# Dr. Herman Pontzer: How We Really Burn Calories & Lose Weight

Perform with Dr. Andy Galpin · Episode 16 · March 12, 2025 · Transcript

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**Dr. Andy Galpin**
The science and practice of enhancing human performance for sport, play, and life. Welcome to Perform.

**Dr. Andy Galpin**
I'm Dr. Andy Galpin. I'm a professor and scientist and executive director of the Human Performance Center at Parker University. Today's guest is Dr. Herman Pontzer. Herman has a PhD in biological anthropology and is currently a professor at Duke University in the area of evolutionary anthropology. In today's show, you're going to learn a lot about what Herman is probably most famous for, and that is how metabolism really works. We talk at length, and you'll learn a tremendous amount about how to properly think of energy expenditure, the role that exercise does or maybe surprisingly doesn't have in things like energy expenditure, body weight, body composition, and overall health. He also does a wonderful job teaching about how energy expenditure changes with things like pregnancy and other things we don't typically think of as exercise or sport but are highly relevant and incredibly interesting regarding how our metabolism and overall physiology works.

**Dr. Andy Galpin**
So there's a lot of practical tips here. There's a lot of just fascinating information. I know you'll enjoy it. I was thrilled to do it. I waited a long time to talk to Herman. So with that said, please enjoy today's episode with Dr. Herman Pontzer. Dr. Herman Pontzer, thank you for coming in today.

**Dr. Herman Pontzer**
It's fun to be here.

**Dr. Andy Galpin**
It is a huge honor. I've been wanting to talk to you for a really long time, even before I had a podcast. Your work is incredibly interesting. I'd actually like to start with exactly your work in the sense that-

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**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... your PhD is in anthropology from Harvard.

**Dr. Herman Pontzer**
That's right. Yep.

**Dr. Andy Galpin**
But you probably are most, I'd say, notable for setting the world on fire a little bit with some interesting and controversial takes on metabolism.

**Dr. Herman Pontzer**
Mm-hmm.

**Dr. Andy Galpin**
How the body burns fat, the role of physical exercise. You had a series of papers come out that, I'd say, put you on the map, if that's a fair way to put it. So what is it exactly that you do? Why is an anthropologist changing the way we think about metabolism?

**Dr. Herman Pontzer**
That's a great question. So as an anthropologist, I'm interested in how the human body works and how it got this way.

**Dr. Andy Galpin**
Yeah.

**Dr. Herman Pontzer**
So sort of an evolutionary lens on the way the body functions. And so coming up through my training in undergrad and then graduate school, I never had any sort of public health or obesity research interests necessarily. I wanted to understand energy expenditure, though, because it's where the rubber hits the road.

**Dr. Andy Galpin**
Yeah.

**Dr. Herman Pontzer**
Any organism is... You can think of it as a strategy for turning energy into offspring, right? That's the game in life. And so from undergraduate up through graduate school, I was very interested in how the body brings energy in and burns it off. And you start following your nose that way, and you get into some interesting places because trying to understand how locomotion burns calories and how that relates to anatomy, that was my graduate work.

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**Dr. Andy Galpin**
Okay.

**Dr. Herman Pontzer**
And then when I thought I understood that pretty well, I put together a mathematical model for predicting the energy expenditure to go walk or run a mile, depending on how your limb anatomy looks.

**Dr. Andy Galpin**
Right.

**Dr. Herman Pontzer**
I felt like I understood that pretty well, and I thought, okay, let's expand that. Let's think about a whole energy budget. How does a whole chimp or a human or anything, how do we bring energy in and burn it off over 24 hours, the whole shooting match? And it turns out people hadn't really been doing a lot of measurements of total energy expenditure, all energy burned through the whole day in humans outside of Western contexts. We had data from the US or Europe. We didn't have-

**Dr. Andy Galpin**
Yeah

**Dr. Herman Pontzer**
... data from traditional contexts, which are more relevant for human evolutionary perspectives.

**Dr. Andy Galpin**
Yeah.

**Dr. Herman Pontzer**
We had no data on the other apes or that kind of thing. And so I started this whole... The last 20 years has been trying to measure energy expenditures in these contexts from an ecological, evolutionary perspective, and then we wind up in some pretty interesting territory.

**Dr. Andy Galpin**
Your first book-

**Dr. Herman Pontzer**
Mm-hmm

**Dr. Andy Galpin**
... "Burn," walks through a lot of these things, but just-

**Dr. Herman Pontzer**
Oh, sure

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**Dr. Andy Galpin**
... as a starting place in the story here, what is this deal with this hunter-gatherer group?

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
What did we get wrong with the paleo diet? Give us the-

**Dr. Herman Pontzer**
Oh, yeah

**Dr. Andy Galpin**
... give us the real quick overview there.

**Dr. Herman Pontzer**
So again, from an evolutionary perspective, how do we understand our body? Well, we are hunter-gatherers. Humans have been hunting and gathering since before we were humans.

**Dr. Andy Galpin**
Yeah.

**Dr. Herman Pontzer**
Two million years. And our species is only 300,000 years old. We are a hunting and gathering species. That's the ecological context. And so if you want to understand how the body works, California's fine, and New York's fine, but more relevant-

**Dr. Andy Galpin**
Sure

**Dr. Herman Pontzer**
... would be a hunting and gathering context. And so luckily, there are still a handful of communities that are still doing that. And they're not time machines to the past or anything like that, but they give us a sense of, okay, if you had this lifestyle and this ecological context, this is how the body would function. They allow you to ask that question. And so nobody had measured energy expenditures in a hunter-gatherer group before. I had some colleagues that were working in northern Tanzania with a community called the Hadza. And so we went there and did this work, and so we used this technique called doubly labeled water, which is this isotope tracking technique that's a really accurate measurement of how many... It actually measures how much carbon dioxide the body makes every day. So that tells you how many calories. It's over about a week or two-week period, so it's a really good look at how many calories you're burning.

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**Dr. Herman Pontzer**
And we wrote those initial grants to go do this project because we wanted to document just the huge amount of calories that we were sure they were burning because they would get more activity in a day than most Americans get in a week.

**Dr. Andy Galpin**
Right.

**Dr. Herman Pontzer**
Right?

**Dr. Andy Galpin**
Right.

**Dr. Herman Pontzer**
And so we're like, well, that's the way that humans everywhere used to live. Let's understand what that does to the body. The calorie expenditures are going to be huge. Nobody's measured it. It was exciting to go do this work. And so we go there to northern Tanzania, 2009 and 2010 armed with isotopically enriched water and-

**Dr. Andy Galpin**
Mm-hmm

**Dr. Herman Pontzer**
... the whole kit. And we do these measurements, and we get back, and we get the data set back, and We're just completely shocked because actually, it turns out, the total energy burned per day was no different than folks in the US, Europe, people sitting at their desks all day.

**Dr. Andy Galpin**
Uh-huh.

**Dr. Herman Pontzer**
Like, what's going on?

**Dr. Andy Galpin**
Uh-huh.

**Dr. Herman Pontzer**
And so you have a choice there as a scientist. You have this model of how the world works. It is totally crushed by the data. And do you stick with the model, or do you say, "Okay, these are the data. We're going to follow the data and say these are the observations"? Obviously, you check and make sure you didn't make any silly mistakes, all that kind of stuff.

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**Dr. Andy Galpin**
Yeah, I think there's a little bit of a reckoning in your soul, right? You're like-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... "Oh my God, our whole project is wrong." "We've messed something up."

**Dr. Herman Pontzer**
That's exactly it.

**Dr. Andy Galpin**
Right? And then-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... you double and you triple, and you-

**Dr. Herman Pontzer**
Yes

**Dr. Andy Galpin**
... standardize again.

**Dr. Herman Pontzer**
Yes.

**Dr. Andy Galpin**
And the data don't change.

**Dr. Herman Pontzer**
Yes.

**Dr. Andy Galpin**
And now.

**Dr. Herman Pontzer**
Yes. And so what do you do? And so I thought, "Well, okay, here we go. I guess I'm going to talk about obesity now."

**Dr. Andy Galpin**
Yeah.

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**Dr. Herman Pontzer**
So I said, because that was this idea in public health, of course, you still hear it. "Oh, we're so sedentary now," which is true, and that's bad, that's true. "And now we're not burning up as many calories, and that's why obesity's a problem." Well, that part turns out maybe not to be true, and so let's think about... So I wrote the paper and then all of a sudden, like you say, I'm in this space talking to people like you.

**Dr. Andy Galpin**
When you say energy expenditure-

**Dr. Herman Pontzer**
Yes

**Dr. Andy Galpin**
... and you're saying things like these people who are hunter-gatherers in various parts of Africa, and you've done now work in Tanzania and Kenya, and you've sort of been all over.

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
And you say that that's not different than us sitting around all day.

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
What is energy expenditure? What are you actually talking about here?

**Dr. Herman Pontzer**
Yes. Good place to start. So you've got about 37 trillion cells in your body, give or take.

**Dr. Andy Galpin**
Just a few.

**Dr. Herman Pontzer**
Yeah. Nobody's counting them, but it's about that. And so every one of those cells is like a little factory. It's got a set of jobs it does. It brings resources in. It does its thing. And so every little factory's burning energy. And so all of that cumulatively is what we call your metabolic rate.

**Dr. Herman Pontzer**
And we can think about all the energy that you burn over the course of a minute while you're on the treadmill. We can think about it while you're at rest, for an hour. We can think about it over the course of 24 hours. And so the way that we usually measure it is over 24 hours. Actually, we

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measure it over a week or more, and then we take the average per 24-hour period. And so that's your metabolic rate, and so it's all your systems all together. One of the things that people kind of misunderstand initially is that they think, oh, well, your energy expenditure's all about how active you are. Even if you're active, most of your calories are being burned on other things.

**Dr. Andy Galpin**
Yep.

**Dr. Herman Pontzer**
Your immune system, your brain. So anyway. So it's the full package. It's the whole, all the things that your bodies are doing. That's your metabolic rate that we're talking about.

**Dr. Andy Galpin**
Mm-hmm.

**Dr. Herman Pontzer**
Not the per minute cost on a treadmill, not while you're just sleeping, but the whole thing.

**Dr. Andy Galpin**
Right. So if you were to say all the calories you burn in a week-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... some of them will be burned just staying alive.

**Dr. Herman Pontzer**
Yep.

**Dr. Andy Galpin**
Right? We call that generally your basal metabolic rate or your resting metabolic rate.

**Dr. Herman Pontzer**
Mm-hmm.

**Dr. Andy Galpin**
That's one of the components.

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
Then the calories that you burn working out-

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**Dr. Herman Pontzer**
Yep

**Dr. Andy Galpin**
... which is generally, what, 5, 10%?

**Dr. Herman Pontzer**
It depends on how much you work out. So it can be 30% of your expenditure if you're active. Yeah.

**Dr. Andy Galpin**
Okay. So somewhere, basal metabolic rate is generally, what, 40, 50, 60%?

**Dr. Herman Pontzer**
Usually over half. A little over half, yep.

**Dr. Andy Galpin**
Yep. Then on top of that, you've got some additional calories you burn from twitching and fidgeting and-

**Dr. Herman Pontzer**
Mm-hmm

**Dr. Andy Galpin**
... that's what, another 5 or 10%?

**Dr. Herman Pontzer**
Well, it's hard to put numbers on that, so that's where it starts to break down-

**Dr. Andy Galpin**
Right

**Dr. Herman Pontzer**
... because it's really hard to figure that out.

**Dr. Andy Galpin**
This is where you've made your money, right?

**Dr. Herman Pontzer**
Yeah, I guess that's right. Yeah. And so right now, talking to you, I'm burning more calories than I was in the Uber over here, chilled out, zoning out, right?

**Dr. Andy Galpin**
Right.

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**Dr. Herman Pontzer**
And so we wouldn't call this physical activity, but my heart rate's higher.

**Dr. Andy Galpin**
Right.

**Dr. Herman Pontzer**
My sympathetic tone's higher. All those things. So I'm burning more calories just by being alert and attentive to you. A little bit of good stress happening.

**Dr. Andy Galpin**
Hopefully.

**Dr. Herman Pontzer**
I think so. And so things like that burn calories, too, and it is actually quite hard. One of the next things we want to try to do is to understand how that works because that's, I think, that's where the body can really juggle and can make space for somebody who's really physically active to still somehow have more or less the same energy expenditure per day as somebody who's sedentary because they're juggling these fungible things.

**Dr. Andy Galpin**
Okay, tremendous. So when you say something like these hunter-gatherer groups, and it-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... Hadza's the one you worked on-

**Dr. Herman Pontzer**
Right

**Dr. Andy Galpin**
... it actually doesn't really matter. We're actually just thinking conceptually about-

**Dr. Herman Pontzer**
Yes

**Dr. Andy Galpin**
... how the body regulates energy.

**Dr. Herman Pontzer**
Yeah.

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**Dr. Andy Galpin**
You have that one example, but whatever.

**Dr. Herman Pontzer**
We've replicated other places, and yeah, it's a general concept.

**Dr. Andy Galpin**
Right.

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
So when you say they have the same energy expenditure as us, you're not talking about energy expenditure from physical activity. Clearly, that part is higher.

**Dr. Herman Pontzer**
Yes.

**Dr. Andy Galpin**
That's the variable you knew.

**Dr. Herman Pontzer**
Yes.

**Dr. Andy Galpin**
So is it their basal metabolic rate is higher or lower, or is it their other, this NEAT or some other factor? How is it that that total number-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... that total energy expenditure is the same? How are they manipulating their partitioning to hit the same final number?

**Dr. Herman Pontzer**
Yeah. So I don't think it's as simple as BMR, basal metabolic rates.

**Dr. Andy Galpin**
Right.

**Dr. Herman Pontzer**
I think it's the other parts of the awake day.

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**Dr. Andy Galpin**
Mm-hmm.

**Dr. Herman Pontzer**
So here's where we have to move from those studies of folks like the Hadza and in those kind of ecological contexts to experimental setups where we can control things more, and then we can have a better chance at getting exactly what's going on. So if we move this question about activity and expenditure into a lab here in the US where we can control everything, here's what we know. If you look at athletes versus non-athletes and you give them a stress, a psychosocial stress, the athlete will respond less. Their bump is smaller, and it returns to baseline faster. So they've saved energy on that stress response. If you look at things like inflammation, so inflammation is your immune system being overly active. We don't know how many calories it costs, but it must cost something, and you have less background inflammation if you are physically active than if you're not. If you look at things like testosterone levels or progesterone levels or estrogen, depending on male or female athletes, endurance athletes especially will see reductions, not unhealthy, but moderations in levels of testosterone and that kind of thing.

**Dr. Herman Pontzer**
Those are anabolic steroid hormones. Those are building and burning energy, and there's less of it. And so that, we think, is how the body's kind of cobbling together. We think about it as an energy budget, right?

**Dr. Andy Galpin**
Yeah.

**Dr. Herman Pontzer**
How do you cobble together these pieces and keep the top-line number in the same place no matter what else is going on?

**Dr. Andy Galpin**
Why would we want to, as a species, keep that top-end number the same?

**Dr. Herman Pontzer**
Yeah, because from an evolution perspective, an organism should use every calorie it can without going over. Right? If you aren't burning all the calories that are available to you, well, you're leaving money on the table. You could be burning those calories on reproduction, maintenance, repair, anything that was going to help you pass your genes on, which is what evolution cares about. So when times are good and you're not being super active, you should spend energy on other stuff. When times are bad and you're going further to get your food and working really hard, well, now you don't want to just ramp up the total calories you're trying to get. That's even worse.

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**Dr. Andy Galpin**
Mm-hmm.

**Dr. Herman Pontzer**
So you want to have mechanisms in place to moderate that and sort of squash that down, and that's, I think, conceptually why that's happening.

**Dr. Andy Galpin**
Today's episode is sponsored by David. David makes protein bars unlike any I have ever encountered. They have an amazing 28 grams of protein, only 150 calories, and zero grams of sugar. That's right, 28 grams of protein, and 75% of its calories come from that protein. This is 50% higher than the next closest protein bar. Honestly, it's the best-tasting protein bar I've had by a mile. While I often talk about the importance of getting one gram of protein per pound of body weight for things like muscle health and recovery and the promotion of lean body mass and satiety, the reality is that for most people, getting that one gram of protein per pound of body weight is really challenging. However, David makes that easy. Their bars taste incredible and are each packed with 28 grams of protein. I eat one almost every day and always have two or three in my backpack when I'm traveling, like literally always.

**Dr. Andy Galpin**
It probably sounds funny, but I eat them as dessert all the time. When you try them, you'll know exactly what I mean. The macronutrients, one more time, are 28 grams of protein, 150 calories, and zero grams of sugar. If you're interested in trying these bars for yourself, you can go to davidprotein.com/perform. Again, that's davidprotein.com/perform. Today's episode is also sponsored by LMNT. LMNT is an electrolyte drink mix that has an ideal electrolyte ratio of sodium, potassium, and magnesium, but no sugar. Hydration is critical to performance, both physical and mental performance. Countless studies have shown that even a slight degree of dehydration, even as small as 1%, can lead to decreases in physical output and mental performance. We also know that electrolytes are critical to proper hydration, which I've been harping on for years. But you can't do that, proper hydration, by only drinking water.

**Dr. Andy Galpin**
You need to get the right amount of electrolytes in the right ratios, and that's why I'm a huge fan of LMNT. In fact, many of you will probably remember that I featured LMNT in my YouTube series on optimizing hydration nearly five years ago. I featured LMNT in these videos because their blend of 1,000 milligrams of sodium, 200 milligrams potassium, and 60 milligrams of magnesium really is unique and different than any other electrolyte on the market, and it has great scientific support. I use LMNT constantly, particularly when I'm sweating a lot, and I routinely make it a part of my clients' optimization programs. If you'd like to try LMNT, you can go to drinklmnt.com/perform to claim a free LMNT sample pack with the purchase of any LMNT drink

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mix. Again, that's drinklmnt.com/perform to claim a free sample pack. If their total energy expenditure on both cases is the same-

**Dr. Herman Pontzer**
Mm-hmm

**Dr. Andy Galpin**
... the Hazda clearly are getting more from physical activity because they're moving all day. Why is it then when caloric expenditure is identical between the two groups, the physical difference, the body composition is so significantly different?

**Dr. Herman Pontzer**
Well, yeah, and I think the simple answer is the energy in part of the system is changing. Right? So the reason we have an obesity problem, this is the kind of conclusion they're pointed to with these data, is that obesity is an issue of energy intake, not energy expenditure, because energy expenditure is actually kind of hard to budge.

**Dr. Andy Galpin**
Yep.

**Dr. Herman Pontzer**
And I won't say... People talk about my work sometimes and say, "Well, he's saying it doesn't matter what you do. There's no change."

**Dr. Andy Galpin**
I see an enormous number of misquoting of you-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... and misrepresentation of your position.

**Dr. Herman Pontzer**
There's no change at all. I said, "Well, no, there can be some changes, but it's much smaller than you think."

**Dr. Andy Galpin**
Right.

**Dr. Herman Pontzer**
And it is true, I will also say, sometimes there is no change. When you give somebody an exercise intervention, there are going to be people that you don't see any change in at all.

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**Dr. Andy Galpin**
Yeah.

**Dr. Herman Pontzer**
They completely compensate.

**Dr. Andy Galpin**
Yep.

**Dr. Herman Pontzer**
But on average, everybody compensates a little more than anybody thinks.

**Dr. Andy Galpin**
Yep.

**Dr. Herman Pontzer**
Now, that means energy expenditure is hard to budge. Weight gain, no matter what anybody tells you, is fundamentally about eating more than you burn off.

