbon, hydrogen and oxygen. And triglycerides can only be broken down by unlocking these atoms through the process of oxidation.

Now, here's how fat is able to vanish into thin air. A peer-reviewed study published in the BMJ, where scientists decided to follow the path of these three atoms as they're leaving the body, they discovered that when 10 kilograms of fat is oxidized, 8.4 kilograms of that fat is excreted as carbon dioxide via the lungs. While just 1.6 kilograms was released as water. So in other words, approximately 84% of the fat you lose is eliminated through your breath when you breathe out, and only about 16% of the fat you lose is through sweat, urine and other fluids, even tears from your eyes is a little bit of fat leaving.

These calculations revealed that the lungs are the primary excretory organ for fat. Plus, if that weren't enough, the researchers estimate that about one-third of the weight loss happens as

you breathe during a full night of sleep. So most of the fat, how it's vanishing into thin air, literally, is because we're breathing it out. This doesn't mean that breathing faster, doing the breath of fire, the chaotic breathing, is going to help you to burn more fat. That's not what it's about. That's just an end point. It's the door leaving the body, that's all that is. All of this stuff has to happen beforehand, which largely relates to our nutrition and our lifestyle.

So now that we have a really good rudimentary understanding of how the process of fat loss works, how our cellular theater is functioning, how we have different fat cell communities, how our fat cells are getting stored in the first place, now we're going to cover some of the specific foods and nutrients, and a way of eating... We'll start with that first... That supports this fat loss process that supports your fat-loss-related hormones and enzymes. But one of the most overarching nutrition principles is seen in the data, which is to simply keep insulin in balance. Again, that's when everything is kicking into gear, the enzymes that do all these cool processes of fat metabolism are kicking it off, happens when insulin can sit down, relax and take a break.

So knowing that insulin is largely triggered by carbohydrate intake and sugar, not that any of these, not that carbohydrates are bad, we're not saying that, but we have a very carbohydrate-dominant society, and largely refined processed carbohydrates, and even once we get into the whole grains, we can take that too far as well. Because that's what I was taught, again, in my conventional, private, expensive university nutrition science class, I was paying to be mis-educated, I was taught 7-11 servings of whole grains. And my teacher was bordering on obesity himself. He was not secretly mainlining Cheeto dust and pop tarts, he was doing the thing that he was teaching. But because of the role that insulin plays, for example, with that carbohydrate coming in, it might be too much, and you kick into that process, again, glucose, cash on hand, writing checks over depositing in the glycogen, in the liver and the muscles, and getting stored as certificates of deposit in fat cells. It can happen easily with a typical meal here in the US.

And so, what if we just shift this ratio a little bit? Just shift the ratio, since we know that the big driver of insulin... Which dietary fats and proteins can also stimulate the activity of insulin, but not even remotely as close as carbohydrate and sugar can. So what do we do? How does this work? Does it work? A study cited in the American Journal of Clinical Nutrition revealed that simply lowering the study participants' ratio of carbs and increasing their ratio of protein, without changing calorie intake... Please hear that, without changing calorie intake, led to higher levels of satiety, a higher resting metabolic rate, and higher levels of fat oxidation. The fat actually getting burned, without changing calorie intake, simply shifting that ratio. I didn't say no carbs, I didn't say even low carbs. It could be, but just lowering that ratio and increasing the ratio of protein create a favorable change in the metabolism.

Now, what if we take this tenet of simply shifting our carb ratio just for one meal of the day, specifically to start the day, the first meal that you have, because you're "breaking your fast," your body's metabolism is in a very influential state at that point. And this is conducted by researchers at St. Louis University and published in the International Journal of Obesity. They 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 are exactly the same. They stay the same, but just talking about the main macronutrient coming in.

Now, for the high carbohydrate breakfast, it's a breakfast that I've had many a day, many people have for their breakfast. Bagel, bagel. Of course, you might be like, "Well, it's not a high quality carbohydrate, even if it's a whole grain bagel." We can get into nuance about this, but this is what's used in the study. And then for the high protein/high fat breakfast it was eggs. Now, the researchers did have the study participants to 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. And here's what they found after an eight-week study period. Even though the calories on the diets were the same, 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. Actual fat loss. Calories the same, changing that macronutrient ratio, which influences insulin, which influences hormone-sensitive lipase and glucagon and all the things we're talking about.

This is a tenet that we can take advantage of. Does this mean you can't have your favorite breakfast, even if it's a higher carbohydrate? No, this doesn't mean that. You can do what works for you, what feels good, but for some people this might be like, "Oh wow, I've been doing this thing this whole time and I haven't really been getting the results that I want. Maybe let me try shifting this macronutrient ratio." Because I promise you, in Eat Smarter you learn how to take advantage and enjoy your carbohydrates. It's how you do it. It's not just what you do, it's how you do it.

