Cold Exposure For Improved Insulin Sensitivity Transcript

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Introduction and Summit Welcome

Hi, everyone. Welcome to the Reversing Type 2 Diabetes Summit. I'm your host. Dr. Beverly Yates, ND is my distinct honor and pleasure to interview Dr.

Thomas Seager. Thomas has a wonderful career. He's a professor, he's a researcher, and he's also a deep expert around the topic of cold exposure. That's right.

Getting cold on purpose in order to spark a better, more productive metabolism and in particular cold exposure as it affects our energy systems, our mitochondria, those are the powerhouses of ourselves.

So in that in this talk for his background, he's absolutely going to talk to us about this. He's an engineer like myself, so we're going to have a great convo in the beginning.

We're going to make sure we invite you all in. He's a professor at Arizona State University and a researcher and making sure that people understand what they can do to improve and help their own health.

So one of the things we wanted to include here in our diabetes summit was information about how to get that metabolism moving so that it works for you instead of against you.

So, Thom, how are you? Welcome. It's a pleasure to be here, Beverly. Thanks for having me on. Absolutely. My pleasure. I'm glad you're here and able to talk with us about these things.

You know, I think that it's not always obvious to the general public, and I know we also have health professionals who attend the summit. So we're going to unpack the the fun things and the not known things or things some of us might need to be reminded about as we talk about this topic of thermogenesis and other things that go along.

So please tell us how does deliberate cold exposure help to resolve metabolic disorders? Let's see if we can start with some things that your audience are familiar with.

Maybe we can get some heads nodding like that makes sense, and then we'll take them to the surprising or the counterintuitive because it's a summit on reversing diabetes.

How Cold Exposure Supports Metabolism

Most of your audience, like most of the population with diabetes, will be type 2. They make insulin, but their body resists the action of insulin. My introduction to diabetes was over 20 years ago when my son was six and he was diagnosed with type one.

So I had to learn a lot about insulin metabolism. Key to the ketogenic diet ketoacidosis, which is the condition he was in when he was admitted to the emergency room.

But the distinction is essential because type one cannot be reversed. It can be managed. The technology just in the last 22 years is accessible to my son has been fantastic.

But type 2, there'sno reason to not try and reverse type 2. There are now been so many success stories, whether it's with fasting or a ketogenic diet or just a low carb diet or exercise wise that people have incorporated into their lifestyle to improve their metabolism and improve their insulin sensitivity where people have hesitated or maybe they just haven't been introduced is in cold exposure.

So I've gone from type one understanding insulin demand, understanding diet to what's relevant for my own body.

Now that I'm 57 years old, I'm at an age where a number of my peers will begin.

They call it pre-diabetes, but a better term is insulin resistance. They'll begin to see the signs that their metabolism is slowing down and they start to think about some changes.

One of the best things that they can do is get cold and it doesn't feel good. It's not even intuitive for most people. They think what would 2 minutes in an ice bath possibly have to do with my diabetes?

And so there are a number of great studies on cold exposure and insulin sensitivity, whether it's cold air or whether it's cold water. And empirically, you can see the association between cold exposure and improvement in insulin sensitivity, even to the extent where some people have entirely reversed their type 2 diabetes, they've made itpart of their regular practice.

They no longer take insulin injections and they feel terrific. So now the question is how does it work? What are the mechanisms? Because when people, they hear a good story or maybe they'll see a podcast, they don't just rush offand buy 200 pounds of ice and put it in their bathtub and say, No, honey, it works great.

I saw this crazy engineering guy on a podcast and he said, This is the thing to do. A lot of people, especially in your audience, they're going to want to know what are the studies say, What are the mechanisms by which it works?

How often do I have to do it? No, me, I'm in there every day. And type 2 diabetes is not my problem. My metabolism is doing great. I'm a little overweight, but I'm in.

Got good blood markers. I've got great testosterone. I'm not on any medications. I should probably do a little more weightlifting or something like that.

