FD_podcast-Dr_Jackson

[00:00:00] **Dr. Mike T Nelson:** Welcome back to the Flex Diet Podcast. I'm your host, Dr. Mike T. Nelson, and on this podcast we talk all about things to increase lean body, mouse or muscle and strength, and also increase your performance, improve your body comp, and to do it all within a flexible framework without destroying your health in the process.

Today on the podcast I've got Dr. Dwayne Jackson and we talk about a whole host of wide ranging topics and we get ultra nerdy, which I enjoy and it's super fun. He is a wealth of tons of information. I finally got to meet him in person at the Rio Coach's Summit in Vegas a couple months ago now.

And today we get to pick his brain about some cold water immersion he worked on for his masters many years ago. Some of the original studies that were done more from an environmental purpose. And then we talk all about different regulation systems in the body from blood pressure, blood volume, local responses.

And these are useful because once you understand them, it gives you a little bit of a lens into performance. And then we wrapped up with a question about lifting. Should you lift in more of a angry state? And is that best for. Stress. Wanted to let you know that the Flex Diet certification will open again coming up June 5th, 2023.

Go to flexdiet.com for all the information there. You'll be able to get on the wait list before it opens. I'm gonna have some super cool. Bonus items for you, especially for people who are on the list there. So go to flex diet.com. You're looking for a complete system on how to maximize nutrition and recovery for both performance, muscle and body composition.

This is your ticket. We cover eight different interventions from protein to carbohydrates to fats to everything including neat. So non-exercise activity thermogenesis. Walking, exercise, sleep, micronutrition, et cetera. So go to flexdiet.com, for all the information there, and enjoy this podcast with Dr. Dwayne Jackson.

[00:02:32] **Dr. Mike T Nelson:** Welcome back to the Flex Diet Podcast. I'm here today with Dr. Dwayne Jackson. How

[00:02:37] **Dr. Dwayne Jackson:** are you doing? Doing well, Dr. Mike. How you

[00:02:40] **Dr. Mike T Nelson:** doing? Doing good. And you're in your garage podcast studio up there in Canada.

Hey.

[00:02:47] **Dr. Dwayne Jackson:** Hey, am in Canada. I'm in my little studio here and On the West coast, we're way out on Vancouver Island as far as you can go and

[00:02:55] **Dr. Mike T Nelson:** Oh, you are on the island.

[00:02:56] **Dr. Dwayne Jackson:** I was wondering about that. Yeah, we're as far as you can go on the, in the, in, in the continent. Basically if you drive, okay. If you get to the island and then you drive to the west coast of that island, and then when you get to the Pacific, hang a left and go as far as you can, to the south.

I guess it would be Southwest or whatever. Or that's our house. It's basically the last stop in Canada. It's just if you drive out my backyard, which is called the front yard, when it's waterfront you took a boat you could, depending what direction you go to Alaska, you Hawaii.

Oh wow. China. Yeah, it's right there. So it's the

[00:03:28] **Dr. Mike T Nelson:** big water. Ah, very cool. Do they do a lot of kite boarding or surfing or anything up there? I know they do sometimes around the western coast in Canada at

[00:03:36] **Dr. Dwayne Jackson:** places. Yeah. So surfing's massive. That's what this area is known for. It's like Malibu Beach, California was in like the late sixties, early seventies.

It's just Oh, okay. To get going. So yeah. Lot of nice that, that's the, that's the mecca of this area,

[00:03:49] **Dr. Mike T Nelson:** and do you surf or do any of those

fun

[00:03:50] **Dr. Dwayne Jackson:** things? I do. My family does more than I do just because I'm more into mountain biking, dirt biking Yeah. Kinda things. But but I do go, I go to the beach with my family and I play around in the water with them.

I wouldn't say I'm a surfer per se, but we have all the gear.

[00:04:05] **Dr. Mike T Nelson:** Nice. Yeah, I'm down here in South Padre, Texas, so we come down here to kite surf and I am attempted two times now to learn to wings surf. I don't know if that's popular up there, but yeah, it's, it looks fun. I used to windsurf eons ago, so I get the idea of kite boarded kite surf for quite a while.

But man, it's different. So for people listening, you hold onto like a physical wing and you've got a board that's got a hydrofoil underneath. So the goal is to not just be on your knees, trying to fly it around as a standup and then to get up on the hydrofoil, just holding onto this little wing thing, which is interesting.

[00:04:41] **Dr. Dwayne Jackson:** Yeah, it's neat. A bunch of my buddies, when we were, when I was in university down in the States in Connecticut, they'd all go down to Hatteras North Carolina. Oh, definitely. Yeah. North, South Carolina, whatever. It's, and they do a lot of the kite boarding out there and man, oh man, some of those guys who who don't really know what they're doing

[00:04:59] **Dr. Mike T Nelson:** a lot of trouble on those kites, man.

Oh yeah.

[00:05:02] **Dr. Dwayne Jackson:** They can get themselves way, way up there and, panicking and not letting go or releasing their harness or

[00:05:08] **Dr. Mike T Nelson:** whatever. It's that they have you to get away from the camera. Yeah. Yeah. One of the earliest videos I ever saw was, God, it was probably maybe 14 years ago now, there's a guy, a professional kite boarder, they were interviewing and they're doing this little interview in this old style camera, and then you see some guy get picked up in the background, just like.

Floating through the image and the camera guy's like going, holy shit, look at that. And the professional kite boarder turns around and this guy's probably like 80 feet in the air just, whizzing by. And he's Ooh, that's not good.