Now, I also today want to talk about and share some of the specific foods and nutrients that have some data, some really solid data affirming that it supports this process of fat oxidation. Alright, so the first one that I'm going to share is a food that a lot of people know about, but this is definitely going to encourage you to maybe add this in a little bit more. Foods that influence the genes themselves that literally control these processes of metabolism are truly remarkable. So we're talking about the genetic programs controlling what insulin does, controlling what hormone-sensitive lipase does, controlling what thyroid hormone does, controlling what insulin does, controlling what... Did I say insulin twice? Who knows? It matters if I say it twice, because it's twice as nice. Insulin is important. But adrenaline, determining what all of our hormones related to our metabolism are actually doing, can be really powerful.

One of these remarkable foods, seen in the research, are blueberries. Researchers at the University of Michigan published data finding that blueberry intake can potentially affect genes related to fat burning. And a study published in the Journal of Nutrition showed that the consumption of blueberries was able to reduce insulin resistance in study participants. Now keep in mind, a consistent sign of insulin-resistance is carrying around more visceral fat. This hyper-emphasizes your body, when you're insulin-resistant, to get that sugar out your bloodstream, because the insulin's not communing with the fat cells properly, and getting it out of the bloodstream. But there are certain departments that can really bear the brunt of the weight, primarily increasing things like non-alcoholic fatty liver disease by storing more fat in the liver and creating lipogenesis there, and also storing it as visceral fat. So anything that we can do to improve insulin sensitivity is going to be a welcome friend to our waistline.

Specifically it's the flavonoids found in blueberries that are found to be protective against weight gain, according to scientists at Harvard University. So best blueberries? Wild, harvested blueberries. Fantastic. Blueberries... And there's the nuance here: Fresh, frozen, dried, all these different... There's many different ways. The most important thing is just to get some of this stuff in. Frozen is great because some nutrients are retained even better while you do lose some other things, so it just depends. Fresh or frozen. Fresh, obviously, you could use it as a snack, you can use it in different dishes. Frozen is great for smoothies and snacks and things like that. The list goes on and on. So many different ways to utilize blueberries, but that's one of those simple, easy things to add in. A couple of berries a day can keep the fat genes at bay.

Next up on our list of specific foods and nutrients that have clinically proven benefits on these dynamic processes of fat loss is one that you might not have heard about before, but I've been enjoying this for many, many years. I've talked about it on the show a couple of times, but not nearly enough, and especially now I've really been utilizing it on a really regular basis, and I just actually I love this. And I think part of it is the name's pretty weird. It's called Pu'er. Pu'er. Pu'er is the name of this historic tea. It's been utilized for thousands of years, and it's such a storied history, but it's a long-renowned tea, fermented tea that is one of the weirdest-named things around, along with things like Muffin Tops. Eggos came out with Muffin Tops. What? Why would you do that? Wet Bottom Pie. Have you ever heard of Wet Bottom Pie? And Nips. Have you ever had Nips? Butter rum candy, guys. Butter rum candies. So it has that strange name, but just really remarkable. And I'm so excited to share this with you guys because every chance I get I want to talk about this really fantastic tea.

So Pu'er is a fermented tea with a storied history of use within regions in and around China, and today it's really well-respected and researched for its profound benefits on metabolism and overall health. According to a study published in the journal, Phytonutrient Research, Pu'er is one of the rare nutrient sources that has a direct significant influence on the enzyme that

unlocks your fat cells to be utilized as fuel: Hormone-sensitive lipase. This is one of the few foods and nutrient sources we know has a positive effect on hormone-sensitive lipase. This is no joke, Pu'er is fantastic.

Pu'er is also effective because it's been found clinically to support the breakdown of stored fat, but also support the protection of muscle mass. And this was documented in a recent study featured in Clinical Interventions in Aging. With its concentration of polyphenols... This is one of the remarkable things, and it has such a ratio of polyphenols, it might be just the most remarkable source of polyphenols you're going to find in any tea... Specifically for supporting healthy gut flora. So that's one of the things that it's well known to do. And your microbiome has a huge role in our overall process of metabolism, as we talked about on many episodes of the show, but it's hitting on these different notes, literally affecting the enzyme responsible for the breakdown of stored fat, and supporting the microbiome.

