

Evolutionary Anthropology with Dr. Herman Pontzer

Ologies Podcast

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Oh hey, it's that cardigan that you left in an Uber, Alie Ward, here with an episode about our squishy, juicy machines and how they run. I've wanted to interview this guy (I know I say this every episode) for *years*. So, we're going to dive into it. Metabolisms. How do they work? What's up? Who am I? What's going on in there?

So, this guy did his undergrad work in anthropology, got a PhD from Harvard University in Biological Anthropology, and has been a professor of anthropology for nearly 20 years, during which time he's been an Associate Research Professor of Global Health and Duke Global Health Institute and he's now a Professor of Evolutionary Anthropology at Duke University. He knows what's up. His CV is 23 pages long, I was looking through his list of papers and it gave me actual vertigo. And then I found out we're the same age and I don't like to think about it. He's also written several books including the 2021 release *Burn: New Research Blows the Lid off How We Really Burn Calories, Lose Weight, and Stay Healthy*. And yes, we're going to address the science and the culture of all of it. Also, just a quick warning, we do discuss, of course, calories, some diet culture in this episode, as well as weaponized language, we discuss all of that, just so you know.

But first, some thank yous to patrons of *Ologies* at [Patreon.com/Ologies](https://patreon.com/Ologies) who spend one burning hot dollar a month to join and they can submit questions to ologists before we record. Also, thanks to everyone who is out there wearing *Ologies* merch from OlogiesMerch.com. For no dollars though, you can really help us out and leave a review and also, I read your reviews. And if you do not believe me, thank you for the recent one from Rattery [phonetic] whose MRI technicians let them listen to *Ologies* while getting an MRI and says that:

This podcast is like a weighted blanket where you learn cool facts.

Thanks, Rattery! I hope all is well!

Okay. Evolutionary Anthropology, we're going to get to it. How did humans evolve? Ancient menus, mitochondria trivia, how science can help you talk to your body, perspectives on some sticky medical terms, isotope magic, how much exercise hunter-gatherers get, carnivore diets, flim-flam, scales, the history of the body mass index, and what to do if you're in kind of a bit of a slump, according to science with author, professor, metabolism expert, and evolutionary anthropologist, Dr. Herman Pontzer.

Alie: Oh hi! I'm... [stutters and groans] This episode... I'm... I don't know, I wish we had a full 24-hour marathon to do this episode because I have so many questions. [laughs]

Herman: Yeah.

Alie: Okay, we'll start with the easy one if you could say your first and last name and the pronouns you use.

Herman: Sure! I am Herman Pontzer, he/him/his.

Alie: Got it. And Doctor, of course.

Herman: Sure. I mean, between friends, whatever.

Alie: What ologist do you call yourself?

Herman: Let's call it evolutionary anthropology.

Alie: Okay, first off... You're an expert in metabolism. And first off, metabolism... What even is it? Where does it come from?

Herman: Yeah, so you know, you are made of 37 trillion (plus or minus) cells and every one of those cells has work to do all day. They've got to bring nutrients in and break them down and build them back up. All that work takes energy, and all that energy together is what we call your metabolism.

Alie: And when you were looking at, say, your Fitbit or your Oura Ring or whatever and it says, "Based on your height and weight, you probably burn 1,700 calories a day or 1,200," or whatever, does it have any idea what the fuck it's talking about or is that so off?

Herman: It's a little bit better than a random number generator. Just a little. [*Alie laughs*] So, it gets this much right; most of what you burn every day, even if you're an active person, most of the calories you burn every day, it's just not about activity, it's about all the other stuff your body is doing. As we're talking here, every fifth breath, I think, is the oxygen needed to feed your brain, right?

Aside: So, 20% of your breathing goes to fueling your brain, whether you're filling a whiteboard with physics theorems or watching my dog breathe because she's old and precious.

Herman: It's true that your brain uses a lot of energy. We can all feel good about that. Your brain runs a 5K every day, it's 300 calories a day. So, most of the energy you use is not activity so when you have a Fitbit or something like that and it's trying to ballpark or guess your energy expenditure based on activity, it's really missing a large part of what's going on. It does have your height and weight in there and it's true that the bigger you are, the more cells you're made of, the more calories you burn, so that part is more or less right. But even there, there's so much variation from person to person that it's just a real wild guess.

Alie: Okay. I mean, I understand BMI is not really accurate at all, right? [*laughs*]

Herman: Well, it depends on what you're trying to measure. BMI is great for knowing our BMI. [*both laugh*]

Aside: So, BMI, side note, stands for Body Mass Index. Mathematically, it's your body mass in kilograms divided by the square of your height in meters. Medicine's optimal body mass index lands somewhere between 18.5 and 24.9.

This is a little fun fact, the body mass index was invented in the 1830s by an Austrian scientist named Lambert Adolphe Jacques Quetelet who, surprise, was an astronomer, not even a medical doctor. This was during a time when physicians were just beginning to learn that germs exist and that bloodletting doesn't solve all the ailments. So, the inventor of the BMI, this astronomer, also influenced early proponents of eugenics. So, the color-coded BMI charts at the doctor's office really don't seem to include that kind of trivia.

But as we've mentioned before, any legit MD can tell you that of course, BMI does not tell the whole story and it's not fair to a lot of folks. But nevertheless, as a broad ballpark of cardiovascular or pancreatic risks, or joint issues related to body mass, doctors we've had on the show have said it's a very rough and far from perfect metric.

Herman: You know, if BMI is trying to get at your fat percentage – which is kind of how we use it, we think about if you have a high BMI that means you're carrying too much fat. But of course, your height and weight, those numbers can't tell you if you're carrying a lot of muscle versus a lot of fat, for example. So, people who carry a lot of muscle tend to, you'll have a higher BMI because your weight will be higher even though really, your body fat might be low if you're an athlete or something like that.

So yeah, BMI is problematic. It's an imperfect measure but it's one of the best ones we have, and it does do a pretty good job – in aggregate, at the population level – of figuring out who is at higher risk for different diseases. If I know any one thing about you, I'm not going to know enough but if I put all those data points together then I can start to put a picture together. BMI is just one thing about you, but when I put it in the context of other stuff about you, then I can begin to put a real picture of your health together.

Alie: So, does metabolism depend a lot on your muscle mass or your lean-to-lipid ratio? Also like, what if you have big heavy bones? How does that work?

Herman: Yeah, those are all good questions. The biggest factor is how much, what we call fat-free mass, you carry, versus your fat mass. And so, all your organs and muscle, aside from fat, fat is an organ too, but aside from fat, all those organs, your liver and brain, and kidneys, they all burn a lot of energy. So, the more of that that you are and the less fat that you are, the more calories you'll burn at a given size. So, to put it in real terms, you have the same two people that both weigh, let's say, 150 pounds, but one of them is 30% body fat and the other one is only 10% body fat. They weigh the same amount but the person who is only 10% body fat, more of them is lean tissue, it's organs and muscle. And so, that person who is only 10% body fat will burn more calories than the person who is 30% body fat because fat is pretty quiet, it doesn't do a whole lot each day, so it doesn't burn many calories.

Aside: Let's rewind though.

Alie: Can we go back to the "fat is an organ"? Whaaat? What's that about?

Herman: Yeah, yeah. Fat is not just hanging out; it makes hormones, it pulls in nutrients out of your blood as storage, and then sends them back into your blood when you need them later for energy. It's doing jobs that other tissues don't do. So yeah, you need it.

Alie: Is it true that you don't get more fat cells, they just get more capacious or just get more stuffed? What's the deal with that?

Herman: Yeah, yeah. Usually, when you are adding fat, you're not growing more fat cells as much as you're just packing the fat cells you have lipids. So, your fat cells have this enormous capacity to just get bigger by pulling in fat.

Alie: So, what happens when you get a BBL? You have the same number of fat cells but it's just maybe in different places that you find aesthetically more desirable?

Herman: You're going to have to educate me.

Alie: That's a Brazilian butt lift. *[laughs]*

Herman: A Brazilian butt lift! [*"I dunno, that's LA."*] Isn't that one of the... There are some of those where they take other peoples' fat, but this is one where they take your own fat... This is, they take your own fat?

Alie: I think, yeah. I think they take your muffin top, and they put it in your boobs or your butt or your face. I don't know if there's a Jack Sprat website where you're like, "I've got a little too much if anyone wants it!" *[Herman laughs]* "I don't have enough," like a Facebook Marketplace tab. I don't know. So, you're retaining your fat cells but they're just in different parts of the body?

Herman: You see, now this really is a two-way street Alie. I'm learning from you, things I didn't know. I love that. It's just like, you turn yourself into Play-Doh and you just push things around.

Alie: Mm-hm! Migrate 'em.

Herman: Yeah. I mean, so one thing to think about there is when they do that, yeah, they're taking cells, right? They're not taking like, just stuff. You know what I mean? I think people think about fat as being this kind of, inert stuff that's not alive. It's alive, man. And so, they're moving that around. I can imagine that's got some interesting consequences for how everything works.

