

Nicki: It's time to make your health an act of rebellion. We're tackling personalized nutrition, metabolic flexibility, resilient aging, and answering your diet and lifestyle questions. This is the only show with a bold aim to help one million people liberate themselves from the sick care system. You're listening to the Healthy Rebellion Radio. The contents of this show are for entertainment and educational purposes only. Nothing in this podcast should be considered medical advice. Please consult your licensed and credentialed functional medicine practitioner before embarking on any health, dietary or fitness change. Warning, when Robb gets passionate, he's been known to use the occasional expletive. If foul language is not your thing, if it gets your britches in a bunch, well there's always Disney+.

Robb: Welcome back friends, neighbors, loved ones.

Nicki: Hello everybody. This is episode 149 of the Healthy Rebellion Radio. Thanks for tuning in yet again. Let's see, well, last weekend was Easter weekend and we made a journey down to Idaho, 10 hours both ways to visit my sister and my dad who had drove up from Reno. So that was a nice weekend.

Robb: I was absolutely knackered after that weekend, as was most of the family.

Nicki: Exhausting,` but actually Robb your back held up really, really well.

Robb: It did.

Nicki: Which remarkably, because normally any kind of long distance driving even like three or four hours would-

Robb: Would lay me up pretty good.

Nicki: Lay you pretty up good. So that was a really, really good thing to see. But this ties into our news topic, I'm just going right there because we listened to quite a bit of different podcast episodes that kind of had been queued up for us. Things that we'd been meaning to listen to and 10 hours provides ample opportunity to catch up on those. And one of them was actually super fascinating. I don't know how this one got on your radar 'cause I'd never heard of the podcast before. A podcast called-

Robb: Decouple.

Nicki: Decouple.

Robb: Rachel James actually shared that.

Nicki: Okay, great. Anyway, so this is our news topic. We're going to talk about this podcast a little bit and it was absolutely fascinating. So it's a podcast that I take deals mainly with energy, all things energy.

Robb: Yeah. And trying to decouple from the carbon economy.

Nicki: Right. And the host is pronuclear.

Robb: And just as a little bit of background, the guy is not a climate change denier. He's actually very concerned about climate change, probably more concerned about climate change than I am. But he's looking at solutions for decarbonizing our energy systems and he's not a physicist or an engineer by training. He comes from the healthcare sector, but he has a bright open mind and has self-educated and followed a lot of folks closely in this kind of ramp up towards the quote, "green transition," which is not unlike... Just to drive this thing off a road immediately, beginning of COVID, I was expecting that there would be some discussion around vaccines. And then I really, really expected there to be a Manhattan Project type thing where we went in and looked at the repurposing of different drugs for therapeutic benefit in the treatment course, either prevention, prophylaxis, treatment, what have you.

And clearly none of that happened. It was actively suppressed. And then we had only one, and only one I guess Remdesivir or whatever, some of these other still patent worthy options. That was it. And not dissimilar to that on this kind of what are we going to do about climate change front. The one and only solution that is put forward is "green renewables" specifically wind and solar. Although to make this thing work, there's also apparently going to be a significant amount of hydroelectric, which people hate because it changes water courses and whatnot and geothermal, which really has limited application. You can only do it in certain spots.

Nicki: So anyway, the guest on the show is a man named Simon Michaux, I guess. I'm not quite sure if that's the correct pronunciation, but he's an Australian guy, right?

Robb: Yeah.

Nicki: So he is an Australian guy who is from the mining sector and I think he's a PhD in-

Robb: In physics and-

Nicki: In physics.

Robb: And then engineering. He had a general degree in physics and then he had a PhD in mining related explosives basically.

Nicki: There you go. And subsequently moved to Finland and so has put out this thousand page report. So basically everything is geared towards moving us towards this green net-zero scenario. And he remarkably asked the question that nobody else has asked, if we are going to get to net-zero and we're going to use no more fossil fuels, what does that mean for the amount? How much wind turbines do we need?

Robb: How many solar panels?

Nicki: How many solar panels do we need? What raw materials? Because he's in from the mining sector, so he knows all about the process of mining these metals. What is the quantity of these metals needed to produce the number of wind turbines and solar panels we need to completely cease using all fossil fuels?

Robb: And then also, which they didn't even get into this because the front end of it, what you covered was kind of blow your hair back enough. How much square footage does one need for the turbines, the solar panels, et cetera? Which they didn't even get into that. This is part of his thousand page report, but what was interesting is this guy went into the whole story with an open mind, but literally... So he went from working in the mining sector in Australia, and I won't give away too much of the episode. It is very worth listening to.

Nicki: It's about a little over an hour long, but really fascinating if any of this stuff is at all interesting to you. It's definitely worth a listen.

