

Nicki: Welcome to the Healthy Rebellion Radio. This is an episode of Salty Talk, a deep dive into popular and relevant health and performance news pieces mixed with the occasional salty conversation with movers and shakers in the world of research, performance, health and longevity. Healthy Rebellion Radio's Salty Talk episodes are brought to you by Drink Element. The only electrolyte drink mix that's salty enough to make a difference in how you look, feel, and perform. We co-founded this company to fill a void in the hydration space. We needed an electrolyte drink that actually met the sodium needs of active people, low-carb, keto and carnivore adherence without any of the sugar colors and fillers found in popular commercial products. Health Rebels, this is Salty Talk.

Nicki: And now the thing our attorney advises, 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 or dietary or fitness change. And given that this is Salty Talk, we should expect the occasional expletive. As we sit here and stare at each other and wonder which one is going to open the show.

Robb: Yeah, we're just like who's going to crack the seal and welcome all of you to another edition of the Healthy Rebellion Radio Salty Talk.

Nicki: Salty Talk.

Nicki: We did that in harmony sort of.

Robb: We did ish.

Nicki: Not really.

Robb: Yeah. Isn't that a jinx pickle moment where I get to slug you or something like that?

Nicki: I don't know.

Robb: Cool. So what's a show about?

Nicki: This episode of Salty Talk is about, I don't know, you tell us. We've got a title of Blood Glucose, Brains and Heart Attack.

Robb: Yeah. So I want to say about six years ago, the potentiality that one of the big precipitating features of a heart attack and stroke, the occlusive process, atherosclerotic process feeding into a blood clot and whatnot the blood glucose changes going from high to low could be a major precipitator in that whole process. And it was interesting clearly. Most of the world is very wrapped up in this lipid centric model, cholesterol, lipoproteins. And without a doubt those things play a feature here. But what was interesting is again, several years ago, just this idea that just simply the change in blood glucose was really powerfully correlated with the precipitating events for a cardiac event.

Nicki: And this over the course of a day, like after a meal, having really high blood glucose and then it plummeting or.

Robb: That's it. That's it. Yep. And that was interesting, but you file these things away and you just keep looking at stuff. And then a number of other papers popped up where they started looking at the glycosylated lipoproteins. Most people are familiar with glycosylated hemoglobin, hemoglobin A1C and that is a measure of average blood glucose over time. But there's one paper that really fired me up. I'm like, "Okay, yeah, we've got something worth digging into here." They were looking at the glycosylated lipoproteins and looked at reasonably sick individuals, they looked at a bunch of different stuff. But the thing that really stood out, the thing that seemed to be the most predictive of whether or not folks had poor health outcomes was this glycosylated lipoprotein. And so that was a piece of this story.

Robb: Another piece of the story is this recognition that again, these blood glucose deltas going high, going low, seems to feed into a process of neurodegenerative disease. And this isn't as simple as the stuff that I used to believe or think about, say like 10, 15 years ago, where if blood glucose goes high, then it was a guarantee that you ended up say like in insulin resistant state. That isn't necessarily always the case. But I did point out in *Wired to Eat* and this is based off of some of the work that Stephan Guyenet has done in the past that when we look at the blood glucose levels of pre-westernized societies, even if they eat a high carb diet, they don't get the blood glucose changes that westernized people do. They look more like your blood glucose, whether they eat high carb or low carb.

Robb: And a big thing that I pulled out of this was by hook or by crook, whether you need to eat low carb or whether you can eat high carb or you need to work out beforehand or something, it really behooves you to not have these extraordinary excursions and blood glucose levels. And what I think is physiologically appropriate is way lower than what the standard mainstream medicine sees. And Peter T. I think has some cut points that are even tighter on this if you're wanting to avoid most of the problems associated with blood glucose excursions. So again, can't emphasize enough. There are some people that do pretty well on carbohydrates and those people generally their blood glucose looks very similar pre, post meal as what my blood glucose does eating low carb. Doesn't get that high, doesn't drop that low. There's just not that much of an excursion.

Robb: If you are experiencing that, then I will go out on a limb and say that you were exposing yourself to a much higher risk profile for everything from cardiovascular disease, type 2 diabetes, neurodegenerative disease. And this is a fairly easy to get on top of and do something about.