Now the pu-erh that I use is from a patented cold-extraction technology, so it's actually retaining the bioactive compounds in the tea that enable your body to do all of this cool stuff, and it's a process that intelligently extracts the antioxidants, and phytonutrients, and preserves them in bioavailable form, and making sure that they're actually present when you have this incredible tea. And it's also wild harvested, which I love so much because these are truly wild foods and they have components and nutrients, adaptogenic properties because these plants have had to adapt and survive without human intervention. So they're truly just... They have so much remarkable lineage inside of the food, it's just like... And you get to take that on, it's just so remarkable. And it's in these easy-to-use tea crystals that you literally, you just pour it into water, there's no brewing involved, you don't have to wait. It's this incredible patented cold extraction technology that makes this possible. And it's also triple screened for some of the highest levels of purity that you're going to find on any product. It's tested for pesticides, heavy metals, toxic molds that are common in teas.

And the tea that I drink is called Pique Tea. That's P-I-Q-U-E tea. Just go to piquetea.com/model, and use the code MODEL. I've been having this tea for a long time. I finally connected with them, and I was like, "Listen, I want to get you guys to my audience, I love this stuff, let's do something," and they agreed that they're going to give you 5% off your first order, plus free shipping when you purchase any of the cool bundles that they have, because they've got over 20 different delicious award-winning teas. This is out of this world incredible. So go to piquetea.com/model. That's P-I-Q-U-E-T-E-A.com/model. Use the code MODEL at checkout to get 5% off your first order, plus free shipping when you purchase a bundle. Alright. So pu'er is incredible, it's one of my favorite things, and Pique tea, definitely check it out. Alright, now another one of these powerful food sources, sources of nutrition that help to manage these metabolic processes, is something else that you're going to be familiar with, but we're going to dive a little bit deeper, and it's salt. Salt. As you recall, the pancreatic hormone glucagon

promotes lipolysis by opening up the cellular doors to release stored fat for use as fuel, specifically really assisting in that process with the liver.

Recent data affirms that sodium aids in the performance of glucagon. You want glucagon to be able to do its job intelligently, and salt also influences the action of leptin, adrenaline, and thyroid hormone. You need salt for all of these things to do their jobs. It's incredibly important, but it's been demonized. And we'll talk a little bit about why, but a meta-analysis published in the Cochrane Database of Systematic Reviews uncovered that study participants placed on a low-sodium diet did have slightly lower blood pressure in the short-term. That's what we think about when we think about sodium, we think about salt. But they found that over time, the restricted sodium actually led to elevated triglycerides, the thing we're trying to eliminate, if we're talking about weight loss. Elevated stress hormones and, accordingly, elevated blood pressure. Short-term, reduced blood pressure. Long-term, created some problems. So we need to be much more aware and conscientious in our management of salt. And I'm not advocating for a high salt diet, I'm just saying that we need enough of the right kinds of salt, high quality salts.

Because according to the Journal of the American College of Nutrition, they estimate that at least 77% of the salt intake in the American diet comes from processed foods, and not what you're adding from your salt shaker. This is primarily from low quality, heavily refined salt that typically contains additives, like anti-caking agents, etcetera, and is devoid of all other naturally occurring micronutrients and doesn't have the long history of use that real salts have. So there's... A lot of folks know about Celtic salt and Himalayan salt and Black Hawaiian salt and real salt. There's so many cool salts to utilize, you need salt. We need higher quality salt, we need to move away from the processed foods that contain this low-quality salt. Another important nutrient adjunct for improving this metabolic process when we're talking about "burning fat", this one's going to be easy, but are you doing it? Water. A peer-reviewed study published in the journal Obesity found that drinking adequate amounts of water can itself trigger lipolysis, aka the release of stored body fat. Water! Water, you sweet, sweet, wet... Never mind.

And if that didn't perk up your ears enough, another study published in the Journal of Clinical Endocrinology and Metabolism found that drinking water can also increase your metabolic rate through a process called water-induced thermogenesis. The reason that water is doing this process is not because of just your body's heating the water up or whatever, it doesn't matter if it's cold water or hot water, that's not really what's making the big difference, it's the fact that water makes everything in your metabolism work better, because here's just a couple of things that water is responsible for related to your metabolism: Water is responsible for the maintenance of your DNA, water is responsible for facilitating reactions in your mitochondria where fat is actually burned, water is responsible for the integrity of all of these different

glands and tissues and cells that enable this incredible process and metabolism to take place. It's all happening in a water medium. That's how important water is. So, are you getting enough? Is that a priority of yours? Because we're looking for this magical thing to help us to lose weight and burn fat, water is the basis, water is the basis.