[00:05:40] **Dr. Dwayne Jackson:** Yeah, man, the note here we saw a kite boarder the other day.

They're not, it's not very popular here just because there's like a lot of purists. There's guys who live in vans and stuff to surf. Sure. And it was funny because we saw him and I was explaining to my daughter, I said, if this guy gets out too far, he's in a lot of trouble out here because, it's the big water, and there's no protection whatsoever. No. And the lifeguards running out here, it's just these big massive wild beaches with these, massive surf. So

[00:06:09] **Dr. Mike T Nelson:** it's pretty crazy. Yeah. We went to Australia a couple years ago. I was teaching some R P R there, went down from the Buddy Luke Lehman's wedding, and I was kinda toured around for two and a half weeks, which was amazing.

And at the time it was supposed to be pretty windy and I'd already, talked to people who kiteboard on the, the coast there and everything. And so I, pack all my gear, haul all of our shit there, and I'm hauling around everywhere for two and a half weeks. And literally there was no wind at all anywhere we were, we would literally just miss it.

And the one day there was this wide open beach, it's overcast, no one was around and the waves just looked angry and it was not directly offshore, but a little bit side off. And I was just like, huh, I don't think I'm going, I don't have a good feeling about this. If something happens, nobody's around.

I've never been here before. I don't know that much about the area. I don't know if there's currents and the fact that there was just nobody there just made me nervous. But you're also so tempted because you're like, oh, this might be the only time I've literally taken all my gear like halfway around the world and I've ridden in ways.

There's no one here and yeah. That's funny. Yeah, same thing happened when we went to Alaska. Went up there several years ago, got through some halibut fishing with my uncle who lives up there again. Brought all my gear, we got all the places to scoped out, we were gonna do it and just wasn't windy at all.

And Alaska, it's freaky because they can have like just massive tides of like timber, the name of the one place, but I think it has the largest title change in the world. And it was like, I think a nine foot difference. It was just bananas. Like we went out and there's a bunch of people riding there that day at High Tide and we had something else going on that day and drove by there the next day.

And there was nobody there, and it was literally a sandbar. And for as far as you could see, you're like, there's no way this was like the same place as yesterday. It's just

[00:08:08] **Dr. Dwayne Jackson:** crazy. It's funny because the winter time out here, like we get these king tides and the actual water and logs on our beach come right up onto our, like our backyard front yard, whatever you wanna call it.

But this is our first experience this winter seeing it. Oh man. Because this, we've only been here since last June or last July, and oh my God, I couldn't believe the difference in height of water in the wintertime and the gnarly waves in front of our house. Like we were getting some like oof 30 footers that were like, oh yeah.

And you can, there's like an island right across from my house and that's what gives us our protection like this. Oh, okay. We knew if it wasn't for that island. And during low tide, you can get out to the island. And then go off to the spot and it's so protected. But you're only about a hundred yards from these massive waves.

So they come at you looking like this wall of water and then they break up the energy all dissipates cuz the rocks. But if you stay out there too long, you're stuck on the island because the oh air comes in and circula goes right around the island. We didn't even know it was an island until this winter Oh wow.

With this island. Because it, cause usually the water doesn't go around it like a moat. So this winter though the tides, yeah they're probably, I would say they're probably at least five feet higher than in the summertime. Oh wow. That's

[00:09:17] **Dr. Mike T Nelson:** a huge difference.

[00:09:18] **Dr. Dwayne Jackson:** Yeah it's big.

But I, I could be wrong too cause they did some modeling out here. And I only saw this modeling after we bought the house, but, so we, they did this tsunami modeling cause we're in a really high seismic area. And there was just a, there was actually just a, like a five five Richter scale earthquake just off the coast from us.

They happen a lot in front of our house, but because the cuz it's so close, there's not enough energy to actually cause any issues for us. Oh, okay. We don't build

any energy. But it's, but it was it's really cool because they showed this modeling in a one meter, so it's like over three feet or whatever.

Yeah. One meter elevation in the in the sea level. Cuz they're worried about what's going on in Alaska with the melting icebergs and stuff. Yeah. One meter rise in level here will turn this place, this whole area that I live in, into the thousand islands. Like it's just gonna look to small islands with these houses sit on top of them.

So it's pretty neat how, these very small changes in what we consider small changes. They're, there's, yeah, trillions of gallons of water but these look like small changes, but you talking about meter actually turn into several meters of damage to the area or you lose whole areas.

So it's, yeah, it's nuts.

[00:10:25] **Dr. Mike T Nelson:** It's fun. Yeah. Even down here in South Padre, like the tide, it changes, but it's not super huge a lot. And we've noticed since coming down here where we go, there's a little bit more erosion now than there used to be. But because it's right at water level, like you'll go out there sometimes and it's, open for quite a while as you have to walk, and other times it comes up really high.

There's not that much of a water difference, but because everything is so flat in that area, even a couple inches, you can have, some flooding and water coming into places that it just normally never comes in, which. I didn't really think about it. Cause at first I thought, oh, there must be a huge tide change in this area.

And it's no, it's only a couple inches. But once you get over that little barrier, which is small, you've got whole inline, areas that just start to flood at that point then too. Yeah. And that's

[00:11:09] **Dr. Dwayne Jackson:** what we get in the summertime here. Like our, out in front of our house, our beach becomes empty during low tide.

And so you gotta walk out, you gotta probably walk. It's so deceiving when you're up on our balcony. Cause it looks like a small area, but you probably gotta walk about half a kilometer from the edge of our beach to hit the actual white water. But when the tide's in you, you'd walk like a foot and you're into the water.