Nicki: Awesome. Well let's dig into it and folks, members of the Healthy Rebellion get access to this video with the slides. So that's an option as well.

Robb: Absolutely.

Nicki: Let's jump in.

Robb: Hey Rebels, welcome back. Today's show should be a little bit mellower than the last one. The 5G unpacking was a lot generally pretty well received. Some folks had some good questions as a followup to that. Some other people continue to lose their minds over this thing. I will do a followup looking at some of the mechanistic proposed papers that there may be a problem with these voltage gated calcium channels, these proton or protein pores that move ions and other substances around the body. There's a review or a propose mechanism paper out there that suggests that radio frequency waves can be problematic there and I will dig into that and hopefully try to put a little bit of context around that. But anyway, today's piece the working title is Blood Sugar, Brains and Heart Attacks is looking at a topic that has been on my radar for quite a while, which is this idea that cardiovascular events, stroke and heart attack, although we tend to think almost exclusively about the lipid part of that story.

Robb: Primarily cholesterol and lipoproteins like LDL cholesterol and LDL lipoprotein. It's been my sense that there is something else going on with that and I'm not in the 100% cholesterol deniers camp. I think that lipoproteins status can influence, say like cardiovascular disease risk. But I've also been of the opinion that there's a lot more to the story than just that. And as an example, somebody who has say like LDL lipoprotein count of 2,000 and they're eating a low carb diet is their risk profile the same as somebody who has an LDL lipoprotein count of 2,000, but they're insulin resistant heading towards type 2 diabetes. I think that those are two very, very different people and different risk profiles and I think a lot of that has to do the effects that big blood sugar excursions can have on our health.

Robb: So we're going to dig into that and we're going to look at everything from the cardiovascular disease perspective on this all the way to the effects that significant blood sugar excursions can have on our brain. Because I think once you span heart disease, cardiovascular disease, trending into neurodegenerative disease, you've peed on a lot of territory there as far as the things that we might succumb to. And if we have strategies for mitigating the risk in that story, then that's probably pretty valuable stuff. So this first paper was the article, was in Wiley study on the levels of glycosylated lipoprotein in patients with coronary artery atherosclerosis. So oftentimes people are familiar with glycosylated hemoglobin A1C which is a measure of the amount of advanced glycation end products which have accumulated on red blood cells.

Robb: And that that gives us a valuable measurement for the average blood glucose levels that an individual's experienced over the last chunk of time. There's a little bit of variability there, like people eating low carb diets, the red blood cells tend to live longer, so you can get some artificially elevated A1Cs. But this is looking at the levels of glycosolated lipoproteins in patients. And again, if you're new to this scene, generally when we go to the doctor, we get a physical and we get some health screening. We get some basic blood work that looks at cholesterol levels, total cholesterol, HDL, cholesterol, LDL cholesterol. But what's missed in that story is that this cholesterol is carried around the body in these things called lipoproteins and the LDL-P, LDL particle is where the LDL cholesterol is shuttled about and then you have the HDL particle and you have other intermediate and very low density particles as well.

Robb: But the just screening for cholesterol content has all kinds of problems. In my opinion and in the opinion of most lipidologists doesn't really give us an accurate picture of what's going on with regards to some cardiovascular disease risk profiles. I think there's an additional layer to this which is considering the glycosylated lipoprotein fraction in these folks basically. And this isn't just the singular mechanism here, which would hopefully I'll remember to talk about that later, but alterations in the lipoproteins caused by glycosylation, basically sugar sticking to these proteins may be an accelerant, a critical factor in this whole atherogenic process. So in the study they looked at 200 folks that had had previous heart attacks and had a host of different health problems and then they had 230 control individuals. And generally things are pretty similarly matched. Like average heart rate is a good bit higher in these people who've had a cardiac event.

Robb: Their systolic blood pressure is a bit higher, diastolic blood pressure is a bit higher. Smoking is about the same in both actually the control had a few more smokers than the heart attack group. One thing that's interesting to me in a significant potential confounder here is that hypertension, elevated blood pressure was a good bit higher. It represented 52% of the heart attack population, whereas only 12% of the control population. That's a pretty big deal and that's also one of these things that may be tough to control for because what they wanted was a group of healthy people and it's very, very difficult to have both elevated blood pressure and any designation of health. But when I'm talking about these challenges around elevated blood glucose and glycosylated hemoglobin, I do think that that's a really important consideration.