Alright, another thing seen in the data that actually helps to nudge... Remember we talked about the different brown cell communities, beige cell communities, white fat cell communities? To nudge those beige fat cells into the realm of brown fat, giving a little bit of a nudge is actually this C-word that comes with some nuance here, but it's coffee. Coffee's been found to help to nudge beige fat cells into the brown fat cell domain and activity. In one of the studies that we highlight in Eat Smarter, researchers actually used FMRIs and looked at what happened in the body when folks drank coffee, and they saw the brown fat areas of the body lit up like a Christmas tree. But as with any of these things, there's nuance here in the quality. Where is it coming from? The amounts that we're using. All this stuff we cover in-depth in Eat Smarter. But I wanted you to know that, because it's not just about targeting the white adipose tissue, it's targeting the other fat cell communities that make all this magic happen as well, like the type of fat that actually burns fat for energy.

Alright, another nutrient source that is pretty common, a lot of folks know about this, is highlighted in a new study that was published in the Journal of Translational Medicine, and it found that oleocanthal-rich, antioxidant-rich, extra-virgin olive oil, can potentially downgrade the expression of the FTO gene associated with excess body fat and obesity. We're talking about that epigenetic influence, we're talking about nutrigenomics here, how nutrition is affecting what your genes are actually doing. Nutrigenetics, all these things come into play here. The scientists found that in a four-week diet intervention that included high amounts of olive oil appears to have epigenetic influences that result in improved body composition, and it's not just the remarkable antioxidants and other phytonutrients in olive oil contributing to these benefits, but the monounsaturated fatty acids themselves sparking some metabolic benefits. A meta-analysis of 24 studies found that a diet rich in monounsaturated healthy fats from whole food sources was able to reduce blood glucose levels and improve insulin sensitivity better than a standard low-fat carbohydrate diet for test subjects.

Another study published in the International Journal of Obesity and Related Metabolic Disorders, pitted a diet with a higher ratio of fats, specifically monounsaturated fats, head-to-head against a low-fat, high-carbohydrate diet for overweight test subjects for 18 months. The test subjects with the higher ratio of monounsaturated fats in their diet lost more weight, lost more body fat, and lost more inches off their waist than the low dietary fat group. In fact, in this study, the low dietary fat group actually gained in all those areas. Fat is a big player in our metabolism, healthy whole food based fats. Some of the most popular sources of monounsaturated fats that have a dense source of monounsaturated fats are nuts and seeds,

like almonds, Brazil nuts, cashews and pumpkin seeds, and also grass-fed butter, beef, duck, avocados, avocado oil, olives, and of course, olive oil. There's nuance here with the olive oil too, of course. You don't want to get your proposed healthy source of olive oil that's coming along with pesticides and herbicides that's been used in the growing process.

Alright, so you want organic olive oil, cold-pressed extra-virgin olive oil, and also it should be stored in dark glass because it's photosensitive. Alright. So, again, more of that data is in Eat Smarter. I could go on and on. There's so many incredible foods and incredible nutrients that really help to guide and create more effectiveness and efficiency in our metabolism. I'll share one more because this is something I have on a... Actually, I've been sipping on this throughout the show. A micro-nutrient in ginger called zingerone is being heavily researched for its influence on body fat. Remember the enzyme that we've been talking about, hormone-sensitive lipase, responsible for ushering fatty acids out of the cells to be utilized. Now, research has shown that zingerone in ginger is able to stimulate the activity of hormone-sensitive lipase and increase the breakdown of stored fat. Really, really remarkable stuff. Research has discovered that compounds in ginger are able to substantially improve the ratio of blood fats and provide protection against non-alcoholic fatty liver disease.

My other favorite tea... So I drink the fermented Pu'er tea from Pique, and I also drink their ginger tea all the time as well. It's been so helpful, especially doing all the media that I've been doing for Eat Smarter and just providing that, just that help with the nice warmness while I'm doing interviews, and just keeping my body balanced and feeling good, and also the digestive support that it provides, and just the list goes on and on. Again, they've got over 20 different award-winning patented cold-extraction teas at Pique Tea. Go to piquetea.com/model, use the code MODEL, and you can get that hook up with a discount and also free shipping if you get any of their cool bundles. Again, there are so many other foods and nutrients to enjoy and to have incredible food experiences with, incredible beverages that provide real metabolic support and benefits, and that's what we really want, we want to support our metabolism, but it's really about supporting our health overall.

So I hope that this episode has brought you a lot of value and understanding, and really a big tenet of health is diversity, and bringing in new things, having a diverse spectrum of nutrition and not getting caught in a rut with our nutrition, and changing things up and being able to add in things that really have a long-term history of use, and also clinically proven benefits to support our metabolism. We can get our citizens and our families healthier, but it starts with education. So, again, I hope that you got a lot of value out of this. If you did, please share this out with your friends and family on social media. Of course you can tag me, I'm @shawnmodel on Instagram and Twitter, and I'm at The Model Health Show on Facebook. And we've got some epic, I'm talking epic shows coming your way very, very soon, so make sure you stay tuned. Take care, have an amazing day, and I'll talk with you soon.

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