Oh, wow. And it gets probably gets two or three feet deep. Where it's completely empty during low tide. So it's pretty neat because when we bought the house, people are like, oh, so you don't actually live on the beach. When they saw like low tide stuff, they're like, oh. I'm like, no, the ocean actually there's low tide and high tide.

And they're like, oh, you have that at your house. And I'm like, The whole world has it man hammer. When you're hammered in Jamaica on the beach, you just don't notice. The beach just got

[00:11:55] **Dr. Mike T Nelson:** way deeper, than it was around in the day every 12 hours or whatever. It's, that's a good transition because we met at the, finally met in person at the Real Coaches conference, which was awesome.

And you had done a lot of the original work or helped with it about cold water immersion? Yeah.

[00:12:13] **Dr. Dwayne Jackson:** Cold. Cold and warm. Yeah. Cold and warm. Thermal regulation was my was my thing way back when I was in my mid twenties doing my masters.

[00:12:20] **Dr. Mike T Nelson:** Yeah. So tell us about that, because cold water immersion is the in thing now, which I never.

Thought it would be, but I guess if I could predict the trends, maybe I would make a lot more money or something. I don't know. But yeah. So what are your thoughts about, let's just say cold water and how it's related to metabolism?

[00:12:38] **Dr. Dwayne Jackson:** Yeah. The work we did actually wasn't to look at the benefits of cold water emergency, right?

We were actually looking at emergency cold water swimming for national defense. And the reason why we were doing it was we was because there's a lot of on the oil rigs especially, there's a lot of military presence and police presence around those. And a lot of these guys that work on these rigs actually fall into the ocean.

Yeah. And because of that, yeah, it was horrible. And so we were trying to create a model in the lab to create a mathematical model so that we could model what would happen out in the real conditions, when we, when you fall into the ocean or fall into a big water clothed the whole nine yards.

So we we started out with a hot tub that we modified to have a lot more air that circulates in it. So we, keep the warm layer that circulates around the body away and we, we used that it was 50 50 alcohol, water, and then a pile of ice to try and get it down to round zero.

[00:13:35] **Dr. Mike T Nelson:** Wow. So you were putting alcohol in there to get it colder then, correct?

[00:13:38] **Dr. Dwayne Jackson:** Yeah. Yeah. We were trying to, we were trying to get a, yeah down colder, because the problem we had when we did the actual pilot work out in the Ottawa River in the winter, Was that the actual stuff that we modeled in the lab didn't even come close to matching it.

And that was our first revelation that we had. So we ran the stuff in the lab that was really cool. So what we would do is we'd have we were looking at exercise before cold water immersion with and without. So basically these guys are walking around with heavy gear on, military garb, walking, basically building up metabolic heat, and then they fall into an extremely cold bath or the ocean.

So the idea was to have these guys, ride the bike at 70% vo two max predetermined. We were measuring metabolism all the way through using a metabolic cart. So indirect color imagery, and we had them sit in a thermal chamber with this hot tub in it. So we clamped a room temperature, ambient temperature, and humidity.

And then had this cold tub, in, in, in this room. And so we'd have the guys ride at 70% and then get in the, and get in the cold tub. And then we'd look at the the differences in the transients from, normal 10 nor, sorry, norm normal body temperature down to 32 degrees.

So we'd take them down to 32. It wouldn't take too long. For most, it took longer in the people that were exercised before because we had a bigger heat transient. And because it causes, because the skin has thermal receptors in it that caused constriction, it's really actually, it actually holds onto that heat quite well in the core team.

So these guys were all instrumented. They had, oh God I think we collected about 80 channels of data. So we had Oh, Jesus. Yeah, 20, about 20 or so thermos on the skin that were weighted, like you have to weight them based on their thermal inputs. So you have sensory inputs into core temperature.

And you also have the core temperature inputs from esophageal temperature. So they had esophageal probe that we shoved up their nose and then down, down their throat to the, that was a predetermined measurement of their height, so that we knew we were around the height of the aorta.

And that gives us the close estimation of blood temperature. Yeah. And then we had a probe up their butt that gave us deep tissue core temperature so that, so the transient would be the blood temperature drops first, and then we start seeing deep tissue start to drop after. And so what we were looking for was a 32 degree esophageal temperature.

This

[00:15:54] **Dr. Mike T Nelson:** it Celsius or Fahrenheit? Just sorry. Celsius. Yep. Okay. Gotcha. That's all I figured. I just wanted to make f

[00:16:02] **Dr. Dwayne Jackson:** going Celsius green.

Yeah. So 32 Celsius. And and we would and that, that's quite cold. That's relatively heavy hyper hy hypothermia. And then we would have them sit and sh undergo shivering thermogenesis after, so they'd get outta the tub and then just sit in a chair with their shorts on. Shivering.

And that was two times I think that was, you wanna know, I think that was the coolest part of the experiments because first of all, after you pull anybody out of a cold water immersion one of the things we wanted to try and figure out was how we can recover core temperature quickly, because core temperature, when it drops down because of cold water immersion to 32, we get this post.

Immersion after drop that they call that we see another degree or two in drop as the body starts to distribute the blood that's really cold from the skin to the core. And one of the things that was really cool about it was watching this sh shivering thermogenesis, cuz this is true shivering.

Not oh fuck, I'm cold like

[00:17:03] **Dr. Mike T Nelson:** that. No, this is like teeth chattering

[00:17:06] **Dr. Dwayne Jackson:** in the fetal position. And if you watched the lean guys, their backs and the lean women you'd see the muscle fibers cycling. Like they were shivering, like this was like deep shivering where the muscles were just basically under tetanus and cycling through.