Robb: But the hypertensive piece I think is something that we've known for ages is a significant risk factor with regards to atherogenic potential and stroke and heart attack. But I think it's underappreciated how significant it is because one of the competing theories out there around cardiovascular disease progression is the endothelial damage hypothesis and this thing holds a lot of water for me. Like it takes a lot of the boxes that the standard lipidology model of cardiovascular disease really doesn't address. And in that model hypertension is just outstanding route for causing damage to the vascular endothelium. And it's worth noting that you generally do not see any type of atherosclerotic plaquing on the vascular side, the vessel side of the circulatory system. It is almost exclusively found on the arterial side, which is the higher pressure side, which is the side that we could potentially experience things like non laminar flow, turbulent flow and turbulent flow is understood to potentially cause damage to the vascular endothelium.

Robb: Now there can be adaptations to that, like calcification of the area or thickening of the area, which one could argue is beneficial and adaptive. But then there's also trade offs with everything. So maybe under certain circumstances that adaptation to this non turbulent flow could be problematic. And if we're just subjecting the system to blood pressure levels plus blood glucose levels and maybe lipid levels too that are outside the ancestral norm, then maybe that's feeding into the overall problems that we have. As far as dyslipidemia, that was about equal in both groups and then diabetes there was significantly higher prevalence about 30% of the heart attack individuals were diagnosed with diabetes where it's only 8% were diagnosed as being diabetic within the control group. Okay, so when we looked at their triglycerides, total cholesterol, HDL cholesterol,

LDL cholesterol, it's interesting in the case group, the group of the folks that had preexisting cardiovascular disease, they had suffered a heart attack typically.

Robb: Triglycerides were a bit higher, not shockingly higher, but a bit higher. Total cholesterol was actually higher in the control group. Again, not massively and once we account for the error bars, then there's actually pretty good overlap there. There was slightly higher HDL in the control group, but interestingly slightly higher LDL in the control group too. So this is another one of these things where when we look at cardiovascular disease risk profiles, LDL cholesterol, LDL lipoproteins do correlate with this process in a lot of ways, but it's not 100% uniform story. And hopefully we'll circle back on that here in a bit. They also looked at fasting blood glucose, which was definitely elevated relatively in the case group, the heart attack group. And this was evidenced both in the fasting blood glucose and also in the A1C, which is the blood glucose average over time.

Robb: The A1C was 6.1 in the case group and 5.7 in the control group, which is not a great A1C to have for a "healthy" population, but it is definitely better. Oh, when we look at the levels of glycosylated lipoproteins in the different groups, both with regards to LDL and HDL, the case group, the group that has suffered cardiovascular events had significantly elevated glycosylated LDL and HDL. So this is the case that these folks are building around largely correlative elements upfront and then suggesting some mechanisms of causation. In the summary to the paper, the lipid levels were not a major factor in the development of coronary atherosclerosis. Then level of modified lipoprotein is closely related to development of coronary atherosclerosis is necessary to take action for glucose control while administering lipid lowering therapy. And I'm going to touch on that in a moment.

Robb: Statins are used to lower lipids and lipoproteins. They do a lot of other stuff too. Certain statins can enhance nitric oxide release in the vascular endothelium. They do seem to have some anti-inflammatory effects. So it's entirely unclear whether or not the vascular benefits that are conferred to some people with statins is related to the modification of the lipid profile at all. And I think that that's a reasonable thing to contest into question. May not be 100% the case all the time, like we have some familial hypercholesterolemia where there seems to be some improvements and morbidity mortality in those circumstances with a statin. But again, is it 100% the effects of lipid lowering or is it some of these other knock on effects? But some of the thoughts here is, like I said before, they definitely seem to ignore the reality that elevated blood pressure could be a real factor here.

Robb: Hypertension is a fantastic way of damaging the vascular endothelium and lipoproteins are involved in repair and so if the vascular endothelium is getting damaged at a good clip. So like if we had a scenario in which we had high blood pressure, which in theory would be damaging the vascular endothelium and then high lipoproteins in particular LDL-P, then we have an interesting scenario there where arguably we're set up better to heal the vascular endothelium, but if the level of damage that's occurring is above and beyond what our expected ancestral norms are, then we could start developing a chronic degenerative disease state. And I think that this shouldn't be too controversial of a topic. It's not like statin denying, it's not cholesterol denying, but it starts accounting for some of the nuance that we see.