**Dr. Andy Galpin**
Right.

**Dr. Herman Pontzer**
It really is it.

**Dr. Herman Pontzer**
And so it must be on the energy inside.

**Dr. Andy Galpin**
I have seen people use your work-

**Dr. Herman Pontzer**
Mm-hmm

**Dr. Andy Galpin**
... as justification for saying things like, "See, Herman proved calories don't matter."

**Dr. Herman Pontzer**
Yeah, that hurts.

**Dr. Andy Galpin**
"It's not calories, it's insulin."

**Dr. Herman Pontzer**
Yeah.

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**Dr. Andy Galpin**
Or, "It's blood glucose."

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
And to make it really clear, that is or is not your position?

**Dr. Herman Pontzer**
That is not my position.

**Dr. Andy Galpin**
Okay, great.

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
I can't see a reality of how people used your work to get to that conclusion.

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
But what you're clearly not saying is that calories in, calories out doesn't matter. You're in fact saying It is exactly what matters.

**Dr. Herman Pontzer**
Yes. Yeah, it's all calories in, calories out. Now the question is: how do you manage that or manipulate it? It turns out the calories out part's not as easy to manipulate as we thought it was.

**Dr. Andy Galpin**
Right.

**Dr. Herman Pontzer**
That's lesson one. And then I think on the calories in part, why do we eat so much? That's fundamentally the question. Well, I think an evolutionary perspective on that helps, too. I think working with folks like the Hadza helps us, too, because you can kind of see the dietary differences between a population that doesn't have an issue with unhealthy weight gain versus a population that does.

**Dr. Andy Galpin**
Yeah.

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**Dr. Herman Pontzer**
And begin to pick those apart. Now, I'm not a nutritionist, so to be really clear about that, but I think there are some clear sort of things you can draw from that kind of research.

**Dr. Andy Galpin**
I don't remember the details of the paper offhand, it's been a decade, but I assume the Hadza were not regulating energy intake at all.

**Dr. Herman Pontzer**
No, they're not trying to keep their energy intake low. They're not dieting.

**Dr. Andy Galpin**
And they eat meat, clearly.

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
They're eating fruits, vegetables, carbohydrates, fats, whatever they-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... can get ahold of. Is that correct?

**Dr. Herman Pontzer**
That's right. It's a mixed diet and it changes. So we can get into this. I love talking about paleo diet and paleo fiction stuff.

**Dr. Andy Galpin**
Yeah. You pretty much crushed that.

**Dr. Herman Pontzer**
Because if you live with hunter-gatherers, like I've had a chance to do, whatever story you told yourself about what hunter-gatherers eat, goes out the window within the first three days.

**Dr. Andy Galpin**
Sure. They're going to eat whatever they can get ahold of.

**Dr. Herman Pontzer**
Exactly, and it's going to change day to day and week to week, season to season. The people who I work with in northern Tanzania are not going to eat the same thing as people who are going to be in the Arctic. I mean, of course, right?

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**Dr. Andy Galpin**
Yeah.

**Dr. Herman Pontzer**
It kind of all is obvious.

**Dr. Andy Galpin**
It was a very thin argument. So to wrap us up on this one, what you're then clearly saying is total energy expenditure between the two groups, or in bigger, between most people, then-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... right? Is probably groups of people. The individual person, we're going to-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... we'll get into that difference, right?

**Dr. Herman Pontzer**
Sure.

**Dr. Andy Galpin**
I'm also very interested in that. But it's likely to stay the same. The energy intake is what's regulating overall body mass-

**Dr. Herman Pontzer**
Mm-hmm

**Dr. Andy Galpin**
... for the most part. You gave an example of something like endurance athletes having a downregulation, and it's just an example-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... of something like testosterone, not because running is bad for you-

**Dr. Herman Pontzer**
No

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**Dr. Andy Galpin**
... or bad for your endocrine system, but because it is a strategy of regulating energy output, right?

**Dr. Herman Pontzer**
That's right.

**Dr. Andy Galpin**
Because your energy output of your exercise is so high-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... let's bring down your anabolic energy outputs-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... so that we can keep that total number the same.

**Dr. Herman Pontzer**
That's right, and if you look at a group like the Hadza, we've measured testosterone. Well, I say we, the scientific community, have measured testosterone levels in the Hadza.

**Dr. Andy Galpin**
Yeah.

**Dr. Herman Pontzer**
They're lower than your typical sedentary American guy.

**Dr. Andy Galpin**
Lower?

**Dr. Herman Pontzer**
Lower, right? And that's because they're doing this moderation. That all fits. Now I can tell you, if you're worried about the masculinity or the virility of these Hadza guys, they're more badass than anybody listening, I would wager.

**Dr. Andy Galpin**
Plenty of fertility, I assume.

**Dr. Herman Pontzer**
Yeah. All that. We're not at a clinical level. But I think what's fun is that you can tie this in, then.

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There is such a thing as over-training, obviously.

**Dr. Andy Galpin**
Clearly.

**Dr. Herman Pontzer**
And I think-

**Dr. Andy Galpin**
And you will see testosterone go down as one of the classic signs of that, right?

**Dr. Herman Pontzer**
Yes, and so in my view, it's not just you're healthy, healthy, healthy, and then you're not. In my view, as you exercise more and more and more, you're regulating, regulating, and then at some point the body goes, "Oh, boy. We're out of room." And now you're over-regulating, so you do get into this clinical space where you're too low.

**Dr. Andy Galpin**
Yeah.

**Dr. Herman Pontzer**
But that's the sliding scale, and there's lots of healthy middle-

**Dr. Andy Galpin**
Yeah

**Dr. Herman Pontzer**
... right? And we probably should all be exercising more, almost all of us. But yeah, but now you can understand that over-training syndrome, not as some weird pathology that it just happens or you fall off a cliff, but oh, this is a body's normal reaction and it's just taken too far.

**Dr. Andy Galpin**
I could get a line of dieticians from here to Mexico-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... who will tell you about how they've increased energy intake in highly active people, and their endocrine system has recovered.

**Dr. Herman Pontzer**
Yeah.

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**Dr. Andy Galpin**
Sleep has gotten better, they've felt better, right? Because this is just-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... it's part of the equation, right?

**Dr. Herman Pontzer**
Yep. That's right.

**Dr. Andy Galpin**
All right. So past that then, the only other thing I want to cover, really, or ask you about in this particular topic, again, is-

**Dr. Herman Pontzer**
Mm-hmm

**Dr. Andy Galpin**
... the second big thing I've heard people misrepresent your research, and your work, and your first book-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... is the fact that, okay, he's either trying to make comments about the first thing we talked about, or the second one is the fact therefore, exercise doesn't matter at all to body composition.

**Dr. Herman Pontzer**
Thank you. Yeah. Perfect. No. Obviously if you exercise, it's going to be good for your fat-free mass. There's some evidence that if you exercise, your appetite regulation is better. So actually the energy intake side is helped by the exercise more so than the calories expended on exercise. It might be that there's appetite regulation stuff happening. So no, obviously exercise is good for a lot of things, including keeping a healthy amount of fat-free mass, for example.

**Dr. Andy Galpin**
Right. So you would be an advocate of somebody who's trying to lose body fat-

**Dr. Herman Pontzer**
Mm-hmm

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**Dr. Andy Galpin**
... that exercise is probably a good activity.

**Dr. Herman Pontzer**
Yeah. Absolutely. It's good anyway. In that context, here's the benefits I would think of for somebody trying to lose weight with exercise. I will say, I don't think you're going to get much movement on the bathroom scale with exercise, and that's not just my work. That's decades of work trying to do exercise interventions for people to lose weight, and I think that's pretty clear.

**Dr. Andy Galpin**
Yep.

**Dr. Herman Pontzer**
You can do a year's worth of exercise, and the expected weight loss, as I understand it, is about five pounds.

**Dr. Andy Galpin**
You're probably in the neighborhood-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... on average.

**Dr. Herman Pontzer**
So if you are overweight by more than that, then exercise is going to be a small part of the solution for you.

**Dr. Andy Galpin**
Right.

**Dr. Herman Pontzer**
I think the bigger benefits of exercise are it's a regulatory activity, right?

**Dr. Andy Galpin**
Yep.

**Dr. Herman Pontzer**
It gets your body working together the way it's supposed to work. We are an active species, and when you take that away, all things fall apart.

**Dr. Andy Galpin**
Yep. So what is then the other side of the equation? What is the exercise not doing?

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**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
Again, let's just say we're only going to classify this in the perspective of caloric burn.

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
There's psychological wellbeing and focus and moods. Okay, sure.

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
All that is true and positive. We're in agreement Exercise is great. Physical activity is great.

**Dr. Herman Pontzer**
Yes.

**Dr. Andy Galpin**
If we're only looking at that calorie part of the equation for body composition, what is exercise not doing that people think it is doing?

**Dr. Herman Pontzer**
It's not pushing you into an energy deficit where you're burning more than you're bringing it in. It's not pushing you there as anywhere near as much as you think it is, would be my guess. And the bigger lever for changing body composition is going to be diet.

**Dr. Andy Galpin**
Right.

**Dr. Herman Pontzer**
And that's where I think people do have a big, broad range of possibilities. Maybe low carb helps you regulate calorie intake.

**Dr. Andy Galpin**
Sure.

**Dr. Herman Pontzer**
Maybe we don't have to have any magic around insulin. You could just imagine that a low carb diet might be a good way to keep you from overeating kind of thing.

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**Dr. Andy Galpin**
Yeah.

**Dr. Herman Pontzer**
But no, I don't think exercise has the impact on total calories burned, and therefore energy deficits, the way that we're often sold it as having.

**Dr. Andy Galpin**
Let's put some numbers behind it.

**Dr. Herman Pontzer**
Sure.

**Dr. Andy Galpin**
You could give some examples here, but if it helps, you can walk us through the additive versus constrained-

**Dr. Herman Pontzer**
Sure

**Dr. Andy Galpin**
... stuff that you've put together.

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
But if I burn, let's say 200 to 400 calories in a workout, and it doesn't matter, let's just say it's an accurate measure, right?

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
Who cares? That's a reasonable number for people to burn in exercise.

**Dr. Herman Pontzer**
Sure.

**Dr. Andy Galpin**
You're not probably burning 1,000 or 1,200 very often.

**Dr. Herman Pontzer**
Right. That too. Yeah.

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**Dr. Andy Galpin**
It can happen, some people, but on average, the person going for a run, exercising, lifting weights, doing a-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... a class at a gym, probably 200 to 400, 500 is probably a more realistic number, right?

**Dr. Herman Pontzer**
That's right. One way to think about that is, as a rule of thumb, 50 calories to walk a mile, 100 calories to run a mile.

**Dr. Andy Galpin**
Okay.

**Dr. Herman Pontzer**
Yeah, so-

**Dr. Andy Galpin**
And that's just because of inefficiencies there, right?

**Dr. Herman Pontzer**
Yeah, walking is just cheaper than running.

**Dr. Andy Galpin**
Yeah.

**Dr. Herman Pontzer**
And it's biomechanically more efficient. And so if you go on a four-mile run, you can expect you burned about 400 calories, as a rule of thumb.

**Dr. Andy Galpin**
Yeah. And that's a 30 to 45-minute activity for most people.

**Dr. Herman Pontzer**
Mm-hmm.

**Dr. Andy Galpin**
All right. So we set the stage there. If I'm burning 400 calories, or maybe we'll use 500, whatever makes-

**Dr. Herman Pontzer**
Yeah

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**Dr. Andy Galpin**
... math easier. Why am I not then, after a week, seven days, seven times five, that should be 3,500 calories-

**Dr. Herman Pontzer**
Yes

**Dr. Andy Galpin**
... that should be my pound of fat. How are you trying to tell me, Dr. Pontzer-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... that I'm not losing that pound of fat if I didn't change my energy intake?

**Dr. Herman Pontzer**
That's exactly right. So, first of all, I'll say that for that first week or so, you might. You might see that initial-

**Dr. Andy Galpin**
On the scale

**Dr. Herman Pontzer**
... on the bathroom scale change. But what's happening is, over time, and again, we're still trying to figure out how this all works, so I'm not going to tell you that we have it all sorted out. Over time, we know when you do these exercise interventions, if I measure your total calories burned per day, when I check in on you in a couple of months, in a year, you think you're burning 3,500 calories a week extra than you were at baseline. But you are not. We know this. You're burning maybe just half that or maybe a third of that. So maybe some people are burning the same as they were at baseline. We see that. And so your body's making these adjustments, and that's why you're not losing a pound a week, because you're not actually burning 3,500 extra calories a week. Eventually, your body adjusts that and reduces it. The other thing is, it's very hard not to eat the calories you burn. That is also just true.

**Dr. Andy Galpin**
Sure.

**Dr. Herman Pontzer**
And so you say, "If I keep energy intake the same," yep, that's right. If you do, very hard to do.

**Dr. Andy Galpin**
Okay. What is exactly changing? You can use mechanism here or numbers, whatever is a best-

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**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... way for you to explain this. But when you say, "My body is adjusting-"

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... what is adjusting to keep that total number the same?

**Dr. Herman Pontzer**
So we're looking into this now, and we have a meta-analysis we're working on in my lab because people have done these intervention studies now since the early 2000s, where you give somebody a dose of exercise. I know exactly how many calories per week I've dosed you with. I watch you do it, and then I follow you for months or maybe over a year. And, typically, people are getting something like, you're talking about maybe 2,000 calories a week, right? So that's like adding 20 miles of running to your weekly schedule.

**Dr. Herman Pontzer**
We measure them at baseline before the exercise, we measure them at month six or maybe month 12, and what we're finding is that the average increase in expenditure is only about half or so of what we think we dosed you with.

**Dr. Andy Galpin**
1,000 instead of the 2,000.

**Dr. Herman Pontzer**
Yeah, exactly. Where is the energy coming out of? Perhaps in some studies, we see a reduction in BMR, but that's not big. The bigger one seems to be perhaps in sleeping metabolic rate. So if the study had a piece where they had somebody sleeping in a metabolic chamber overnight and could measure that at baseline and then in the intervention, we tend to see some changes in sleeping metabolic rate.

**Dr. Herman Pontzer**
The other changes must be in the waking period of your expenditure. Now you'd think, okay, well, they're being less physically active when they're not exercising. They're taking the bus to work instead of walking, something like that.

**Dr. Herman Pontzer**
That doesn't seem to hold up because we have accelerometry data with these folks. We know what their 24-hour movement looks like, and the neat part of things doesn't seem to be changing

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the way that we would expect. So there's something physiological happening, I think, like stress response, like immune function, that we're not capturing in BMR necessarily, but that is helping square the numbers.

**Dr. Andy Galpin**
Okay. That's actually really interesting. I wasn't aware of that.

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
I was thinking of it very differently.

**Dr. Herman Pontzer**
Mm.

**Dr. Andy Galpin**
If what you're saying is their BMR-- Because again, let's go back to the total equation.

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
What we're trying to figure out is what part of that equation is changing.

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
And let's assume some percentage of people are in fact eating more and blah, blah, blah.

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
But just as a thought exercise here, let's say that that is not the case at all. You got a couple of things that could be happening. One is we know energy expenditure in the same form and mode of exercise over time-

**Dr. Herman Pontzer**
Mm-hmm

**Dr. Andy Galpin**
... will go down.

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**Dr. Herman Pontzer**
Mm-hmm.

**Dr. Andy Galpin**
So you'll get more efficient. So that five-mile run that used to burn 500 calories-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... now might burn 450 or 75 or 90.

**Dr. Herman Pontzer**
You get some savings there. Yeah.

**Dr. Andy Galpin**
Right? So now you're getting some small amount of efficiency of movement.

**Dr. Herman Pontzer**
Sure. Yep.

**Dr. Andy Galpin**
Okay, great. A few calories there. I doubt basal metabolic rate would go down right here-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... but what you're saying is, it doesn't look like it does, maybe-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... a few percent.

**Dr. Herman Pontzer**
We can break that one down, too. That's fun because if the basal metabolic rate should be the kind of background stuff your body's doing to stay alive. I'm sedentary, I'm not breaking my muscles down every day with exercise, and my BMR is 1,000 calories a day, just to give a number. Now I'm exercising all the time, my body's doing all this muscle repair, and I'm still 1,000 calories a day. That's interesting.

**Dr. Andy Galpin**
Huh.

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**Dr. Herman Pontzer**
Right? So even when you don't see a change in BMR, I would just put that out there, it doesn't mean that your physiology hasn't changed.

**Dr. Andy Galpin**
No. Okay. So this is exactly what I'm getting at.

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
Right. So, but yes, that alone, right? Your BMR should be going up. If you look-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... at the literature across every form or fashion, changing basal metabolic rate chronically-

**Dr. Herman Pontzer**
Mm-hmm

**Dr. Andy Galpin**
... is a really hard thing to do-

**Dr. Herman Pontzer**
Oh, yeah

**Dr. Andy Galpin**
... independent of basically one thing.

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
There's only one thing I'm really aware of that will change your basal metabolic rate chronically. You can do 1,000 things acutely, right? You could take-

**Dr. Herman Pontzer**
Mm-hmm

**Dr. Andy Galpin**
... some caffeine right now, like-

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**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... but then it's going to come right back down.

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
Right? In fact, your work will suggest it'll probably go below baseline.

**Dr. Herman Pontzer**
Maybe, yeah. That'd be fun to track.

**Dr. Andy Galpin**
So that it centers back out, right?

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
The only thing that I'm aware of that will actually chronically enhance basal metabolic rate is an increase in lean muscle mass.

**Dr. Herman Pontzer**
Yeah, that's right. And I think about we're often comparing across body sizes, so often we're kind of canceling that effect out-

**Dr. Andy Galpin**
Yeah

**Dr. Herman Pontzer**
... because we want to say, "Well, yeah, you had a higher expenditure because you're 200 pounds and this person's-

**Dr. Andy Galpin**
Yeah

**Dr. Herman Pontzer**
... 100 pounds," and so obviously there's a difference there. So we're often controlling for body size. I should make that clear. In all these analyses we're sort of accounting for that, too.

**Dr. Andy Galpin**
But you guys haven't had the ability to, is the way I'll phrase it-

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**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... it's just not been realistic to equate for lean muscle mass. You generally have to just do body weight, right?

**Dr. Herman Pontzer**
Oh, no. So we do fat-free mass and fat mass.

**Dr. Andy Galpin**
Okay.

**Dr. Herman Pontzer**
Now, what we don't do is organ sizes. So we don't do muscles versus brains, for example.

**Dr. Andy Galpin**
Oh, yeah. Right. Of course.

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
And for technical detail reasons, getting actual muscle mass versus non-fat mass is a hard sort of thing, right?

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
So the organs matter-

**Dr. Herman Pontzer**
Right

**Dr. Andy Galpin**
... when it comes to that. Okay.

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
So if it is not BMR, which is a whole interesting thing there, then presumably in the way that people have often thought about that is then if you are doing more physical exercise-

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**Dr. Herman Pontzer**
Mm-hmm

**Dr. Andy Galpin**
... either your physical activity-

**Dr. Herman Pontzer**
Mm-hmm

**Dr. Andy Galpin**
... and you could call this NEAT, you could call this a bunch of different things.

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
I can tell you right now, this is not scientific at all.

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
This is just having been around a lot of people who are on the severe caloric restriction for a long time.

**Dr. Herman Pontzer**
Mm-hmm.

**Dr. Andy Galpin**
You'll get what we call the lean. So when you get really physically lean and you get low on calories-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... you'll notice you just start leaning on stuff a lot.

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
You start putting your shoulders on things.

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**Dr. Herman Pontzer**
Mm-hmm.

**Dr. Andy Galpin**
Like, you don't stand there. You're always finding some way to hold onto some calories, right?

**Dr. Herman Pontzer**
Yeah. No, that could be a part of it, for sure. I don't doubt that that's a piece of it. What I'm telling you is, in these, I think it's we have 14 or 15 studies in the meta-analysis now that we're putting together. A lot of them have measured with an accelerometer.