Wow. It looked almost like alien, like things happening in the, in like the traps, the lats, mainly the back you could see cause they'd be in the fetal position. But it was really cool because we, some of these guys and some of the girls would actually burn up to 1500 calories. Bringing their temperature back up.

And we model all of it to show that it actually was an input and worked really well. So there is a big metabolic drive, but these experiments are far, we're far taken way further into into hypothermia than what people see when they jump into a cold tub for four

[00:17:54] **Dr. Mike T Nelson:** minutes or 10 minutes or whatever.

And obviously a very controlled situation. You've got professionals there who know what the hell they're doing watching them. You've got monitors literally in their nose, up their ass, like all over their skin. Yeah. Pressure's being monitored throughout. Yeah. It's not just some bro who gets in this cold tub for way too long by himself.

[00:18:15] **Dr. Dwayne Jackson:** We did. The funny part was when we did the when we went to do the ca, the it turned out to be a case study because we only got an n f1. But when we went to do the field study based on what we learned in the lab, that was when the physics took over. And it was really interesting to see because.

It was and we actually published this this case study just as a an abstract at Fab. And so my supervisor, so I'm like, so when you say there's a bunch of experienced people around, it was in the lab. We had that all set up. We, we had everything in a e d and everything going on out in this field study.

We so we ended up getting the lock master of the Ottawa River to give us his house so that we could utilize it for a lab. Oh wow. There's a boat launch right there. So we had a zodiac that was given to us from national Defense. It was a defense and environmental, it was called D C I E M.

It's a defense and civil Institute of Environmental Medicine. And so we had this thing rigged right up. We had so this is back back when we had to make our own data acquisition systems. So we had our attack in there that was like, this big thick box looking old stereo from the seventies.

[00:19:19] **Dr. Mike T Nelson:** About what year is this for context? Yeah, so

[00:19:21] **Dr. Dwayne Jackson:** this would be 1999. Okay, gotcha. Okay. So we've got this, we've got the Dak in there, we've got a portable metabolic cart, we've got all these batteries. We've had everything switched over with a DC converter to 12 volt. It was just a nightmare. And we instrument everybody up exactly in the lab, right?

So we get, so we start with our supervisor and so we all go out there. It's a little colder than we expected that day. It's just me, my buddy Chris, and my supervisor Glen. And he's yeah, it's a little colder. So we go out, we can't get the zodiac even into the Auto River cuz the ice is too thick. Like it just goes on top of it.

We're like breaking the ice up. We get it all done. We get in, we're like, we got Glen all instrumented. He's all, he's got like kind of military fatigues on kind of thing. Just a bunch of clothes basically. And we dump him into the water and he's this is way colder. He looks like this is way colder than our situation.

And he said, and you can feel it cuz the river's flowing, right? This is the thing. So it's carrying heat away, let's flowing water.

[00:20:18] **Dr. Mike T Nelson:** Any sort of transient, it's so much harder than stagnant water. It's crazy how big of a difference there is.

[00:20:26] **Dr. Dwayne Jackson:** It was unbelievable. And this took what would take, let's say I'll give you some numbers that I'm just pulling out the top of my head.

Yeah. But it wouldn't take an hour in the lab to achieve 32 degrees. Took about five or six minutes. It didn't take Ooh, it took, we, we only got a hundred yards from the shore. Wow. And at that point was when my supervisor starts singing the American National anthem for some stupid reason and rips out.

His esophageal probe. Oh, and Unattach unattached himself from the metabolic cart and throws it and starts just swimming around. But we've got him tethered with his rectal probe. So anyway, long story short, it ends up he goes, we we're still watching his rectal temperature now his rectal temperatures down to 31.

And we're like, we gotta get him outta there. But we can't get him out. He won't, he doesn't wanna get out. We, so we finally, because he is completely delirious, so we finally get him out. Oh yeah. We get back to the lock masters's house. I'm cranking the heat in the lock masters's house. And anyway, turns out that we

end up having to like basically break down into our schiess and hug our supervisor.

This

[00:21:26] **Dr. Mike T Nelson:** is our first year in our masters

[00:21:28] **Dr. Dwayne Jackson:** and he's saying, don't call an ambulance cuz we're gonna get in so much shit, but we can't get his core temperature. But thank God he had that rectal probe in, took us four and a half hours in this house. I was heating up water like there was like mason jars all in the CLO cup.

Oh yeah. Those up. Putting 'em all around him. But it's really neat because what came out of that was we developed a device or D C I M with the data and everything developed a device that was made for recovery from this. And what we realized we needed to ha have it happen fast, was forced hot air rebreathing.

And so breathing. Interesting. Yeah. So it was literally like a hot air breathing device, like

[00:22:04] **Dr. Mike T Nelson:** sucking on a hair dryer. You

[00:22:06] **Dr. Dwayne Jackson:** want a what, almost like a hair dryer? Yeah. But it talks you more of a cabinet that they're in that has hot air in it. But it was it was really neat because that's what came out of it.

But it was quite, quite the quite the adventure and it serves as a warning to make sure people don't get to the point where they feel weird and like the water doesn't really bother them anymore. Yeah. Cause there are these shifts in mental mental acuity, I guess you could say as you get into deep hypothermia.

[00:22:29] **Dr. Mike T Nelson:** Yeah. And the other part when I was looking at it too, was I, there was a stat, and I can't remember what it was, but for. Significant effects of drowning. And this was like, I don't remember what it was, but every, year from, plane crashes, car accidents, some military stuff, people fall out of their boat, et cetera.