Aside: Yes, okay. So, a Brazilian butt lift, or a BBL, it's the redistribution of adipose tissue that's abducted from your stomach, or your thighs, and then it's purified and whisked away to a new part of the body.

The relocation, it might change your life, or it might be a mistake, your mileage may vary. One beauty magazine urged those considering the procedure to first google "BBL done wrong." And friends, this may lead you to scroll image searches and stumble upon the saggy tragedy called "Diaper booty," and it does look how it sounds. But unfortunately, there may be more at risk than just your booty, as explained by the 2017 article in the *Journal of Aesthetic Surgery* titled, "Report on Mortality from Gluteal Fat Grafting," which warns that, "Despite the growing popularity of gluteal fat grafting, significantly higher mortality rates appear to be associated with gluteal fat grafting than with any other aesthetic surgical procedure." So, it's risky. What's happening here?

So, I looked into this, and stray lumps of your fat can break free and then just enjoy a trip through your arteries resulting in a pulmonary embolism. And we're seeing more and more reports of deaths from this procedure as people are traveling to potentially sketchy clinics for beauty tourism. Also, for more on harmful beauty standards here, all over planet Earth, you can see the two-part Kalology episode, we'll link that in the show notes. But yeah, in terms of metabolism, if you store any more fat, it is likely to wind up wherever your fat cells were surgically relocated.

Herman: They're basically trucking some cells, sounds like, from your muffin top, as I understand it, to your butt.

Alie: Yup. So, fat cells are more chill and muscle cells are maybe burning more energy, they're a little bit more active. Is this a mitochondrial thing? We always hear that they're the powerhouse of the cell.

Herman: Oh, very good, yeah. [*"Thank you."*] So, mitochondria determine how much oxygen you can bring in. You need oxygen to be able to make ATP. ATP is the molecule that your cells actually use as energy and it's actually a rechargeable battery. So, you have ATP, which is adenosine triphosphate, and that's converted from adenosine diphosphate, ADP. So basically, you're taking this two-phosphate molecule, you add a phosphate, and make it a three-phosphate molecule. It's all interesting stuff. But basically, you're recharging this molecule. So, you run on rechargeable batteries; when they're charged up, they're called ATP. And you need oxygen to do that conversion, to charge up your batteries and the more mitochondria you have, the more you can do that. So yeah, that's how that's all linked. And your muscles certainly have more mitochondria than your fat cells. Yup, that's right.

Aside: So, not everyone is able to manipulate their body composition for all kinds of reasons, from physical disabilities to mental health challenges, there are economic factors. I totally get that. But if you're someone who can and wants to get slightly more jacked – maybe to flex at yourself in the mirror, I don't know, maybe to have an easier time helping other people put their carry-ons in the overhead bins – but you can also do it, if you need a reason, for the mitochondria.

So, this 2015 study in the journal of *Medical Science and Sports Exercise* titled "Resistance Exercise Training Alters Mitochondrial Function in Human Skeletal Muscle," does contain a spoiler. It reports that the "Loss of mitochondrial competency is associated with several different chronic illnesses... Endurance exercise has long been known to increase mitochondrial function." However, as the title said, they looked into resistance exercise as well, like weightlifting, body weight

exercise, and yoga, and that also appears to be a means to augment the function of muscle mitochondria.

If you can get stronger, it could be an act of love to your future self, as detailed by the study “Effects of Exercise on Mitochondrial Content and Function in Aging Human Skeletal Muscle,” which was published by the *Journal of Gerontology*. It notes that “Exercise enhances mitochondria electron transport chain activity in older human skeletal muscle.” What does that mean? You’ll feel better longer. So, present-day you, you might be groaning, bewildered in front of a kettlebell but future you is like, “Get in there and get it bitch! Do it for us.” But let’s go the other direction in time.

Alie: Let’s travel back in time to our hairier, shorter ancestors. Where did our systems change or evolve? When did we start veering off how much we use our body and what we’re eating? Where did things get too far, too fast?

Herman: Wow. Well, I mean, how far back do you want to go? First of all, mitochondria are like a bacteria that eukaryotic cells basically engulfed and started using as a power source, that happened like 2 billion years ago or something like that. It’s a long time.

Alie: Is that... That’s true?! How did I never know that?!

Herman: Yeah, you’re a chimera, we all are. [*Alie gasps*] All your mitochondria are little bacteria relics. Isn’t that wild?

Alie: [*hushed tone*] Nooo. Yes! I didn’t realize that we were running on other animal batteries. That’s wild!

Herman: Yup!

Alie: I never knew that. In all the cell biology I took for years and years, I don’t think I ever grocked that. Oh my gosh. Okay, so we engulfed these bacteria. Okay.

Herman: Yeah. Well, not you but a couple billion years ago. Anyway, so that’s when the whole story starts and then man, around 220 million years ago, you get reptiles that decide to burn their metabolisms faster and you get warm-blooded animals that we call mammals today, so there’s a big step there. Primates get started about 65 million years ago after the dinosaurs get knocked out. [*“Heads up.”*] And then our story, we’re apes, apes are kind of a 20-million-year-old story, and our lineage is like, 7 million years, we’re like a 7-million-year-old branch from that with all these little dead ends and crazy things like Lucy and all these other species.

And then our particular species, *Homo sapiens*, let’s say our group, the genus *Homo*, is about 2.5 million years old and that’s when we think our modern metabolisms start shaping up. So, that faster metabolism separates us physiologically from the other apes. So, we burn our energy faster than other apes do. We think that that’s to help support our big brains, we’re more active than other apes are, we have bigger babies, more often than other apes do, we live a lot longer and that takes more energy to invest in your body. So, probably your modern metabolism starts shaping up over the last 2 million years and everything is going great. And then, you know, we build ourselves these crazy zoos that we live in today and everything kind of goes to pieces. That’s the short story. [*laughs*]

Alie: [*laughs*] That’s the short story. And when you say that our metabolisms are speeding up, is that because our brains get bigger and they’re kind of like a V8 versus a V6, just using more fuel?

Herman: No. We get more expensive parts. So, it’s the V8 versus the V6. We have a bigger brain, our reproductive systems are running faster so we can have these bigger babies more often. We are more physically active, so you need to be able to have a diet that’s got a high enough energy

content, and to be able to digest it down and absorb those nutrients, you have to turn those nutrients into ATP. So, the whole system has to get ramped up to be able to support a faster metabolism, so we see that happening over the past 2 million years or so, we think.

Aside: So, 1.4 billion years ago your far-off slimy little ancestors engulfed bacteria and they made it ours and used it as a rechargeable battery that runs on hot dogs and flat white lattes. And then, as we branched off into mammals, which branched off into apes, which branched off into the genus *Homo*, millions of years ago, and then *Homo sapiens* 300,000 years ago, we started growing these bigger brains and babies and needed a faster engine burning up more fuel to get us through our journeys of life.

In his book *Burn*, Dr. Pontzer describes his work with the Hadza hunter-gatherer tribe in Northern Tanzania and I'll read you an excerpt of his description. He writes:

The one thing we knew for certain going into the Hadza energetics project was that life as a hunter-gatherer is tough. Like other hunter-gatherers, and like all people prior to 12,000 years ago, the Hadza have no domesticated animals or plants, no machines or cars or guns, no modern conveniences to help them get by.

Every morning, they wake up with the sun and set out into the wild savanna for the day's food. Women typically go in groups, relying on their encyclopedic knowledge of the plants around them and the latest info on what's in season to find productive groves of berries or tubers. Several species of wild tubers form the core of the Hadza diet, and a woman can spend two or three hours on any given day digging them out of the hard, rocky soil with a sharpened wooden stick. They can easily cover five miles or more on a foray, often with a child in a sling on their back and loaded down with twenty pounds of hard-won tubers on the return trip. Back at camp, women are often busy tending to kids, preparing food, or collecting firewood.

Men usually leave camp alone, preferring to hunt by themselves to improve the odds of sneaking up on a zebra, baboon, antelope, or anything else unlucky enough to cross their path. They aren't picky; just about everything except snakes and other reptiles are on the menu. Hadza men make powerful bows with giraffe-sinew strings and add a glob of poison to the shaft of their arrows, just below the sharp iron tip, poison strong enough to kill a zebra with a single shot. Men regularly break from hunting to collect wild honey, climbing thirty feet into the crown of massive, ancient baobab trees and hacking into the giant, hollow limbs to plunder an angry hive. They'll bring the game or honey back to camp, covering ten or fifteen miles round trip, to share with the community.