Robb: Well, it should be because we are-

Nicki: Because it matters and we're being bombarded with a lot of, shall we say misinformation or just propaganda that the way forward is this wind, solar net-zero path. But all of these leaders that are making these policies have never asked this question, and we don't have... I'll give a couple of these figures away. So there was this podcast, which is an hour and 20 minutes or so long. And then the Decouple folks also put together, it's just under eight minutes, a video with some highlights of-

Robb: An overview of the thousand page-

Nicki: An overview of that thousand page report. But basically, in order to do this, we would need 2.1 million new wind turbines and 27.6 billion with a B, new solar panels. And just for the wind turbines alone, it would require 44.5 billion tons of copper, which is six times more copper than has been mined in the history of the planet and five times more copper than all the proven copper reserves on earth. So if we have them, we don't know where they are. If we have these metals that are needed to produce the quantity of solar panels and wind turbines we need to completely decouple from fossil fuels, if they exist in the planet, we don't know where they are. And then they also talk a lot about the extraction process and the mining process. How challenging it is the more you've mined something to get the next marginal amount of the thing out of the earth.

Robb: Chris Martenson has talked about this, and it's funny, my kind of libertarian background, I've kind of kicked the can on this topic. It's like, oh, we'll innovate around this, we'll innovate our way around this. And this has worked at various points. And they mentioned, say fracking was an example where we were supposed to hit peak oil and then we pulled a rabbit out of the hat with fracking.

And we had about a 15-year run on that, but we are running up against the limits of resource extraction. And again, Chris Martenson has done a great job on this with his crash course. And maybe we should put that in the show notes too, but he has some great pictures of the late 1800s, early 1900s actually from locations around here. We drove by the Anaconda...

Nicki: A copper mine. Or they have the-

Robb: Smelter.

Nicki: You see it when you're driving on the highway. There's this huge smokestack off in the-

Robb: It looks like the Eye of Sauron.

Nicki: It does look like the Eye of Sauron. And so we Googled it 'cause I'm like, "What is that thing?" And it's the largest freestanding brick smokestack. And it's almost 600 feet tall and 75 foot diameter. It's huge.

Robb: But at one point, this particular operation produced one third of the global copper supply. And it has subsequently, that play has worked itself out, but Chris Martenson has photos of late 1800s, early 1900s copper nuggets that are as big as a Volkswagen Beetle. This is the type of material that they were mining copper age forward up until about the, again, late 1800s, early 1900s. It was literally like giant hunks of pure copper or effectively pure copper is what they were working with. And over the course of time, it makes sense to go after the easy stuff first. It costs less energy, it's more economically viable.

Nicki: It's right there.

Robb: It's right there. What has happened there's lots and lots of minerals around. Apparently the totality of the Andes Mountains is a significant amount of copper, but the amount of copper in these rocks is much, much lower than what it has been in the past. And there's a non-linear input of energy to be able to process these rocks because as the amount of metals decreases, the amount of energy necessary to extract these metals increases and it increases in a non-linear fashion. It's exponential. So you have to grind rock ever smaller. The rock is ever harder. It takes more and more energy.

Nicki: They're these huge, huge machines that run on fuel to grind this material smaller and smaller and smaller because the particulate is so small. And then it has to float in some sort of a water bath to extract it out. But like Robb said, the amount of energy required to get a given amount of a metal out of the earth is increasing dramatically.

Robb: So there are multiple metals that face this situation. There are multiple issues that come up with regards to resources and whatnot. And like Nicki mentioned, just to get this first generation of wind turbines and solar panels up

and running, and again, there's multiple metals that there we need six times more of nickel than has ever been found before and is six or eight times more than what we think even exists in the earth's crust that is reasonably accessible. And it goes on and on and on. And this is for one generation.

Nicki: These things only last 30 years and then you got to do it all again.

Robb: Then you have to do it all again.

Nicki: To make the next batch.

Robb: And they got into the problems of recycling. There are some things like steel and iron that are rather...

Nicki: One second. Our heater is making a loud noise. There we go.

Robb: You have some things that are pretty recyclable and then you have other things that are much less recyclable. And within even copper in the way that copper is used industrially, upwards of 30% of it is unrecoverable. And they had a great analogy with this, which is imagine a cup of hot water, you put some instant coffee in it, and then you put a scoop of sugar, and then you put a splash of milk and the milk has protein and fat and carbohydrate in it. Okay. You got a nice cup of coffee, probably more sugary and milky than what I would like, but then somebody says, okay, extract all that stuff out, recycle it. And so you could get the water out pretty easily. You can dehydrate it. The sugar, as a decent chemist, I could think about some ways of getting the bulk of the sugar out of there. But the coffee is going to be devilishly hard to get out intact and as coffee.

And the milk, there's no way to unfuck that situation. The thermodynamic process, the entropy, the loss of energy and information has just gone to the state that you would literally need to incinerate it, take the carbon, the nitrogen, the oxygen, and somehow plug it back into a biological system that would then produce milk, or synthetic organic chemistry that stuff from scratch out of raw materials like carbon and then carbon dioxide and then working your way forward. But there's just some of these processes that the arrow of time and entropy is not in your favor. And none of this stuff stacks up particularly well. And the guy made the case that fossil fuels energy density wise are like a steak wrapped in bacon and renewables are like lettuce.

Nicki: So all of our listeners will understand that visual of-

Robb: Diana Rogers uses that analogy all the time talking funny enough about goddamn vertical farms and this notion that we're going to feed the world with vertical farms. It's an absolute farce, and we've seen these things failing in the droves because the thermodynamic process, the energy inputs versus what the outputs are are ridiculous. And nobody sat down and just did some goddamn basic math on this stuff clearly.