And it was interesting to see the time course. Like some of them were like super short, like in a couple minutes. And then obviously it was a little bit longer. And when I first looked at it, I'm like, what the hell is this? Like how there can't be that much difference and you're not gonna get frank hypothermia in a minute.

And then when I read further, I realized it was people who would go into cold water were not used to it would have that gasp reflex where they and their head would be in the water and they would inhale water and they would drown instantly. And it wasn't from the, basically the effect of the cold. It was the cold causing a gas reflex.

Their head was in the wrong position or whatever too. So that to me was A little bit eyeopening because I was like, what? This doesn't make sense. And they're like, oh, yeah. So there's all different facets of things going on beyond just, frank hypothermia too. Oh,

[00:23:41] **Dr. Dwayne Jackson:** 100%. Absolutely. Yep.

Yeah. And it's usually drowning. Hypothermia would tend to if you get outta the water with severe d hypothermia you're only just starting your adventure into Yeah. Problems, right? So there's a lot of cases where people actually make it in. They're like, holy fuck. And I can't walk.

And they get in and they lay down and they're done die of hypothermia because they go into this after drop and there's no recovery from it. And so all systems slow rate down when you start getting into, the 20 degrees Celsius range with your in the twenties with with hypothermia.

So it's, yeah it's quite a, it was quite a, quite an adventure studying that stuff. And it was really neat because it It led to a, I actually, once we started doing the cold stuff, I realized how fickle it was. Now was, and that's when I got into warm thermo regulation cause little less fickle.

And it was neat because it's it's still a really neat competition between cardiovascular reflexes and thermal reflexes. And we run into this also with Hy hypothermia. There's a battle between, high blood pressure during that time and not dilating skin like you normally would because you have this high, really high cold thermal input to cause

construction.

[00:24:49] **Dr. Mike T Nelson:** Yeah. Explain that for the listeners who may not be familiar, because at the end of the day, like you, you have to keep perfusion to your brain. So your body's trying to solve this complex battle between these. Opposing

[00:25:00] **Dr. Dwayne Jackson:** factors. Yeah. Heat heat stress is actually the best way to exemplify it.

So after about especially after exercise say we create the heat by exercising even in a controlled environment if you ride a urometer for, 30 to 45 minutes at 70% VO two max, you're actually gonna build up a few degrees of, or at least a degree and a half or so of heat during that bout of exercise just purely from the exercise itself.

And during that time, there's a whole bunch of big shifts in blood flow to different areas of the body. So one thing we know is there's this post-exercise hypotensive period after about a relatively intense cardiovascular exercise. And this post-exercise hypotension has always been a question of what it is.

And our hypothesis was that the hypotension is a consequence. Of dilated skin ke skin arterials so that we can actually dissipate heat over time. And so the question we had was, does the body favor thermo regulation over cardiovascular homeostasis? And we got these people heated up with so we suited them up, first of all, in a massive water perfused suit.

And the reason why we did that was so we clamp skin temperature. And the reason why you have to do that is because skin temperature provides a thermal input for dilation in the brainstem.

[00:26:21] **Dr. Mike T Nelson:** Ah, so that's how you detect your environment to figure out what the hell's going on.

[00:26:25] **Dr. Dwayne Jackson:** That's right. So we, we eliminate that variable as much as possible, and then we can vary the temperature of the suit to look at transient and skin blood flow and sweating.

And what ends up happening is after a boat of exercise you end up having this hypotensive period that also coincides with a elevated esophageal temperature. So blood temperature. What's that? So blood temperature, correct. Blood temperature. Yep. So like your immediate core temperature.

And what's really interesting about it is that we see about a, probably a degree change in a degree, deer and a half change in core temperature. And it prevails over time and it prevails about the same length of time as the hypotension. So we developed a bunch of experiments where we had low body positive pressure.

So we I created this device in my dad's machine shop that you could upright sit in this thing, you could pedal inter garter, do your exercise, and then we could turn on pressure in the low body so that basically it redistributes the blood from the legs back into the core blood volume.

[00:27:31] **Dr. Mike T Nelson:** Yeah. So it's like the reverse of sending someone into space

[00:27:35] **Dr. Dwayne Jackson:** that you wanna know what it's it's it's like a countermeasure that you'd have for space.

Absolutely. Yeah. Yeah. Yeah. Yeah so at the end of the day, at the end of the day, the idea was that we'd redistribute, redistribute that, that blood back to the core. So then it could be available for whatever the body has chosen as its recovery. So it's gonna be blood pressure or is it gonna be thermal regulation.

And what we found was that after exercise we get this post-exercise hyperthermia that kind of matched up the blood pressure. When we started putting low body positive pressure on reestablishing blood pressure, then we'd see at the same time core temperature come back down to normal. So what we came up with was that the body is serving blood pressure over thermal homeostasis in order to try and recover blood pressure.

So blood pressure is the controlled variable, but when we have this massive amount of blood pooling in the legs after exercise, and we have the thermal stress where we have to try and get rid of that heat, Blood pressure can't do enough to recover just because of our blood volume isn't high enough.

Our legs can hold probably, double our blood volume. So depending on the size of them. So at the end of the day, at the end of the day really the body itself only has a limited blood supply and that limited blood supply, like you said, has to make sure that it services the brain.

And the brain is above the heart and way above the toes. So gravity isn't helping us out there whatsoever. So cardiovascular homeostasis prevails over thermal homeostasis. And that's why when you're standing at the Boston Marathon or the New York Marathon or any marathon, yet the finish line, you see so many people go horizontal.