For right now, the ice bath is keeping me young, but for the people who haven't started, they probably want to know some more. Absolutely. You're right. You're right.

Because, you know, for some of the audience, this is absolutely going to be new info. And I want to make sure they're feeling completely included in this conversation.

Right. You know, you're an engineer. I'm used to work as an engineer. And it's just so fun to go into all the details. And there's certainly the physiology behind this, too.

But, you know, meanwhile, right, when people need to make these decisions about what's right for their own health. So thank you for walking us through and making that clear exactly what we're talking about.

So here, Thomas, I have a question for you, which is this When we think about plunging in the cold water, cold water immersion, you know, and a bathtub for ice cubes, well, however, this is going to actually happen to someone.

Is there any real basis or reason from an evolutionary biological point of view for cold water immersion? It there's an evolutionary narrative. And, you know, human beings go back tens of thousands of years and our close progenitors, you know, 100,000 years back.

Evolutionary Roots of Cold Adaptation

So is an evolutionary narrative and it amounts to speculation because we all we have is these shreds of archeological evidence about the conditions under which the first Homo sapiens lived.

But let's talk about that and then we'll move from the narrative to the mechanisms. So the why and the how are the two different things. The narrative is sort of this origin story and explain some of the why, but the how, that's science.

So let's start with evolution. The oldest fossil records that we have lead us to believe that Homo sapiens emerged in East Africa. And I get a question like, East Africa is equatorial, it's hot.

You know, it's the grasslands. Why the heck would we possibly need cold exposure? And some people say, Oh, it's fine for you, Tom. You know, your people are from the North Sea.

They migrated out of Sieger. It means harpoon. You know, my people been cold for a long time, but they say, but if I'm from an equatorial area, why could I possibly need cold?

The geography of East Africa is foreign to all of us, but there are four active glaciers even now on the equator in What's the one that Wim Hof alwaystakes his trainees up Mount Kilimanjaro.

It's right on the equator, and at the top is a glacier. So you got to imagine the ice ages. And during each ice age, Homo sapiens experienced what's called a population bottleneck.

So I'm going to make up some numbers, but they're not entirely wrong. Maybe we're down to 10,000 Homo sapiens on the entire continent of Africa, and they're all living between the edge of the glacier and the cold ocean.

So what are they doing? What are they eating? How are they foraging? How do they live? There are some distinct in atomic features of the human being that makes us different than other apes with whom we share 99% of our DNA.

Our nostrils point down chimps, apes. They point out we have what's called subcutaneous fat. I mean, I got a little bit too much of it, but that's much healthier for humans than visceral fat belly fat.

Apes don't have subcutaneous fat, Dolphins do, manatees do. Apes are covered with hair and we're, by comparison, hairless. We walk upright and they're still mostly down on all fours.

What would explain these anatomical differences? And there's a very compelling hypothesis called the aquatic ape. Now, some people, they they object just to the comparison between primates and animals.

And I don't want to activate those objections. There's a lot we can learn about metabolism, a lot we can learn about health by studying what's happening with animals.

We are different than animals that lived in the conditions in which our species is thought to have emerged. Why are we different? Because we waited in the water.

This is why we walk upright. The hypothesis about the grasslands is not anywhere near as compelling to me. If you ever see a chimp or an orangutan or something waiting because they got across the stream, you're going to say, That's why we walk up, right?

Because we can see how keeping our head above water while we're crossing or we're foraging. Why are nostrils pointing out so we can dive and get the shellfish or spear the fish so we can, during the ice age, eat from the waters rather than from the glacier.

So that's one. But here's the really interesting thing. Human beings, infants, newborns, they're born knowing how to swim, not knowing how to walk. Now, why would that be?

A newborn baby comes. It knows not to breathe, not until the air hits. It knows to start moving its limbs. How could we possibly have these instincts to swim instead of, you know, a giraffe pops out and it's ready to walk?