**Dr. Andy Galpin**
Yeah.

**Dr. Herman Pontzer**
So a research-grade accelerometer.

**Dr. Andy Galpin**
Totally.

**Dr. Herman Pontzer**
24-hour movement, and that doesn't change as much as you would think it would change.

**Dr. Andy Galpin**
It's not accounting for 1,000 calories a day.

**Dr. Herman Pontzer**
Yeah. So even if your body is saving 100 calories a day, so I thought you would burn 2,500 calories a day, you're burning 24. That doesn't sound like a whole lot. That's a mile.

**Dr. Andy Galpin**
Yeah.

**Dr. Herman Pontzer**
That's a mile run-

**Dr. Andy Galpin**
Yeah, that's your whole workout

**Dr. Herman Pontzer**
... that your body figured out how to... I mean, that's amazing.

**Dr. Andy Galpin**
Right. So what does this then tell us, presumably about our actual understanding of metabolism?

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**Dr. Herman Pontzer**
Yeah. I think it means we have to be a little more curious.

**Dr. Andy Galpin**
Yeah.

**Dr. Herman Pontzer**
You know? I think that the model that you started off with, and everybody starts off with, and I don't fault it, it's a good starting point. You've got basal metabolic rate, digestion, and physical activity. Okay, fine. But there's actually more than that.

**Dr. Andy Galpin**
Oh, there clearly has to be.

**Dr. Herman Pontzer**
There has to be, and we know there is. And everything from stress response to even there's a circadian rhythm in BMR.

**Dr. Andy Galpin**
Yep.

**Dr. Herman Pontzer**
People, your listeners might not know, if I measure your metabolic rate while you're sleeping, it's going to be lower, actually, than when I measure your basal metabolic rate, which by definition is supposed to be your lowest metabolic rate.

**Dr. Andy Galpin**
That's funny.

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
It's not. Definitely.

**Dr. Herman Pontzer**
It's not. At 7:00 a.m. when you come into the lab fasted and ready to get a measurement.

**Dr. Andy Galpin**
Right.

**Dr. Herman Pontzer**
And so there's a circadian rhythm there. I do think this is where a perspective of an evolutionary biologist, which is kind of how I think of myself, I think there's an advantage there, and I think it's

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available to anybody, so I'm not saying it's... But if you think about the body as a set of systems working together to achieve a goal, which is survival and reproduction, that's how you're built.

**Dr. Andy Galpin**
Yeah.

**Dr. Herman Pontzer**
Now you can begin to get curious about how those systems are going to work together, how they're going to dynamically change when one goes up and another comes down.

**Dr. Herman Pontzer**
And now it's a lot more interesting than basal metabolic rate, digestion, and activity.

**Dr. Andy Galpin**
Yeah.

**Dr. Herman Pontzer**
Let's get curious about what's going on. So that's one of the things we're trying to do in the lab now is sort of push that boundary and try to get system metabolic rates because we're very interested in that.

**Dr. Andy Galpin**
I don't know how you're ever going to answer these questions without that.

**Dr. Herman Pontzer**
Yeah, I think that's right. I think if you don't know how the systems are changing, if you can't measure it, then this will stay in the realm of trying to match different conceptual hypotheses with the data, and that's never as satisfying as saying, "Look, I measured the liver-

**Dr. Andy Galpin**
Yeah

**Dr. Herman Pontzer**
... and it burned fewer calories in my athletes than my non-athletes over the course of 24 hours." Something like that.

**Dr. Andy Galpin**
Which probably happens, right?

**Dr. Herman Pontzer**
I mean-

**Dr. Andy Galpin**
For known mechanisms

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**Dr. Herman Pontzer**
... if your muscles can get more efficient-

**Dr. Andy Galpin**
Or could happen

**Dr. Herman Pontzer**
... why can't everything get more? And so I don't think we know yet how it's all going to play out, but that's the next frontier for us anyway, is trying to track that down.

**Dr. Andy Galpin**
Are you going to have to eventually just have people live in a direct- ... calorimetry room for six months to answer this?

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
How are you ever going to answer this-

**Dr. Herman Pontzer**
Well-

**Dr. Andy Galpin**
... without being able to capture every gas expenditure, every thermal expenditure?

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
Because that's the only way you're going to get these numbers, right?

**Dr. Herman Pontzer**
I think there's other ways to do it. I think there are, for example, there are MRI scanning modalities you can use that will get the oxygen consumption of an organ.

**Dr. Andy Galpin**
Yeah.

**Dr. Herman Pontzer**
Something like that.

**Dr. Andy Galpin**
Sure.

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**Dr. Herman Pontzer**
And so you can imagine taking snapshots morning, afternoon, because you can't live in an MRI. You can imagine getting snapshots with different interventions about how an exercise intervention changes an organ's metabolic rate, or a challenge. This is a fun thought experiment. You're in an MRI, and I ask you to eat a yogurt. You're coming fasted, you eat a yogurt. None of that's metallic, so it shouldn't kill you.

**Dr. Andy Galpin**
Plastic spoon.

**Dr. Herman Pontzer**
You're right. Yeah, plastic spoon.

**Dr. Herman Pontzer**
We know that about 10% of the calories that you ate from that yogurt will turn into metabolic expenditure that we can measure with a mask.

**Dr. Andy Galpin**
Thermal effect of food.

**Dr. Herman Pontzer**
Exactly. But where is that? So with an MRI approach, potentially you could say I could watch the liver turn on, I could watch the muscles turn on and replenish. I could watch all these things happen. Anyway, we're talking blue skies, moonshot kind of stuff here, but I think it's doable, and I do think that's the kind of thing that would be interesting to do next.

**Dr. Andy Galpin**
Yeah. A couple little sub-questions going back a little bit. One of them is, how should I think about this then for the person that says, "This guy's out of his mind."

**Dr. Herman Pontzer**
Uh-huh.

**Dr. Andy Galpin**
I started working out.

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
I've lost 60 pounds. Clearly, he's wrong.

**Dr. Herman Pontzer**
Mm-hmm.

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**Dr. Andy Galpin**
Sort of all these things there. At some point, if I were to run, just to make an easy thought exercise example at surdum, if I were to run a marathon every day-

**Dr. Herman Pontzer**
Mm

**Dr. Andy Galpin**
... I'm going to lose some weight 30 days later. Let's just say water is back to normal-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... muscle glycogen, blah, blah, blah. So at some point, if I'm burning 10,000 calories a day with exercise, clearly the exercise mattered. So with the constraint model, the adaptive model, how much are we talking? When does it matter? Where's the crossover-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... between when a system won't be able to recalibrate? If I'm burning 3,000 calories in my workouts every day-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... it's not plausible, so it's kind of a dumb example, but you get the point.

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
My body won't down-regulate 3,000.

**Dr. Herman Pontzer**
Nope.

**Dr. Andy Galpin**
Because then my basal metabolic rate is zero.

**Dr. Herman Pontzer**
Nope.

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**Dr. Andy Galpin**
Or negative 1,000.

**Dr. Herman Pontzer**
Yes.

**Dr. Andy Galpin**
So how much are we talking when we're getting into this adaptive or additive, rather, I keep saying that, additive versus constraint?

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
What is the realistic context to some of these numbers?

**Dr. Herman Pontzer**
Yeah.

**Dr. Herman Pontzer**
No, it makes total sense. So I can tell you that we've measured people who ran a marathon a day for five months.

**Dr. Andy Galpin**
Marathon a day for five months.

**Dr. Herman Pontzer**
Yeah, they took some days off, but they ran from LA-

**Dr. Andy Galpin**
Liar

**Dr. Herman Pontzer**
... to Washington, D.C. It's a race across the USA. And it took them five months to run a marathon, and they weren't pushing the pace, but still, that's a lot of work.

**Dr. Andy Galpin**
I don't care if you're walking it.

**Dr. Herman Pontzer**
No, that's right. That's exactly it. And so we measured energy expenditures before they started the race, the first week of the race, and then almost at the end, about five months in.

**Dr. Andy Galpin**
And this is double labeled water.

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**Dr. Herman Pontzer**
Yep.

**Dr. Andy Galpin**
It's gold scientific standard.

**Dr. Herman Pontzer**
Yep, and it's a sample of people, so it's not just... Anyway, if you go from the pre-race to the first week of marathons, their energy expenditures went up by exactly what you'd expect based on running a marathon a day, because we know how much running costs, and so we could estimate how many calories extra they should be spending. Sure enough, nailed it.

**Dr. Andy Galpin**
Do you happen to remember what that number was?

**Dr. Herman Pontzer**
It's about 2,600 calories a day. Because 26 miles-

**Dr. Andy Galpin**
2,600, okay

**Dr. Herman Pontzer**
... times 100, more or less.

**Dr. Andy Galpin**
So it's crazy because people would probably think it's tens of thousands of calories for a marathon.

**Dr. Herman Pontzer**
No, 2,600 calories for a marathon.

**Dr. Andy Galpin**
On average.

**Dr. Herman Pontzer**
Yeah, exactly.

**Dr. Andy Galpin**
Number.

**Dr. Herman Pontzer**
Your mileage may vary.

**Dr. Andy Galpin**
Great.

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**Dr. Herman Pontzer**
And that's tacked on to what they were doing the week before. We have that measurement, too, and sure enough, it's real simple. You take 2,600 calories, you tack it on to what they were doing before, and you pretty much nail exactly what they were burning that first week.

**Dr. Andy Galpin**
Yep.

**Dr. Herman Pontzer**
Go five months forward, do it again, and to your point, they are not back to pre-race levels. You can't. Not possible.

**Dr. Andy Galpin**
No way.

**Dr. Herman Pontzer**
You can't adapt 2,600 calories. But they're below what you'd expect. They're below that simple let's add pre-race to race, and they get our answer. And the adjustment's about 600 calories a day.

**Dr. Andy Galpin**
Okay. That's a lot.

**Dr. Herman Pontzer**
It is a lot. And so we think that's one way of asking what's the most the body could change, could sort of absorb.

**Dr. Andy Galpin**
Mm-hmm.

**Dr. Herman Pontzer**
And so that's one thing we talk about in that paper is maybe that's one estimate of it.

**Dr. Andy Galpin**
That's the number.

**Dr. Herman Pontzer**
About 600 calories. So you could add 600 calories of exercise to your life, and maybe that would be the most you would be able to absorb and get back to something like pre-exercise levels.

**Dr. Andy Galpin**
Yeah.

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**Dr. Herman Pontzer**
I don't know if that's normal or typical or whatever, but that's what we saw in that group.

**Dr. Andy Galpin**
Yep. So again, you're just giving a broad number. As you've said multiple times now, and you've seen this in your work.

**Dr. Herman Pontzer**
Yes.

**Dr. Andy Galpin**
For some people, that number is zero.

**Dr. Herman Pontzer**
That's true.

**Dr. Andy Galpin**
Some people, it might be 1,000.

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
It's kind of there, but what you're just saying is it looks like, as an anthropologist, as someone who likes to think about the species-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... that seems to be the number where if you train really, really, really hard, the caloric deficit that you could hold onto for a long time from the exercise looks like it's capped at potentially around 600 calories. Is that a fair, safe-

**Dr. Herman Pontzer**
Yeah, the maximum amount you could absorb, you can kind of rejuggle in your budget is something like 600 calories based on that. Maybe that's a little bit high, but it's in that ballpark. It's not thousands of calories.

**Dr. Andy Galpin**
And would it be fair to say that that marathon a day for five months is the highest caloric expenditure activity that you've studied?

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**Dr. Herman Pontzer**
Personally, yes, but that's a fun one because when you look at that maximal expenditure, so they did that for five months. If you look at the Tour de France, it's a higher expenditure, but it's a shorter amount of time You look at Kona triathlon, half day, even higher expenditure than Tour de France. And so you can begin to plot out this nice relationship between how long you can maintain something and what the maximal expenditure is. And that's something we're interested in as well.

**Dr. Andy Galpin**
Yeah.

**Dr. Herman Pontzer**
And the analogy is like running. You can sprint for 10 seconds-

**Dr. Andy Galpin**
Yeah. Sure

**Dr. Herman Pontzer**
... but you can't keep that speed up for a marathon.

**Dr. Andy Galpin**
Yeah.

**Dr. Herman Pontzer**
And so we see that across days as well. You can burn a lot of cal-- If you think about it as multiples of your basal metabolic rate-

**Dr. Andy Galpin**
Mm-hmm

**Dr. Herman Pontzer**
... you can burn about 10 multiples of your BMR-

**Dr. Andy Galpin**
Yep

**Dr. Herman Pontzer**
... for a day.

**Dr. Andy Galpin**
That jives a lot, yeah.

**Dr. Herman Pontzer**
But you come out to... And the fun thing is, at nine months, pregnancy is the most expensive

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thing anybody's ever done for nine months. So there's this fun kind of human biology story about how our metabolic limits are shaped by our athletic abilities, but also by our reproductive systems. And so it all fits in there.

**Dr. Andy Galpin**
I can't let you get away with stopping right there.

**Dr. Herman Pontzer**
Okay.

**Dr. Andy Galpin**
I have to ask more about this pregnancy thing.

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
If you were to look at the hunter-gatherer communities.

**Dr. Herman Pontzer**
Mm.

**Dr. Andy Galpin**
Right now, in your head, again, you're imagining they're so physically active.

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
I certainly know as an outdoorsman myself, a hunter myself, when I'm out there, it feels like I'm burning 30,000 calories a day.

**Dr. Herman Pontzer**
Right. Yeah.

**Dr. Andy Galpin**
Like you're just gone. So to frame this pregnancy thing more appropriately, when we start getting into some of these numbers, what is a hunter-gatherer burning throughout the day? It's clearly, again, total number is the same-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... over here, but what is their physical activity? Is it 2,600 calories like a marathon? Is it lower?

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And then what do these pregnancy numbers look like so we can go, "Wow." Like-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... without that context, I think it's going to be hard for people to understand how that pregnancy thing is so wild.

**Dr. Herman Pontzer**
Yeah. So, where to start? So Hadza men get 19,000 steps a day.

**Dr. Andy Galpin**
19,000 steps, okay. So we're told here get 7,000 to 10,000.

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
So they're getting like-

**Dr. Herman Pontzer**
Twice that

**Dr. Andy Galpin**
... call it double.

**Dr. Herman Pontzer**
Yeah. And they're actually doing it rather than we're just told to do it.

**Dr. Andy Galpin**
Uh-huh.

**Dr. Herman Pontzer**
Women are getting about 12,000 steps a day. And then they, often with a kid on their back, and the hard work it takes to kind of get food out of the... Often, they're digging into the ground to get wild tubers, that kind of stuff. So there's added work on top of the steps. But the walking's the big thing.

**Dr. Andy Galpin**
Yep.

**Dr. Herman Pontzer**
But to your point, so their burning top line numbers are the same as you and me.

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**Dr. Herman Pontzer**
How does that all juggle out?

**Dr. Herman Pontzer**
A Hadza woman, because pregnancy is so expensive, we know from populations like the Hadza, women are having a kid, and this is without birth control, and they want to have a big family, so they're not trying to regulate that. They're having a kid every two to four years. Whereas in the US, a woman who's healthy and well-nourished, this is not recommended, but she could have a kid almost every year.

**Dr. Andy Galpin**
Yep.

**Dr. Herman Pontzer**
Her body could do that.

**Dr. Andy Galpin**
Irish twins, yeah.

**Dr. Herman Pontzer**
Yep. And so, not recommended, just real clear. But that's because of the energy availability that's there-

**Dr. Andy Galpin**
Yeah

**Dr. Herman Pontzer**
... to handle what is the most expensive thing the body can do, which is pregnancy.

**Dr. Andy Galpin**
Okay, so what you're kind of saying is when you were talking about the virality and fertility of the male side-

**Dr. Herman Pontzer**
Mm-hmm

**Dr. Andy Galpin**
... perhaps the female side, because their expenditure is so high-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... that perhaps something physiologically is intentionally lowering that fertility so that they don't-

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**Dr. Herman Pontzer**
Oh, yeah

**Dr. Andy Galpin**
... have kids too often. Is that kind of what you're referring to?

**Dr. Herman Pontzer**
That's right. Yeah. The body is just-

**Dr. Andy Galpin**
You don't know that directly, didn't study that, but that's kind of the thought train you're on here, right?

**Dr. Herman Pontzer**
Well, and we kind of have a lot of, there's fun evidence about that. So if you take in other populations where women are doing a lot of work to go get water every day. So these are populations in Ethiopia, I think, but also in Central America. One of their typical tasks in a typical day is to go and get water for the family.

**Dr. Andy Galpin**
Yep.

**Dr. Herman Pontzer**
And it's a huge amount of work. You walk in a kilometer to get a whole lot of water, and water's heavy, and you bring it back. And then in a couple of these studies that are just wonderful little kind of natural experiments, you add a well in the village, and now mom doesn't have to walk to go get water anymore. And fast-forward a couple of years, and you're like, "Oh, family size has got bigger, and the time between kids got smaller." And that's because you've taken this activity cost, and you've taken it out of their energy budget, and now the body is able to kind of recover after a pregnancy and be ready for the next pregnancy faster.

**Dr. Andy Galpin**
Okay, makes sense. It's not necessarily a... I'm assuming you're equating for, in all these studies, overall sex activity and things like that. So it's not like that's probably going down somewhat, but that's-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... not explaining all this.

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**Dr. Herman Pontzer**
That's right. These are populations where people would love to have big families.

**Dr. Andy Galpin**
Yeah.

**Dr. Herman Pontzer**
And yeah, the issue is of physiology, not behavior.

**Dr. Andy Galpin**
Today's episode is sponsored by AG1. AG1 is a vitamin mineral drink with probiotics, prebiotics, and adaptogens. Initially, I was extremely skeptical of AG1, as I am with all supplement companies, but after months of discussions with their lead nutrition scientist and the general team at AG1, I've been impressed by AG1's commitment to sourcing the highest quality ingredients and constantly updating their formulas to have the right ingredients in the optimal amounts. By now, it is abundantly clear that the gut microbiome plays a critical role in everything from body composition to bone health to mental health. And the probiotics and prebiotics in AG1 help to promote a healthy gut microbiome, improve digestion, reduce food cravings, and increase short-chain fatty acids, which play a critical role in regulating metabolism and immune responses. It's for these reasons, and many others, that I personally take AG1 almost every day.

**Dr. Andy Galpin**
Now, it's of course not a replacement for eating whole, healthy foods, but it is a great way to make sure that you're plugging in any gaps in your nutrition to improve your energy, bolster your immune system, and just generally help promote a healthy gut microbiome and more. If you'd like to try AG1, you can go to drinkag1.com/perform to receive five free travel packs plus a year's supply of vitamin D3 plus K2. Again, that's drinkag1.com/perform to receive five free travel packs plus a year's supply of vitamin D3 plus K2. Today's episode is also brought to you by Renaissance Periodization. If you want to put on muscle through science-backed training programs, look no further than Renaissance Periodization. Renaissance Periodization guides users through effective and easy-to-follow strength training programs all through their hypertrophy app. These programs are designed by the absolute best in the industry, including one of my favorite sports scientists and professional bodybuilders, Dr.

**Dr. Andy Galpin**
Mike Israetel. You may recognize that name because I referenced him and his work countless times over the years. Whether you're looking to put on muscle, gain strength, or both, these programs will help you achieve your goals and have produced results in thousands of men and women. Renaissance Periodization also has a diet app that is backed by the latest science and innovation in the field of nutrition and takes the complexity out of dieting, helping you achieve your ideal body composition. If you'd like to try Renaissance Periodization, go to

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rpstrength.com/perform to save up to $50 off your subscription. Again, that's rpstrength.com/perform to save up to $50 off of your subscription. So getting back to the numbers then, you said 12,000 steps a day for the females, right?