And it's because blood pressure just plummets and you'll see them throwing up. And all my wife's a marathon runner. She does. Boston. Got it. And and it was

really neat because I saw it an application when I was there and I thought, these guys are going horizontal because their body's reestablishing blood pressure.

And during that time, once they get blood pressure reestablished, then the body can start reestablishing its blood flow to the skin and get rid of that core temperature. So it's, it has a lot of application on the these studies and really fun to do, but really complicated because of the way the skin operates.

So skin, blood flow has sympathetic constriction and sympathetic dilation.

[00:29:49] **Dr. Mike T Nelson:** And that's really, and then that's a local effect then. Is

[00:29:51] **Dr. Dwayne Jackson:** that correct? Yes. And it's really interesting because we have local effects. So we can put, sweat monitors, we can put blood flow monitors, stuff of the skin and just hit that one spot of skin, not, don't change any other temperature in the body whatsoever.

With a quick blast we can dominate and we can cause sweating. We can also heat up the legs, increase core temperature and cause sweating all over the body. So we've got local inputs and then we've got hypothalamic inputs and the, and that's where BL studying blood flow in skin and thermal regulation becomes super complicated and not as sexy as skeletal muscle blood flow.

So that's why I into skeletal muscle blood flow after that. And it's a, it was, that was a fun adventure in itself too, with a bunch of kind of new findings and whatnot.

[00:30:36] **Dr. Mike T Nelson:** So is this would explain why athletes then could literally, potentially drive themselves into heat stroke because they are maintaining pressure.

They're literally overriding the thermal regulatory signals. It's telling their body, this goes into Tim Nokes, central Governor hypothesis, or whatever hypothesis you want to use that I'm so determined I'm gonna make it across this finish line, and I'm still prioritizing blood pressure. So my brain is still semi operational despite my core temperature now becoming potentially dangerous until it.

It's a certain point where it's just whoop you, you're going down no matter what. Like you've crossed the point of no return now.

[00:31:17] **Dr. Dwayne Jackson:** Absolutely. And that's at least one of the reasons why Yeah, abs sure. There's a whole

[00:31:20] **Dr. Mike T Nelson:** bunch of reasons, but,

[00:31:21] **Dr. Dwayne Jackson:** yeah. But yeah, exactly. But from a, a physiological and physics perspective, 100% blood pressure is, really working to try and reestablish itself.

And a lot of the work I did at Yale when I was down there doing, starting my PhD, the we looked at, we were looking at the same thing, but looking in, looking at it in countermeasures for space flight. Cause this they wear and because they're in outer space and now all of a sudden we have a completely opposite thing, right?

Because ground longer reckon our blood pressure and everything, fluid shift up, fluid shifts and everything. And and that was really fun because we got into studying what the actual peptide transmitters were. That we're releasing, that were released during heat stress to, to turn on sweating.

So we looked at like histamines and all these other different things, and we end up realizing that C G R P, which is normally no subception pain C G R P actually is one of the ones that drive the, that drives sweating when we increase core temperatures. And we did that through these really cool microdialysis probes that I would insert using ultrasound guidance.

So you had to almost weave it through the skin. It was a spinal tap needle is all it was. Oh, yeah. And then the spinal tap needle, I put like these, I made these microdialysis probes that we sterilized. I made those under the micro microscope. Ooh. And we, and then we didn't put those in and then we'd just run a infusion pump through it at a certain rate, and then we'd collect the effluent it's just, it was just a a buffer at the other side.

And then I'd run it through a radioactive Eliza and or a radioactive PSO assay. And we'd and then we'd just measured, measure the levels of whatever was in the blood. We just did a panel and we found that C G R P was one of the ones that went up. But what was really cool in those studies was we were trying to tease out the inputs of parasympathetic and sympathetic nerve activity on this heat response.

And because of the bar reflex response. So bear the bar reflex is what, maintains our blood pressure at certain set points. And that changes when we go outer

space. This is a really important question for us to understand, is can we measure heart rate variability in these ash and be able to predict different things?

And then can we do countermeasures like exercise? Can we give like plasma, plasmapheresis, these kind of things to try and, circumvent some of the issues that they have with space. And that was where we developed all these algorithms for heart rate variability because we didn't have any other way to measure it except for through an ekg.

And then actually, do you know the mathematical transformations? So the fast four A transformations and whatnot. Yep. Turn them into spectral data. Yep. And that was real. I really enjoyed that and I loved seeing that come to fruition. And like you said at the beginning, if I'd if I had the foresight and I wasn't just such an academic at the time, I would've totally tried to patent this procedure for just fitness, right?

Yeah. Cause we end up using it like in all fitness things. After that we were using EKG and running these algorithms that we developed in matlab, like for years after. Yeah. Unfortunately we didn't get on the bandwagon early enough. Now I have to pay for the devices.

[00:34:14] **Dr. Mike T Nelson:** I know nobody did.

Like when I was doing H R V stuff I still remember transferring to the exercise fizz department. Didn't wanna do anymore math anymore, did a master's in mechanical engineering, did five years as a PhD student and exercise, or I'm sorry, in biomedical engineering. And even then we had the old school, $10,000 of used equipment because the issue was trying to find the peak of the rwa, right?

So for listeners, you have to accurately measure one wave to the neck. So imagine you have to be super accurate with how you're measuring heart rate in essence. And if it varies just a little bit and that's noise, then your whole thing is just screwed. Anyway, so we had to make sure we got that.

And then I had a write a specific MATLAB code to transfer all of that data. And luckily at that time they had Kuo and Finland had just put out their software. So I found that and I was able to put in the RR intervals and I didn't have to write anymore code to, to do all the rest of it. But yeah, even then it's like, If I would've known enough to be like, oh, someone should probably standardize these types of things.