Nicki: The world leaders that are pushing us in this direction are motivated by a feeling and ideal, I don't know. But again, it's kind of appalling that this analysis hasn't been done before this fellow just did this.

Robb: And I don't want to give away too, too much, but I really implore folks to listen to this thing and share it. It's a very good episode and super important because... So the host of Decouple is very pronuclear as am I.

Nicki: The guest, Simon Michaux-

Robb: The guest is Pronuclear too, but he had an interesting take on it, which was currently, it takes about 20 to 25 years to get a nuclear power plant up and running. Most of this is due to-

Nicki: Red tape.

Robb: Red tape and just ridiculous ecological constraints. And people are concerned about another Fukushima and different things like that. And that's understandable, but I keep pointing out to people that Fukushima and Three Mile Island and Chernobyl were built at a time when the rotary phone was the standard of telephonic communication. We've moved on a little bit in a lot of other areas except for nuclear because we don't do anything with it. It's just absolutely ridiculous. But he again, did some math and some projections on this. And we're in a situation in which we could start building nuclear power plants and we need a lot of them, and it won't plug the holes with everything that we need, but it could plug a whole lot of holes. But as we go forward, according to his projections, and I'm common around more to his worldview that we're not just going to continually pull an energy rabbit out of our hat.

We have a point in about 40, 50 years in which we effectively run out of fossil fuels to the degree that they too are really economically viable. And we have this time where we have ramped up on nuclear energy, but there's a reality of needing to deal with spent nuclear fuels, which this is where Gen III, Gen IV reactors in theory could use spent nuclear fuels, but we're not developing that technology yet. And it takes time to do it, but he basically made the case that we are in a race against time. We could thread the needle, we could do this and have this energy independence and this energy abundance be available for all of humanity. The alternative is that if this green revolution goes through, there will be an oligarchy that has access to-

Nicki: To power and heat

Robb: Non-trivial amounts of energy and then nobody else does. And even in that scenario, what is critical to understand is that thermodynamically, and you find any physicist, any engineer that will sit down and crunch numbers on this stuff, it is thermodynamically impossible to make new solar panels, new wind turbines using solar panel and wind turbine electricity.

Nicki: That was the big one. That was the big holy shit. You need fossil fuels to make them or nuclear.

Robb: We need some denser energy source to be able to make this stuff.

Nicki: But we can't move completely to wind and solar and then when the 30 years are up and those ones need to be retired, you can't make the next batch.

Robb: You can't mine the next batch. You don't have enough energy. You can't mine the next batch because there's not enough shit around. You can't recycle the next batch because that doesn't work thermodynamically.

Nicki: We need to really get to work on what direction we're going to take here, otherwise we're all going to end up in a...

Robb: Well, our kids are going to be in dire straits. We'll be dead more than likely, but we'll be cascading up towards the precipice on this. And this is again, one of these interesting things where cows are supposed to be this horrible blight upon the earth and we should be getting rid of them because of climate change. And we've talked a lot about that in the past, but this is another one of these examples where pre industrialization, we ran a lot of cattle globally in cattle type alternatives because this is a very thermodynamically efficient system. It's a very resource efficient system. You have sunlight, you have grass, you have grazing animals. You do need some infrastructure, you need some access to water, but the interesting thing is if these animals are well managed, it improves the water retention and it improves the soil and does all these things.

This is really the place that we should be looking at harvesting solar energy, is in our food system specifically on ruminant animals. And then that can play into the agriculture that makes sense. And that's a whole other thing is that the current reliance on, to the degree that we have access to fossil fuels and carbon inputs that could be turned into fertilizer, we would probably do well to figure out ways of saving those resources for that application versus burning them in other applications is where nuclear energy is valuable and just having an eye towards really well-run holistic management and grazing.

Nicki: It's a solid episode folks, definitely highly, highly recommend it. And again, steak wrapped in bacon versus lettuce. It's crystal clear. The Healthy Rebellion Radio sponsored by our SALTY AF electrolyte company, LMNT. Turns out that electrolytes don't need to be brightly colored and full of sugar. In fact, the brightly colored and highly sugared concoctions on store shelves often contained very few electrolytes. The sodium, magnesium, and potassium that your body needs to perform at its best. That's why we made LMNT the way that we did, all the electrolytes you need, none of the crap you don't. So if you eat keto or low carb, if you're an athlete, a Spartan racer, BJJ player, runner, biker, if you have an active or physically demanding job, work in hot or humid conditions. If you're a breastfeeding mom, if you have pots, or if you're just feeling a little tired and

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Robb: Let's do it.

Nicki: Okay, our first one is from Mike on protein and leucine and body size. "Hey Robb, just a quickie, we always hear that 30 to 35 grams of complete protein as the minimum threshold for obtaining three grams of leucine and the anabolic magic that occurs with this sort of meal. Is this body size dependent? Seems like it would have to be." Run with it, Robb.