A zebra is running from the moment it's born and all our little babies know how to do is swim. And it's because this is speculation. It's because our ancient grandmothers, they gave birth in the water.

It was I don't know if you have kids, but I've talked to and. I've seen this myself. I do. This is fantastic. My wife, she

labored in the water. I talked to a woman.

She's got seven kids. I talked to her yesterday. She said I tried a water birth, but the water was too warm. They warmed it up for her and the heat is no good for pregnancy.

It's no good for childbirth. I've only heard I haven't met her. I've heard of one woman who did a legit cold water birth. She said it was fantastic. It was all natural.

She had a healthy baby. And that's not enough to encourage other women to try it in the cold. But there's been a lot of success with water births. It hasn't.

Analgesic effect. Yeah, that's what I did for my babies. I got. You. How did it go? It was fine. Yeah. Even to the point. Unless your water breaks too soon, but even to the point where you could give birth in the water.

A lot of women find this comfortable. So where would you know? Our ancient great grandmother was find comfort during labor. The big problem of Homo sapiens is how to pass that big brain through that tiny pelvis lived experience.

I get it. More power to you, Beverly. Those waters were cold at these critical moments in human evolution. We were selected for cold water. Not even just cold water tolerance.

Our bodies are designed to expect the cold, just like we're designed to expect. Exercise. And if we don't get exercise, we get sick, we get disease. If we don't get the right nutrition, we're designed to expect protein.

We're designed to expect some fats. You know, if we don't get the right things that our body expects, we get disease. And one of the things our body is evolutionarily designed to expect is cold water immersion.

When you don't get it, your body will make adjustments. And for the most part, those adjustments are maladaptive, not they don't make you healthier, they make you unhealthier.

Human babies are about 30% by weight, fat and in particular they are brown fat. You will never see an infant shiver. And this is kind of a frightening thing.

Most moms and I was like this as a dad. Oh, we kind of bundle up the baby to keep it warm. But my son, when he was born, he was £9. He didn't need bundling.

I needed bundling, you know, for my own emotion or something. So I feel okay. But he's covered with brown fat. And the reason is brown fat keeps the baby warm.

Their muscles are not developed enough to shiver, so they don't have enough muscle mass to keep them warm through shivering thermogenesis. They must use non shivering thermogenesis, so they start at about 30% and the brown fat.

The primary purpose of the brown fat is to suck up glucose and lipids from the bloodstream and just turn it into heat to keep you warm. Then, as humans grow, the muscles develop the amount of brown fat that we have, it doesn't grow with us.

That is the rest of our bodies grow. The brown fat shrinks a little bit, and as a percentage of our overall body weight, it goes down, down, down, down.

But here's the thing because Americans are so comfortable, we get so little cold.

Brown Fat, Mitochondria, and Insulin Sensitivity

By the age of 40, more than 95% of American adults have zero detectable brown fat. We've lost that baby fat. And

most of us feel like, oh, that's a good thing.

You know, I want to look. But by the time you're 40 and you've got no brown fat, you are, I'm going to say a metabolic risk. You're setting yourself up for disorders of the mitochondria, disorders of insulin and metabolism that will begin to show up in your late forties, in your fifties, as what most people know is pre-diabetes.

But Ben Brickman, who wrote Why We Get Sick more properly, calls it insulin resistance. Right? Right. These are absolutely the routes. I feel these root cause issues where we've done things to be more comfortable, as you say.

But now we have set up the exact conditions by which we start to suffer, not knowing where our decisions and how we're living our lives are actually part of the problem in a way that's not obvious.

We all know that nutrition is going to be the bull's eye of the target when it comes to blood sugar regulation, right? I think anybody's going to argue about that.

But then when you think about what it takes to restore a metabolism, to have that literal internal fire, you know, despite these things, this is what matters.

I remember in physiology class in naturopathic medical school, there was a lot of talk about brown fat, white fat thermal genesis, how to keep your metabolism on.