We've quantified the amount of physical activity that the Hadza adults get each day, and the results are staggering. Both men and women average more than two hours of hard work each day, roughly ten times more than the average American. That's in addition to the walking. They get more physical activity in a day than the typical Westerner gets in a week. The kids and old folks are active, too. Kids are often tasked with fetching water, which can be half a mile from camp, and men and women in their sixties, seventies, and even eighties are out most days foraging like they did in their prime. This impressive amount of physical activity isn't unique to the Hadza. All hunter-gatherers lead lives that would make Westerners melt. And while you wouldn't know it from our cushy, urbanized existence today, this extreme level of physical activity was the norm for all humans only a few thousand years ago.

So yes, Herman has spent a lot of time across the world pondering your pancreas and butt muscles. So, how did he land his gig?

Herman: Well, I got into this because I wanted to understand how people evolved and there's nothing you can understand... If you had to pick one thing to know about an organism, you'd pick its metabolism, in my opinion. It tells you the most, in the smallest amount of time, about what an organism is all about. So, I just wanted to know how the human body works and how it got this way. I never had any intention of doing any public health stuff. And then we started to get all this really interesting and useful data on hunter-gatherers and activity levels and how that affects metabolism and all of a sudden, I was like, "Oh wow, I guess we do have things to share and to contribute in the public health space." So, then it's been a lot of that ever since and it still is today.

Alie: At what point did we go from maybe small packs of us to bigger villages and start hunting and gathering versus agriculture? How did our metabolism and our needs and our fuel change?

Herman: Yeah. So, hunting and gathering, if you think about the genus *Homo*, it is a hunting and gathering genus. That's 2.5 million years, that's before *Homo sapiens* shows up, we're the latest hunter-gatherer model but we're from a family of hunter-gatherers. The genus *Homo* is all hunting and gathering. And that changes things because all of a sudden, you're sharing food, a lot.

It's crazy to think about this but there's no other species where half of the group goes and forages on plant foods and the other half of the group goes and pretends they're carnivores and goes after animal foods, and then at the end of the day, they all share it back at camp. That's a really crazy way to make a living. ["Do you want my pickle?"] But what it does, is you can always depend on the plant foods, so you have this dependable safety net food, or staple, and then the animal foods, the game that you go after have tons of fat and protein and they're really nutritious. You won the lottery kind of packages, you get a zebra or a giraffe, you combine those together man, and that's unbeatable. And that's why the last 2 million years have been all about the genus *Homo* just taking over.

Alie: Wow.

Herman: And our metabolism kind of responds to that. So, that shared energy economy is the fuel we needed to evolve these faster metabolisms and bigger brains and all of it. What sets humans apart from other apes? We're really social, we have these big brains, we share all the time, and we're really cooperative, all of that happens over the last 2 million years and it's all tied directly to the foods we're eating, the ways our bodies are using it, and the hunting and gathering way of life.

Alie: And then agriculture, 10,000 years ago?

Herman: Yeah, that's a good ballpark. Yeah, 10 or 12,000 years. This is really crazy. Agriculture, people figured it out all around the same time, independently, all over the world.

Alie: [gasps] Really?

Herman: Yeah. So, people in the Americas figured it out, the Aztec and Maya, famously. In the Fertile Crescent, the Tigris and Euphrates rivers that you've probably heard of, that my generation learned about in social studies, the Near East. And then of course in East Asia, they figured it out there too, and probably other places, Africa. So yeah, it's one of these kind of good ideas. Isn't that amazing? Sometimes you have these great ideas, and they get, you know, figured out independently, kind of like the time has come for them and agriculture is one of those ideas.

Alie: What a trend watch. [Herman laughs] The hottest thing right now? Agriculture. [laughs]

Herman: That's right. Are you still going out there to get your food? [Alie laughs]

Aside: And for more about where fire plays into our history, and its role in our brain size hundreds of thousands of years ago, yeah, we have a whole episode dedicated to that, it's called Pyrotechnology, so we'll link that in the show notes.

But going forward to the switch to golden fields of wheat and rye, it didn't happen as fast as a TikTok home interior trend, which I'm sorry, goes too fast for anyone to keep up with and it's wasteful. That's neither here nor there. Rather, agriculture took up until 6,000 years ago to hit Ireland and the UK, and of course, some places continue with hunting and gathering longer, with changes gradually occurring with livestock and plant crops, and then more massive changes as those lands were colonized.

Alie: How about grains? So, did we tend to veer toward grains because of storage reasons and because it was more predictable? Did we shift our carbohydrate to protein? What happened there when we became agrarian?

Herman: Yeah, so a bunch of things happen. The foods narrow, first of all, because now you're dependent on a few crops that you really spend a lot of your time and energy getting, so the diet narrows. You're certainly eating a lot of carbs in every early farming culture that we know of but that's not such a new thing. There's this idea out there that hunter-gatherers were eating all this meat and they hardly had any carbs and as far as we can tell, that's completely bogus, that just isn't true. [*"That's totally bunk!"*]

Hunter-gatherer diets in the past were really diverse. Depending on where you lived in the world, different foods might be available to you. So yeah, if you live in the Arctic where nothing grows then surprise, surprise, you're going to eat a lot of meat and fish. But elsewhere in the world, people eat a variety of diets and a lot of it is pretty carb-heavy. So, the carb content probably wasn't the new feature. It was more about a couple of things. First of all, you start farming and the food becomes even more dependable. You can start kind of manipulating these animals and plants to provide more energy per bite. And so, you know, corn, for example, is a classic one; it goes from this little, smaller than your pinky, kind of a head of grass, and turns into the corn cobs that we know today.

Alie: Wow.

Herman: Domesticated animals today on farms carry twice as much fat as wild animals do, right? So, the wild game that we would've hunted has only half the fat that you'd have on a domesticated animal. So, we start manipulating these species, and by the way, we're manipulating their metabolisms too. So, you know, if you're me, everything's a metabolism story. And guess what happens? We take all these extra calories and populations explode because we turn those calories into babies. [*Alie laughs*] And so, populations grow, villages grow. But at the same time, now we're living really close together in population densities that we never used to, and people start getting sick. And so, you see, like, contagious disease. You see people actually get shorter because they spend their childhood sick with all this contagious disease, rather than being able to sort of be less exposed to that in a smaller hunter-gatherer camp. So, I mean, it just changes everything.

Aside: What's with all these babies? Well, our changing diet enabled our species to make more babies, of course, but also feed those babies earlier, with grainy mush. And earlier mush feeding meant shorter periods of breastfeeding, which means that a person is fertile again sooner, and that means more babies. So, as a species, grain meant success, until then it didn't.

Alie: When did we get, kind of, too rich for our own good? If we think of a calorie, if we think of fuel, we're essentially sitting on an oil mine, most of the world, to the point where we are today. Are we too wealthy with energy?

Herman: Oh, yeah. I mean, there are a few ways to think about that. First of all, obviously, we have this global obesity crisis and that's telling us right there, I mean, you don't have to go any further than that to know that we are eating more calories than we're burning off. That's almost entirely driven by changes in our diet. And the fact that we have just so many more calories available to us. I'm talking to you from my home. I have literally at arm's reach, like, I don't know, I haven't counted it up, but like, I think it's a billion calories, more or less.

Alie: Oh god!

Herman: It's just the holidays. So, you know, I could eat a week of chocolate if I wanted to right now.

Aside: Okay, before anyone gets worried, we'll discuss the term obesity at length, in a minute. But in terms of caloric resources, poverty and food scarcity abound in so many countries, including whichever one you're in right now. In the US, reports estimate that more than 44 million people face hunger and that includes 1 in 5 children. Globally, estimates range from 700 million to 2.4 billion people who experience hunger and food scarcity. So, when we talk about a wealth of calories, that is by no means universal, far from it. And conflict in some regions can account for a lot of that but unemployment and low wages are also huge drivers of food scarcity.

So, why do some of us have too much fuel for our physiological needs than our evolution has bargained for? Well, because just in the blink of an evolutionary eye, our food sources have changed. In the last 100 years, what's become affordable, particularly in food deserts, is lower in nutrients but richer in fuel, like a higher octane than the engine we've evolved for the last 2.5 million years of our genus. So, your ancestors, they did not have prescription antibiotics, they did not have general anesthesia or X-rays, but they also didn't have marshmallow Peeps in every color.

Herman: That's crazy! That's never happened. That isn't how life is supposed to work. And not only that, but the way we make the calories is really peculiar. So, would you care to guess how many calories of fossil fuels, basically... Because this is what we do, we take all this energy from the outside world and right now, we're hooked on fossil fuels to do this, it used to just be fire and stuff, but now it's at a whole other level of fossil fuels. We take all of that energy, and we use that to make our food, to plow our fields, or to make fertilizer. Would you care to guess how many calories it takes to make 100 calories of food?

Alie: Oh god, 100 calories of food.

Aside: I was going to guess 500 but then I upped it because I figured that was too conservative. So, I don't know what I'm doing here.

Alie: Uhh... [*hesitantly*] 1,000?

Herman: Yeah, that's about right.

Alie: Am I right?