Robb: And then if we add in the additional wrinkle that the advanced glycation end products which modify these lipoproteins and will absolutely affect their structure and the way that they function, both the way that they directly function in our body and also the way the immune system sees these chemicals or these molecules, that could change a lot of the story. And now a quick word from our episode.

Nicki: This Salty Talk episode is sponsored by Kettle & Fire. Kettle & Fire makes the first USDA approved shelf stable bone broth made with grass fed and finished beef bones and organic pasture raised chicken bones. Bone broth is super helpful in improving gut health. Can help with leaky gut and provides nutrients for stronger hair, skin and nails. And the cool thing about Kettle & Fire is not only do they make amazing broth, but they have a whole line of soups that they make with their broth. And we in our household particularly are fans of the tomato soup. One of the things we like to do after we have a robb frequently bake a chicken or we'll pull the meat off the carcass and...

Robb: I'll just dice that up and maybe saute that with a little bit of veggies, maybe not. And then just put the tomato soup on it. And if you've already gone through the process of prepping the meat or even if you just had some chicken or...

Nicki: I think it'll work with any protein that you have leftover.

Robb: It could work with any protein but for some reason the chicken just seems to pair really well with the tomato. But anyway, it can be literally a three minutes process, you're through.

Nicki: Also could be a quick lunch if you're working from home. But we definitely like it, the girls like it.

Robb: Kids smash it. Basically, whether or not we do two, a second exposure of the meal is kind of did we have to write the kids to eat it.

Nicki: The litmus test?

Robb: Yeah

Nicki: Yep. So check out Kettle & Fire, go to kettleandfire.com/saltytalk and use code SaltyTalk for 15% off your order. And now back to this episode of Salty Talk.

Robb: One of the earliest papers that I ran across, there are newer papers in this one I'm talking about here from the Indian Journal of Endocrinology and Metabolism. It was published January, February, 2012. And the title is, Does Hypoglycemia Cause Cardiovascular Events? This is the first paper that I found that made a suggestion, and again, it's not necessarily contrary to the lipid hypothesis, but really made a case that there might be a different accelerant, like a different initiating factor in this. And from the abstract, hypoglycemia is a very common side effect of insulin therapy and to a lesser extent of treatment with oral hypoglycemic agents.

Robb: Severe hypoglycemia can precipitate adverse cardiovascular outcomes such as Myocardial ischemia and cardiac arrhythmia. These are mainly secondary to autonomic activation, which results in the haemodynamic changes, vasoconstriction and rise in intravascular coagulability and viscosity. Basically, when the brain tends to get fairly well attuned to the blood glucose environment that it's in, and if the glucose goes up slowly or down slowly, we tend to not see the really severe response like this autonomic activation phase of constriction, elevated heart rate, elevated blood pressure and whatnot. But in these all too common hypoglycemic events where blood sugar goes very high, which itself is problematic because of advanced glycation end products, which can occur throughout all of the body receptor sites, lipoproteins like we just discussed, but also seems to have a pro-inflammatory effect.

Robb: And so this is the first paper that I ran across years ago that made the case that hypoglycemia may be the precipitating element to cardiovascular events, and it's been cited a ton of times since its publication. And again, lots of newer papers likely have a better take on this, but I have links to this paper in the show notes. It's worth digging into because to my knowledge, it's the earliest paper in this story that that raised this question of could blood sugar deltas like going from high to low. Could that change in level be a precipitating factor for cardiovascular events. And then circling back around a bit to where we left off on the first paper where the end of the paper made the case that elevated blood glucose levels are really problematic with regards to atherogenic potential and that we need to be mindful of blood glucose levels when we are managing cholesterol and lipoprotein levels because statins have a tendency to elevate blood glucose levels.