And that has progressed since because that was 30 years ago for me. So now we're refreshing it. Actually, it was 33 plus years ago. So obviously the world has caught up.

We're here now and I'm really thrilled to have you here as an expert. Talk to us about this because I feel that different people resonate with different things around their health.

And there's no such thing as one size fits all. And so I'm helpful if people are listening, they're taking notes, and hopefully this is starting to, you know, spark that thought of, hey, this could be for me, this might be something that would be safe to do.

Now, it also makes me wonder, Thomas, for whom is this not a good idea? What are the contraindications? There are some contraindications to keep in mind.

I've got an article about it. You can search for contraindications to Cold Exposure, and I think I'll come up on the first page. One of the concerns is heart arrhythmia, heart issues, and this holds a lot of elderly people.

Back when you get into water that is cold enough to activate your brown fat, you're going to feel the gasp reflex, the if you don't feel the gas reflex is probably not cold enough because brown fat is activated by your nervous system, you're going to feel sometimes it's called cold water shock.

And so thermal receptors in your skin, they go straight up to your hypothalamus and they say emergency, emergency. The hypothalamus says, oh, we get brown fat, unlike white fat brown that is highly enervated.

And you say, well, why are so many nerves in there? Because brown fat communicates with the entire rest of the body. Its primary purpose is to keep you warm, but it has several other purposes, including the secretion of neurotransmitters and hormones.

We're going to talk a little bit about that later. So it has to be keyed into the nervous system. It is the nervous system that activates the brown fat.

If you don't feel the shock, you're probably not getting your brown fat going. But of course, brown fat is not the only thing that is activated in the gasp reflex.

The first thing that happens is your heart speeds up, your liver shoots a little glycogen into your bloodstream to give

a little glucose boost. Because your hypothalamus is signaling emergency.

It puts your body into fight or flight mode. You always go in feet first. We don't want to go in face first because the gasp reflex at the same time you're going in face first.

It could result in some kind complications, ingestion of water. We don't want any of that. We're going in feet first, so we get a gasp reflex. But then something happens as you go all the way.

And I like to go up to my collarbones. I like to get my neck in there as you go up and you take control of your breathing, you slow everything down. I use a mantra if you know my brain is getting a little out of whack or my thoughts are getting a little out of whack, I remind myself this is what cold feels like.

This is not a sabertooth tiger. You know, this is not even my boss yelling at me or not like this is not a dangerous situation. But my hypothalamus thought for a second it was.

I bring everything down. There is something that counters the gasp reflex and it's called the dive reflex. And it typically happens when we get water on our face.

Here. The body is anticipating that you're going to dive. You're going to go, I don't know, get clams or oysters or I don't know. You're going to get your cell phone off the bottom of the lake.

Whatever you got to do, your body is equipped to dive. It will slow your heart rate. This slows the rate at which you're producing carbon dioxide. It slows your metabolism, it slows your oxygen levels down.

So because it wants to conserve all your metabolic resources until the dive is over. So the gasp reflex speed everything up, fighter flight, the dive reflex, slow everything down.

We're going to go into like conservation work. These two can be in conflict with one another. So one of the things that cold exposure does is improve your heart rate variability.

I got a note from someone just this morning because I put a post up on some of the science on my Instagram at Seager. TP And it was on heart rate variability and cold exposure.

And she said, you are absolutely right. I think she's using an aura ring or a Fitbit, some other wearable to measure her HIV. And those measurements, they're not incredibly reliable, but the direction is going so well for her.

She said she used to get a reading down in the low twenties, now she's up in the forties and fifties because she started cold exposure. Well, it makes sense.

Heart rate variability is not your cardiovascular strength, it is the capacity of your heart to make adjustments to the demands put upon it. We used to think maybe a good steady heart rate was the way to go, but that's not the case.

Every breath, every feeling, every thought creates a different state of demand upon the heart. So when you get into the ice bath, of course, you were putting a stress on your heart.