Herman: Yeah, it's like 10 times more, 8 times more energy it takes to make the calories on your plate and that's insane. No other species can survive if it burns more energy than it gets.

Alie: Augh! So, we should all just drink gasoline, probably. [*laughs*]

Herman: You heard it here first, people.

Alie: It's not intended to diagnose or treat any illness. [*Herman laughs*] What about in terms of this epidemic of, I'm going to air quotes "obesity," I know a lot of us might have a hard time with those words or those labels, or if you go into your physician, they might say very clinically, "You're at this. You're at that. You're at this." But also, socially, so many people have been objects of oppression. So, how do we parse out what's healthy versus what's just body shaming?

Herman: That is a great question. You're absolutely right that there's way too much stigma and moralizing around this. I wish it were otherwise, but it is still the fact that people who are carrying more than is healthy, in terms of body fat, are at a greater risk for a whole lot of different diseases; diabetes is probably the main one, but heart disease, kidney disease, we saw with the first wave of the COVID pandemic that people who were overweight had a much greater risk of serious complications with that. So, I wish I could tell you that, "Yeah. It's just all stigma and it's all cultural and we should just ignore it," but in good conscience, I don't think I can. I think there are just too many very solid studies out there showing very clearly that carrying a lot of extra weight is not healthy when you carry that weight as fat.

I think the fact that it's gotten so stigmatized is super, well, it's terrible on a personal level. There's a personal tragedy, there's a personal cost to that, obviously. But it's also counterproductive to the public health intent, you know, of some of these measures that end up being seen as stigmatizing when people just totally turn off because they're feeling like they're not being heard, or they're feeling like it's more oppressive than helpful, then yeah, of course, people are going to tune out. So, that's how I parse it personally.

Aside: I just... [sighs] I was not sure how to approach this episode because I want to be inclusive, I want to be sensitive, so I don't want to toss terms at you that feel painful or that are insulting. Also, the current scientific language for a range in body fat composition – or rather the less accurate BMI – is as follows: underweight, healthy weight, overweight, and obese. As Aubrey Gordon, who is the host of the podcast *Maintenance Phase* points out in her book, *What We Don't Talk About When We Talk About Fat*, this term "obese" has a dark etymology. It means "having eaten oneself fat" and the term has been weaponized against fat people for decades. And also, sidenote, many people prefer the term "fat," having reclaimed it.

So, the word "obese" means different things to different people. There is currently far from a consensus, so I wanted you all to inform me with your lived experience. I wanted to hear what you had to say, so I asked listeners on X and Bluesky – calling only for medical professionals or those who self-identify as fat – what terminology they prefer when talking about body composition in a scientific and public health sense. And I think it was pretty consistent... [quietly] No, it wasn't.

So, @sohailai says:

My ophthalmologist just told me that I'm medically obese and explained the requirement for being called obese. I'm okay with fat or obese since there are requirements for being called obese.

@AsClubPrez says:

I like the term 'fat' as a self-descriptor. But @LordofGoats_ says: I don't speak for all fellow fatties but at 6'1" and 375 pounds, I'd say there's a clear distinction between clinical terms and social slang. Context matters! No clinician should be using terminology that was immediately lifted from social media.

@QueSarahSarahX says:

Isn't "overweight" the correct term? Factual and with less negative connotations than obese/fat? You could also be underweight as well.

But @ConfettiNoodles:

Disagree [with overweight]. Fat is a neutral adjective and neutral descriptor of body types. Additionally, overweight is a word most fat acceptance folks avoid because it's like, "Over what weight, exactly?"

But @DrSuzanne says:

If someone called me obese or fat, it would take me several days to recover from it. Overweight is as close as I can get without a full-on meltdown.

@ZigZag156 says:

As a person who used to be 350 pounds and is now 250, obese is fine. It's simply a medical term to describe when someone's BMI is over 30 which is generally linked to worsening health problems.

@DearBlueEarth says:

I feel "obese" is mostly used by people who don't have good intentions at heart. I like "fat", but it sometimes shocks people when you say it. Also, men use "fat" against you.

@KevinVanDev says:

I used to be around 400 pounds, though now I've lost about half of that, but I never once considered obese to be a slur. If anything, I tended to use obese over fat.

@BeerIsYum says:

I don't recall ever being bullied with the term obese, but fatass for sure.

Someone with the handle @FatMan says:

Couldn't care less about the term used. Overweight, obese, heavy, et cetera doesn't matter to me at all. The tone and the content of how a comment was made is far more important to me reacting negatively.

So yeah, it's all over the map. This was illuminating for me too, how much every answer varied. But my point is, no matter where you fall, open your minds to others' sensitivities, and also advocate for what feels right for you, and feel free to communicate that. Tone and intent are also important so for god's sakes, be nice to each other and take your judgments and throw them in a volcano.

Now luckily, our lead editor, the wonderful and brilliant Mercedes Maitland has an undergrad degree in Anthropology and a Master's of Science Communication and happened to write her dissertation on exactly this subject. The title of that dissertation was, "Investigating the Availability of Information on the Evolutionary Mismatch Hypothesis in the Media and Public Health Literature." So, a lot of metabolic issues that Dr. Pontzer is talking about can be boiled down to the evolutionary mismatch hypothesis: that humans did not evolve for this life. Mercedes cites several studies explaining that:

It is important to note that the health recommendations provided by an evolutionary mismatch hypothesis framework already align with standard health advice; they simply provide a higher-level understanding of why those actions lead to better health. Participants in studies who were educated on the evolutionary mismatch hypothesis said that novelty led to curiosity and sustained interest, and it made it easier to link the information to their own experience.

So, for all of us, zooming out from how you look or what a dick doctor might be barking at you, and looking at the history of our species can help us understand how our bodies work more because all people should not be held to the same standards of ability, or of appearance, or even metabolism.

Alie: How much of that is just genetics and how much of that is your body composition? How much muscle you've been able to retain or build, things like that?

Herman: Well, okay. So, that's a complicated story too. Your genetics has a lot to do with whether or not you will struggle with your weight. And that's because as far as we can tell, your likelihood of putting on too much fat has to do with the way that your brain responds to food, right? And there are a lot of different genes and a lot of different gene variants that are going to be involved and how your brain is wired. There's also, of course, the way you grew up and how you were exposed to food growing up. And so, all of those things shape your brain, wire your brain, in your reward systems, to respond to food in a particular way. And they're going to determine if you think about food all the time and kind of can't miss a meal without feeling miserable. So, your genes matter a whole lot, but I'll tell you what, we all had the same... Our grandparents' generation and their grandparents' generation had the same genes we have.

Aside: But though we have the same genes, roughly, as our grandparents, we have a different number of 7-Elevens and corporations that take your money and build you sugar bombs so that your health insurance company can then make a profit off of your suffering. And Herman says that's where it's complicated because the genes only matter in a bad environment.

Alie: Did the '70s corn syrup explosion have a lot to do with health rates and life expectancy at all?

Herman: I just want to, first of all, say that "the '70s corn syrup explosion," if it's not a band name yet, [*Alie laughs*] it needs to be, immediately.

Alie: Definitely a jam band with too many carbohydrates and simple sugars. [*laughs*] It's a raspberry jam band.

Herman: I love it. So yeah, people always want to find the supervillain, right? It's not carbs, it's not sugars, it's not... I mean, none of those things are good for you. Just to be real clear, extra sugar isn't helping anybody. But it's kind of the combination of it all. It's the fact that, you know, all that corn syrup goes into these ultra-processed foods that are literally engineered to be overeaten, right? That's how food companies make money is if you can't stop buying their food. [*Alie groans*] And so, you know, and they're not, I don't even really blame them for it. That's like, you know, "Don't hate the player, hate the game," I believe is the expression. They're doing what they're built to do, which is to sell food., I'm sure they're not trying to make anybody sick. [*"You sure about that?... You sure about that?"*] I don't want to believe that. Anyway, they are though, because those foods are, you know, as close to addictive as they can make them legally, I think.

Alie: Where does your endocrine system come in, in terms of, what is it, ghrelin and insulin? And also, just as you age, your estrogen or testosterone changing, or your cortisol... You always see those ads on the internet, "That's like too much cortisol? You've got belly fat." And you're like, "Who doesn't have cortisol?! There's a goddamn pandemic!" Where is your endocrine system?

Herman: Yeah. So, that's a great example of, again, this other layer of complexity but we can also use this to understand what's happening. Okay, so your endocrine system, that's your hormones signaling across tissues, across organs. A hormone is a signal sent by one organ to another through the bloodstream. And so, your endocrine system is all about the hormones sloshing back and forth, your body talking to itself. And those signals, those hormones are meant to regulate things like how hungry you feel, how full you feel, all sorts, not just hunger and satiety, but those too. So, they're going to be part of the kind of reward system – people are going to complain that I'm kind of mixing up neurotransmitters and hormones, but I'll let them complain, that's okay – they're part of that reward system that either makes you feel so excited about food that you can't stop, or not.