**Dr. Herman Pontzer**
Mm-hmm.

**Dr. Andy Galpin**
And what is this difference in a Hadza female total daily energy expenditure? And then what happens, whether it's them or in non-hunter-gatherers-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... what happens in terms of energy demand with the pregnancy thing?

**Dr. Herman Pontzer**
During pregnancy. Yeah, so a Hadza woman-

**Dr. Andy Galpin**
That's quite the claim. This is the most expensive thing we'll ever do as a human, right?

**Dr. Herman Pontzer**
Yeah. For nine months.

**Dr. Andy Galpin**
Ever, hopefully.

**Dr. Herman Pontzer**
For nine months. So a healthy human pregnancy costs about 75,000 calories.

**Dr. Andy Galpin**
Total?

**Dr. Herman Pontzer**
Total.

**Dr. Andy Galpin**
Okay.

**Dr. Herman Pontzer**
You spend most of that in the second and third trimester.

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**Dr. Herman Pontzer**
And if you are a Hadza mom, you've got to do that while also maintaining pretty high levels of physical activity. So that does come down a little bit, just the mechanics of foraging in your third trimester, I'm sure is hard.

**Dr. Andy Galpin**
Sure.

**Dr. Herman Pontzer**
But yeah. So, I'm not sure how you want to break it down, but okay, here's another fun thing. And this is the kind of stuff you learn when you start moving your field of investigation beyond a Westernized, industrialized context and start looking elsewhere, at what human diversity is all about. There are farming populations, a great study of farmers in Gambia. This is going to sound like a real tangent, but it's not, I promise.

**Dr. Herman Pontzer**
You've got women who are working really hard doing agricultural work. Their total energy expenditures are still more or less the same as everybody else's, but on the higher end, let's say. Higher end of normal. They measured them through pregnancy, and they don't change. Right? They're able to maintain, in that context, where food is a bit limited, but activity levels are high, and Mom's already pushing her limits probably even before pregnancy, it doesn't get pushed much higher during pregnancy. And that was a study done in the late '80s, early '90s.

**Dr. Herman Pontzer**
And so it seems like the most Mom can do for that nine months is pregnancy, and even if you add physical activity on top of that, there doesn't seem to be a lot of room to even move beyond that ceiling.

**Dr. Andy Galpin**
And I'm presuming you have to partition out to the child. That's the idea.

**Dr. Herman Pontzer**
Yeah. That's right. So the baby gets protected, baby is healthy, and Mom takes the hit.

**Dr. Andy Galpin**
Yeah.

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
And if you were to contrast that to these marathon numbers-

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**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... Tour de France numbers and stuff, you said 75,000 total calories for-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... a normal pregnancy. So how much is energy expenditure on total differ between a pregnant female versus a non-pregnant female?

**Dr. Herman Pontzer**
So a normal daily energy expenditure would be about 1.7 mets, something like that.

**Dr. Andy Galpin**
Yep.

**Dr. Herman Pontzer**
In pregnancy, that'll go up to about 2.2 mets in the highest expenditures for a sedentary population. We're trying to figure out right now if that changes if you have active moms in the US. We don't know what the results are on that yet, but the expectation is that that 2.2 mets for nine months is really the maximum what the body can do.

**Dr. Andy Galpin**
And that is an enormous amount. Again, that is more than this marathon running thing.

**Dr. Herman Pontzer**
Mm.

**Dr. Andy Galpin**
This is more than Tour de France stuff. This is a really big number, right?

**Dr. Herman Pontzer**
Well, so the guys who ran across LA to DC, they were at 3.5 mets for that five months.

**Dr. Andy Galpin**
There you go. There's your context, right?

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
Male versus female, so it should be generally higher anyways. And running a marathon a day.

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**Dr. Herman Pontzer**
Yeah. It's 3.5 mets. And then Tour de France, you can get up close to five mets, but it's only 28 days.

**Dr. Andy Galpin**
Sure. Right.

**Dr. Herman Pontzer**
Right? So that's the trade-off, is duration for maximum expenditure.

**Dr. Andy Galpin**
So it's almost like you're halfway between here, right? So you're not short month Tour de France. You're not five months-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... for this running thing. You could run a marathon every day for nine months and not burn as many calories as you would having a kid.

**Dr. Herman Pontzer**
No, I don't think that's right. I think-

**Dr. Andy Galpin**
Pretty close.

**Dr. Herman Pontzer**
I think a marathon a day is still more, but how about this? For nine months, we think the maximum a body can do is about 2.5 mets as max. Think about this. Moms burn 2.2, but then they have to also eat extra to gain weight.

**Dr. Andy Galpin**
That's right.

**Dr. Herman Pontzer**
So this same study of duration versus maximal expenditure, just to kind of reset ourselves, the expectation is that the longer you go, the lower that metabolic ceiling becomes. At about nine months, that's where moms are. And that it kind of flattens out. And the long-term ceiling for everybody is about 2.5 mets-

**Dr. Andy Galpin**
Yeah

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**Dr. Herman Pontzer**
... is the expectation from this study. And that means that whether you want to be an ultra-marathon runner training for your next big thing, or a cyclist or whatever, or you just want to be super fit and exercise a lot, you're still capped-

**Dr. Andy Galpin**
Yeah

**Dr. Herman Pontzer**
... long-term at about 2.5 BMR, and that's the same cap for that Mom's under, basically.

**Dr. Andy Galpin**
Mm-hmm.

**Dr. Herman Pontzer**
Right? So that's what we're talking about here.

**Dr. Andy Galpin**
Yeah. It makes intuitive global general sense-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... right? If that number shakes out. So in the case of something like pregnancy, because you're going to preserve it for the developing child, that means mom's physiology, as you said earlier, is going to take the hit.

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
Same thing happening with the over-training situation.

**Dr. Herman Pontzer**
Yeah. It's the same juggling, right? It's the same over-juggling kind of thing going on. Yep.

**Dr. Andy Galpin**
So that means your immune system or your endocrine system, some metabolically active part of your life is going to have to go down.

**Dr. Herman Pontzer**
Mm-hmm.

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**Dr. Andy Galpin**
Hopefully, that it recovers-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... but if it doesn't, this is why you see people getting more sick when they're over-trained.

**Dr. Herman Pontzer**
Yes.

**Dr. Andy Galpin**
This is why their libido goes down. This is why sleep and other things go down. It's in large part because of this energy. You can talk about it from the hormone perspective-

**Dr. Herman Pontzer**
Right

**Dr. Andy Galpin**
... but the hormones are a response.

**Dr. Herman Pontzer**
Yes.

**Dr. Andy Galpin**
They're the signal because of this energy flux being off, right?

**Dr. Herman Pontzer**
That's how I see it, yep.

**Dr. Andy Galpin**
If you look at the folks that pay a lot of attention to what's called REDs.

**Dr. Herman Pontzer**
Oh, right. Yeah.

**Dr. Andy Galpin**
I'm sure you're familiar with that, right?

**Dr. Herman Pontzer**
Mm-hmm.

**Dr. Andy Galpin**
How does that fold into this equation? Maybe just walk us through a little bit, what REDs is. I

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know you're not a dietician-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... so take care of it.

**Dr. Herman Pontzer**
And let's see if I can get the acronym right, Relative Energy Deficiency Syndrome.

**Dr. Andy Galpin**
Yeah. There you go.

**Dr. Herman Pontzer**
I'm a simple man, and in my mind, REDs is just another way of talking about over-training syndrome-

**Dr. Andy Galpin**
Yep

**Dr. Herman Pontzer**
... basically.

**Dr. Andy Galpin**
It's the energy side.

**Dr. Herman Pontzer**
It's the energy side of it. That's right. And one way to think about REDs is you're not getting enough energy in, but the other piece of it is, there are studies where they supplement athletes, and that helps. That's great. But there are athletes who won't respond to that.

**Dr. Andy Galpin**
Yes.

**Dr. Herman Pontzer**
As I understand it, and I think my suspicion is it's because they've actually hit the energy ceiling cap, and they really can't put more energy through their bodies. They're not able to do that-

**Dr. Andy Galpin**
Yep

**Dr. Herman Pontzer**
... to take advantage of those extra calories.

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**Dr. Andy Galpin**
Yep.

**Dr. Herman Pontzer**
And so that's the expenditure cap of it.

**Dr. Andy Galpin**
Yeah, and it's typically when we talk about REDs, we're talking about female.

**Dr. Herman Pontzer**
Mm-hmm.

**Dr. Andy Galpin**
Right. It's a way to describe what happens when females tend to be really active and oftentimes get really low amounts of body fat-

**Dr. Herman Pontzer**
Yep

**Dr. Andy Galpin**
... body mass, and then they have a whole host of things like amenorrhea, and you name your-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... debilitating bones being more brittle and-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... breaking and things like that.

**Dr. Herman Pontzer**
Mm-hmm.

**Dr. Andy Galpin**
And so typically, you're going to do a combination of two things, or one at least. You're either going to reduce physical activity-

**Dr. Herman Pontzer**
Right

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**Dr. Andy Galpin**
... or you're going to-

**Dr. Herman Pontzer**
Increase the intake. Yep

**Dr. Andy Galpin**
... or both, right?

**Dr. Herman Pontzer**
Yeah. Yep.

**Dr. Andy Galpin**
Which is your typical treatment. There's more to it, but-

**Dr. Herman Pontzer**
That's right. But thinking about these energy caps on that, what is the ceiling that I'm working under? I think one pragmatic thing to take away from that is, if the supplementation's not helping, it's not because you're doing it wrong.

**Dr. Andy Galpin**
Yeah.

**Dr. Herman Pontzer**
It might be because you're at the ceiling, and then you take some training away, and you might get a kind of less is more outcome-

**Dr. Andy Galpin**
Yeah

**Dr. Herman Pontzer**
... where you're actually healthier and able to maintain higher overall workloads because you're not dealing with downtime from being sick or being injured or something like that.

**Dr. Andy Galpin**
Yeah. So in that particular case or in other cases, when people have felt like their metabolism is slowing down-

**Dr. Herman Pontzer**
Mm-hmm

**Dr. Andy Galpin**
... all right? And I've seen this in plenty of our high-performing athletes-

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**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... and non-athletes we deal with, where legitimately they used to do the same workout before, eat the same things in the-

**Dr. Herman Pontzer**
Mm-hmm

**Dr. Andy Galpin**
... same relative amounts, and now-

**Dr. Herman Pontzer**
Mm-hmm

**Dr. Andy Galpin**
... all of a sudden, progression of weight is different, right?

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
Again, you'll colloquially call this my metabolism's slowing down.

**Dr. Herman Pontzer**
Right.

**Dr. Andy Galpin**
You and I both know that's not what-

**Dr. Herman Pontzer**
Right.

**Dr. Andy Galpin**
Your metabolic speed is not changing.

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
Clearly, this is a total energy expenditure issue.

**Dr. Herman Pontzer**
Mm-hmm.

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**Dr. Andy Galpin**
What do I do about that? What do we actually know scientifically? Can you raise-

**Dr. Herman Pontzer**
Hmm

**Dr. Andy Galpin**
... this number back up?

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
If so, how? I'll feed you a little bit-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... before we go on this one. The answers you'll often hear are things like, well, increase lean muscle mass because-

**Dr. Herman Pontzer**
Mm-hmm

**Dr. Andy Galpin**
... muscle mass is active, and it burns a bunch of calories.

**Dr. Herman Pontzer**
Mm-hmm.

**Dr. Andy Galpin**
What do we actually know about the ability to, again, it's not the right term, but how people were going to hear this-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... raising our metabolism like that-

**Dr. Herman Pontzer**
Yeah

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**Dr. Andy Galpin**
... so I don't feel like I have to eat 1,000 calories a day-

**Dr. Herman Pontzer**
Right

**Dr. Andy Galpin**
... which is really, really hard to not-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... gain weight.

**Dr. Herman Pontzer**
Yeah. Ugh. That's the big question.

**Dr. Andy Galpin**
Be a nutritionist. Be a dietician for me, please.

**Dr. Herman Pontzer**
So yes. Fine. First of all, I would say feeling like your metabolic rate is slowing down doesn't necessarily mean your metabolic rate is slowing down. And so, we've measured, for example, daily energy expenditures in non-athletes, so these are just typical folks, but from about early 20s till about late 50s, people's energy expenditures, daily energy expenditures, we don't see a slow down in middle age. It doesn't happen.

**Dr. Andy Galpin**
Say it again?

**Dr. Herman Pontzer**
Yes. Your metabolism does not slow down in middle age.

**Dr. Andy Galpin**
What?

**Dr. Herman Pontzer**
And look, I'm 47, and I feel like it did too.

**Dr. Andy Galpin**
Yeah.

**Dr. Herman Pontzer**
But it doesn't. Those are the data.

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**Dr. Andy Galpin**
You and your science lies, Herman.

**Dr. Herman Pontzer**
And here's another fun one. This is another great example. It's like the Hadza data, where you've got the data and you've got your preconceived model, and you have to choose-

**Dr. Andy Galpin**
Mm-hmm

**Dr. Herman Pontzer**
... because you don't get both, right?

**Dr. Andy Galpin**
You will see pretty routinely now, people will talk about things like bone health.

**Dr. Herman Pontzer**
Mm-hmm.

**Dr. Andy Galpin**
People will talk about muscle size-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... muscle strength. People will talk about things like HRV.

**Dr. Herman Pontzer**
Hmm.

**Dr. Andy Galpin**
That these things all will decline with age, VO2 max-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... cardiorespiratory fitness.

**Dr. Herman Pontzer**
Sure.

**Dr. Andy Galpin**
All of those examples have been now shown to not actually decline-

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**Dr. Herman Pontzer**
Ha

**Dr. Andy Galpin**
... as long as activity remains the same.

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
What you're also trying to tell me, this evil lie-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... is that you're saying metabolism does not slow down with age on-

**Dr. Herman Pontzer**
On average

**Dr. Andy Galpin**
... on average.

**Dr. Herman Pontzer**
Yeah, that's right. Yeah. This is a study of 6,000 some people.

**Dr. Andy Galpin**
Justify yourself, sir.

**Dr. Herman Pontzer**
Thank you. I will.

**Dr. Herman Pontzer**
It's actually a really fun science story. We have a big international consortium now of people sharing doubly labeled water measurements across studies.

**Dr. Andy Galpin**
Is this the Global Human Metabolism database?

**Dr. Herman Pontzer**
Yeah. The Doubly Labeled Water database or something like that.

**Dr. Andy Galpin**
There we go. Yep.

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**Dr. Herman Pontzer**
Yes. And so you've got my lab and a bunch of others all sharing data. It's a really fun science story that way. And we've got, and now I think it's 10,000 or 11,000 measurements of people from eight days old up to people in their 90s. So this is a full snapshot of human metabolic diversity.

**Dr. Andy Galpin**
Men and women, active, inactive-

**Dr. Herman Pontzer**
Absolutely

**Dr. Andy Galpin**
... healthy, diseased, whatever.

**Dr. Herman Pontzer**
Yes. Everybody. And so we can really say something that we can stand behind about what, for example, what does metabolic rate look like over the arc of a lifetime?

**Dr. Andy Galpin**
You published this already, right?

**Dr. Herman Pontzer**
That's right.

**Dr. Andy Galpin**
Yeah.

**Dr. Herman Pontzer**
It's a 2021 paper.

**Dr. Andy Galpin**
Lifelong metabolism paper or whatever, yep.

**Dr. Herman Pontzer**
That's right. And so there's some really fun stuff. When you're born, well, first of all, one thing that you get right away, which is kind of obvious, is that bigger people burn more calories.

**Dr. Andy Galpin**
Yeah. Body size, right.

**Dr. Herman Pontzer**
Body size. Men and women, when you correct for body composition, burn the same. So-

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**Dr. Andy Galpin**
Again, you're going to have to say that one again.

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
Particularly when you correct for lean mass.

**Dr. Herman Pontzer**
Yep, that's right. So a 150-pound man and 150-pound woman, the man might burn more calories on average because men tend to carry less body fat for a given size. But now let's ask the question differently. 150-pound man, 150-pound woman, both the same body fat percentage, imagine. The expected expenditure is the same.

**Dr. Andy Galpin**
You would, in looking at those people-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... you would think, in that case, the woman is a lot healthier, leaner, because at the same body composition, a woman will look a lot physically leaner than a male. It's because normal.

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
But when you equate for those two things-

**Dr. Herman Pontzer**
Yes

**Dr. Andy Galpin**
... their total expenditure is you would not be able to be like, "That's male, that's female."

**Dr. Herman Pontzer**
That's right. It comes back to these 37 trillion cells doing their jobs, and when it's the same composition of cells, the same fat-free mass, the same fat mass, they're all kind of doing their thing, things like sex differences disappear from your results. You don't see it.

**Dr. Andy Galpin**
Okay. There's a whole bunch of stuff I want to ask about this in terms of are we then thinking

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about human capacity, human systems, adaptability-

**Dr. Herman Pontzer**
Mm-hmm

**Dr. Andy Galpin**
... as your new book is-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... wrong. But before that, to finish our little story here.

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
So we don't see in this giant database now using... It's all doubly labeled water.

**Dr. Herman Pontzer**
That's right.

**Dr. Andy Galpin**
Now-

**Dr. Herman Pontzer**
I will say that we get the same pattern with basal metabolic rates. So we have two modalities giving us the same answer, so it isn't like, "Oh, this measurement-

**Dr. Andy Galpin**
I see

**Dr. Herman Pontzer**
... has a problem." Just to be clear, because that's always the follow-up, right?

**Dr. Andy Galpin**
That's more interesting, right?

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
Because now you're using two different methodologies-

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**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... for that same measure, and they're both at least aligning-

**Dr. Herman Pontzer**
That's right

**Dr. Andy Galpin**
... overlapping in a pretty high correlation.

**Dr. Herman Pontzer**
Yes.

**Dr. Andy Galpin**
Okay. So no differences between the sexes. Generally, no differences past, what? Probably age 20, 25. When is that-

**Dr. Herman Pontzer**
Yeah, biology doesn't take hard corners, right? The things kind of mellow out. So around 20 to 25, somewhere in there, you hit your adult rate.

**Dr. Andy Galpin**
Yep.

**Dr. Herman Pontzer**
And then you're just rock steady until late 50s, early 60s, something like that. And then it begins to decline again, which is interesting.

**Dr. Andy Galpin**
Mm-hmm.

**Dr. Herman Pontzer**
Because we know that later age is when things like diabetes risk, heart disease risk, dementia risk, all these things kind of inflect up-

**Dr. Andy Galpin**
Yeah

**Dr. Herman Pontzer**
... after 60, and your metabolic rate's inflecting down. And these are all body mass, body composition controlled, so it isn't just sarcopenia, because that happens too.

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**Dr. Andy Galpin**
Yep.

**Dr. Herman Pontzer**
And so I think we're seeing cells slow down.

**Dr. Andy Galpin**
Lost muscle. Yeah.

**Dr. Herman Pontzer**
Yes. We're seeing cells slow down, we're seeing the body slow down, and that's related to, I think, this increased disease risk.

**Dr. Andy Galpin**
All right. So I got one question on each side of the age spectrum.

**Dr. Herman Pontzer**
Sure.

**Dr. Andy Galpin**
I know you got some new work. I think you got a new NSF grant for doing a bunch of stuff with adolescent girls.

**Dr. Herman Pontzer**
Mm-hmm.

**Dr. Andy Galpin**
Right? So you've got some experience in the children side of the equation-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... as well as now past 50. So two-part question. One of them is how much higher is generally energy expenditure when it is peaked, right?

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
I presume it peaks at puberty or close to it.

**Dr. Herman Pontzer**
Oh, it peaks up. Size-corrected expenditures peak when you're one years old. That's your-

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**Dr. Andy Galpin**
Boom.