It was like each lab was doing their own and the assumption was, Hey, if you got our animals and you got H r V, it must be good. Like most of peer reviews didn't know enough math and exercise fizz to actually say if you were doing it correct or not. No, it was just kinda like the wild west.

[00:35:36] **Dr. Dwayne Jackson:** Yeah. Yeah. And it's funny because we so I had a real control freak all, actually, all of my supervisors were control freaks. I'm soccer, I'm a control freak. But really interesting because these guys actually would make me do all these crazy pilot experi. Proof of principle and a three, those kind of things for the papers.

And so we actually would do the four A transformations, get the, get all the peaks of the very low very low frequency, high frequency, all these different peaks. And then we'd go in and inject phentolamine or prices in, and then see how we change them to prove that our algorithm actually worked.

Yeah. So we knock out parasympathetic with atropine and these kinda, and that's what I loved about being at Yale because the Human Investigations Committee let us do these crazy things like you'd only see in Sweden and stuff. And I, it was purely because we were part of this, we, I was in the John B.

Pierce laboratory, which was an environmental medicine lab from like the 18 hundreds and had been around for so long that they just, we were allowed to do these things. And that was really where I really gained a lot of insight into the proper methods for actually understanding for a transformation.

And it's funny because you don't see any of those data for any of these wearables now. So you pay what, 11 or 1200 bucks for this watch. And yet the algorithms are all secret. Like they're buried. So this is what, this is something that's always bothering me cuz like you said, finding the peaks and doing all these things, what kind of statistical analyses do these devices run to make sure we're actually getting what we say we're getting?

And that's the interesting part about it. And I'm sure they go through a lot of averaging is probably what they do.

[00:37:13] **Dr. Mike T Nelson:** Yeah. But especially the early didn't, womens now are actually pretty decent, but the early optical stuff off the wrist, if you look at that raw data, it is not clean at all.

It is really messy. And you're also looking at a waveform. You're not looking at the electrical signal. So I talked to the guys at Ora when they came out early on.

They actually went and used the finger location because the signal they could get was so much cleaner. And so then they poached a bunch of people from, basically a lot of the heart rate stuff they did in Finland and told a bunch of their engineers and had 'em figure it out because if you looked at their raw data, you could see the waveform like super clear.

And that made it a lot easier for them to figure it out. But yeah, even now, like I've, I think I've lost almost like every H R V consulting contract I've ever had an interview with. Cause it almost always goes like the same way. It's Hey, okay, what's your hair brain idea for H R V? You wanna do?

I'll just do a free call to see if I'm interested in helping you out. And I'm like, okay. Yeah, that's basically a stupid idea that's not gonna work very well. And here's why. And they're like, We already have 70 or 80% of it done and we're gonna do this. And I'm like, okay, so you're gonna do H R V, even if it's accurate with no context at all.

Like what if they're exercising, you're gonna tell 'em their H R V sucks and it's a horrible thing. Just crosscheck it against accelerometer. There's ways around these things and they're like, oh. And then they all get mad at me and I just lose the contract anyway and never call back again.

[00:38:40] **Dr. Dwayne Jackson:** It's funny because we've had, I've had people like contact me when I had my lab like a couple years ago. Similar idea. And it's funny because generally these companies will come to you when they've already developed the product. Yep. They just want you to put your doctorate behind it and say this is sweet, this thing's awesome.

And what they're not realizing is these lifetime academics, like you and myself are work on a nerds and you wanna contact us at the beginning of the project because chances are, there's gonna be something in there that our expertise can help you with.

But I tend to find, yeah, a lot of companies are already, they've already developed their product and they just want the, they want the press release, right?

[00:39:17] **Dr. Mike T Nelson:** Yeah. And that's the nice part also about, I realized very early on was after I left academia was if I have one my own distribution network, like through a newsletter, social media, whatever you, one of you do, and I have money that comes from, most of my money comes from actual clients.

I don't need industry money. I don't have to consult with this other Wizbang crazy ass supplement company or wacky H R V Tech, whatever. I can just walk away and be like, eh, no. Nope, not gonna work. But I get it. Where if I had just graduated, I'm a hundred thousand dollars in debt, I've got a house payment, I've got all these other things mounting up and someone's gonna be like, Hey, we're gonna give you five to 10 grand a month.

Just, to ask for your opinion. And who knows what'll happen after that. It's. Yeah, I probably would've said yes. As much as I wanna sit here and be like, oh, I never do that. It's I don't know. I don't wanna be in that position and find out what I would do.

[00:40:13] **Dr. Dwayne Jackson:** Yeah, no, it's, it is a, for, it is a fortunate thing to come into the fitness realm after you've developed your, your expertise.

Mainly like you said, because you can pick and choose. That's why I love that I left academia for pretty much that reason. I, 16 years as a tenured medical professor in medical biophysics absolutely loved my job, loved academia, but realized I outgrew the institution quite quickly.

Just b just because I couldn't disseminate my knowledge without being completely chastised all the time. Because, they want asses and seats and when you're helping people for free, you're not getting any asses in seats. Even though I would fill my classroom twofold what I was supposed to have in it.

Yeah. Just cause I wanna help people out. But yeah, so it's funny it's funny because. The academic thing. I definitely it academia was was a dream for me. I lo I loved it all the way through until probably the last, until I became a chair of a department.

[00:41:03] **Dr. Mike T Nelson:** Yeah.