But here's what's cool. [*"Let's hear it."*] There are also hormones that your intestines make called incretins. Those hormones help you feel full and satisfied, and those are the hormones that the new class of weight loss drugs mimic. This is why these weight loss drugs are working, to sort of

manipulate how full you feel and therefore, get control of your hunger and satiety. And, you know, I'll be really clear, I don't have any investments or anything like that. I'm not going to make any money off of those drugs. Somebody's going to make a lot of money off those drugs.

But it's kind of exciting because back in the '90s, we started to discover the hormones around hunger and satiety, how hungry you feel, how full you feel. Ghrelin, you mentioned, which is this hormone that your stomach makes when it's empty, makes you feel hungry. The other one is leptin; people might have heard of, leptin is a hormone that your fat makes. Your fat makes leptin in response to getting chucked full of fat and sugar. Well, fat only gets full of fat, but you can pull blood sugar out of your blood and turn it into fat, and store it in your fat.

So, when your fat cells are getting filled, your fat goes, "Ahhh," *[Alie chuckles]* and it makes leptin. *[Herman laughs]* That's how I picture it anyway; you can't actually hear your fat sigh, but if you could... And it makes leptin, and your brain hears that leptin and it should be part of what makes you feel full, and they were going to give people leptin and it was going to make people feel full and they would stop eating. It works amazingly if you're a mouse. *[Alie groans]* Yeah, bummer. And doesn't work so well if you're a human. It's the same hormone with the same role but for whatever reason, it didn't have that effect in humans. So, they've been hunting around because there are a lot of these hormones and that's what this new class of weight loss drugs is. They were like, "Oh, well what about this hormone that your body makes after you eat?"

Alie: Does that last, or does it have like, a rebound effect? And also, I understand that for people who are diabetic, it's a medical necessity in some cases but it's also really difficult to get because it's such an effective way to change your body mass.

Herman: Oh yeah. Yeah, there are all kinds of interesting societal questions around access with that. Is there a rebound? Yeah. It looks like if you are on it, you will lose as much weight as people lose, like in bariatric surgery, which is kind of incredible. If you go off of it, you'll gain the weight back, at least a lot of it, I don't know about all of it. And it'll just say again, I'm just watching the science come out, I'm not involved in any of it. But just watching these studies come out, it's super impressive to see because it's the first time that we've had a weight loss drug that seems to really have this size of an effect. What we know now is that the effect is pretty sizable. If you stay on the drug, it lasts. If you come off the drug, it bounces back. Now, who's going to bounce back more? Who is going to bounce back less? Is there something you can do with lifestyle interventions to be able to come off the drug but keep the weight loss? That's the frontier right now. That's where people are at right now.

Aside: Herman notes that these drugs, like Semaglutide, started off as diabetes medications that regulate insulin secretion. If body composition is a factor in any cardiovascular health or diabetic conditions, these drugs can also help with that and lower high blood pressure or cardiometabolic diseases. Although my friends who are diabetic are not down with the general populace or a lot of celebrities taking this and gobbling it up while folks who have diabetes cannot get a hold of it. That sucks.

But again, it's a bigger picture of total health, assessed by a doctor who listens and doesn't, like, write off other concerns as weight-related, because actual weight doesn't tell you everything about organ health, or muscle mass, or even your metabolism. In fact, I'll tell you a little secret, the best thing I've ever done for my body was in my late twenties; I took my scale, I took it to an alleyway, and I smashed it with a hammer, and then I tossed it into a dumpster, hard. Because a number fluctuating every day and not reflecting muscle or water was doing so much damage psychologically. So, I switched it and I tried to focus on how many steps I was getting each day because I knew the days that I went on walks, especially if I was outside, I felt less anxious and sad,

and I had more energy. And if you can't take walks, we've done other episodes about how just going outside, and being around a tree for a few minutes, can provide a psychological boost.

But yeah, for me, scales are garbage. Literal garbage. And I actually went to the doctor this week, it was a gynecology clinic, and they actually had their scale set to kilograms which, as an American, I was like, "Sweet, I don't know what that is in pounds. I have no idea. I'm not going to think about it or google it because that's not the point."

Alie: Well, when it comes to yo-yo dieting, I know the worst health I was ever in body mass wise, depression wise, like, autoimmune stuff wise, was when I was trying to get skinnier and I just... When given the opportunity, I could eat, like, half a jar of peanut butter because I was just so *pissed* to be depriving myself. So, I know that yo-yo dieting, part of it is probably psychological, but how much too is that metabolic? And how do people avoid that if they're just like, "Fuck this."?

Herman: Yeah, it is so hard. And what I hate is when people have these kinds of conversations with folks like you and they say, "Well, here's what you'd have to do," like there's one easy answer that people haven't already tried. So, I'll just start by saying it's hard. My suggestion is to... If you are pissed off and feeling deprived on whatever diet you're on or whatever nutrition plan you're kind of trying to stick to, then you're not on one that's going to be sustainable, and you've got to find one that's better. That's where I do think there's a place for intermittent fasting or for low-carb diets if they're done in a healthy way, or for vegan diets, or Mediterranean, or whatever. But I know it's hard.

Alie: And it's a lifestyle, not a diet, right? I know that I'd be like, "I'm at my goal weight!" And then I'd be like, "Sweet!" [*through laughter*] and go eat, like, a double-decker taco from Taco Bell. I'm like, what happened to my... [*laughs*] Why don't my pants fit?

Herman: "That's weird!" Yeah.

Aside: Okay, first off, I love double-decker tacos. Also, when I'm sick or have a migraine, all I want is a Diet Dr Pepper and Cheetos and it's disgusting but it's a decision made not by my body but my soul. But Herman told me that we all have a little bit of magical thinking around this stuff too. And it's really hard in modern culture and with the food available to folks in food deserts, on lower incomes, and really anyone, to track how much fuel we are putting into our bodies and how our individual endocrine and neurological systems are going to react to them.

Herman says that there is such a stigma around body image and health and so much undue blame on individuals and that it turns into a mental challenge and a stress to just try to tally numbers and understand this really complex and impossible system that he's been studying for over a decade. And if you have access to healthcare, talk to a trusted doctor, and maybe get your thyroid or your blood sugars checked if you're feeling a bit off. But okay, onward to some of the 49 pages of questions we got for Herman.

Alie: I have so many questions from listeners. Can I lob them, some at you?

Herman: Oh! That's why I'm here, isn't it? Yeah, sure.

Alie: Yes! Okay.

Aside: But first, let's donate to a charity of the ologist's choosing and Herman said the choice was very easy, and he'd like it to go to the Hadza Fund. The Hadza Fund provides healthcare to this hunter-gatherer community by funding an ambulance for the critically ill, resources, food, and medicine during hospital stays, as well as preventative health care like mosquito nets to combat the spread of malaria. To find out more, you can go to HadzaFund.org. So, thanks to sponsors of the show who make that donation possible.

[Ad Break]

Okay, let's get some burning questions off your chest, including this first one about metabolic speed, which was on the minds of Julie Scott, Olga, Dawn and Eric Easton, Annmarie Everhart, Michael Wegman, Lina Staudt, Lisa Rowell, Sophia A, Sharon, Tari Lee Johnson, Valerie Bertha, first-time question-asker, Angie Smith, and...

Alie: Abigail Ladd is in Denver,

Herman: Hi Abigail.

Abigail: "I am curious about the idea that we can speed up or slow down our metabolism just with like, products. Particularly the biggest Loser study. The Biggest Loser study showed that extreme dieting caused a slow down in peoples' metabolisms but then there's been some sort of debunking out of that that I've seen so it seems to be really conflicting and I would love clarification."

So, the first question was the easier one which is, are there products out there that can boost your metabolism? The answer is, no ["Okay."] with a caveat. ["Okay!"] The caveat is, there are some illegal things you can do that will boost your metabolism that are not recommended. So, you know, that's partly a joke. There are some illegal things you can do that would boost your metabolism, but you shouldn't do them because they'll kill you.

Alie: Like, are those things you snort? Are those things you get illegally by prescription?

Herman: ... Yeah, so, moving on...

Alie: Yeah.

Herman: [chuckles] I don't know. Actually, so they used to sell this one, I forgot, god, I'm blanking on the name of it, that would speed up your metabolism. It made your mitochondria leaky so they would just burn through all this energy trying to charge your ATPs.

Aside: Okay, so sidenote. I believe Herman is talking about this drug is known as 2,4-Dinitrophenol, or DNP for short. It's been used in things like bombs and pesticides! But taken by alive humans, it ups your metabolism by 30-40% which, of course, can melt away excess fat. It can also cause rapid heart rate, cardiac arrest, cell death, and hyperthermia, meaning you literally cook yourself. DNP can also very much kill you, so much so that people have used to unalive themselves. So, yeah. No, not worth it. You are wonderful as you are, which is living and breathing.