Robb: I mean, to some degree, yes, this is going to be body size dependent. If you have a 100 pound individual versus a 265 pound individual, that anabolic signaling of 30 grams of protein is really going to be quite different. And I think that we just see this played out with general athletic success and hypertrophy gains at or around that gram of protein per pound of lean body mass up to a gram of protein per pound of body weight. I think the literature would make the case that the gram protein per pound of lean body mass is all that you need for the full anabolic signaling. And that's probably true, but then we have these knock on effects like appetite control and nutrient density and things like that. But yeah, there definitely is a size scaling factor here. The 35 grams of protein in a large individual is in theory going to get that anabolic signaling, but it's still going to be somewhat blunted in total magnitude relative to what their need would be.

Nicki: So sticking to the one gram per pound of lean body mass?

Robb: That just kind of overs things at a very macro level. You could get in and do all kinds of reductionist research on this, but just when we look at what produces success, we've seen pretty consistently that a modestly high protein intake with the adequate calories, not too much, but not too little, proper growth stimulus and whatnot that that's really where things work well.

Nicki: Cool. All right, Mike has a second quickie. "Everyone parrots don't get in the cold plunge immediately after your strength workout. It'll blunt hypertrophy. So what percentage of lifters are gaining any size anyways after their first several years of lifting? I lift for health, enjoyment, maintenance, as I imagine 90% of people do no matter what they tell themselves about getting huge. In that sense, is everyone fearful of cold plunge after lifting for no reason? I'm in shape, 38 years old, 165 pounds. I've been 165 for 10 years and will likely be 165 till I'm 80 and croak." Come on Mike, you might live to 85, don't sell yourself short.

Robb: You and me both. It's an interesting angle. A thing to keep in mind on this stuff is we do want some amount of pro-inflammatory response to maybe we're not gaining, but as what he said, he's 38 years old so he's in that thing where

you're fighting to hang on to whatever you got for as long as you can. So maybe you're not gaining, but we also tend to have a catabolic stimulus with aging and so we want to offset that. And I don't have my randomized control peer reviewed study to support this, but it makes sense that at least in that scenario we might not want to suppress that pro-inflammatory response from strength training because that is going to help us to maintain some amount of this. Now that said, I did see an interesting paper that looked at say ibuprofen administration in younger athletes and attempted hypertrophy training. And that appears to have blunted the mass and strength gain effects in younger folks, but interestingly in older people it actually seemed to improve hypertrophy a little bit.

Nicki: Interesting.

Robb: Wife, why might that be? Why might anti-inflammatory be not helpful in young people and possibly helpful in older people?

Nicki: The thing that's popping to my head is that older people probably tend to have more inflammation generally, and the younger people are more...

Robb: You're the smartest person in this room anyway. Yes, that is what my takeaway from that would be. And there's kind of an optimum that inflammation needs to exist and it can't be too little, can't be too high.

Nicki: It's the Goldilocks of inflammation.

Robb: There's a Goldilock zone within that and if we extrapolate ahead... And also it's always a story of this is probably within a standard western population and inflammation being probably ramped up if you're in this kind of ancestral health space, this may not apply the same way because systemic inflammation may not ramp up with age to the same degree. But one could make the case that with aging, maybe we do want to do some amount of maybe post-training cold plunge or other inflammation mitigating activities because if we get into too much of a pro-inflammatory state, then that can be a problem too. But interesting question and no perfect answer on this stuff.

I did see Huberman Lab, it was interesting. He made the case that doing a cold exposure pre-training offered none of the downsides with regards to negatively influencing inflammation and actually improved the neuroendocrine response, so like growth hormone, dopamine and epinephrine. So if one were to pick a timing around that, you would do your cold plunge and then so much of the benefit of the cold plunge is actually your body naturally warming back up. So it would make your warmup kind of a bastard. You would have to move and wiggle and-

Nicki: You'd almost have to cold plunge like an hour before and then let your body come back to temperature or you can actually actively warm up to warm yourself up.

Robb: Yeah, you just actively warm up. But the big deal was that for a lot of these benefits to take hold, you don't go from the cold into hot. You don't go from cold and then just sit down and put a blanket on.

Nicki: Gotcha.

Robb: You're mitigating or decreasing some of the benefits there, particularly the neuroendocrine benefits like the 600% increase in epinephrine in the brain and stuff like that, that really makes you awake and feel energized and whatnot because you nearly died in the cold water.

Nicki: All right, let's see. Our next question is from Sam on PerfectAminos. "Hi guys. Like so many others, I've followed you from the early days of CrossFit and remain a loyal follower. I have been a CrossFit gym owner for about 13 years now, 11 years with a normal affiliate. In the last three as a seniors only affiliate, over 100 members ages 55 to 93. My challenges are very different specifically with diet with these guys. This is a generation of some normal from farm to table eating and some margarine over butter believers. Some days my head explodes from the things I learn that they believe. Recently I was challenged by a new athlete with a bevy of medical conditions. Our first attack with these people is their protein levels. I know when people age their appetite for physical chewing, dietary protein wanes. So we try to get creative, but this one stumped me.