That can be a dramatic stress, a healthy stress. But one of the contraindications for Cold Exposure is people who are already experiencing heart arrhythmia.

Here. We want to be careful with the temperature. We don't want to give them too much gasp and we don't want to put them into what Mark tipped them, calls Orton Cosmic Conflict.

That is the gasp and the dive reflex, both acting at the heart at the same time in a way that can be unpredictable. So I don't have documented cases of people experiencing heart trouble.

And I think it's because the people who write to me, they're basically in good health. They're looking more for

optimization or they're looking for something that they want to do with their continuous glucose monitor and their metabolism.

The marginal cases haven't come to my attention. I just wanted to warn the readers or the listeners that, yes, heart arrhythmia can be one of the contrary indications.

There are some others. Bernard syndrome can be a challenge. If you have primary Raynaud's that is urinates is not caused by some other underlying condition.

Raynaud's is this complex psycho physiological reaction. It's an overreaction to the cold and it starts this cascading loop of vasoconstriction and anxiety you can treat with nods with what's called exposure therapy to treat small exposures in a safe environment using the breathing exercises.

And I've got one great video of a woman who has overcome hearing ARDS using ice baths. But if you're Raynaud's is a condition that is developed secondarily to some other underlying condition called exposure is not for you.

So these are the two major contraindications and you can look at the article about some others.

Contraindications and Cold Exposure Safety

It's also a good time to talk about safety, never hyperventilate and then get in the ice baths. And some people because they then have both teaches breathing and he teaches cold exposure, do not combine these things.

And the reason is when you go really into the hyperventilation light, you can pass out. So you get into this hyperventilate state. The CO2 levels are very low and you your brain can kind of miss the need to breathe if you pass out in the water for what should be obvious reasons, it's very dangerous.

Bring your breathing back to normal before you do cold exposure and continuously breathe. There are no breath holds in the ice baths. That's the safety tip.

That makes complete sense. It really does. You know, when you think about physiology and what our body is trying to do, what it's designed to do and to work for us, not against us, but then we need to make smart choices along the way so that way all those mechanisms can work.

Yeah, we're not free diving. We're not this is not an extreme sport. We're not trying to prove any point. We're just trying to take care of ourselves.

Ninja Warriors, Cold Plunge edition. Right. You are not going to see me on that episode. I hear you. I hear you. Okay, cool. All right. So, Thomas, then what protocols would you recommend for cold exposure?

Well, let's talk about some of the mechanisms, because we already said you want to go cold enough to feel the gasp reflex and whether that's in the shower or in the tub or in the stream, I'm now at this point, I do.

I'm so well cold acclimated. If it's not colder than 39 degrees, it's just boring for me. And I must be, you know, up to my neck, literally in brown fat because it accumulates around the clavicles and all the areas where it when the blood leaves the heart.

You want that brown fat there to warm it up before it's going to go up to the brain. So brown fat is all in here. Well, as you get cold acclimated, your body will recruit new brown fat because your body is going to adapt to the conditions in which you put it.

It does this by adding mitochondria to mostly to white fat. Now, we don't know whether it also is just making new brown fat cells or whether it's just converting some of the adipose tissue that's in the right place.

But it's called a process of Beijing. But the difference between one of the differences between white fat and brown

fat is brown fat. It's packed with mitochondria.

And it makes sense because mitochondria have to do all the energy conversion work. They're the ones that are taking the glucose and taking the triglycerides and converting them into heat.

Brown fat needs a lot of them. You need magnesium for it's called mitotic biogenesis. There are some nutritional demands. Magnesium is a big one. But how much cold do you really need?

Turns out it's not a lot. There was a good study in Denmark, and, you know, there's this Scandinavian image of people plunging in the fjord and then going in the sauna, and it's not made up.

There really is a long standing tradition of thermal contrast therapy in Scandinavia, Denmark, Finland, Siberia. Well, she studied This is Susanna Solberg.