Herman: And so, they had to stop selling it but obviously it's super terrible and really dangerous to mess with your metabolism that way. So no, your coffee in the morning gives you a little tiny bump, ["Want a bump?"] But you cannot boost your metabolism. Everybody out there trying to boost their metabolism with whatever supplement you're buying, you're just being robbed. I'm sorry, please, for your own sake, just stop.

Alie: Mm-hm. Good.

Herman: You can't even really boost your metabolism very much with exercise, it turns out.

Alie: What?!

Herman: That's one of the big surprises. Yeah, so when you're exercising, you burn more calories, that's true, while you're exercising. And if you start a new exercise program, then yeah, for those first few weeks, you'll be burning more calories by the end of the day than you were before you started it. But this really interesting phenomenon happens where your body adjusts and so after a few months, you're not burning a whole lot more than you were when you started, maybe not any

more than you were when you started. And so, you know, that's some of the really surprising work that's come out of my lab and some others.

Aside: So, apart from fieldwork observations and interviews, what does this lab work entail? Well, in his book, Herman explains how difficult it was to do this research in decades past when you'd have to essentially lock someone in a metabolic chamber and measure the ratios of carbon dioxide and oxygen in the room and also collect pee from the entire stay to analyze for metabolites of protein and stuff.

But then, in the 1990s when mass spectrometry analysis became more affordable, scientists were able to do this thing called the doubly labeled water method they had used in smaller animals but was more affordable now to use in humans. This involves people drinking a water sample with special, non-radioactive isotopes of hydrogen and oxygen, and then later analyzing a pee sample (maybe two weeks later) to see how much carbon dioxide they had produced based on what's left of the isotopes. So, water, some pee, some mass spectrometry; so much easier than an airlocked chamber. And yes, more affordable.

He writes in *Burn*, "So, what's the bottom line? How many calories do we spend each day? It depends, of course. But not on the factors you might think."

Herman: Here's a fun snapshot for you, we were talking about hunter-gatherers before. So, my lab, our group, did the first measurements of calories burned per day in a hunter-gatherer group. We went and worked with these folks called the Hadza in Northern Tanzania and they get more physical activity in a day than most Americans get in a week, hunting wild game, and getting wild plant foods. But despite that, despite that, to our enormous surprise, because we did not expect this going in, they burn the same number of calories every day as Americans do.

Alie: What's going on?

Herman: Yeah, because their bodies have adjusted to this really rigorous lifestyle and they're saving energy elsewhere. Your body will do that too if you start exercising, a new exercise program. You might not wipe out the entirety of the exercise bump but a lot of it.

Alie: And even if you increase your muscle mass by a lot? Like if you're weightlifting?

Herman: So, that's interesting. That's understudied. Most of the exercises people do to lose weight are like cardio, and you don't gain a lot of muscle mass so that's not even a factor. If you do gain a lot of muscle mass, then what we'd expect is that, you know, for your size, sure you're going to increase your energy expenditure because you've gotten bigger, back to this whole issue of what is metabolism? Well, it's your body at work. If there's more of you, yes, you'll burn more calories. But for your size, we don't think your expenditure will go up that much.

Alie: Wow. So, it's mostly diet, as they say?

Herman: In terms of your weight, yeah. It's not even worth worrying about exercise for weight.

Aside: Hang on, very important message here.

Herman: You should still exercise, by the way, it's *really* good for you. And some of those adjustments that your body makes and response to exercise are probably some of the reasons exercise is so darn good for you. So, I'm on Team Exercise, 100%. But we have to think about exercise and diet as two different tools for two different jobs. So, you know, diet is about diet for your weight and exercise for everything else.

Alie: What about the serotonin component and the endorphins? Is it mental health, I understand, that exercise can be as effective as some antidepressants?

Herman: Yeah, yeah, yeah. That's absolutely right. And there are lots of great studies out there showing exercise interventions for depression, is a really good tool, like you say, as good as a lot of the drugs people take.

Aside: Plenty of studies, yes. So, go ahead, get yourself a wingback chair, get a big cup of tea, and settle in for years of reading published studies, cobwebs are going to grow on your arms because there's a lot. But here are a couple samples. So, the 2017 meta-analysis titled "Is the Comparison between Exercise and Pharmacologic Treatment of Depression in the Clinical Practice Guideline of the American College of Physicians Evidence-Based?" in the journal *Frontiers of Pharmacology*, gave a recap of experiments and found that three randomized clinical trials compared four months of exercise to just antidepressants and all these studies reported that exercise and standard antidepressant treatments were equally effective.

And then another 2015 study in the *British Journal of Psychiatry* called, "Physical exercise for late-life major depression," showed the greatest improvements people had were with high-intensity aerobics, followed by low-intensity aerobics, followed by just antidepressants. Other studies show that exercise and medication can be an effective two-pronged intervention for major depression.

So, what is the message here? Well, it's not from me, because I am not board certified in shit. You have to talk to a doctor and under *no* circumstances go off antidepressants on your own. I say this as your friend, I say this as your internet father. And this spring, I've mentioned this before, but I went off of Effexor to try medication for ADHD instead and for my hormonal issues, and guess who ended up in the ER with a panic attack? That was me! Remember that? That was me. Of course, you don't remember, because I don't know if I mentioned it but my point is, please do research, talk to a doctor, don't go cold turkey on your own. And also, make sure that your loved ones know that you're changing any medication and you have a lot of loving support – or better yet, maybe just consider adding any exercise to your medications if you're physically able to and see if you feel more amazing.

And if you're feeling like garbage and are feeding yourself garbage, like I sometimes do, remind yourself that your body deserves fuel and nutrients and that companies marketing you things are in it to make money, not to make you happy. But what happens if you do all this, and start to feel healthier?

Alie: And then that second part, yeah. So, the slowdown in peoples' metabolisms after they diet, that's a bit of a myth.

Herman: No. So, that's depressingly true. So, you can slow your metabolism you just can't speed it up. [*Alie whimpers*] If you lose a lot of weight, like they did in *The Biggest Loser*, people lost a human's worth of weight; talk about unsustainable. It was completely unsustainable the way they did it so the folks who managed to keep a lot of that weight off, even six years later, their metabolic rate was still slower than you'd expect for their size. Their body was still trying to right the ship. It's a survival response. If you lose tons of weight right away, really fast, your body... You know, you're an evolved organism, we've been evolving for millions and millions of years. We have all these mechanisms in place that say, "Look, times are tough. We've got to tighten our belts and lower the metabolism until things get better again," and so that's real. That absolutely is real and people in *The Biggest Loser* who kept the weight off for six years, their bodies were still in that mode. And the people who gained all the weight back, well, their metabolisms recovered because their bodies were like, "Yep, we did it. Good job guys."

Alie: Wow. And I imagine it's just, evolutionary processes helping protect you from future famines.

Herman: Yeah, exactly. Every species will do this. As far as we can tell, any species, given the opportunity to put on extra weight, will. And it seems to be because it has just been a truism, a fact of life, for hundreds of millions of years that animals have been evolving, that you can always end up in a lean time, so you always better be prepared.

Aside: And yes, it's hypothesized that some people's bodies have a thrifty genotype and they're more efficient at surviving those lean times. But our relationship with processed and high-calorie and low-cost foods presents a challenge to tell our brains that we have to contradict hundreds of thousands of years of survival instincts and genetics every time we walk into a grocery store.

Cindy: "Does cinnamon or ginger or any other herbs or spices actually do anything for your metabolism?"

Alie: I myself put cayenne pepper and black pepper in my chai every day but for flavor. The idea that you can take, like a capsicum pill, and be like, "Bikini season!" ... That is not true.

Herman: Yeah. Sorry, Cindy. [*Price is Right losing horn*]

Aside: What about individual variation? This was wanted to know by patrons Lovely Bites, RJ Doidge, Hannah Riedl, Matthew Walcher, AmandaLovesJurt, Quincy J Byrne, Mish the Fish, Felipe Jimenez, GhouNextDoor, Monica Olvera, Margot Louis, Sarah Morcom, Griffin Russell, Julie Scott, and member of the BFF audio-asking Tier on Patreon...

Alie: Erin Ryan says:

"Look. We're all thinking it. Why does my metabolism suck?"

Herman: Oh! I've got good news for ya.

Alie: Okay.

Herman: It doesn't suck.

Alie: All right.

Herman: Some of us do have just because of our genes or, you know, maybe because of the way the conditions in which we grew up, we're not entirely sure, but some of us do burn more calories than others. That's true, just inherently. But – and we've done this study in our own lab, we've done it other seen it done in other places – people who have slow metabolisms aren't necessarily more likely to gain weight. People who have fast metabolisms aren't necessarily less likely to gain weight. So, we always blame our metabolisms. But the fact of the matter is, it really comes down to your brain. So, your metabolism's great; it's your brain that's giving you trouble and it's giving you trouble because, you know, you're surrounded by all this really delicious food that you can't... It's hard to pull yourself away from.