I'm familiar with BCAAs branched-chain amino acids and EAAs, but have never used this addition as contributing to dietary protein intake. In other words, if someone consumes 10 grams of EAAs in a powdered supplement form two to three times a day, I would not have counted that as 20 to 30 grams of protein from our dietary goal. Am I wrong? I'm currently being challenged on a supplement created by a local physician called PerfectAminos. I'd love your read on this. My fear is what I'm hearing them claim is I'm getting my protein with no calories. Maybe I'm too old for this new age stuff. Thanks again for all you do to bring sanity to the ever-changing world of health and nutrition."

Robb: It's an interesting question in that if we look at a serving of protein, so let's just say a steak that is uncooked is going to have a certain scale weight. And then if you cook it even rare, it's going to have a lesser scale weight because we took some water out. If we cook it well done, it's going to have an even lesser scale weight because we've removed more of the water. If we took that whole thing and cut it super thin and turned it into jerky, it's going to be much lighter for say seven grams of protein. Normally you need about an ounce of steak to get seven grams of protein. If you get into a really dried jerky, you can sometimes get 14 grams of protein per ounce of jerky, 11, 14. But it gets more and more dense.

Now, if we got in and we pre-digested all of that steak and got the little fiddly bits and the collagen and all the things that aren't contributing to the essential amino acids and the branched-chain amino acids out of there, there really is a significantly lower amount. We've removed the water, we've removed

this, we've removed all these different things. And so on the one hand I could see where this thing could maybe plug a little bit of a hole with regards to the anabolic signaling and all that type of stuff. The problem that I have here is this is this kind of reductionist approach where we forget that that protein offers satiety. And granted, I know Sam is making the point that sometimes with older folks, satiety really isn't that big of an issue.

They just don't want to chew things. Appetite goes down, hydrochloric acid production in the stomach decreases, so people just don't want to eat as much. And this is where you get in the bread and salt saltine crackers diet with older folks. But we forget about all of the nutrition that you get with that, the iron, the zinc, the copper, essential fatty acids, and again, some of the appetite control so that we have a little less tendency to overeat some of this other stuff. So I poked around and tried to find something where they had people extend long term or exist long term just off of an essential amino acid item like this, and I just can't find anything. So they make some pretty bold claims that this stuff is 99% absorbable and digestible. It probably is more so, and again, because when you strip all the other stuff out of it this is just raw amino acids that are relative.

When we absorb amino acids in the gut, they're mono and dipeptide, so either single or two amino acids. So they're in a form that it's like absorbing raw glucose versus a super complex starchy fiber type item. You got to digest that fiber and break it apart and everything and break it down, whereas these amino acids are just raw amino acids. So ostensibly you should be able to absorb them and they're just showing up with less other stuff to not get absorbed. So even then when they show the relative absorption versus eggs and beef, it's not really a fair comparison because you have water and collagen and fiber and these other things in there. I don't think long term this is going to be a real legit solution to older folks maintaining good quality muscle mass.

However, I would love to see something like this as a side supplement to an otherwise hopefully well-balanced diet. And I tell you, this is a place where ground beef, ground chicken, ground turkey, a little bit of that pre chewing by grinding it is a great idea for older folks. It's easier on the teeth, it's easier on the digestion, it makes it more absorbable.

Nicki: But let's say you have 150, 180 pound older person and they're getting 20 to 30 grams of protein from this. As long as they're getting-

Robb: It's not really 20 to 30 grams of protein, it's about five grams of amino acids and they're claiming that this is equivalent to 20, 30 grams of protein.

Nicki: Gotcha. So you would only count it as the five?

Robb: This is the tough thing because again, it is more concentrated. But I just don't know that we're really going to get the same mileage out of it, again, the overall nutri... Okay, great.

Nicki: But I'm guessing what percentage of... Let's say that this particular athlete of Sam's really wants to use this product. If he gets 10% of his protein allotment from this, how much of this do you think is-

Robb: Here's what I'm concerned about. We're quibbling over reducing the one macronutrient that is-

Nicki: Maintains muscle mass, keeps you...

Robb: Maintains muscle mass. It makes appetite suppression great, is thermogenic, is virtually impossible to store as body fat. You can in an overall a caloric excess state, but protein isn't the place that you get concerned about it. So what the fuck else are they going to eat? Now it's like, okay, you reduced their... And 20 or 30 grams of lean protein, 120 calories there or something.

Nicki: Yeah. Can of tuna.

Robb: That's not the place that you lose the fight. And Nicki and I have been weighing and measuring our food the past couple of weeks, and it's a big eyeopener. Where you lose the fight is on macadamia nuts and adding-

Nicki: Olive oil to things.

Robb: Olive oil to a meal that... And olive oil is great, but I'm getting ready to put together some spaghetti squash or something like that and I want to drizzle some olive oil on it. Well, I just took the caloric content to the moon potentially by being a little bit heavy-handed on that. And again, I know that from the practicalities of running a gym and just trying to get people to move forward, I guess the thing that I would-

Nicki: I guess I'm also wondering, is it a good stepping stone? Let's say Sam decides I don't want to have this battle with this person right now. Let this guy have his powdered supplement or shake or whatever this thing is, but make sure that he also eats 80% of his protein is actually real, had a face and a soul as you used to say in the CrossFit seminars, legitimate protein. And then let's get this guy moving, let's decrease his inflammation, let's build more trust, get some results. And then it's like, hey, you're making great progress, let's try dialing down.