**Dr. Herman Pontzer**
We've all peaked too soon.

**Dr. Andy Galpin**
Yeah.

**Dr. Herman Pontzer**
We've all peaked too soon.

**Dr. Andy Galpin**
That's it. So you lied to us earlier. It does go down with age. After one, it goes down.

**Dr. Herman Pontzer**
That's right.

**Dr. Andy Galpin**
You're right.

**Dr. Herman Pontzer**
To 20.

**Dr. Andy Galpin**
Yeah.

**Dr. Herman Pontzer**
One to 20. Yeah.

**Dr. Andy Galpin**
Exactly.

**Dr. Herman Pontzer**
Yeah. A little baby, one-year-old infant, their cells are just super busy, right? And you see that in the calories they're burning. Now, look, they're also tiny, so total calories a day is not impressive.

**Dr. Andy Galpin**
Right.

**Dr. Herman Pontzer**
But when you correct for body size, it's 50% higher-

**Dr. Andy Galpin**
Yeah. It's a lot

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**Dr. Herman Pontzer**
... than if you could shrink an adult down to that size, the baby's burning 50% more calories than the adult.

**Dr. Andy Galpin**
Yeah. Well, it's turning over its entire skeleton in a year.

**Dr. Herman Pontzer**
All those, yeah.

**Dr. Andy Galpin**
Everything is really ramped up.

**Dr. Herman Pontzer**
Yes.

**Dr. Andy Galpin**
But when you get into your teenage years, how much higher is that expenditure, whether it's teen or whatever that peak-

**Dr. Herman Pontzer**
Yeah. You're coming down. So it's sort of a glide path, and so by the time you're 10, you're probably around 20% higher-

**Dr. Andy Galpin**
20%

**Dr. Herman Pontzer**
... than you would be as an adult, and then slowly it's going to come down. But that's the kind of ballpark, 20 to 30% higher. So when your teenage kid comes home and eats the entire fridge, yeah, that's real.

**Dr. Andy Galpin**
Yeah.

**Dr. Herman Pontzer**
And that's because their metabolic rate's just higher just because they're still developing.

**Dr. Andy Galpin**
And do we know what part of the metabolic equation that's coming from? Is it all of it? Do we know?

**Dr. Herman Pontzer**
So again, we see the same pattern in BMR. That doesn't really answer the question because

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your BMR is all your organs playing around.

**Dr. Andy Galpin**
Yeah.

**Dr. Herman Pontzer**
So we don't know which organs are doing what. So the brain is super expensive. Even in an adult, the brain burns 300 kilocalories a day.

**Dr. Andy Galpin**
Yeah.

**Dr. Herman Pontzer**
Whether you're dumb or not.

**Dr. Andy Galpin**
Yeah.

**Dr. Herman Pontzer**
As I like to remind my students.

**Dr. Andy Galpin**
Actually, probably more if you're more dumb, right?

**Dr. Herman Pontzer**
It just feels that way.

**Dr. Andy Galpin**
More dumber. Yeah.

**Dr. Herman Pontzer**
Yeah. So when you're a kid, it's probably even higher than that because not only is your brain doing its expensive thing of thinking and-

**Dr. Andy Galpin**
It's developing

**Dr. Herman Pontzer**
... regulating, it's developing.

**Dr. Andy Galpin**
Yeah.

**Dr. Herman Pontzer**
And so all the organs are probably doing that. We don't know. Another frontier's had a thing to

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do-

**Dr. Andy Galpin**
Yeah

**Dr. Herman Pontzer**
... is figure all that out.

**Dr. Andy Galpin**
Well, I ask that because colloquially, we'll hear things like, "Well, oh man, yeah, I played all these sports as a kid, and so I was lean, but now I'm not playing sports anymore."

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
And so people will tend to justify that 15 to 20-pound gain in their early 20s-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... as, "Well, I just stopped playing sports anymore." And then they rush back into the gym-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
don't often see a lot of results-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... and then partake in-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... sedentary activity for the next 20 years.

**Dr. Herman Pontzer**
That's right.

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**Dr. Andy Galpin**
So how are we thinking about that incorrectly?

**Dr. Herman Pontzer**
Yeah. Also, I think that the higher expenditure that you had as an 18-year-old, you are at the wonderful tail end of this elevated metabolic rate that you get for free-

**Dr. Andy Galpin**
Yeah

**Dr. Herman Pontzer**
... just from your development. You hit 21, 22, 23, and that goes away. And that usually coincides with a lot of life changes. You get your first job, et cetera. It all collides.

**Dr. Andy Galpin**
Yeah.

**Dr. Herman Pontzer**
But yeah, I think the big bump that you thought was because you were playing baseball is actually because maybe the bigger bump is actually just because your body was still developing.

**Dr. Andy Galpin**
Yeah. So it's almost certainly a combination.

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
Generally, people are way less physically active post high school.

**Dr. Herman Pontzer**
For sure, yeah.

**Dr. Andy Galpin**
They're probably also maintaining the same nutritional habits-

**Dr. Herman Pontzer**
Yes. Yeah

**Dr. Andy Galpin**
... intake. So it's all of those things.

**Dr. Herman Pontzer**
Yeah. That's right. And look, stress is an issue, sleep is an issue, all these things that push us to eat more.

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**Dr. Andy Galpin**
Yeah.

**Dr. Herman Pontzer**
Right? All of a sudden, I'm stressed out all the time, and I find myself eating more than I did before. Things like that.

**Dr. Andy Galpin**
Of course, yeah.

**Dr. Herman Pontzer**
And that more than some kind of global change in your metabolic rate in your 30s is what's, I think, really pushing things around for people.

**Dr. Andy Galpin**
Yeah. Then let's go to the other end of the age spectrum.

**Dr. Herman Pontzer**
Yes, sir.

**Dr. Andy Galpin**
Now what happens, and we'll say this, it's fair to say, if you want to think about it this way, your metabolism slows down past 20. Okay?

**Dr. Herman Pontzer**
Mm-hmm.

**Dr. Andy Galpin**
They have that big bump when we're 10 or 15, 12 years old, whatever. It does start to glide down, as you're mentioning.

**Dr. Herman Pontzer**
Mm-hmm.

**Dr. Andy Galpin**
It levels out mid to early 20s.

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
It holds on for the next 30 or 40 years.

**Dr. Herman Pontzer**
Mm-hmm.

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**Dr. Andy Galpin**
So you can blame those pounds you gained as a 20-year-old on it.

**Dr. Herman Pontzer**
Sure.

**Dr. Andy Galpin**
But you can't blame those pounds you gained as a 40-year-old-

**Dr. Herman Pontzer**
Yes

**Dr. Andy Galpin**
... most likely, on it. But it will now start to decline even, as you're saying, when you correct for maintaining muscle mass.

**Dr. Herman Pontzer**
Right, which we know is harder past 50.

**Dr. Andy Galpin**
Really, really hard, right?

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
So let's just say you were able to maintain that thing. Do we know what is happening, both mechanistically as well as, again, what part of the equation-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... post 50, if it's not loss in muscle? Because if you were to ask me right now-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... I would say I bet it doesn't happen as long as you hold your muscle.

**Dr. Herman Pontzer**
Oh, yeah.

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**Dr. Andy Galpin**
That would've been my guess.

**Dr. Herman Pontzer**
Yeah. So, I don't know that it's that easy.

**Dr. Andy Galpin**
Damn it.

**Dr. Herman Pontzer**
Yeah, I know, because again, this is paired with basal metabolic rate measurements.

**Dr. Andy Galpin**
Science is supposed to be easy.

**Dr. Herman Pontzer**
It's more fun when it's not, but I agree. The stories are simple.

**Dr. Andy Galpin**
Ha. You're a teacher. You're a storyteller.

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
It's supposed to be easy. Come on, Doc.

**Dr. Herman Pontzer**
Yeah. So, it could just be that you lose muscle mass and your metabolic rate goes down for that.

**Dr. Andy Galpin**
Yeah.

**Dr. Herman Pontzer**
But we correct for that, and we still see it. Oops. Okay, next explanation.

**Dr. Herman Pontzer**
If you do basal metabolic rate measurements along with this, which we have in that same data set, you see that, for a given fat-free mass, so for a given organ sizes, you hold organ size and muscle mass the same, basal metabolic rates, even at rest, are lower post 60. And so the only way you can get that mechanistically is for the cells themselves to be slowing down. Now, you're asking a different question, I think.

**Dr. Andy Galpin**
Mm-hmm.

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**Dr. Herman Pontzer**
Related but different, which is, if I'm physically active, and one thing that'll happen is I'll keep my muscle mass up, maybe. But the other thing that might happen is, again, exercise is a regulatory behavior.

**Dr. Andy Galpin**
Yep.

**Dr. Herman Pontzer**
Right? And I'm signaling to my body to keep going. That's a very hand-wavy way to talk about it, but there's something about that regulation of activity that might keep all your cells more active.

**Dr. Andy Galpin**
Yeah.

**Dr. Herman Pontzer**
Okay. I'd love it. Let's test that. I think that's possible. I don't think we know that for sure right now.

**Dr. Andy Galpin**
Generally, we associate aging with inefficiency at the cellular level.

**Dr. Herman Pontzer**
Yep.

**Dr. Andy Galpin**
Right? So you're losing either actual cell mass, things are dying-

**Dr. Herman Pontzer**
Mm-hmm

**Dr. Andy Galpin**
... breaking off, going down, or they're becoming hyperinefficient, more leakage.

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
Which I would think would actually then make energy expenditure higher.

**Dr. Herman Pontzer**
Mm.

**Dr. Andy Galpin**
What am I missing here?

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**Dr. Herman Pontzer**
I think you could have two things happening. You can have inefficiencies and just lower output overall. Right? Again, the only way you can make the math work on these measurements of expenditure, and you get it from both modalities, so it's not just a methods thing-

**Dr. Andy Galpin**
Yeah

**Dr. Herman Pontzer**
... is that it has to be the case that a liver cell... To pick an organ, I don't know if this is the right one. A liver cell in a 70-year-old burns fewer calories every day than a liver cell in a 40-year-old.

**Dr. Andy Galpin**
Yeah.

**Dr. Herman Pontzer**
And it kind of has to be that.

**Dr. Andy Galpin**
Yeah.

**Dr. Herman Pontzer**
Now, is it the liver, or is it a different organ? And that's the interesting set of questions.

**Dr. Andy Galpin**
Yeah, but one of them-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... it's going to have to be one or a combination.

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
Something has to be changing.

**Dr. Andy Galpin**
You think this is a function of looking at, I would not say exclusively, but primarily cross-sectional data-

**Dr. Herman Pontzer**
Mm

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**Dr. Andy Galpin**
... versus having more longitudinal things like that? Is that-

**Dr. Herman Pontzer**
No, that's a fair point. These are big cross-sectional studies. I think there has to be a longitudinal signal in there to see the big data trends that we see. But it is true, for all sorts of obvious reasons, that we don't have data from somebody who's 40, and then 50, and then 60, and then 70. That would be a study that's still happening and started 40 years ago, right? We don't have that yet.

**Dr. Andy Galpin**
Yeah, but geez, we should. We're ready to start it, right?

**Dr. Herman Pontzer**
I agree. And that would be something we're really interested in, is get you at 55, get you at 60, get you at 65, and see.

**Dr. Andy Galpin**
What is the longest that we do have? Do you know? Do we have any two-year studies? Do we have any five-year studies that have-

**Dr. Herman Pontzer**
We do. We have two and five-year studies here and there, small ones, but not that I know of in that critical post-60 age group. The ones I know of are in people's prime adult years. And that's interesting. There you find individual differences are pretty static. So if I measure you today and I see that you have a high metabolic rate, and I measure you again in two years, I'll see that you have a high metabolic rate again.

**Dr. Andy Galpin**
Mm-hmm.

**Dr. Herman Pontzer**
And it even independent of what you report anyway as lifestyle change. If you're slow, you're slow. If you're fast, you're fast. Now, the good news is it doesn't seem to have a big impact on whether you've gained weight or lost weight in the intervening years.

**Dr. Andy Galpin**
Yeah.

**Dr. Herman Pontzer**
So that's another kind of myth, right? People think, "Oh, my metabolic rate's high. That's why I keep the weight off." Probably what you are experiencing is a better relationship with food-

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**Dr. Andy Galpin**
Uh-huh

**Dr. Herman Pontzer**
... that you aren't being pushed to overeat the same way that somebody who says, "Oh, I have a slow metabolic rate," is maybe more food focused and has that different relationship with food, and is having a hard time that way. In fact, it's not metabolic rate, I'll say that. Right? Anyway, here's my metaphor for that. You walk into a bar, you want to play some darts, right? And they've got the dartboards hung on the wall, and you're throwing your darts at the wall. You don't know if that dartboard is hung a little high or hung a little low. You just know you're trying to hit it, and that's what your body's doing with expenditure and intake. It doesn't know if you happen to have a little bit of a high metabolic rate or a little bit of a low metabolic rate. It's just trying to balance the budget and hit the center of the bullseye, right? So if I came and said, "Oh, yeah, your dartboards are hung a little high," I'm still going to find that the darts are stuck all around the center-

**Dr. Andy Galpin**
Yeah

**Dr. Herman Pontzer**
... because people are still aiming at the center. They're not aiming at some global middle dartboard height.

**Dr. Andy Galpin**
Yeah.

**Dr. Herman Pontzer**
They're aiming at that one, and that's how your body works. You're aiming at that metabolic rate, and so if you're high, you're high, that's fine. But missing the bullseye and gaining or losing a little bit of weight is going to be independent of if the guy next door is aiming at a slightly lower dartboard.

**Dr. Andy Galpin**
Yeah. So if you take the person who says, "I eat all the time."

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
"I'm constantly stuffing my face. I never gain weight."

**Dr. Herman Pontzer**
Yeah.

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**Dr. Andy Galpin**
And you contrast that to the person who feels like they're doing the opposite, what you're saying is most likely that energy intake for the person that feels like they're stuffing their face is probably not as high as they think?

**Dr. Herman Pontzer**
Yes. And vice versa, the person who says that they're not eating a lot, doesn't feel that they are, probably is eating more than they think. And we've known that for a long time, that people under-report.

**Dr. Andy Galpin**
Yeah.

**Dr. Herman Pontzer**
Sometimes they over-report, but usually they under-report, and there's all sorts of obvious reasons about that. That's not intentional.

**Dr. Andy Galpin**
No.

**Dr. Herman Pontzer**
I'm not saying people are lying, that's not the point. People have a hard time tracking what they do.

**Dr. Andy Galpin**
Yeah. I would say in my experience, the people who feel like they're the former, the "I can eat anything I want-"

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... they end up going through really long periods of not intaking food.

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
So they'll be like, "Oh, yeah, I ate a whole pizza last night." And you're like, "Oh, great." And then they had a yogurt for breakfast.

**Dr. Herman Pontzer**
Right.

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**Dr. Andy Galpin**
And then they had a lunch, and you're like, "Oh." So actually, you feel like you're feasting all the time.

**Dr. Herman Pontzer**
Exactly.

**Dr. Andy Galpin**
Where the other folks are way more consistent about their food intake, so it feels like, and clearly there's more to it-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... than this, but that's been my experience of being like-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... "You actually don't eat that much. You just go through waves-"

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... of eating.

**Dr. Herman Pontzer**
Yeah, that makes sense. Yeah, totally.

**Dr. Andy Galpin**
Do people tend to be more physically active, whether it's exercise or activity, in periods of short caloric surplus? So if I eat a whole bunch more this weekend-

**Dr. Herman Pontzer**
Oh, that's interesting

**Dr. Andy Galpin**
... am I going to be more active next week?

**Dr. Herman Pontzer**
Huh. I don't know any data on that. That's a nice prediction. You could imagine evolutionary reasons that those mechanisms would exist.

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**Dr. Andy Galpin**
Yep.

**Dr. Herman Pontzer**
Good question. Yeah, I don't know.

**Dr. Andy Galpin**
Because then we don't know the opposite, I assume, as well, right? So if you pull calories a little bit this week-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... you hear people say these things, right?

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
"Man, if I pull calories down, I just don't move."

**Dr. Herman Pontzer**
The fatigue response, and we know that if you really crash diet, your basal metabolic rate can go down as a response.

**Dr. Andy Galpin**
Oh, sure, yeah.

**Dr. Herman Pontzer**
But you're not talking about that. You're talking about something smaller than that.

**Dr. Herman Pontzer**
Yeah. Gosh, I don't know. It seems like a real easy one to measure, and maybe people have done it, but I can't think of a study that's looked at it.

**Dr. Andy Galpin**
Today's episode is sponsored by Eight Sleep. Eight Sleep makes smart mattress covers with cooling, heating, sleep tracking, and more. I've personally been sleeping on an Eight Sleep mattress cover for years now, and it's absolutely glorious. I love it so much that I hate traveling away from home because it means I can't sleep on my Eight Sleep Pod 4 Ultra. As you'll hear me talk about endlessly on this podcast, there really is nothing you can do that makes more of an impact on your health and performance than getting tremendous sleep. And getting great sleep requires having your body temperature drop a couple of degrees at night, and that's hard

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to do on your own. The Eight Sleep has been a game changer for me because I run hot at night, or as my wife calls it, I'm a furnace. If I don't have something like an Eight Sleep helping me cool down, I'll wake up in the middle of the night overheating and not feeling great.

**Dr. Andy Galpin**
This is something I've also found in many of the people that I coach, especially those who are really physically active. The Eight Sleep Pod 4 Ultra has two times more cooling power, yet is virtually silent, and it has high-fidelity sleep tracking, and even has snoring detection that'll automatically lift your head a few degrees to improve airflow and stop your snoring. If you'd like to try Eight Sleep, go to eightsleep.com/perform to save $350 off your Pod 4 Ultra. Eight Sleep currently ships to the US, Canada, the UK, select countries in the EU, and even Australia. Again, that's eightsleep.com/perform. I'm going to take what feels like a pretty big left turn.

**Dr. Herman Pontzer**
Okay.

**Dr. Andy Galpin**
And I'll say it this way. I generally have had more disdain for the world of anthropology than I have had love.

**Dr. Herman Pontzer**
All right. Okay.

**Dr. Andy Galpin**
It's not the work of the scientists. It's generally the media and the interpretation-

**Dr. Herman Pontzer**
Okay

**Dr. Andy Galpin**
... is not your guys' fault, right? What I'm getting at is the natural fallacy.

**Dr. Herman Pontzer**
Oh, yeah.

**Dr. Andy Galpin**
And so I always have a hard time getting through things like, okay, what can we learn from anthropology? What can we learn from looking at culture and looking at ancient humans, and how things that matters without making the natural fallacy?

**Dr. Herman Pontzer**
Yeah.

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**Dr. Andy Galpin**
I feel like you've done a really good job of that now in our conversation, as well as over your career. So how do we think about these things properly, getting the best out of studying ancestors-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... and anthropology, and if that's even-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... biological anthropology, and not making natural fallacy?

**Dr. Herman Pontzer**
No, that's right. So I think let's start it this way. The value of looking at a broad sweep of cultures In general, is that you're going to capture more of what our bodies can do and more of how our bodies respond to changes and differences in lifestyle-

**Dr. Andy Galpin**
Yeah

**Dr. Herman Pontzer**
... and ecology and environment, all these things we're interested in, but we only have a really narrow view when we only look within the US, for example, or within urban centers in the industrialized world, right, where most research happens, by the way.