Alie: So many people, Greg Lewis, Valerie Bertha, Ryan Walsh, Les Johnson, Calla Turnbull, Matthew Winn, and Earl of Greymalkin...

Aside: Also, Leanne Shuster, Anjali Himali, Rebecca Cloud, Daniel Kelly, Hannah Boyd, Average_pi, Larn Arn, Rineil Mandre, Margie and Dexter, and Cece Theberge.

Alie: All asked, in Greg's words: How does aging affect metabolism? Does being an active senior make a difference? Does it slow down as you get older? I've read some of your research [*laughs*] and I know the answer.

Herman: Yeah. This is one of the most fun studies I got to be part of over the last couple years. We finally put together this like, roadmap of your metabolism from birth till very old age. So, we know the answer to that. So, first of all, as you grow up and get bigger, there's more of you, you burn more calories,

right? So, bigger people burn more calories. Men tend to burn more calories than women because this gets back to the, you know, what kind of weight are you carrying? Women tend to carry a bit more fat for a given body size, men tend to carry a bit less. And so, you know, fat is quiet, other tissues aren't. So, men tend to burn a bit more calories just because of the body composition difference. Once you control for that, men and women are the same.

Aside: So, the numbers crunched in most studies are based on the model of sex assigned at birth, but my nonbinary and trans pals, I see you.

Herman: So, bigger is more fat-free mass, you burn more calories. But once you control for that, so now, we're thinking about this in terms of pound for pound. For a given size, how does your metabolism change? Well, it's really high when you're a kid, from about 1-year-old, it's at the peak, right? One-year-olds are burning 50% more calories than you'd expect for somebody their body size, which is kind of incredible. And it's because of all the stuff your cells are doing all day to grow and be active and develop. And then, you peak at about 1 year old, and then you sort of slowly come down through childhood and teenage years. And in your early twenties, you hit your adult level. So, whatever you and I are at Alie and Greg, you too, and me, and all of us adults, we're at our metabolism plateau. And we're going to stay there. You're there from your twenties through your late fifties.

Alie: Oh wow. Late fifties?!

Herman: Yeah, it really doesn't change with menopause, it really doesn't change as testosterone levels go down in men. I was really sure it did. I'm 40... I'm in my forties and I was really sure that my metabolism must be slower than it was when I was 30. And, you know, it just doesn't look like that's true. And then after 60, it starts to decline, that decline is real. So, active seniors, it might be the case that staying really active as a senior, 60 years plus, is a good way to keep that decline at bay.

What we'd love to know is... So, okay. When we see metabolism start to slow down around 60, that's your cells becoming less active, they're slowly turning down the volume knob there on everything they're doing. That's around the same time that people start to get sick, your likelihood of heart disease, dementia, all the things, really starts to kick up around the same time. And so, that makes us think those things are related. So, if we can keep our cells more active, do we keep those diseases associated with old age at bay? Man, wouldn't that be cool to know? And wouldn't it be great to be able to use that kind of therapeutically? But that's the next step.

Aside: And for more inspiration to take Zumba classes until you're 90, other than just having sweet, sweet moves, you can see the 2021 paper titled, "The active grandparent hypothesis: Physical activity and the evolution of extended human healthspans and lifespans." It summed up several previous studies that showed that about 20 minutes a day of moderate physical activity or 12 minutes a day of vigorous aerobic activity "reduces the average otherwise-sedentary person's relative risk of all-cause mortality by ~50%." So, you do that 20 minutes a day or 12 minutes a day of harder activity, your mortality rates go down by 50% which, if you live in the United States, that can help you dodge medical bills that would bankrupt you! So, that's a plus.

So, the active grandparent hypothesis, what is that? It's one by evolutionary anthropologists to answer the question: Doesn't nature just want your babies and then for you to die? Why would humans have evolved to be so active and not dead after they reproduce? Well, researchers found that in the Hadza and other hunter-gatherer societies, active grandparents will forage up to six hours a day, taking that burden off of new mothers who are tending to the squirmy little babies. So, the active grandparents out there foraging bring in more calories for the whole community, kind of

like when grandma sneaks you an ice cream sandwich and you both promise not to tell your parents.

Also, before any of you write me letters, I love you, but before anyone writes me a letter, yes, calories are the same thing colloquially as a kilocalorie. Technically, a calorie is one one-thousandth of what we call a calorie, but yes, it's just confusing terminology. I don't make the rules.

Alie: Denise and Scott want to know: Is six meals a day to boost metabolism? Is that debunked? Six small meals?

Herman: Yeah.

Alie: Yeah. *[laughs]* Okay.

Herman: I'm not even sure exactly what they're talking about, but I can promise you it doesn't work.

Alie: Okay. You'll see sometimes in like, "How does this person (who's definitely had liposuction), how did they do it?" And they're like, "Six small meals a day." And you're like, okay. But then intermittent fasting goes completely against that. I know people had questions about intermittent fasting.

Aside: Such as Elliot McAtarsney, Amanda Washington, Norma Vazquez, Leanne Shuster, Monica Olvera, Denise and Scott Ologiephiles, Anna Elizabeth, Ferf Brownoff, Cate Muenker, Erin Gunderson, Emily Staw-fur, Vanessa Frey, and Euan Munro.

Alie: Does that slow your metabolism because you're not eating for 12 hours, 16 hours a day? Or is that not enough to mess it up?

Herman: The bigger switch on your metabolism, think about it in terms of days or weeks of energy balance. So, if you're intermittent fasting but you're not seeing the weight on the bathroom scale change really fast, because when you're allowed to eat, you're eating enough that you're not losing weight in a really fast rate, then you're probably going to keep the metabolism impact pretty small.

Alie: Okay. What do you do? Do you have a walking pad under your desk? Were you ever a chubby bunny as a kid?

Herman: I personally, you know, I've never had to really worry about my weight. I'm one of those annoying people who don't. I was a really skinny kid. My mom was like, trying to pack me full of food whenever she could. Honestly, I think it fits the research, which is, you know, I don't think about food very much. I just kind of don't care. I like good food. More than that, I like nice meals with good friends. My wife, she'll tell you, she thinks about lunch and dinner and snacks more often than I do. I think that's just true.

Alie: And that is... is that hardwired? That's hormonal? That's...?

Aside: Oh, you had genetic questions Heidi Wright, Jo B, Matt Ceccato, Valerie Bertha, Pavka34, Devin McPeek, Erin Burbridge, Emily Staw-fur, Matthew Walcher, Diana Moreno, Magdalena Castillo, Kathleen Regovich, Kay, Colin Croft, Lanice J, and first-time question-asker, Ms Nowak. So, how much of your jean size is based on your gene size?

Herman: So, those are the genes that are important as far as we can tell, I'm going to say all of them, certainly almost all of them are active in your brain. It's how you're wired. Your brain isn't a static thing, that's where people get brains wrong. You're not born with the brain that you have right now. your brain is a work in progress from the beginning. So, the genes that help build your brain matter but also the experiences you use to finish off and build those connections, and so probably both together, but by the time you're an adult, the cake is baked and your response to food is what it is and you're working with what you've got.

Alie: What about guts?

Aside: Patrons Katherine Fox, Bonnie M Rutherford, Nathan Howard, Nicole Austin, Earl of Greymalkin, Tristin Berg, Jessie, Kay, and Catherine B, first-time question-asker, this one is for all of your simmering intestines, as well as...

Alie: Alana Okuley, Emilie, Isis, Hey Artemis, Milinda B...

Herman: A microbiome question.

Alie: Yes. Sarah Dutton.

Herman: God dammit, I knew it was coming.

Alie: Yes! Alana says: This may be gross but I'm so curious and wondering if there's any connection between metabolism and... they say bowl movements, but I think they mean bowel movements...

Herman: Let's hope so.

Alie: But that's a good typo. How does your digestion change your metabolism? If it moves more slowly, do you have more satiety, which I always thought was pronounced say-sh-ity [phonetic]? Or... What's going on?

Herman: There's a great study actually out over the summer that had people on two different diets and the really highly processed food diet, their guts were able to absorb more calories more efficiently. And so, they're getting more of the calories that they put in their mouths actually going into their body rather than into the toilet. [*Alie laughs*] And people on the high fiber, they call it the microbiome happiness diet or something like that, that's not really it, but it was something meant to help their microbiomes, they had more fiber, was harder to digest, and they absorbed fewer of those calories and more passed through them. [*"Bye now."*]

So, there you go. Something that simple, you can see it in action that absolutely, the way that your guts work, the efficiency with which you pull calories out of your food and into your bloodstream, the kind of food you're feeding yourself, which will have an effect on that, all of those factors are going to play a role. This is the ultimate multiplayer game for metabolism and so to think it's just one thing, it probably is never just one thing. But it's okay. It's not wrong to think about all the parts that work together but they are just parts that work together. And the ones that are sustainable, they make you eat fewer calories without feeling miserable.