Robb: And I think you can make it pretty quantifiable, like is the person achieving the goals that you would like? And one cool thing about running a gym is you always have people that you can compare and contrast with. We had a group of siblings that came from a Seventh Day Adventist family and they had been vegetarian their whole lives, and then a group of about three of them decided to go paleo and a group of three or four of them stuck with the vegetarian deal. And it was stunning the body composition changes and the strength increases.

Nicki: Some got pull-ups and the other ones didn't.

Robb: The other ones just fucking didn't. And oh, I'll eat a little more cheese or I'll do this and that. But even they're really heavily influenced by John McDougall and so they were vegetarian but leaning really hard towards veganism. And it was virtually impossible to get enough protein in them and they always ended up overeating calories because all the vegan protein options tended to come with a lot of-

Nicki: Cheese. Very calorically dense.

Robb: Well, they weren't doing a ton of cheese because they were so McDougall influenced. And this is some of the stuff that Diana Rogers has talked about and really detailed in Sacred Cow. You get two or three ounces of steak and you've got this protein and you got zinc and you got all this stuff. To get the same protein intake, the steak is something like 120 calories, 200 calories, something like that, you have to eat 800 calories of beans and rice to get the same protein allotment. And that's just protein at a macro level, like the grams of protein. It's not the same from branched-chain amino acids. It does not have the same anabolic signaling because the protein is all wrapped up in plant fiber. So it just doesn't stimulate a glucagon response and it just doesn't do the same goddamn thing. So you're going to overeat calories.

Nicki: Well, I just reread Sam's last sentence. He's like, "My fear is what I'm hearing them claim is I'm getting my protein with no calories." So if they're counting that as protein and they they have this extra calorie allotment that they feel they can then eat-

Robb: Something else.

Nicki: Something else. Carbs or fat.

Robb: Which carbs are they going to eat? If it's some fruit and it just-

Nicki: Probably wine.

Robb: I could use a snort myself right now. But Sam, it's a really interesting question and I think products like this, like I really like Whey protein for the right person post-workout. In an older population post-workout, Whey protein, no sugar in it, maybe just a little bit quarter cup of fruit or something like that. God, it's a great anabolic signaling agent and it comes with very few calories and it tastes good. So it's enjoyable and all that type of stuff. I love stuff like that. And so I could see this maybe nesting under something like that, but I'm just really... The way that, again, on their website where they're like, "This is 99% absorbable, so it's equivalent to this many eggs and this much this and that much that." Yes and no.

There's truth to it, but it's also being a little bit not fully honest or transparent with it. And also there's just all the other... We evolve to eat food, not take supplements. And I'm not saying that supplements don't have their place and they can be really beneficial in the right circumstances, but I just don't see this penciling out the way that folks would like it to.

Nicki: There we go. All righty.

Robb: Or maybe not. Here's the thing, the cool thing about an environment like that, and this is a very Greg Glassman orientation, if this is the beneficial way and it's superior, you will see that cohort of people pull ahead and kick everybody else's ass. And it'll be obvious and apparent and you don't need a study to delineate that. You'll see it in the gym. I doubt you'll see that happen though.

Nicki: Okay. All right, our final question this week is from Jeanie on microdosing testosterone. She says, "First I absolutely love your podcast. You recently mentioned microdosing testosterone on a recent episode. My husband has been on monthly intramuscular testosterone for the past 12 years. He works out four days a week with weights. I would just a little more info on that."

Robb: Man, so a monthly IM injection, it'd be interesting to know what that amount is. And then what would be really interesting is to, and this would be a fair amount of work, but to look at what his testosterone levels are one day after, five days after, 10 days after, 20 days, and then go forward. Usually the schedule is every two weeks. I think the vast majority of doctors follow an every two weeks protocol, but they're giving a rather large bolus. It's supposed to be the average amount that you would've secreted approximately day by day over that two weeks. And what ends up happening is that the individual goes super physiologic. So testosterone levels are way higher than what they would be under normal physiological conditions for some period of time. And this leads into things like increasing red blood cell production, which can be a problem for blood clotting and stroke and heart attack and things like that.

You're downregulating the receptor sites for testosterone because the environment is so rich and full of testosterone, so you'll tend to get a downregulation of receptor sites. And then we will pass into a period of time in which we are at normal physiological levels for a couple of days, but we're also coming off of being super physiologic. So again, the body stopped responding to testosterone because of the high levels and now the levels have dropped and it will start compensating back up, upregulating the receptor sites. But you've got this lag time in which the testosterone is now at normal physiological levels, but you can't sense it potentially. And then we end up in this low subphysiological period at the end of the month where you're lower than what you would've wanted at any period of any of this stuff. And so the really large doses just seem to make people feel like garbage. It doesn't seem to help with libido. It seems to have the highest risk of side effects. It just is the shittiest way to possibly do this.