**Dr. Herman Pontzer**
So I think looking across cultures gives us a real sense of what real biological diversity looks like, how interactions with environment look like, how that interplay happens. And then the evolutionary perspective is it gives you a kind of working hypothesis, a working model for expecting how the body will work, how it will respond, what the body's trying to do. Your body isn't evolved to make you look great for the beach. Your body isn't evolved to be a massive bodybuilder necessarily. Or whatever it is that you're trying to accomplish, understanding what the body's kind of organized toward, the organizing theory of the body, which is evolutionary success, I think helps you make sense of the physiology. Why does my body adapt to physical activity the way it does? Well, because we're a physically active species and have been for two million years. And so, our entire physiology is organized around that.

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**Dr. Herman Pontzer**
You take that away, you have problems, right? So I think that's the advantage. It isn't to say, "Oh, a hunter-gatherer lives this way, therefore, I'm going to cosplay like a hunter-gatherer and be healthy." I mean, that's silly, right?

**Dr. Andy Galpin**
Right.

**Dr. Herman Pontzer**
That's goofy.

**Dr. Andy Galpin**
I'll give a couple of direct examples.

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
I think that was great, by the way. That was actually really helpful. When you hear justification of a particular methodology, doesn't matter, diet, exercise-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... psychological, relationships-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... you pick how humans interact. You could fall back to basically any time point, find some previous part of our history in which people did it this way, and justify it, right? This is the natural fallacy of, I skipped over, I know you know it, but is the idea that just because it is natural, then therefore that is correct.

**Dr. Herman Pontzer**
Right. Yeah.

**Dr. Andy Galpin**
There are a lot of things that are natural that we don't want to do anymore.

**Dr. Herman Pontzer**
Right. Yes.

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**Dr. Andy Galpin**
We don't have to list them.

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
But you can imagine ancient humans did some activity in a certain way that we don't want to do anymore as a culture.

**Dr. Herman Pontzer**
Yes.

**Dr. Andy Galpin**
We say that's not okay.

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
Fill in the blanks, folks, if you want there.

**Dr. Herman Pontzer**
Cannibalism's a fun one.

**Dr. Andy Galpin**
Okay, great.

**Dr. Herman Pontzer**
Right? Yeah, you could find a population, there's documented evidence in the past of people, different populations, who practice cannibalism. Now, why and how, those details are an interesting question, but nobody would advocate now that that's a great thing we ought to be doing.

**Dr. Andy Galpin**
I'm sure somebody would.

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
I'm sure somebody would, right?

**Dr. Herman Pontzer**
The world's a crazy place. But most folks are not going to want to do that.

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**Dr. Andy Galpin**
So if the natural fallacy exists, then why does it matter at all that we study old people?

**Dr. Herman Pontzer**
Oh, yeah. No, I mean, again, that gets me back to this diversity thing, because if you want to know what a really physically active day-in, day-out lifestyle looks like, or how our bodies juggle those demands, well, then let's go and ask that question. Let's go find populations that are really physically active. Let's find ones that are sedentary. Let's find ones that eat a really high-carb diet. Let's find ones that eat a really low, high-meat diet. And that's a way of asking about that diversity. I think you also learn some other interesting things. You learn about local adaptations in some cases that you otherwise would miss. But I think that's the advantage is, in terms of when we want to bring it back home to a health context-

**Dr. Andy Galpin**
Yeah

**Dr. Herman Pontzer**
... what we're going to learn about how we're going to fix our own lives today, that's it. You're learning about the diversity of human experience, and you can pick and choose the lessons from that. Not in a naturalistic fallacy kind of way, but in a, "Hey, they've tried it that way for..." and this is how they result. This is how their body results from that. I can bring that home. Great example.

**Dr. Herman Pontzer**
Physical activity we know is important for lots of reasons, but how much should you get? Right? That's a fair question to ask.

**Dr. Andy Galpin**
Mm-hmm.

**Dr. Herman Pontzer**
And it turns out that if you look at how much, this is just a fun little comparison. If you look at how much physical activity folks get in a nice study that was done in Scotland. Where was it? Glasgow. It's in Glasgow. These Glaswegian mail carriers. All right? This is a fun one. You have folks who are carrying the mail every day, getting 17,000 steps a day. You have folks who are in the office sorting mail, and they're not getting the steps. And you ask, who has the best health outcomes? And it's all National Health Service up in the UK, so it's all kind of controlled that way. The real big difference here is how active you are. The folks who are getting the 17,000 steps a day are, turns out, really well protected against cardiovascular disease-

**Dr. Andy Galpin**
Yep

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**Dr. Herman Pontzer**
... and all these things. Well, how do we understand that? Well, it turns out if you look at traditional groups around the world, that's kind of the sweet spot of where people are getting their activity. That's how much they're getting in a hunting and gathering context or a farming context. It matches up. And so that's, not that those mail carriers were thinking, "Gosh, I want to make sure I get as many steps-

**Dr. Andy Galpin**
Sure

**Dr. Herman Pontzer**
... as a hunter-gatherer today." That's where we can learn something from another cultural context, a non-industrialized context, and it helps make sense of the practical things we can do in our own lives here. We don't have to act like hunter-gatherers. That's not the goal. The goal is to learn.

**Dr. Andy Galpin**
Yeah. You and I are going to focus on physiology.

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
Metabolism and exercise.

**Dr. Herman Pontzer**
Mm-hmm.

**Dr. Andy Galpin**
Great, but you can find these same examples in cultural-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... in relationship, in how people interact.

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
We're just going to focus on this aspect of it, but I really think it's important that people extend that thinking out to this is all of how we behave as a species-

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**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... that can go there. So with the, I don't know if that was stuff in the UK Biobank, but in the Glasgow example there-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... you're highlighting another cr- ... positive role of physical activity and exercise.

**Dr. Herman Pontzer**
Mm-hmm.

**Dr. Andy Galpin**
But just not from the caloric expenditure.

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
Right? That's what you're saying-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... is you're not denying and suggesting that so many people in so many magazines-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... and articles have said that you're saying there are plenty of physical activity benefits. It's just-

**Dr. Herman Pontzer**
100%

**Dr. Andy Galpin**
... perhaps not from the caloric expenditure side of the equation.

**Dr. Herman Pontzer**
That's right.

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**Dr. Andy Galpin**
All right. So I just want to triple, quadruple down on what you don't say.

**Dr. Herman Pontzer**
Right.

**Dr. Andy Galpin**
But getting back to this, how do we then decide which of these learnings from anthropology that we-

**Dr. Herman Pontzer**
Mm-hmm

**Dr. Andy Galpin**
... choose to take, like physical activity, but then we don't choose to take the cannibalism one?

**Dr. Herman Pontzer**
Right. Well, that gets to this question of biology can tell us how things work, cultural studies can tell us the diversity of what possibility spaces are. But then it all ends up, you still have the hard decision to make yourself, as in, what are my principles?

**Dr. Andy Galpin**
Yeah.

**Dr. Herman Pontzer**
What are my guiding ideas, and how do I bring this into my own life? So, that's why you're probably not going to bring cannibalism in. But you might want exercise.

**Dr. Andy Galpin**
Speak for yourself.

**Dr. Herman Pontzer**
Yeah, fine. And I think there's also a broader importance here, and that is, I think we reduce a lot of how we study the natural world and study ourselves down to, what's the next thing I'm going to do to tweak my life, to give myself more energy, better health, whatever. Those are all important things to have. We should all want to maximize our time here. Absolutely. But there's a broader question, which is, how do we understand the world? How do we understand ourselves? How do we understand everyone around us? And you're not going to get all those answers with blinders on narrowly focused on your neighborhood and your immediate or area.

**Dr. Andy Galpin**
Mm-hmm.

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**Dr. Herman Pontzer**
You're going to get those answers, I would argue, by casting a pretty broad net, asking what's going on around the world, even in different species, but let's keep it to our species for a moment, asking those questions about what happens in different cultures and different contexts. And I think there's a richness there that actually does improve our lives in ways that are harder to measure.

**Dr. Herman Pontzer**
But that we often want to reduce things down to the bottom line, to the health nugget, to the biohack.

**Dr. Andy Galpin**
Yeah.

**Dr. Herman Pontzer**
And okay, I get it. But there's a broader thing here that I think is valuable.

**Dr. Andy Galpin**
Right.

**Dr. Andy Galpin**
Could not agree more. Really well said there. How much do we know about the variation, and let's just stay with our wheelhouse here, of something like energy expenditure among other older forms of lifestyle, if you will? So clearly, you've spent time in Africa and I don't know if you've gone to Central America, but how much variation do we know exists between Southeast Asia cultures, European, Scandinavian, and other ones? I assume you think your findings with the Hadza group would extend to everyone else, but what do we actually know, if any-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... about other groups?

**Dr. Herman Pontzer**
Great question. So now we have this big global database that we're putting together, has allowed us to ask that question, which is really fun. And so we've got, in the latest iteration of it, I think we've got 35 populations from around the world. Everything from traditional folks with their herds in Siberia-

**Dr. Andy Galpin**
Yep

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**Dr. Herman Pontzer**
... to Hadza are in there, to US, I mean, we're all in there. And what we're finding is there are some interesting differences between groups. They're pretty small. They don't track with activity the way that you might simply think that they do, but there are some interesting things happening there in terms of average differences between groups. But the variation within a group swamps-

**Dr. Andy Galpin**
Okay

**Dr. Herman Pontzer**
... any average group differences between groups. And so, if I say I pick a person from Southeast Asia and say, "What's their energy expenditure?" It won't help me to know that they're from Southeast Asia, right? Because actually, the variation within that population is so much that-

**Dr. Andy Galpin**
I'm so fascinated by this thing because in full disclosure, you were kind enough to send me a copy of your new book.

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
Which I was going through, and I'm thinking, "This is the exact opposite of anthropology."

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
And one of my other gripes with that field is you're studying giant populations, and you're completely forgetting about individuals.

**Dr. Herman Pontzer**
Mm-hmm.

**Dr. Andy Galpin**
And you're now just saying, "Because I'm from X region-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... this is my physiology."

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**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
Which has always irritated me, having coached and worked with countless people.

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
And I get this question all the time, "Oh, what have you found different between your females and your males?" Or, "How do you treat them?" Or fill in the blank.

**Dr. Herman Pontzer**
Yeah. That's right.

**Dr. Andy Galpin**
Your powerlifters versus your endurance.

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
My answer is always, "I don't really have any answer to you-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... that is categorically different."

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
So I feel very validated- ... in your new book-

**Dr. Herman Pontzer**
Perfect

**Dr. Andy Galpin**
... you're saying even the guy who does this-

**Dr. Herman Pontzer**
Yeah

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**Dr. Andy Galpin**
... and looks at big populations of people is going to come back and make a pretty strong argument that that's potentially not the best way to look at it.

**Dr. Herman Pontzer**
No, that's right. Yeah, I think what you're-

**Dr. Andy Galpin**
Thank you for letting me do that, by the way.

**Dr. Herman Pontzer**
No. Yeah. Have you had enough? Do you want me to say more?

**Dr. Andy Galpin**
No, I have so much more to say, but go ahead.

**Dr. Herman Pontzer**
So that's where this new book came out of, was not just thinking about how metabolism varies, but just about how our bodies vary and how our bodies work across systems, brains, hearts, lungs, livers, spleens, how it all works. And in every one of those stories, your body is a series of stories, and every one of those dimensions of you can vary. And people, first of all, don't understand how their bodies work, I think fundamentally. Teaching physiology for 20 years, that seems to be what I take away from that. People walk in the door fresh from high school, but not knowing how muscles work really, or how hearts work, or how brains work, any of it. We need to do better than that. But the other thing is when we teach it, and I don't know what your experience was in your training, I know that my experience was You get the textbook human. That's how you're trained.

**Dr. Andy Galpin**
Always.

**Dr. Herman Pontzer**
Right? And whether you're taking gross anatomy at Harvard Medical School, like I had a chance to do, or you're doing whatever your training is in human physiology, the people who taught me had a very, and I think this is true generally, have a real...

**Dr. Herman Pontzer**
How do I put this?

**Dr. Herman Pontzer**
There's a kind of struggle with how we talk about diversity. You're taught the textbook human, right? Because as soon as you start talking about differences between people, people get super nervous-

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**Dr. Andy Galpin**
Mm-hmm

**Dr. Herman Pontzer**
... for all sorts of reasons, because there's a real nasty history there about how we think about human diversity, and we get it wrong, and we divide it up into racial differences or sex differences, and all of a sudden we're in really, first of all, we're way out of where the science is, and secondly, we're into some really ugly history and culture there. So people don't want to do it. And so we don't have the tools to talk about diversity. But when we can do it right, and we sit down and think about how our bodies work and how we vary across individuals, now we have the tools, and we can sit down with somebody and say, "It doesn't matter to me that you're Asian American or that you're Black or that you're white, because I'm going to treat you like an individual with a ... And you're going to be different in all your dimensions than somebody else might be, and that's how we're going to talk about your body, and that's how we're going to treat you."

**Dr. Herman Pontzer**
And so that's what I kind of wanted to get at with the book.

**Dr. Andy Galpin**
Clearly, what you're indicating is all of those factors matter.

**Dr. Herman Pontzer**
Yes.

**Dr. Andy Galpin**
They all matter, right? So it's not that I'm saying, "I don't care what your ethnic background is." You're saying, "I do care, but this is part-"

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
"I care only enough to then ask more questions about your complete picture."

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
That ethnic background, your genetic inheritance, you pick your variable here-

**Dr. Herman Pontzer**
Yeah

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**Dr. Andy Galpin**
... is only a part of the equation that makes you, you.

**Dr. Herman Pontzer**
That's exactly right. To take a sort of the simplest example I can think of, race in this country is tied up with skin color, obviously. Well, skin color is this amazing trait that is, it's a natural sunblock. The pigment in your skin that makes it darker is melanin. It's this wonderful natural sunblock. It's this really cool evolutionary story. Populations in high ultraviolet light intensity areas make more melanin in their skin. Those alleles have been more successful. And so, you get darker skin in high sunlight areas, lighter skin in low UV areas. But just because I know about that trait, I don't know anything else about you necessarily. I don't know anything about your cardiovascular health, or risk, or anything, other systems. So these systems all vary independently. And when I categorize and say, "Oh, yeah, you're white. Oh, you're Black. Oh, you're Asian," and therefore, I think I know everything else about you, you don't.

**Dr. Herman Pontzer**
You don't. And that's an important way to start to think about human diversity, I think.

**Dr. Andy Galpin**
I'm smiling because you give a really easy example of skin color in the book. Another one from my sector that you give is related to kidney function.

**Dr. Herman Pontzer**
Oh, yeah.

**Dr. Andy Galpin**
So GFR, right? Now, I'll set some background for you, and then you can walk through.

**Dr. Herman Pontzer**
Mm-hmm.

**Dr. Andy Galpin**
If you get any blood work done, a very common blood test you'll get, even if you don't have any kidney dysfunction, it's called glomerular filtration rate. Right? It's actually an estimate of a measure. But what it is, is it's a blood test that measures how effective your kidneys are filtering and functioning, right? But it's actually not a kidney test directly, it's a blood test.

**Dr. Herman Pontzer**
Right.

**Dr. Andy Galpin**
Okay. eGFR is how you're going to see this. It's on almost every blood test you've ever had done. What you'll also see is you'll generally get two numbers. You'll get a number that says, are

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you African American or are you not African American, right? Or you'll actually have to answer that question prior to your blood draw, and then they'll give you your response based on what you answered.

**Dr. Herman Pontzer**
Mm-hmm.

**Dr. Andy Galpin**
You look on your blood work at home right now, you'll see that in there in one form or fashion. Why is that done? And is that accurate? Is that a good way to think about... What do we know about why is it done, first of all?

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
It's the only metric I know of in blood work from just the standard one-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... that is broken up by that.

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
So give us-

**Dr. Herman Pontzer**
No, that's right

**Dr. Andy Galpin**
... and I don't really care about kidney function. You don't care about it. But this is highlighting this bigger point.

**Dr. Herman Pontzer**
Yeah. It's the way we think about how bodies work fundamentally, and then about how bodies work differently, and how we think about human diversity. I believe there was an old study in the '60s or '70s or something like that that looked at GFR, and they just happened to note, are the people that we're looking at, are they African American or are they white? And they came up with a sort of predictive equation about how to get to your GFR based on your blood work, and they did it in two ways, one with and without. They did it for the white participants and for the

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Black participants separately, and that has carried on to today, to 2025, where if you get your blood work done, if you're African American, you'll get the Black equation used to calculate your GFR, and if you are white, you'll get the white equation used to do your eGFR. And there is no reason to ever think that the amount of melanin in your skin has anything to do with how well your kidneys function.

**Dr. Herman Pontzer**
Those are unrelated traits. But because we think about diversity in these sort of group-based ways, we have these sort of funny hangovers of thinking about diversity in the wrong way.

**Dr. Andy Galpin**
In this specific example, why does it matter that we're doing that?

**Dr. Herman Pontzer**
Well, because the same blood work from a white patient and a Black patient will give you two answers, and it could be that one person gets flagged as having kidney problems, and the other person gets flagged as being perfectly healthy. And-

**Dr. Andy Galpin**
With the exact same number

**Dr. Herman Pontzer**
... with the exact same blood work number. And that's a real problem, obviously. And it's not just kidney function. Equations used today in medicine to estimate bone health, to estimate your risk, if you have had a cesarean section in a previous delivery and you want to have a vaginal birth in the second one, your risks of that are race-based. That has nothing to do with your physiology. It is purely-

**Dr. Andy Galpin**
Diabetes

**Dr. Herman Pontzer**
... thank you. Exactly. There's so many of these. And we know that it comes down to fundamentally that even doctors who we trust with understanding our physiology the best and being able to give us the most individualized bespoke treatment still don't have a great way of thinking about diversity or are given these sort of legacy ways of thinking about diversity that we know are wrong.

**Dr. Andy Galpin**
Would it be fair to summarize your position here, and do please correct me if I'm a little bit even slightly off on this particular topic as it's not that there isn't differences.

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**Dr. Herman Pontzer**
Mm-hmm.

**Dr. Andy Galpin**
There potentially could be differences in this small example with something like GFR in Black and white Americans. There could be, but it's simply the fact that that's all founded right now on far less scientific evidence than you would assume. Is that a fair characterization?

**Dr. Herman Pontzer**
That's fair, and I think I would expand it, and I would say, first of all, we know that if we look at human genetics across the globe-

**Dr. Andy Galpin**
Mm-hmm

**Dr. Herman Pontzer**
... we do not find delineations, boundaries around what we in the US are brought up thinking about as racial groups. There is no African and white, Black and white genetic gene pool. That's not how it works. First of all, any two populations around the globe actually share almost all of their variants, right? So any two people might be quite different, but if I look at the total number of gene variants in this population, I'll find 90-plus percent of those same variants in another population. Pick any two across the world.

**Dr. Andy Galpin**
Any two communities.

**Dr. Herman Pontzer**
Any two communities. Within Africa, genetic diversity is huge, and so there's no such thing as an African American genetic ... That's not a thing, right? That's not a coherent group. There's actually more genetic diversity within Africa across populations than there is in any other part of the world because we're an African species. We've been there the longest.

**Dr. Andy Galpin**
Right.

**Dr. Herman Pontzer**
So yeah. I think the way that we divide things up by groups is inherently problematic. It doesn't have a scientific basis, and yet it shows up in these, what we think of as scientific things like the measurement of kidney function or the measurement of diabetes risk.

**Dr. Andy Galpin**
You said it earlier and you wrote it in the book that there are many other things to discuss in terms of diversity and culture and our history, and that is all true. What we're trying to do right

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now is just leave that aside and talk about the biology.

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
What you're saying again is there's not any lack of differences. We're all the exact same. That's not what you're saying.

**Dr. Herman Pontzer**
Nope.

**Dr. Andy Galpin**
It is this different context of that it's probably being extended into some areas where, again, the scientific support isn't-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... as sound as you think. Genetics is another great example of that. So I want to go further into that because you just brought that up.