Alie: Does the carnivore diet drive you crazy? Because evolutionarily we evolved to eat plants as well?

Herman: What drives me crazy is when people want to sort of rewrite history and say, you know... It's not enough for them that the carnivore diet works for them. It has to be the one single perfect diet to rule them all and it has to be proven by the fact that, "Of course, don't you know dummy, that we evolved to only eat meat?" That just pissed me off because the evidence is really clear that humans have been eating a lot of plants forever, except in certain special circumstances like the Arctic. So, like, man, why do you have to ruin what we know about human evolution, what took so long for people to figure out? And you've got to ruin it just so that you can, like, enjoy your diet and be snooty? I don't get it.

Alie: Yeah. [*laughs*]

Aside: Again, for more on what hunter-gatherers do eat, grab his book *Burn*, linked in the show notes, to learn about his years of research, befriending the Hadza community in Northern Tanzania. I burned through it in a few days, and it has already influenced how I am taking care of my bod, and my bod, which has been a shitshow of pneumonia and hormone chaos, is thanking me for caring. Actually, back to hormones...

Alie: You know, we had some great questions about hormone replacement therapy. You know, and I know that menopause itself and aging itself doesn't slow your metabolism but...

Aside: Anuja Joshi, Kate DuHadway, Interstitial K, Larn Arn, Dionne Needham, Rebecca Roehm, Jen A, Brittney Corrigan, Lau, Lisa Rowell, and Katie Shannon, as well as...

Alie: Lisa Pannek asked about during perimenopause and menopause, having less testosterone, does that affect your ability to build muscle mass?

Herman: Oh yeah.

Alie: And we also had great questions from trans listeners Keegan Newman, Wayne Halliburton, and Jude Scout Campbell who asked, in Jude's words: I'm a transmasculine person about to hit the two-year mark on testosterone gender-affirming hormone therapy. Both myself (and pretty much anyone on T ever) experiences what feels like an increase in metabolism. Why does this happen? When will it chill out? Please, I'm hungry all the time and who among us can afford that many groceries in this economy? Thanks!

Herman: Yeah. So, testosterone is what's called an anabolic hormone; it builds, it makes your body build, it makes your cells more active. That is why people dope with testosterone mimics. And they're illegal because they're incredibly effective, right. So, if you are on testosterone for whatever reason, yeah, your cells are more active, you're going to be probably burning more calories and certainly, your body's going to send in the signals, "Hey, let's build some muscle," because that's what it's good at. So, when will it go away? Ah, man, that's actually an interesting question. I don't know.

Alie: Mm-hm. And then if you're in menopause or for some reason your estrogen goes up or down, I understand a lot of birth control pills and SSRIs can change your body composition a lot. So, what's going on with the estrogen?

Aside: Okay, I asked these estrogen and SSRI questions for you all, Megan Bolton, Shelby Smith, Chyann Colles, Lizzy Martinez, Madelyn Dunkle, Kendall M, Kelsey Larson, and Brittany Kaufman.

Herman: We know what hormones are being given in those cases or what hormones are extra. I don't know that we have lots of great studies that are sort of counting calories in that context or measuring calories very well. So, this is just my impression of what's going to happen physiologically. You mentioned SSRIs, those are all kind of different systems.

So, testosterone and androgens generally, are muscle-building anabolic hormones that are going to tend to ramp that up. The hormones that are taken for oral contraception actually mimic the hormonal state of pregnancy. Or, the second half of the ovarian cycle, which is the same as the early parts of pregnancy. You've kind of kicked in some mechanisms, sort of early pregnancy mechanisms there to put on some weight. And then the SSRI thing seems to be back to the reward systems in the brain and that you're manipulating those systems and one of the outcomes is going to be the way that you respond to the reward of food.

Aside: So, if you experience more cravings for carbohydrates as your depression lifts from antidepressants, you can keep an eye on intake, or you could not care and enjoy more pasta and smiling. I'm not a medical doctor even a little bit but do whatever keeps you healthy and happy. But let's get back to misery.

Alie: The last questions I always ask are worst thing about your job. What sucks? What's hard?

Herman: Hmm... I love my job.

Alie: There's got to be something that sucks... Paperwork!

Herman: Yeah, I'll tell you what sucks. There is so much regulation right now around the actual performance of science in American universities. I have so many trainings and regulatory things I have to do and it's all well-intentioned but my god, [*Alie giggles*] there's so much of it. There's so much of it. We're paying this person at my university to talk to this person at my university. So, that's the only frustrating thing, I think. I love to teach, and I love to do research and I feel like I am one of the luckiest people, I know, in terms of the career I get to have.

Alie: Do you ever lose sleep over it and does that affect your metabolism?

Herman: Yes, and yes.

Alie: Ohhh! So, sleep does affect the metabolism?

Herman: Oh yeah, if you get completely sleep-deprived, sure.

Alie: [*softly*] Ah, good to know. I know you love your job, is there a certain moment or certain factor of it that is just your favorite?

Herman: Just talking to you, Alie.

Alie: Oh, stop. I've asked so many not-smart questions and I've really appreciated... [*Herman laughs*] This is probably one of the most frenetic episodes where I'm like, "[*grumbles gibberish*] What about this?!" I have so many questions about it. [*laughs*]

Herman: Honestly, there are two things I love about my job. One is I have had the amazing good fortune, a handful of times in my career, to be the first, at least feels like, the first person ever to see something or to figure something out. The discovery! I think every scientist lives for that and any scientist who has been around a while and has had some success has felt that... You live for that. there's nothing better than that. The other thing I really do enjoy is talking to science, whether that's teaching, or whether that's writing, or whether that's conversations like this. I love to be able to share that because I think that's part of the job too and it's a really fun one.

Alie: Augh! Thank you so much for doing this.

Herman: This was really fun!

So, ask informed people, uninformed questions. Thank you so much Dr. Herman Pontzer for the time you spent with us and all the research that you continue to do. Again, his book is titled *Burn*, it's linked in the show notes. We'll also link his labs, website, and his Instagram and his Twitter/X handles so you can follow him there.

We're @Ologies on Twitter and Instagram and I'm @AlieWard on both. We have shorter, kid-friendly cuts of classic episodes and those are called *Smologies* and they're available for free, they're at Alieward.com/Smologies. Erin Talbert admins the *Ologies* Podcast Facebook group, Aveline Malek makes our professional transcripts, and Noel Dilworth is our scheduling producer. Susan Hale is managing director, Kelly R Dwyer makes our website and can make yours. Our lead editor in this episode produced and contributed a ton of excellent research, some from her own dissertation, *sapiens* indeed, Mercedes Maitland of Maitland Audio. Nick Thorburn made the theme music.

If you stick around until the end of the episode, I tell you a secret and this week is kind of weird. Okay, so I was working on this, right? I was listening to a playlist of like, some new indie music and there was this one song called "Drop Dead" by Katy Kirby and no joke, there's a line about body mass indexes and I was like, "Get out of my head music, what are you doing to me right now?" It was creepy but it was fun so there you go. But yeah, put on a song maybe, enjoy some fresh air, be good to your flesh machine, and most importantly, be good to each other. All right, Berbye.

Links to things we discussed:

[Does Thinking Burn Calories? Here's What the Science Says](#)

[Body mass index - Wikipedia](#)

[What Your BMI Doesn't Tell You](#)

[Adipose Tissue \(Body Fat\): Anatomy & Function](#)

[Brazilian Butt Lifts Surge, Despite Risks](#)

[These Are the Biggest Risks of a Brazilian Butt Lift](#)

[Report on Mortality from Gluteal Fat Grafting: Recommendations from the ASERF Task Force](#)

[Effects of Exercise on Mitochondrial Content and Function in Aging Human Skeletal Muscle](#)

[Feasibility and Preliminary Efficacy of a Reverse Diet as a Novel Weight Loss Maintenance Strategy for Weight-Reduced Adults With Overweight/Obesity](#)

[Can reverse dieting really trick your metabolism and prevent weight gain?](#)

[Ask the Expert: Reverse Dieting](#)

[The active grandparent hypothesis: Physical activity and the evolution of extended human healthspans and lifespans](#)

[Combination contraceptives: effects on weight](#)

[The reality of menopause weight gain](#)

[Vegan Diet Health Benefits in Metabolic Syndrome](#)

[Physical exercise for late-life major depression](#)

[The thrifty genotype in type 2 diabetes: an unfinished symphony moving to its finale?](#)

[Dinitrophenol \(DNP\) Fatality Associated with a Falsely Elevated Salicylate Level: a Case Report with Verification of Laboratory Cross Reactivity](#)

[Resistance Exercise Training Alters Mitochondrial Function in Human Skeletal Muscle](#)

[Doubly labeled water](#)

[Is the Comparison between Exercise and Pharmacologic Treatment of Depression in the Clinical Practice Guideline of the American College of Physicians Evidence-Based?](#)

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