Robb: So this is a journal Cardiovascular Diabetology number 17, published 2018 number 155, but the title is Effects of Statins on Fasting Glucose in Nondiabetic Individuals, nationwide population base health examination in Korea. This thing is a bit of a retrospective study, but it's interesting. This looks at the effects of statin therapy on fasting blood glucose over time and it's a very consistent upward trend in blood glucose. And from the conclusion in the paper, more adherent and intensive use of statins was significantly associated with an increase in fasting blood glucose of non-diabetic individuals and subgroup analysis of individual statin use atorvastatin, rosuvastatin, pitavastatin and simvastatin had significant association with increase in fasting glucose and then some other statins tended to not have as much.

Robb: So it's one of those things that really needs to be weighed in this decision making process. Let's say that you do have elevated lipoproteins, but you also have elevated blood glucose levels. What should you do? Some people are just... they have a sense that this is an absolutely crystal clear answer. It's not entirely crystal clear to me because when we think about individual differences and possibly the dueling banjos of what's happening here, I can see where this could be a bit of a murky outcome. But I will say, and maybe the self-serving because I'm a fan and clearly of paleo and low carb diets and all that stuff, but in my mind, shifting to a lower carb way of eating makes a lot of sense here because we have a direct mechanism for lowering lipoproteins and cholesterol, which that happens in most people under these circumstances.

Robb: Not all, some people see an elevation, so we need to definitely keep that in mind. But we definitely see a reduction in blood glucose levels. And so it's a really good question to me about how we want to tackle this. And again, it doesn't necessarily have to be a super low carb intervention to have efficacy if we just are shifting people off of refined carbohydrates, particularly liquid carbohydrates. And we're some a whole food, paleo Mediterranean type deal is probably going to be a win. But as we'll reconsider the work out of the Weitzman Institute here in a little bit, there's a lot of individual variation there. Some people just they don't do that well with carbs and there may be a situation in which they are overeating saturated fat.

Robb: These things can affect insulin sensitivity in a negative way and tend to promote elevated blood glucose response. But just as an example for myself, I have tried every iteration of improving my insulin sensitivity so I could eat a modest amount of carbs and it just hasn't worked. And I'm not by any means saying that that is the story or the destiny of everybody. But within this population, we draw a big bell curve. There are some folks who are going to navigate all this stuff really well and there are going to be some people that have a heck of a time handling much in the way of blood glucose excursions or just dietary carbohydrate.

Robb: So statins clearly have some specific utility. Again, I'm not in that Uber statin denier camp. I think that many people are a bit too aggressive in the application and not really considering the a cost benefit risk analysis there. But clearly there's some utility there. It tends to be in some really specific sub categories of people, but there's also a pretty clear trend of statins increasing blood glucose levels and these elevated blood glucose levels lead to increased atherosclerosis and cardiovascular events.

Robb: So do you want to get in and do something that screws up blood glucose levels, just so you can "treat" the cholesterol? This is just a conversation that I don't think is had often enough between doctor and patient just when people are considering the pluses and minuses of different approaches. And again, there's definitely interventions like getting adequate sun and exercising and lifting weights, all of these things can favorably impact both the lipid part of this story, the blood glucose part of this story, the hypertensive part of the story. And this is why addressing the four pillars of health, sleep, food, movement, community/stress, they're non negotiable features of getting on top of this complex chronic disease process.

Robb: Shifting gears from the cardiovascular considerations, there's a piece that appeared in medical hypotheses June 2020. Looks like it's going to be published. It's interesting. So it's in electronic publication right now, June, 2020, it'll be print publication, but does hyperglycemia downregulate glucose transporters in the brain? And this is an interesting treatment where they discuss the different families of glucose transporters, the different ISO forms, and then what happens in the scenarios in which the brain is subjected to higher than is likely good blood glucose levels. And it makes the case that under glucose fed circumstances, glucose is the primary fuel for the brain, but when these glucose transporters are exposed to significant elevations in blood glucose, they will tend to downregulate the glucose transporters and this is a protective mechanism to prevent an overabundance of energy in the neuronal tissue.

Robb: And it's interesting because energy toxicity is... there's two pieces that I look at in a lot of this chronic degenerative disease state. The first is a chronic energy toxicity where we're just chronically overfed and you can certainly do this on a low carb diet. Like I think people overeating fat can overwhelm their mitochondria with the triglycerides that are coming in, calories do in fact matter. I do have a sense that eating a mixed diet where it's easier to overeat calories in total and have both the negative effects of too much glucose and too much fat. I arguably think is worse but overeating of any kind is problematic. But the two dueling banjos or different ends of the spectrum that I see happening here is on the one hand, we can have damage to different tissues and most especially neurological tissue from a situation in which there is energy toxicity. There's too much energy being rammed through either the glycolytic process and or the mitochondria and there's all kinds of problems that can come about from that.