She studied people who were self-reported winter swimmers. They get in the fjord and they came into her lab so that she could do the PET scanning to see how their brown fat works.

They told her they do it an average of 11 minutes a week, and it didn't really matter whether they did all 11 minutes all at once or they were doing like, you know, three times a week and three or 4 minutes, it was an average of 11 minutes a week.

That was enough to maintain their brown fat, according to her PET scanners. We don't really know what the minimum sort of effective dose of cold is. So I'll tell you, what I do is 2 to 4 minutes and I don't usually wind up shivering when you're novice, when you're naive to cold exposure, the rule of thumb is cold enough to gasp long enough to shiver.

But at this point I'm in maintenance mode. A lot of people who are going to be acclimated, they could go down to 34 degrees Fahrenheit, which is where I am now and spend 2 to 4 minutes and still not shiver.

I can feel the temperature on my skin has changed when I come back into my air conditioned apartment, you know, I want to crank the thermostat up to 82 because that's where my thermal comfort would be.

I'm probably activating my brown fat because I'm still getting that gas when I go in, but I don't need muscle shivering thermogenesis to know that my metabolism is getting the benefit.

So we're going to break it down.

Practical Cold Plunge Protocols

If you can get two or three times a week in San Francisco, the water's pretty cold, fill up the tub, maybe put some ice in there. If you've been at it for a little while, give yourself three or 4 minutes in the tub.

Do it two, three times a week. You're going to notice a difference in rats. It takes a week of constant daily cold exposure to see the brown fat show up in human beings.

Ten days was enough to increase insulin sensitivity 40% among these middle aged German men. They all had type two diabetes and they didn't even use the baths.

They just turned the thermostat down. So these guys are hanging around in t shirt and shorts for like a couple hours. They started and they went to 6 hours.

By the end of this ten day period, they no changes in exercise. They were not allowed to change their diet because they wanted to isolate just this cool air exposure.

And these German researchers measured a 40% improvement in insulin sensitivity, which was enough to change

their metabolic conditions so that several of them never met the no longer met the criteria for a type two diabetes diagnosis.

So when I say it doesn't take a lot, I'm giving you these examples to encourage you to try a just like exercise. The difference between zero and a little bit is tremendous.

With cold, the difference between zero and a little bit is tremendous. You don't have to run a cold marathon, you know, to get your metabolism in shape.

Just such system a little bit. All right. That's really a clear way to, you know, look at this and think about it and, you know, make sure that if you decide you want to do this, it's a safe option for you.

And, you know, try it out. Right? Because I think in today's complex, busy world, I really feel people need to have a wide variety of tools so they can figure out what can actually be effective for them.

And however it is, they live their life. People have different constraints, different opportunities, you know, different mobility issues, access this, that and the other thing.

And having something that is largely, if not completely in your control is always a good thing to have in your tool bag. It's easy to do and it doesn't take very long.

You don't have to go to the gym for this. No, I live in Phenix, you know, it's 115. That's the forecast high for today. It was 118. A couple of days ago.

And our tap water is about 88 degrees Fahrenheit. I had to invent an ice bath in order to be able to get my cold exposure in Phenix. And there's other people, Texas, Florida, Southern California, who are in similar situations.

So we sell a lot of ice baths to the southern United States. We sell some to the northern states as well, because people, once they get it, they get hooked.

They're like, This is great. I want to do this every day. And the convenience factor that I have of my own ispat is tremendous. But for starting out, nobody wants to spend $15,000 on something they haven't tried in their own tub.

Just get a little bit of cold and see how it feels. The first 30 seconds. If you're cursing me out, if you say that, dang, Dr. Seager, I'm so well, what I even listen to him for?

You're doing it right. It's cold enough. If you come out and you say you're like Wonder Woman, then you've been in there long enough. It there is a euphoric feeling that comes over you when you practice.

And it's for good reasons. The cold will stimulate production of nor epinephrine and dopamine. Now who doesn't want more dopamine? But it takes about 30 seconds for that to really reach the brain.