**Dr. Herman Pontzer**
Mm-hmm. First of all, you've got something like 20,000 genes and 3 billion As, Ts, Cs, and Gs in your genome, right?

**Dr. Andy Galpin**
Base pair, correct.

**Dr. Herman Pontzer**
So we'll call that your genome.

**Dr. Herman Pontzer**
If we compare mine and yours and anybody else here in LA, LA is a great example because it's super diverse.

**Dr. Andy Galpin**
Yep.

**Dr. Herman Pontzer**
We'll find differences between any two people, but they're tiny, actually. Any two people, if we count all the As, Ts, Cs, and Gs, will be 99.9% similar.

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**Dr. Andy Galpin**
That's right. I covered this in season one and in the genetics episode.

**Dr. Herman Pontzer**
Mm-hmm.

**Dr. Andy Galpin**
But it really is hard for people to understand, humans, for the most part, all have the exact same genes.

**Dr. Herman Pontzer**
Yes. That's right. So you've got 20,000 genes, and actually you got two copies because you get one set from mom, one set from dad. And if I made a list of all your genes, the gene that gives you your blood type, the gene that, et cetera, all the way down the line, you and I have the same set.

**Dr. Andy Galpin**
That's right. And you and I, and you and Allison, anybody else on the planet-

**Dr. Herman Pontzer**
All have the same set

**Dr. Andy Galpin**
... have the same set.

**Dr. Herman Pontzer**
Now, we might have different variations. So the way I think about it is, I'm wearing a shirt, underwear, pair of pants, shoes, and socks, just like you. So if we made a list of all our clothing, it'd be the same list. But obviously, your shirt's different than my shirt, your shoes are different than mine, so different variations.

**Dr. Andy Galpin**
Great example. Yeah.

**Dr. Herman Pontzer**
So genes are like that, 20,000 of the same items, but different variations of those.

**Dr. Andy Galpin**
Yep, and those variations come from those As, Ts, Cs, things like that, right?

**Dr. Herman Pontzer**
Yep.

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**Dr. Andy Galpin**
Slightly different order. That's what we call a polymorphism or a variant or a mutation or-

**Dr. Herman Pontzer**
Yeah, perfect. Exactly. We can think about diversity then as what versions of the genes do you have or how similar is the actual sequence of As, Ts, Cs, and Gs, right? That could be a different thing, because you could have a gene that might be ... Genes are about 1,000 base pairs long. That would be a short one.

**Dr. Andy Galpin**
Yeah.

**Dr. Herman Pontzer**
And you could have one letter difference between the two variants. And so those variants are 99.99 whatever percent the same, even though they're two different variants.

**Dr. Andy Galpin**
Right. Yep. And that functionally means that that gene will then produce a different protein or a protein that functions differently or-

**Dr. Herman Pontzer**
Exactly

**Dr. Andy Galpin**
... and that's why your eyes are blue and mine were purple or-

**Dr. Herman Pontzer**
Exactly

**Dr. Andy Galpin**
... whatever the case is, right?

**Dr. Herman Pontzer**
Exactly. Right. So any two people on the planet, the letters are 99.99% the same, and that's when we talk about us versus chimps, for example, that's what we're talking about, that kind of diversity.

**Dr. Andy Galpin**
Yeah.

**Dr. Herman Pontzer**
Now, let's talk just about humans, and let's think about those 20,000 genes and the versions you have. Within any population, you can ask, "Oh, how many different versions of the blood type gene does that population, will we find if we do a survey?" And so, oh, I see people with type A

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blood and type B blood and type O blood, right? Those are all different versions of the blood type gene for that protein.

**Dr. Herman Pontzer**
If I look here in this small population, I go across the globe, I'll find the same variants, the same A, B's, and O's. Maybe at slightly different frequencies, but I'll find them.

**Dr. Herman Pontzer**
And so, even though one person might be, in that population, might be type A, another person's type B, so those people are quite different. But actually, this population with A's, B's, and O's is similar to this population over here with A's, B's, and O's. So, it's this funny thing.

**Dr. Andy Galpin**
Mm-hmm.

**Dr. Herman Pontzer**
Populations are more similar-

**Dr. Andy Galpin**
Yeah

**Dr. Herman Pontzer**
... because they have the same variants, than any two individuals are within that group. If you can wrap your head around that, that's the starting point to wrapping your head around human diversity, because within any population, people will vary more than populations will vary on average-

**Dr. Andy Galpin**
Right

**Dr. Herman Pontzer**
... across each other.

**Dr. Andy Galpin**
Right. If I were to get a commercial direct-to-consumer genetics test-

**Dr. Herman Pontzer**
Mm-hmm

**Dr. Andy Galpin**
... and it tells me I'm 43% Scandinavian-

**Dr. Herman Pontzer**
Yeah

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**Dr. Andy Galpin**
... 20% Mongolian, and 6% Norwegian-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... whatever, how is that actually working? Is it even accurate?

**Dr. Herman Pontzer**
Mm.

**Dr. Andy Galpin**
How are we deciding those numbers?

**Dr. Herman Pontzer**
Yeah. That's a really important question. And so you have 20,000 genes in your DNA, but between those genes are lots of stretches of DNA that as far as we can tell, don't do anything. And because of that, you don't have evolutionary pressures keeping them the same. They tend to vary more. And they vary in a random way, and so they create noise, let's say, in your genome. Now, the random processes that create noise in one population are unlikely to be the same as they happen in other populations. So those random, meaningless bits of noise in your genome actually become a nice fingerprint-

**Dr. Andy Galpin**
Mm

**Dr. Herman Pontzer**
... for where your recent ancestry is, because the same random things that happened in Scandinavia probably didn't happen in Southeast Asia. And so that's what a retail genetics company is doing. They're looking for those kind of meaningless, actually, the more meaningless, the better.

**Dr. Andy Galpin**
Yeah, the non-coding stuff, right?

**Dr. Herman Pontzer**
The non-coding stuff. And so, yeah. So that's funny because I think those tests are really fun to play with. They give you the sense that those genetic differences are big and meaningful, when in fact, the whole reason they work is that they're not meaningful.

**Dr. Andy Galpin**
By definition.

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**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
We don't yet know that they're doing anything.

**Dr. Herman Pontzer**
Exactly. Yeah. That's right.

**Dr. Andy Galpin**
How do we distinguish, though? How do we draw that line? When you said recent ancestors.

**Dr. Herman Pontzer**
Well, that's another thing. So we know now, that people have been mixing and moving globally forever. So there are no genetically isolated pure populations, and everybody intermixes with everybody. That is just the truth.

**Dr. Herman Pontzer**
And so I couldn't use, for example, I would have a hard time, let's say it this way. Those little random noise signals that tell me I'm from Scandinavia or Southeast Asia, those only work because recently we measured a bunch of people from those places, and we know what that noise looks like there.

**Dr. Andy Galpin**
Right.

**Dr. Herman Pontzer**
But check back in in 100 years, and it might be different. Because it's going to keep on churning. This churn is going to keep on happening. It's been happening for 200,000 years, and that's going to keep on mixing it up.

**Dr. Andy Galpin**
How good would you call our current database of genetics across the variety of cultures?

**Dr. Herman Pontzer**
We know it's hugely uneven. The most data we have in terms of UK Biobank or GenBank or any of these big databases, or for that matter, the retail space of the, those are all wealthy, largely white populations and countries. Not entirely.

**Dr. Herman Pontzer**
People work very hard to get coverage as far as everywhere they can get it, but just in terms of the bulk of the numbers. Yeah.

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**Dr. Andy Galpin**
I think the more recent data suggests that still to this point, 90-plus percent-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... of genetic data is on white Caucasian.

**Dr. Herman Pontzer**
That's right. And what we know is that when we go, we can talk about this next, when we do a study of what gene variants predict height.

**Dr. Andy Galpin**
I would love for you to go into this. Yes, please do.

**Dr. Herman Pontzer**
Yeah. What gene variants predict height? What gene variants predict cardiovascular risk, disease risk? What gene variants predict, pick your trait. When those studies are done in the UK Biobank with a largely white population, it turns out they're not what they call portable. I can find those same gene variants anywhere else because, again, populations share these variants. But it turns out they're not predictive over there anymore.

**Dr. Andy Galpin**
Oh.

**Dr. Herman Pontzer**
Oops. And so, yeah. It's an interesting time to be alive, because I remember in the '90s as an undergraduate, the human genome hadn't been published yet.

**Dr. Andy Galpin**
Right.

**Dr. Herman Pontzer**
We were in the late stages of this reckoning about racial diversity and the fact that race is a cultural construct that has, of course, important biology embedded in it, and actually racism itself can create biologies. I mean, so there's a whole, but we understood that race is not a biological category, it's a cultural category. We understood, it was a reckoning about sex differences. It was a reckoning, all these things. And we were ready, I think we were poised to do the next thing, which is to get down to the genetic level, and then we had the human genome published, and we're still, it's a promise unfulfilled because the genome work has gone in a different direction. I think we still don't really reckon with diversity in the ways that we probably ought to.

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**Dr. Andy Galpin**
Well, you could explain a lot of things here, but one thing of note is I don't think many people have really gotten past or the awareness has gotten out about what I call the one-to-one gene fallacy.

**Dr. Herman Pontzer**
Mm.

**Dr. Andy Galpin**
Which is the entire human genome, the promise of it, the direct or indirect-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... was that we will sequence every human gene

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
And because one gene equals one physical trait-

**Dr. Herman Pontzer**
Yes

**Dr. Andy Galpin**
... we'll then know everything about you.

**Dr. Herman Pontzer**
That's exactly right. Yes. That's a great way to go with it, too, because the promise was I'm going to be able to sequence your genome, and I'm going to know everything about you. And it didn't happen, and now we know that it will never happen. It won't happen.

**Dr. Andy Galpin**
The numbers are astronomical.

**Dr. Herman Pontzer**
They're astronomical, and environment has too big of a role.

**Dr. Andy Galpin**
Right.

**Dr. Herman Pontzer**
In a lot of traits, it has a very dominant role, and in every trait, it has some role. And so it isn't

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that you have three genes, and the versions you have of those determine how tall you get. There are at least 10,000 genes for which we know if you have variant A or variant B, you're going to be a little bit taller, a little bit shorter. And you add up all those over 10,000, and I might know something about your height, but then I also have to know your environment because I only know about half the story with the genetics. Right? So it's a complicated system.

**Dr. Herman Pontzer**
If we wanted to be predictive about things, we can understand it at a broader level and just say, look, we have to understand the interplay of environment and genetics for each trait individually, how they work. That's the better way in to understanding why your physiology's different than mine, or why this athlete is struggling with this thing, or this person's struggling with that disease risk, or whatever it is. When we want to understand our diversity, we have to break it down, I think, back to that fundamental beginning, and then it's a good way into it.

**Dr. Andy Galpin**
Why does this stuff even help? Why does it even matter-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... that we're thinking about genetics, as an example, wrong? We gave the example earlier of why it mattered for GFR.

**Dr. Herman Pontzer**
Mm-hmm.

**Dr. Andy Galpin**
But can you think of any examples of where overgeneralizing by population, or perhaps maybe not thinking about the uniqueness of that individual population appropriately-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... matters? What are the practical implications of these mistakes-

**Dr. Herman Pontzer**
Oh

**Dr. Andy Galpin**
... outside of sociocultural, like-

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**Dr. Herman Pontzer**
Here's a fun example. And we can do a couple of these, but here's a fun one. I was working in northern Kenya, when we first started working on that project with a community called the Daasanach. This is tradition-

**Dr. Andy Galpin**
Oh, perfect. Great.

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
Great. Let's, yes.

**Dr. Herman Pontzer**
Traditional pastoralists, these folks, they live with their herds, goats and cattle, and camels. And we started this project. We got into the community, and of course, it's community-based work. We met with community leaders. We met with the health clinic folks. We wanted to, before we started, to make sure we were talking to everybody and getting everybody on board, and this is something we all wanted to do. One of the folks we talked to was this German charity that was there to try to reduce malnutrition in this group. And so they're giving food supplementation to moms with little kids to try to fix what they saw as malnutrition. And so we met with this guy from the German charity, me and my Kenyan colleague, Rosemary, who's wonderful, and this guy's like, "Look, man, it's really bad. Malnutrition, 60% of the kids here are malnourished." That's scary. Obviously, that's a tragedy. And so we thought, oh, gosh.

**Dr. Herman Pontzer**
Okay. That's important to know. And then, but you go out into the community, you go around the villages, and that's not what you see. What you see is kids running around, playing, happy, laughing. And if undernourishment is that big of an issue, you should also see issues with fertility.

**Dr. Andy Galpin**
Mm-hmm.

**Dr. Herman Pontzer**
You don't see that. You see big families. Folks are active, healthy, doing their thing. That's strange. How do we square the circle on that? And it turns out, we were talking to the health clinic about this, and they had, in their records, partly with this charity, they had been doing this, they had been collecting heights and weights for children in that community, the Daasanach community, for years and years, and they had hundreds, I think a couple thousand, of measurements of kids' heights and weights from birth up through childhood.

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**Dr. Andy Galpin**
Science gold.

**Dr. Herman Pontzer**
Wonderful. It's so awesome, right?

**Dr. Andy Galpin**
Everything you could ever hope for.

**Dr. Herman Pontzer**
Yeah. So what we were able to do is basically make a Daasanach community growth curve, right? What the Germans guys had been doing is, they'd been taking heights and weights of kids, and they'd been plotting them against WHO standards.

**Dr. Andy Galpin**
Oh, there you go. There you go.

**Dr. Herman Pontzer**
Right?

**Dr. Andy Galpin**
Yep.

**Dr. Herman Pontzer**
And the assumption there is that kids everywhere across the globe all grow exactly the same.

**Dr. Andy Galpin**
Bingo.

**Dr. Herman Pontzer**
The kids in the Daasanach community were doing a really cool thing, actually. They would start off normal height and weight. They would kind of fall off the growth curve a little bit around year one, but then around year two, their heights would shoot up. They were taller than the global standard, actually. But because of that, their weight for their height, that ratio looked thin.

**Dr. Andy Galpin**
Way off, yeah. Did they physically look ill? Did they physically-

**Dr. Herman Pontzer**
They don't look ill, but even the folks-

**Dr. Andy Galpin**
Just lanky

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**Dr. Herman Pontzer**
... they're just tall and thin. It's just the body build in that population. And so, the German charity, they had their hearts in the right place. They wanted to help, but you are never going to get those kids to look like WHO standard kids because they are in that population, and the alleles that promote a tall, thin build are really common. That's an adaptation in that part of the world for dealing with really hot climates. It's incredibly hot there. You're on the equator.

**Dr. Herman Pontzer**
Being tall and thin is a way to be able to thermoregulate better. That's been known for a long time. We see that around the world. Tall, thin body build tends to be more common in really hot climates because it's a way to dump heat.

**Dr. Andy Galpin**
Yeah, surface area alone.

**Dr. Herman Pontzer**
Surface area, exactly.

**Dr. Andy Galpin**
Yeah.

**Dr. Herman Pontzer**
Yep.

**Dr. Andy Galpin**
Yeah.

**Dr. Herman Pontzer**
And so these kids were doing exactly what their bodies were built to do. Now, if you understand the way that height works, just to pick a trait, and the interplay of genetics and environment, then you can look at that and say, "Oh, that's the system. Now I understand it." Now, actually, now that you have a Daasanach-specific growth curve, now you can pick the kids that really do need help.

**Dr. Andy Galpin**
Oh, yeah.

**Dr. Herman Pontzer**
That's great. You could help them. You could focus the help better. And I don't fault the German charity for wanting to help.

**Dr. Andy Galpin**
Clearly.

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**Dr. Herman Pontzer**
But they were never going to achieve... They actually left They closed up shop and left because they thought we can't solve this problem.

**Dr. Andy Galpin**
Oh, no.

**Dr. Herman Pontzer**
So there's a great example. If you don't understand how the system works, you're going to come to wrong conclusions about how to help, you're going to come to wrong conclusions about what's going on. You're going to flag the wrong people for needing help. You're going to miss who does need help. All these things. So I think pragmatically understanding how these systems work and how genes and environment work together, and how it's a trait-by-trait thing. Just because I know about their growth curves doesn't mean I know about anything else about them, by the way.

**Dr. Andy Galpin**
Right.

**Dr. Herman Pontzer**
I don't know their heart health or their mental health or anything like that. Those are different traits.

**Dr. Andy Galpin**
There is clearly need and value in population-level research.

**Dr. Herman Pontzer**
Mm-hmm.

**Dr. Andy Galpin**
This is, again, your field-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... at least your old field on that. What you're clearly arguing for, though, here is, at least as I interpret it, is a move closer towards precision.

**Dr. Herman Pontzer**
Yeah. Individualized.

**Dr. Andy Galpin**
Towards individualized, right?

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**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
How do we, in your words, square that circle? In other words, how do we set up research, how do we think about research on the population level?

**Dr. Herman Pontzer**
Mm-hmm.

**Dr. Andy Galpin**
Because there are benefits we can get from that that we can't get from individualized-

**Dr. Herman Pontzer**
Oh, for sure

**Dr. Andy Galpin**
... single research.

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
How do we get the best out of both? How do we use population-level research so that we can be the most informed, and then also not make these mistakes-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... like we are currently doing with basically everything in genetics, in terms of, and to be clear, what I'm saying there is if you're making nutrition or exercise decisions based on your genetic testing-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... I think you've laid out a compelling argument that that's probably quite short-sighted-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... to be kind.

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**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
How do we do this? How do we think about it?

**Dr. Herman Pontzer**
What I think this kind of work argues for is a few different things. First of all, I think if we had better fluency, I think if you learned your biology and how these things worked in the same way that you learn social studies and English lit and all these things, I think that this is part of the general fluency that we expect kids to come out of high schools with or out of colleges with, that we would all be better consumers of things like retail genetics. We'd all be better patients with our doctors, because when they say, "Here's how your kidney function looks," you'd say, "Wait a second."

**Dr. Andy Galpin**
Mm-hmm.

**Dr. Herman Pontzer**
Right? So I think that's part of what this new understanding of diversity and how our bodies work, I think that's one important avenue for that. In terms of how we change the way we think about research, here's what I would love to have. I would love to see research that didn't just reiterate the same kind of wrong classifications like we think, right?

**Dr. Andy Galpin**
Yeah.

**Dr. Herman Pontzer**
I can tell you, if you do NIH-based research-

**Dr. Andy Galpin**
Yep

**Dr. Herman Pontzer**
... you're supposed to tell them how many Hispanic, non-Black Hispanic, non-Hispanic whites. These are the census categories, right?

**Dr. Andy Galpin**
Yep.

**Dr. Herman Pontzer**
And then somehow those categories are used to interpret results of your population-based data in a way that we know going into it is fundamentally problematic. And I'm not saying that we

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don't want to have diverse cohorts, I'm saying the opposite, actually.

**Dr. Andy Galpin**
Okay, thank you.

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
Yes.

**Dr. Herman Pontzer**
I'm saying the opposite. I'm saying that let's take these individual by individual, and let's look at trait-specific physiology, let's look at those individual axes of variation.

**Dr. Herman Pontzer**
It might be helpful to know in your big population that folks who are Black in the United States have these physiological outcomes.

**Dr. Andy Galpin**
Yeah.

**Dr. Herman Pontzer**
But that's not telling you that skin color does that or that their genetics did that. That's flagging that perhaps their environments, because of all the cultural baggage we have in the US, are affecting physiologies that way. Let's understand it that way. So we need diverse research, we need diverse research populations, but the way that we handle it just has to be different.

**Dr. Andy Galpin**
Yeah. I love how you frame that. If I could throw a little bit of an analogy on the spot here-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... on that. The way that I generally like to think about population-based data, and let's just keep using that example. One trait that you'll see pop up, we said earlier, for Black African American-

**Dr. Herman Pontzer**
Mm-hmm

**Dr. Andy Galpin**
... much higher rates of type 2 diabetes.

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**Dr. Herman Pontzer**
Mm-hmm.