Robb: But then the flip side of this is that we can end up in these energy deficit states where we have too little energy actually making its way through these different tissues. And this is interestingly one of the features and benefits of things like ketone bodies is that they're called energy recovery substrates for these situations in which again, specifically say like insulin resistance in the brain can't get enough glucose in or the neurological tissues will tend to start being damaged and dying if we don't do something about that. And both lactate and different ketone bodies, mainly beta-hydroxybutyric can provide an alternate fuel substrate to prevent that energy crisis within the cell and the ATP and NAD reduced production.

Robb: So when the blood glucose goes very high, we tend to get both energy toxicity and some damage to the cells, which causes a downregulation in the glucose transporters. And then if we end up in a hypoglycemic event, which is not difficult to do with these blood sugar highs and lows, we go from an energy toxicity and damage state to a situation in which we are at an energetic deficit state. We're not keto adapted, we may be insulin resistant, even if it's just "at the blood brain barrier." And then we suffer the damage that is inflicted from an energy deficit state. So these blood sugar excursions and these running the highs to lows are really dangerous. And I would make the case that these blood sugar excursions are far more dangerous than just about any given lipid level and there's caveats to that.

Robb: I know that, again, in the case of familial hypercholesterolemia, we can have some remarkably high lipoproteins and cholesterol levels. And there clearly is some linkage to morbidity and mortality there but throw a big glucose excursion scenario in with that and think about the proinflammatory effects, the increase in viscosity of the blood, the energy toxicity followed by energy deficit state and it's a really damaging process to be in this blood sugar roller coaster experience.

Robb: Now again, I think it's really worth remembering some things like the work from the folks out of a Weitzman Institute where they had the piece personalizing nutrition by prediction of the glycemic response. This was a great paper and was really front and center in Wired to Eat. And the takeaway that... if you guys recall this, it looked at the blood glucose response of about 1,000 people. They did a gut microbiome analysis, full genetic analysis, and comprehensive lab testing and they started feeding people different meals, different carbohydrates, and looking at their blood glucose responses.

Robb: And they were all over the map. And although they did in theory, find some signal in the noise with regards to gut microbiome interfacing with genetics and what carbohydrates amounts and types people might do best with, what was fascinating is there were examples of people eating chocolate chip cookies and they would have a totally nominal blood glucose response, but the same person would eat a banana and have a crazy blood glucose response and then vice versa, where a banana caused a virtually nonexistent blood glucose response and then the cookie caused a sky high blood glucose response. And the big takeaway for me is that we need to really respect the fact that different folks have vastly, sometimes shockingly different blood glucose responses to various foods.

Robb: And what's interesting for me is that the folks who do really well on high carb say low or moderate low fat diets they tend to have a blood glucose response that looks pretty similar to what I have eating broccoli, kale and maybe a little bit of carrots. These folks will sit down and eat rice and have a lot of it and their blood glucose might get 110, 115, maybe a little bit more than that, but not much more than that. And these are the folks that are able to motor along really well on a high carb diet and it seems to work well for them. But the thing that is, in my opinion, so missed in this story is that the blood glucose response still needs to look like what most people experience under low carb eating.

Robb: And the folks who don't experience that end up developing problems, not the least of which is that they tend to overeat because of these, again, hypoglycemic events, the blood sugar goes high, then it crashes low. This is a great way for stimulating hunger because we want to rectify that low blood sugar experience with something other than cortisol and adrenaline pinging the liver to release glucose. So this is the merry-go-round that people can get on with regards to these hypoglycemic events and I think it's a little bit in my mind of the Rosetta Stone within these macronutrient wars. Some people do well on low carbs, some people do well on low fat.

Robb: The folks who do well on low carb oftentimes cite the fact that they get really high blood glucose levels in response to a denser carbohydrate sources and that's true. But what is oftentimes missed is that there are other people like my wife who eat dense carbohydrate sources and they have outstanding glucose disposal. They have good phase one and phase two insulin response. And so their body's anticipating the carbohydrate but then it matches that second phase insulin response appropriately. So we don't get a hypoglycemic event and they motor along pretty well on that.