So you're going to get in and for 30 seconds you're going to be miserable. And you say, I'm never listening to that podcast again. And then I've got a great video of my daughter doing this.

And in about 30 seconds you're going to say, I don't know why I'm smiling, my toes hurt and I hate this. And for some reason I can't get it. We call it the ice space.

When the dopamine in the north and American hits the brain you like, you automatically are thinking, Why am I so happy when I'm so miserable? And then you get out and you feel like you've got all the energy in the world.

And that's what I mean by people get hooked. They're like, Oh, well, let's do that again. That's so cool. Interesting. Ice face, resting ice face. I love it.

Okay, cool. Right. And it's a big smile. Good to know. Get to know. I'm curious, are there ways, you know, before

we wrap up our session here together, this has been filled with so many gems.

Thank you, Thomas. What? How can is there a way objectively for someone to measure like the starting point for their brown fat? I'm just curious. Subjectively, yes.

Objectively, no. All right. Because what we've talked about, you know, do you feel the gasp reflex? Do you feel that sort of that cold water shock? But these are still subjective self-reports.

You know, there are objective measures. The cold pressure test is a standardized, validated psychological instrument. You go into the psychologist's office and when they want to measure your stress response, they'll take your non-dominant hand and put it in a bowl of ice water.

It used to be that 5 minutes was the limit, but then the psychologist freaked out and they said, Well, no, no more than 3 minutes, you know, because most people can't even last the 3 minutes.

This the cold pressure test is a stress test. They will measure your heart rate.

Measuring Response and Where to Learn More

They will measure your blink rate. They will measure the perspiration on your dry hand to try and see physiologically what is happening to you when you're in cold stress.

So there are some objective signs, but you know, you don't have a psychology lab in your bathtub. Your own subjective self-report is good enough. All right.

That's good. Then The WHO. Thank you so much for that. Okay. So, Thomas, if people would like to connect with you or find out more about your work and what you're doing, where can they reach you?

I published a lot of articles on morozkoforge.com morozkoforge.com You can click on the journal link and you'll see the latest pieces. I have my own Substack seagertp.substack.com so that seagertp.substack.com.

And that's where I'm putting the book chapters. I'm up to chapter four in this book. I got six more to go. It'll be called Uncommon Cold The Science and Experience of Deliberate Cold Exposure.

So if you really want the long form before the book comes out, you've got to go to the Substack and get it there. All right, great. So wonderful to know.

Thank you so much for the information you've shared and the stories and the ways people can recognize themselves and you know what their response is, what they can look forward to here on that journey.

I think that it just makes sense. I feel like in today's world, there's any number of things that we aren't doing that historically were actually quite good for us and we have to find a way to get back to some level of better health for everyone that's accessible.

So thank you for that. Well-said. All right, friends. So for these episodes of these wonderful experts, please share. You know, when the summit is up and live and available, you know, send it the family and friends, people that you care about, people that you love, your colleagues, your neighbors, people in perhaps a spiritual community, wherever you may have your social world, because we really do want to be able to help.

Eventually, 3 million plus people who are dealing with type 2 diabetes, pre-diabetes, all kinds of blood sugar concerns. This includes our friends with type one, people who are in that range of type 1.5 and friends with Alzheimer's and dementia.

You know, consider type three diabetes, because when you look at all these various glycemic control issues, these black blood sugar related issues, I mean, it's just stunning to me the growth of this around the world When I

originally went to naturopathic medical school, in fact, anybody's medical school, it wouldn't have mattered back in the day.

Type one was always childhood onset andtype 2 was always a disease considered for people much older, maybe sixties, definitely seventies and eighties.

And now we got kids as young as eight, as young as eight with type two, which should never happen. And now we have a rising incidence of adults with type one.

So That's all work together with link arms and let's make this world a happier, healthier place. Thank you so much. Thank you, Beverly. It's been a pleasure.