Other options are to do much smaller doses, so take whatever the amount is that they're doing in say two weeks or a month and divide it. Let's say it's in two weeks, and let's say you're going to take it every other day. Some people do it every day, in which case you would divide it by 14. If it's every two days, then you divide it by seven. But then you just take whatever that amount is that you would normally inject and you can use something like a insulin syringe and take that smaller dose and go subcutaneous in the thigh or the hip or something like that. Try to get below the adipose tissue because you don't really want to inject testosterone directly into adipose tissue because of the aromatase in the fat, which can directly cascade it into estrogen, which is kind of a problem too.

But the stuff that I've read, and there's not a lot of studies, there's not a lot out there. It's very much kind of bro science website forums and stuff like that, but people report feeling a lot better and getting much better results, being much more normal. And this is in theory, much more the way that either male or female, you would have normal circadian variation where it goes up a little bit, it goes down a little bit and there's a little bit more normalized circadian biology.

Nicki: Not the huge peaks and drops.

Robb: Versus these massive peaks and drops. It's not remotely the same analogy because insulin does such different stuff, but it's like I'm going to take a bolus of insulin that's going to cover me for a month. And it's no, it doesn't work that way. But probably a bad analogy because it does such different things there, but testosterone has all kinds of functionality and it functions best generally within normal physiological bounds. Most people do feel better, do perform better when they're at the higher end of normal. There's just no two ways around that. This is why performance enhancing drugs are performance enhancing.

Nicki: Do you think that a physician who's prescribing this monthly would be open to changing that? Or is this something that-

Robb: I would hope so. And really this is some-

Nicki: Or do you find a different doctor?

Robb: You might find a different doctor. That's a whole interesting thing too. If it was one good thing that happened out of COVID, telehealth really took off and blossomed, but now the FDA and DEA are really cracking down on testosterone prescriptions, making it all but impossible. You again need to go physically meet a doctor. Whereas the way that telehealth had developed recently is that the doctor would talk to you online, you would get blood work, they would evaluate, they'd do all the history, all the shit, all the blood, the lab work and everything.

Nicki: We'd do everything on Zoom. Why do you have to go meet in person with the doctor?

Robb: But they're curtailing this stuff. And it's fascinating, given fentanyl and this and that and the other, it's like, this is what you fuckers are allocating resources to? Balding old guys with hair growing out of their back that just don't want to feel like shit?

Nicki: They want to feel a little better.

Robb: You're going to put the Stazie boots on their neck. But this is where they allocate a lot of time and resources. So...

Nicki: Jeanie.

Robb: Jeanie, that's kind of the idea, is you would just look at what is normally dosed in one bolus and then divide it into smaller sub boluses, whether it's every three days, every two days, every one day. It would be however you want do that. Insulin syringes can work fine. It takes a long time to draw up something like testosterone cypionate because it's an oil-based item and so it's viscous and it takes a while to do that. So there has to be a little bit of patience applied to that, but it can work just fine. And as with all this stuff, we would highly recommend quarterly, biannual blood work to make sure that things are looking good. Generally people don't need to do any type of aromatase inhibitors preventing the conversion of testosterone into estrogen.

Sometimes if the individual is really overweight, there might be a case for a very small dose like Arimidex or some type of aromatase inhibitor. But I think a lot of people have gotten themselves in trouble being so worried about estrogen that they suppress estrogen production to a harmful degree, which can lead to cardiovascular poor endpoint, poor bone mineral density. So ironically you're on testosterone therapy and potentially setting yourself up for a hip fracture, back fracture somewhere down the road because the estrogen is too low and your libido can be negatively affected and you'll feel like shit. All of this stuff works like a symphony, and each one of these hormones is a key and you want it to be turned on and off in a rather precise fashion, which biology is really good at doing.

And this is where if you can kick the can on stuff like this, or you can use something like tongkat initially, which is an herbal extract which seems to legitimately raise testosterone and Huberman Lab has talked about this a lot. That could be a first intervention. Using something like HGG or Enclomiphene turns on the production of testosterone in the brain because it tricks the brain into thinking that testosterone levels are low and so it's still running through the gonad. So you're getting the normal cascade process as far upstream as you possibly can. And each step that you intervene further down when you just apply testosterone exogenously, it can be great, it can be the right call for many people, but it's also where people end up getting not as good of libido, not as good of cardiovascular effects and whatnot. But if they've had traumatic brain injury or whatever situation they're just hypogonatic, then it also can be a complete life

changer.

Nicki: Okay. Good questions this week.

Robb: Hopefully good answers.

Nicki: I think that's a wrap. Any other closing thoughts?

Robb: No, just I would really ask folks to go back and check out that Decoupled podcast. It's this thing again where we're having decisions made around our food systems and our energy systems. And I will mention Jordan Peterson, he's got this initiative going in... I've lost track of it, I just saw it a couple of months ago. But he basically had an initiative like we must figure out our energy future. And so really doubling down on figuring out next gen small modular reactors for standard nuclear fission, investing in nuclear fusion. Back to the Green Revolution stuff, which we've already painted this really kind of bleak picture about can we even get enough resources out of the ground to build this stuff? And it honestly doesn't look like it, and it's so energy intensive.