Robb: But this is something that again, in these macronutrient wars and trying to unpack all the stuff, we've made it this arbitrary deal where it's got to be one or the other. And what this ends up doing is abandoning between a quarter and a half of the population that doesn't fit into whatever the theory to ensure these extreme positions put forward. There is a great piece from Virta Health, which again, I have a link to this in the show notes. The Emerging Science Connecting Glycemic Control to Improved COVID-19 Outcomes. It's a really great piece and it isn't like some of the over the top things that I've seen where people are like, "If you eat keto or carnivore, you can't catch COVID." That stuff is ridiculous. But we do seem to have some indication folks that have better

glycemic control, better metabolic health, that have fewer of these metabolic complications seem to be navigating this whole process better.

Robb: So this is really important both from the infectious disease standpoint in this story all the way to the chronic degenerative disease point. So a couple of takeaways, good glycemic control might be a really smart thing to do. I think that there's just a really strong case to be made for that. And again, what constitutes good glycemic control is likely going to be different from person to person and situation to situation. And some people may have great glycemic control in their youth and rather poor glycemic control later in life. Or if you went from being quite active to reasonably inactive, that's going to really change things. But having an eye towards glycemic control, I think is likely far more important than lipid levels. And a host of other things.

Robb: There's just so much stuff that gets effectively addressed by finding an appropriate glycemic response for people. And again, I made the point that what may be a favorable food for one person, may be a terrible option for someone else. I definitely made that point that people who do well on low carb have a blood glucose response or people that do well on high carb have a blood glucose response that looks more like mine. And it's really important for folks to remember that. That two people could eat completely different dietary compensations yet at the blood glucose level have similar or identical glycemic or blood glucose response.

Robb: And I will go out there and say that the modern acceptable cut points for blood glucose are likely pathological. Stephan Guyenet did a piece years ago looking at blood glucose responses in non westernized populations. And again, this is one of their benchmark pieces that I used for Wired to Eat. He didn't see blood glucose levels hardly ever get much above, about 100 nanograms per deciliter, and this is in populations that are eating 70, 80% carbohydrate and stuff like that. Now, it tends to be largely whole, unprocessed foods and things like that, but there is still a reality that these cut points are significantly lower than what we would generally see as acceptable within the Western medical scenarios. So that's what I've got for y'all today. Hope you all are doing well. Hopefully we'll see you over in the Healthy Rebellion. Take care.

Nicki: All right, that is a wrap for this episode. Thank you for listening and tuning in. Remember to grab some bone broth or some tomato soup from our show sponsor, Kettle & Fire at kettleandfire.com/saltytalk and use code SaltyTalk for 15% off your order. And please share the episode.

Robb: Share the episode, yeah.

Nicki: Share the episode and I think it's really important right now in particular as we're learning more about how one's metabolic health makes you either more resilient in a time where there's a pandemic like COVID-19 out and about. So if you have people who maybe aren't metabolically healthy but might need a little goosing in the right direction, some of these episodes could be helpful in perking people's ears up.

Robb: Yeah, because it's worth mentioning, I assume that most people know that big blood sugar excursions are a problem. Not everybody does, not everybody gets as fired up or as concerned about it with regards to chronic disease. It's like diabetes, heart disease, Parkinson's, Alzheimer's. But all that stuff seems really distant into the future even though we're laying the groundwork for that today if we're not eating and living properly. But there's a reality that it's possible that this COVID experience may become a seasonal experience similar to just the common flu. And even within the context of "just the flu," the folks who fare poorly in that scenario are the metabolically unhealthy folks. And I think that there's just a real opportunity here that this is clearly a topic that is front and center for people. And so if they've been reticent to do any type of diet and lifestyle modification in the past, their ears may be perked up in a way that they will be amenable to doing something new here.

Nicki: All right, we'll see y'all next week.

Robb: Take care. Bye-bye.

Nicki: Bye. As always, Salty Talk episodes are brought to you by Drink Element. The only electrolyte drink mix with salty enough to make a difference in how you look, feel and perform. Get salty at drinkelmnt.com. That's drinkelmnt.com.