**Dr. Andy Galpin**
Much, generally higher rates of obesity, right? So what you're saying is population data can shine a light on that.

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
And that allows us to say, hey, we need more focus, we need more emphasis, we need more resources.

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
Does that then tell you if you're Black, there's something in your physiology that makes you have more diabetes? Maybe, maybe not. All it's simply saying is there's something in the entire picture.

**Dr. Herman Pontzer**
Yeah. That's a great example. Another one is heart disease, hypertension and heart disease.

**Dr. Andy Galpin**
Yep.

**Dr. Herman Pontzer**
We know that Black folks, Native Americans, other minorities have higher rates of hypertension and heart disease than whites in the US. We know that.

**Dr. Andy Galpin**
Yep.

**Dr. Herman Pontzer**
For a long time, in the '80s, '90s, particularly the observation that we had higher rates of hypertension among Black Americans was taken to somehow mean, interpreted as they have a genetic predisposition to hypertension.

**Dr. Andy Galpin**
I spent my graduate work in Memphis-

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**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... in health science. I had to teach this.

**Dr. Herman Pontzer**
And it's wrong.

**Dr. Andy Galpin**
Yeah.

**Dr. Herman Pontzer**
Right? It is both true that in the US, Black populations have higher rates of hypertension. It is also true that if you go anywhere else that doesn't have a history of racism, guess what?

**Dr. Andy Galpin**
Yeah.

**Dr. Herman Pontzer**
They don't. And it's same with Native Americans have higher rates of cardiovascular disease in the US. Go to places where the healthiest hearts in the world are in indigenous populations in Bolivia. Right? And it's basically a very similar recent diaspora of those populations down into South America, because you're talking about genetically similar populations if you want to talk about it that way.

**Dr. Andy Galpin**
Right.

**Dr. Herman Pontzer**
Point being, we take the wrong conclusions, we make the wrong fixes, we learn the wrong lessons when we don't understand how our bodies work and why we become unique.

**Dr. Andy Galpin**
And to your point of the German charity-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... this can be done well-hearted.

**Dr. Herman Pontzer**
Yeah.

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**Dr. Andy Galpin**
Right? It's just, again, potentially not focusing the right lens-

**Dr. Herman Pontzer**
That's right

**Dr. Andy Galpin**
... and help and support-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... in the areas because we don't understand what the actual rationale, what the reason, what the cause-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... is for some of these issues. So on the topic, then, of diversity in physiology-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... we'll stick, again, to our side of the equation.

**Dr. Andy Galpin**
How do we best think about that? What is the best way we can learn from it, make better help-

**Dr. Herman Pontzer**
Mm-hmm

**Dr. Andy Galpin**
... better support, whether it's scientifically, public health. I know you don't work-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... in the areas of public health, but what is the most appropriate way that we should maybe start thinking about it, or advocating for types of science? Anything that's the solution side of the equation, how should we be better thinking about it?

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**Dr. Herman Pontzer**
Yeah. I think when we understand the role of environment, especially in a lot of these health outcome, diabetes risk, obesity risk, heart disease risk, I think a kind of individualized approach and a life course approach, because we're thinking about environment over the lifespan here-

**Dr. Andy Galpin**
Yep

**Dr. Herman Pontzer**
... points us to research that's going to focus on early life experiences especially, getting those environments right. Childhood is a really important, obviously, learning period for your body's physiology. And I think when we see differences among different communities in health outcomes, not ascribing that to some inherent issue there, but flagging that as usually, when it's at the population level, an environmental issue. When we see individual differences, well, now we can ask, "Okay, what is it about your individual physiology that we need to tweak?" That's a move towards precision medicine that I don't have all the answers there yet.

**Dr. Andy Galpin**
Of course.

**Dr. Herman Pontzer**
I don't know that anybody does.

**Dr. Andy Galpin**
No.

**Dr. Herman Pontzer**
But we can focus more on the individual that way and hopefully do a better job.

**Dr. Andy Galpin**
Again, I'll never get over this interesting, what I feel like is a juxtaposition of what your academic background is-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... and the fact that you're now arguing so heavily for, I'm sure it feels like it's seamless and it is the same thing, but I'm like, "Finally." Yes, a person that's telling us all about how we can learn from studying one tribe-

**Dr. Herman Pontzer**
Yeah

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**Dr. Andy Galpin**
... 1,000 years ago is now getting in here. Do you feel like your time as, I don't know, were you technically an EMT? I know you were-

**Dr. Herman Pontzer**
Oh, yeah

**Dr. Andy Galpin**
... in that stuff.

**Dr. Herman Pontzer**
That's right, yeah.

**Dr. Andy Galpin**
Do you feel like that-

**Dr. Herman Pontzer**
About three or four years.

**Dr. Andy Galpin**
Yeah. Is that a part of this here? Is that why you're seeing this? Is that how you're able to zoom back and look at population level stuff as well as the individual person?

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
I feel like when I knew that about you, I'm like, "This has got to be in there somewhere that's driving this equation."

**Dr. Herman Pontzer**
Yeah. I think that my time as an EMT was motivated by two big things. We tell our stories about why we do things after the fact.

**Dr. Andy Galpin**
Yeah.

**Dr. Herman Pontzer**
Right?

**Dr. Herman Pontzer**
So I don't know if I would've articulated this as an 18 or 19-year-old taking that EMT class at Penn State when I learned how to do this stuff.

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**Dr. Herman Pontzer**
I think it really hit two buttons for me. One was the human physiology side and just seeing the medical world play out in practical terms with a patient that you're taking care of and understanding the body that way. That was super cool.

**Dr. Andy Galpin**
Yeah.

**Dr. Herman Pontzer**
But the other thing was, medicine, and especially emergency medicine, happens behind closed doors for most of us.

**Dr. Andy Galpin**
Yep.

**Dr. Herman Pontzer**
We don't get to see it firsthand. Certainly growing up, I didn't get to see it. My parents weren't doctors or anything like that. And so to pull the curtain to the side and understand how that high-intensity world worked and just understand how the world worked a little bit, that was a draw I couldn't... I think that was the biggest draw. I wanted to know what happened in the back of the ambulance, man.

**Dr. Andy Galpin**
Yeah.

**Dr. Herman Pontzer**
I wanted to know what happens when you pull up on a car wreck, and you have to make decisions right now about how you're going to treat the patient, keep the scene safe. And the immediacy of it, the fact that it's something that I never got to see growing up, that was the draw. And the patient care, obviously, that's obviously a big thing, too, but I think that was the big draw for me.

**Dr. Andy Galpin**
Did you have a love of physiology before that, or was that what jumped it off a lot?

**Dr. Herman Pontzer**
I think that and the anthropology classes I was taking were very biologically focused.

**Dr. Andy Galpin**
Yeah.

**Dr. Herman Pontzer**
So that combined elements of that. What you're learning from the medical context in an EMT

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book and then the evolutionary perspective on it in my classes, I think that, I hadn't really put it together like that before, but I think that's right. I think that was this cool synergy as I was figuring out what I wanted to do with my life.

**Dr. Andy Galpin**
What do you have coming up next in that? You were talking earlier about some of the projects you got going on.

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
Where is the next question? We talked about a bunch of things-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... you could answer.

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
What's on the immediate horizon for you right now? What are you most interested in next?

**Dr. Herman Pontzer**
Well, we have a really exciting project happening right now, two actually, trying to understand metabolic ceilings. Is there really a cap on what the body can do? And if there is, how do we push it? What happens when you push it? And so we've got one study going on right now looking at pregnancy and looking at female athletes through pregnancy that are maintaining really high activity workloads to see how that pushes the body around, and energy expenditures, and all the follow-on things that happen with that.

**Dr. Andy Galpin**
Yeah.

**Dr. Herman Pontzer**
That's a super exciting project that hopefully we'll have out in the next year or so. We have a project looking at ultramarathon runners, asking, outside of the pregnancy context, just people who are just pushing their bodies to the extreme What does that look like physiologically, metabolically? And that's work where I'm doing with Drew Best in Massachusetts, and that's been really fun. So those are that avenue of research. We want to get work going trying to look

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at organ metabolic rates and how those might juggle and change-

**Dr. Andy Galpin**
Mm-hmm

**Dr. Herman Pontzer**
... in the face of lifestyle change, in the face of different interventions. That's really early days, and I'm hoping to get that going. We'd love to know, in that same kind of distant horizon is looking at life course changes in childhood and in old age, how metabolic rates change. And then we have a bunch of projects right now looking at, in different communities. We have one looking at cardiometabolic health in pastors, in clergy in-

**Dr. Andy Galpin**
Oh

**Dr. Herman Pontzer**
... Western North Carolina.

**Dr. Andy Galpin**
Okay.

**Dr. Herman Pontzer**
We were asked to help out on this grant. There's a higher rates of cardiometabolic disease, diabetes and stuff with this population than we'd like to see. Higher than background other folks in those same communities. We want to understand what is it about the challenges of that job, psychological, physical activity, diet, that are pushing health outcomes where we don't want to see them.

**Dr. Andy Galpin**
Mm-hmm.

**Dr. Herman Pontzer**
And we're working abroad still. So we have the work in Kenya, other collaborations around the world. So yeah. It's a busy, it's a full plate.

**Dr. Andy Galpin**
Yeah. You're not slowing down at all in addition to writing books-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... and all those things.

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**Dr. Andy Galpin**
If someone would've been as fascinated as I am in this conversation, I really thoroughly enjoyed it, and they're thinking to themselves, "Okay, great. How can I better think about metabolism, energy expenditure, all these things?" Is there any other lessons that you think people should glean that you really want to emphasize-

**Dr. Herman Pontzer**
Hmm

**Dr. Andy Galpin**
... or that they can pull from? You mentioned this several times now. You're a natural teacher-

**Dr. Herman Pontzer**
Hmm

**Dr. Andy Galpin**
... just talent-wise, and you also clearly have a passion for it. So how do we help connect this last dot for people in saying, "I'd like for people to learn..."

**Dr. Herman Pontzer**
Yeah.

**Dr. Herman Pontzer**
Okay, so let's start with the metabolism thing. If people are trying to optimize their health, change their body composition, maybe maintain their body composition, thinking about metabolism, I emphasize that we should think about diet and exercise as two different tools who do different jobs.

**Dr. Andy Galpin**
Yep.

**Dr. Herman Pontzer**
Sure, there's lots of crossover, but diet's going to be your best tool for maintaining weight or getting your weight where you need it to be. Exercise is going to be your main tool for everything else, right? Heart health, mental health, muscle health.

**Dr. Andy Galpin**
Fill in the blanks, right.

**Dr. Herman Pontzer**
Fill in the blanks.

**Dr. Herman Pontzer**
Now, how do we connect that to this second half of our conversation about individualized

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approaches and diversity? I think you need to treat yourself as N of one and understand that there is a real broad range of possible diets that might work best for you, possible exercises that you're going to get into, that you're going to love more or less. Your individual environment and genes, how those mesh together, nobody has that same setup. You are unique. And so, I think the one size fits all approaches, I think the kind of evangelistic, you have to have this diet approach kind of thing, give yourself a break. Walk away from that and just ask, "Okay, I'm going to pay attention to myself, and I'm going to treat myself as N of one because you are." And you can play around with what we know is out there. Be evidence-based. Read good books, read good papers, or listen to great podcasts and figure out what the evidence is out there and then say, "Okay, I can play with this without putting myself in a bucket of, 'Oh, I'm a woman and therefore this.

**Dr. Herman Pontzer**
I'm a man and therefore that. I'm this-

**Dr. Andy Galpin**
I'm this age

**Dr. Herman Pontzer**
... people in that group."

**Dr. Andy Galpin**
Yeah.

**Dr. Herman Pontzer**
"I'm that group." You're N of one, so go out and feel free to sort of play with it that way and I think with that kind of an approach, first of all, it lets you breathe a little bit and have a little less stress about, "Oh, I'm not doing it right."

**Dr. Andy Galpin**
Perfect. Right. It's empowering. It should be more empowering-

**Dr. Herman Pontzer**
I hope so

**Dr. Andy Galpin**
... than not, right?

**Dr. Herman Pontzer**
Yeah. And then it also lets you explore and find something that you'll love. I'm an anthropologist. I study people. And what I can tell you is across the world, around the world, if people don't love something, it doesn't matter what, culturally, whatever, all the diversity, if people don't love something, they're not going to stick with it. People do what they love. They always fall back to it.

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And so if you can't find a lifestyle approach that is going to really resonate with you, it's not going to matter what it does physiologically because it's not going to stick. So I think that's listen to yourself and be N of one, because that's what you are.

**Dr. Andy Galpin**
If somebody wanted to do something like this and they wanted to start learning more about their metabolism-

**Dr. Herman Pontzer**
Mm-hmm

**Dr. Andy Galpin**
... and figuring out their daily energy expenditure and things like that, what tools would you recommend? Where should they start?

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
What options do people have if they want to follow your advice there?

**Dr. Herman Pontzer**
Yeah. Well, you can go low tech. You've got the bathroom scale.

**Dr. Andy Galpin**
Yep.

**Dr. Herman Pontzer**
Right? And-

**Dr. Andy Galpin**
It's always the best place.

**Dr. Herman Pontzer**
It's not a bad place to start.

**Dr. Andy Galpin**
Yeah.

**Dr. Herman Pontzer**
And we talked a little bit in this conversation about models versus data. If your model is, "I'm on this diet, and I'm eating at an energy deficit," but the data say you're not losing weight, then I'm sorry, you're not. That's just it.

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**Dr. Andy Galpin**
Yeah. Good data.

**Dr. Herman Pontzer**
And so you got to follow the data, not the model. There are lots of companies out there that'll measure different aspects of your health if you're into that. If you want to measure your energy expenditures, I'm a science advisor for a company called Calorify. You can check them out, and do that.

**Dr. Andy Galpin**
Just tell us a little quickly about what that is and how it works.

**Dr. Herman Pontzer**
Oh, right. Yeah. So this is a really cool company.

**Dr. Andy Galpin**
And full disclosure, I've used it many times I paid for it full price, no discount.

**Dr. Herman Pontzer**
Okay.

**Dr. Andy Galpin**
So, I've used it quite often, but-

**Dr. Herman Pontzer**
Awesome. Yeah

**Dr. Andy Galpin**
... we're going to tell them what it is.

**Dr. Herman Pontzer**
Yeah. So, the technique I talked about earlier about how we measure total energy expenditures, all the calories you burn for 24 hours, the technique we use is called the doubly labeled water method. It's an isotope tracking method, and it's the gold standard for doing those kinds of measurements. And until recently, there wasn't a retail way to do that. You couldn't just get a measurement for yourself. You had to sign up for a study or something like that.

**Dr. Herman Pontzer**
Hari Mix, who's the founder of CalorieFi, and I was there too to help get it off the ground. I'm a science advisor for that company, full disclosure. They wanted to make this available to everybody. And so you can check out CalorieFi and get those measurements yourself if you want.

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**Dr. Andy Galpin**
Great. Fantastic. What would you say to somebody who was concerned that they've been in a caloric deficit for a long time? They have been potentially, whether they're losing weight or not, but they're eating a really low amount of calories. Potentially, they've lowered it.

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
They're weighing, they're measuring, they're-

**Dr. Herman Pontzer**
Mm-hmm

**Dr. Andy Galpin**
... reasonably accurate in that, and they've continued to reduce a couple of hundred calories. It's been months and months and months.

**Dr. Herman Pontzer**
Yeah.

**Dr. Andy Galpin**
Now they're concerned that they have crashed their metabolism. They've-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... gone to the bot-- People-

**Dr. Herman Pontzer**
Yeah

**Dr. Andy Galpin**
... will explain this thing differently, but is that a real thing? And if so, what's happening there?

**Dr. Herman Pontzer**
You can definitely see people's basal metabolic rates get lower when they go on really crash diet kind of things.

**Dr. Andy Galpin**
Yeah.

**Dr. Herman Pontzer**
As far as I know, I don't know of any evidence that says it doesn't just recover when you go back

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to a more normal amount of food and a more normal exercise load.

**Dr. Andy Galpin**
Yeah.

**Dr. Herman Pontzer**
And so I don't think anybody is forever damaged from whatever they tried in the past. Yeah. So again, let yourself off the hook a little bit and it's going to be okay.

**Dr. Andy Galpin**
Yeah. I really, really appreciate you coming halfway across, well, entirely across the country.

**Dr. Herman Pontzer**
Yeah. And I didn't run, I took an airplane.

**Dr. Andy Galpin**
You did?

**Dr. Herman Pontzer**
So, yeah, I didn't do the marathon a day thing for five months. I just jumped on a plane. I cheated.

**Dr. Andy Galpin**
I'm not going to lie, I feel like that's a little bit lazy.

**Dr. Herman Pontzer**
It is.

**Dr. Andy Galpin**
Yeah.

**Dr. Herman Pontzer**
That's fair.

**Dr. Andy Galpin**
Yeah. You got out here, but really appreciate it. I thoroughly enjoyed it. I've been waiting a long time for it, and I know people are going to get a ton out of this. If people want to follow along with your journey and support and stuff, where can they do those things?

**Dr. Herman Pontzer**
We're online. You can check out the Pontzer Lab, and we try to update how our projects are going. Of course, we publish everything in the scientific literature, which isn't always-

**Dr. Andy Galpin**
Sure

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**Dr. Herman Pontzer**
... easy to keep up with, but it's there. And then, I guess you could check out my writing. We've got a new book coming out, and I'm sure there'll be more fun stuff to tell the world about.

**Dr. Andy Galpin**
And then the foundation as well?

**Dr. Herman Pontzer**
Oh, thanks for that. Yeah. One of the things that we've done working with the Hadza community is to start a charity that helps support their population health to give back, because we've learned so much from them.

**Dr. Andy Galpin**
Yep.

**Dr. Herman Pontzer**
We want to make sure we're giving back. And so it's called Hadza Fund, H-A-D-Z-A-F-U-N-D.org. And if folks want to support the Hadza community, keep them strong and healthy, they can go on there and make a donation. It's always appreciated.

**Dr. Andy Galpin**
Really appreciate you coming out. I learned a ton, and I know people are going to respond really positively to this, so thank you so much.

**Dr. Herman Pontzer**
You bet. Thanks for the invitation. It was a really fun conversation.

**Dr. Andy Galpin**
Thank you for joining for today's episode. To learn more about Herman, follow along with his books, social media, laboratory, and other resources, please check the show notes for direct links. Thank you for joining for today's episode. My goal, as always, is to share exciting scientific insights that help you perform at your best. If the show resonates with you and you want to help ensure this information remains free and accessible to anyone in the world, there are a few ways that you can support. First, you can subscribe to the show on YouTube, Spotify, and Apple. And on Apple and Spotify, you can leave us up to a five-star review. Subscribing and leaving a review really does help us a lot. Also, please check out our sponsors. The show would not exist without them and their exceptional products and services. Finally, you can share today's episode with a friend who you think would enjoy it.

**Dr. Andy Galpin**
If you have any content questions or suggestions, please put those in the comments section on YouTube. I really do try my best to read them all and to see what you have to say. I use my

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Instagram and X profiles also exclusively for scientific communication, so those are great places to follow along for more learning. My handle is @drandygalpin on both platforms. We also have an email newsletter that distills all of our episodes in the most actionable takeaways. We have newsletters on how to improve fitness and VO2 max, how to build muscle and strength, and much more. To subscribe to the newsletter, just go to performpodcast.com and click Newsletter. It's completely free, and we do not share your email with anybody. Thank you for listening, and never forget, in the famous words of Bill Bowerman, "If you have a body, you are an athlete."

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