Nicki: But we didn't even mention the storage component in the report. They estimated the batteries would be the most likely thing to store it. And there's the number of gigantic batteries that would be needed to store these things, it's like where do we put them all? It's massive.

Robb: And again, the lithium to make that represents five times more lithium than has ever been mined in history. And they do mention in this thing, there's quite a bit of lithium in the earth's crust. It's a fairly ubiquitous item, but it occurs in varying amounts. Just because there's a lot there-

Nicki: People don't like it when you plow down a field to build a supermarket. What parts of the earth are going to get plowed under? They don't like mining in any of these operations anyway, but to do what, again, our global leaders are pushing towards is going to dramatically change the earth's landscape.

Robb: Well, the wording that they used is turn the earth's crust inside out, and we don't have the energy for it. We don't have the time for it. They used an analogy or dug into the giant earth hauling trucks that are used. They're 200 ton trucks that carry 400 tons of ore. The amounts just boggle my mind. I don't even know what-

Nicki: Can't even picture it.

Robb: I don't have a picture for it. You get these numbers and it's just, you kind of glaze over with it. But they were mentioning that these trucks run currently on diesel, and the diesel runs an electric generator that helps run all this other stuff. And these trucks run in eight hour shifts and it's literally one guy is running and gunning for eight hours and then he pulls in, stops, a new guy jumps in, they refuel the truck and it's like an indie pit car turnover. And the next one goes. And

it's like \$4 billion to get a lithium mine up and going, or a copper mine, I forget which one it was.

Nicki: Whatever it is, it takes 15 years to pay-

Robb: To pay back the capital input.

Nicki: To pay off the capital. And so then to suggest that these trucks would be running on batteries, which then need to charge for some amount of time.

Robb: The current battery technology allows them to run for 90 minutes then they're offline. And so they made the case that if we increased battery capacity by 600% and these things could run for seven hours, they're still offline and need to recharge versus these massive diesel machines run kind of 24/7 for years and they almost do maintenance on them while they're driving them. And they have to do that because \$4 billion of capital input has a massive fucking price tag attached to it with interest rates an hour. And then they made the point too that just to circle this thing back around, if y'all haven't notice globally in the United States in particular, is in a really up position from an economic perspective. We have printed so much money and we have so much debt and now our interest rates are high because we're trying to drive down inflation that we don't have any more wiggle room.

30 years ago had we seen this coming, and some people did but we've been unwilling to do anything about it, we could have really laid in a bunch of capital intensive activity to mine the stuff we needed for nuke and to really make this stuff go forward. And we could have probably had an easier, more seamless position. We're now at this point where it's literally going to be like this thread the needle process potentially in which we will barely have enough energy to get us over to the next side where we basically have a nuclear fueled energy that can provide for us. And they add all kinds of details on that. Anyway, maybe this guy's right, maybe this guy's wrong. I think he's far more right than wrong. And at a minimum he's got a thousand page report that if people want to put forward this notion about the green future, they need a good answer to that stuff. Because otherwise we're dumping very limited time and resources into not just a boondoggle, this is the picture-

Nicki: We have very limited time, but we're dumping massive resources into a boondoggle.

Robb: Right.

Nicki: Yeah.

Robb: So yeah, please check that out.

Nicki: And the video too. And if you have kids that are of a reasonable age, have them listen to it, watch, the video's literally eight minutes long. I think it's

definitely something that needs to be shared.

Robb: One of the things that Simon Michaux mentioned is that we have a woefully ignorant politic running things. We don't have any engineers, we don't have any physicists. They are few and far between. If we do get somebody with a science background in politics, it's usually a retired doctor or a currently practicing doctor, which is great, but they're not engineers and physicists. They have some experience in this stuff, but to put not a ton. And these folks are not making decisions with any type of truly informed understanding about what our current situation is. Which is why we're seeing moves like do away with all cattle and we should be going 100% into green renewable energy when it's neither green nor really renewable. Because you get that one generation of these things and then you're like... The windmills out of Europe are when they get decommissioned, get chopped up and moved to North Africa and landfilled.

Nicki: And we saw one of these...

Robb: Blades.

Nicki: Blades from a turbine. It was on our drive. We drove for 10 hours both ways.

Robb: It was like four semis long.

Nicki: It was so huge. And that was just one blade for one turbine.

Robb: One of probably three or four of them on a turbine.

Nicki: And I mean, massive. And we need, what was the figure? 21?

Robb: 21 million, yeah.

Nicki: 21 million of these things. And if each one has three blades, so 63.

Robb: There's a lot going into it.

Nicki: I mean it's a lot. It's a lot. Anyway. All right folks, thank you for joining us for another episode of the Healthy Rebellion Radio. Please check out our show sponsor, LMNT for all your electrolyte needs. You can grab yours at drinklmnt.com/robb. That's drinkL-M-N-T.com/R-O-B-B. Remember when you buy three boxes, you get the fourth box free. And I think that's it. I'll catch you all next week.

Robb: Bye everybody.

Nicki: Bye-bye.