That's usually where people are like, uhoh, what did I do? Yeah. That

[00:41:08] **Dr. Dwayne Jackson:** was an undergraduate chair of medicine. And I realized I got sitting in the back backroom meetings and realized that I'm just part of a big business and if I, I might be solving all the blood flow mysteries in the world about blood pressure regulation and whatnot, but if it doesn't if it's not gonna develop a item that the university can't take 50% of with their, with the patent, then they don't wanna know about it.

It's funny you mentioned about you can make your. Other ways that it's selling your soul. So I actually funded my lab and I had a massive lab. I had, I had a 2000 square foot lab with everything from live animal research, cell culture a full genetics lab. I had, cancer programs going on.

Everything was under the under the idea of autonomic nervous system regulation and stress. And I had about 11 or 12 people in my lab working for me. And it was funny because it was that part was all fun until I realized that, I had lots of grants, everything else, until I realized that my colleagues were just getting big grants with widgets.

So being a box, right? Their widget would be, say, an mri. They had no, they were engineers or they were physicists or whatever. They had no idea about physiology. That's why I was actually brought into the department. But they would just say, okay, so widget. Do fatty liver disease and then write a grant and they would get it.

Cause they had the spaceship enterprise right. To study liver disease, but they were studying the same shit they were doing in the seventies with microscopes. So to me it was like, the answers weren't any different that came out. And yet these were like multimillion dollar grants because they needed multimillion to run an mri.

[00:42:39] **Dr. Mike T Nelson:** Oh yeah. MRIs extremely expensive

[00:42:41] **Dr. Dwayne Jackson:** in the ass. And we have, and we had we have we had over at Bart's Research Institute, like a dozen of them that were being used clinical scanners that were being used for rodent studies. So interesting there too, when you have to wait for an M R I.

But anyway, point is that for me, I started to become disenchanted as I was in the back rooms talking about, how things go down. And realized pretty suddenly that I was part of the Wizard of Oz and that I'd finally seen the wizard and it was time to. Time did not have that disenchantment because I, cuz I just love, I love education.

So it's way, like you said, it's way better to do it outside of academia. And it's really fun because you get to help people, like the actual people on the ground. You're not just, it's not just a bunch of kids at the classroom that have paid nine grand or whatever for tuition.

[00:43:24] **Dr. Mike T Nelson:** Yeah.

And that's why, I still adjunct at a couple places, primarily online. The last time I taught in person was at St. Thomas as an adjunct. And it was great. The university was awesome. Like all the instructors were great. Like most of the students were awesome. The labs, they had two, parvo metabolic carts.

We got to do great stuff. But half the students, I'm like, why are you paying an obscene amount of money to be here? You could not be more disinterested in any, I could be up here juggling flaming balls and you'd be like, eh, and it wasn't everyone, like half the students, were pretty good and into it and we're trying and half were just I hope

[00:44:00] **Dr. Dwayne Jackson:** they're there for the paper.

It's just, it's a ticket.

[00:44:01] **Dr. Mike T Nelson:** Yeah. It was weird where you go to a private event and I realize that, oh, all these people paid out of their own pocket to show up. And a lot of it, even, the 2, 3, 4, $500 events like that adds up with travel. Everything else, if you're a trainer, you gotta take time off.

So now you're not working with clients, you're not making money during that time. But those people who did all that were committed. Like they really wanted to learn. They asked better questions. And so I realized, I'm like, oh, I actually like teaching in the private sector better than I did in academia.

And I was like, oh. And then the last straw was that I think even now it's becoming where I could still do some research. I could still help with papers. I knew enough people. If a buddy of mine in California, I said, Hey man, you're doing this new study. If I can get three weeks off and my wife will, let me travel, could I help you with data collection?

I'm like, you don't even need to pay me. As long as he knows I'm skilled in that area, he's not gonna turn down like free qualified help. So even if I wanted to do it and I didn't need it for an income, I could still do the things that I wanted to do and I got to pick what things I wanted to do instead of, oh man, I gotta work on this widget.

Or Oh God, I'd have to write a grant proposal and I'd rather carve my right eyeball out with a dull spoon than do that.

[00:45:18] **Dr. Dwayne Jackson:** That's where the academics got mad at me because I actually used my, so I wrote for all the big magazines back, back in,

back from about 98 to, I still write for them now, but they don't pay anymore till now.

Back when

[00:45:30] **Dr. Mike T Nelson:** they actually paid money.

[00:45:31] **Dr. Dwayne Jackson:** Yeah. And they paid a buck word. So it was pretty good. So I had most months I had 10 to 20,000 words. That's great as a graduate student and into my first, first couple years on the tenure track. And so what I did was I was like, okay, so these papers that I get paid, $3,000 for each, take me like, three or four hours now a grant takes me three or four months, and the chance of getting it are under 10%.

Yeah. So I said, I'm just gonna, in order for me to have time with my friends, be able to leave work at a good time and everything, I'm just gonna do, use my writing to fund my lab. So I funded my lab with my writing, and it worked out to about probably several hundred thousand dollars a year. And it was really neat because the department had no fucking clue how is this paper right?

With the funding I had e even because I had so many students, right? I needed like millions of dollars in funding. I had hundreds of thousands. It worked out really well until people started getting jealous. It was really interesting. That's when I it's when you mentioned like the crowd that you're teaching to outside of the academy.

Yeah. Really neat because you don't get jealous people paying to go to a fitness conference or a health conference that you're putting on outside Right. Academy. But if you go to experimental biology with your data which is what we used to do. We used to go to three or four different conferences.

Experimental Biology was one of our bigger ones. Yep. And you go there, you're actually on the hot seat. You're not there to tell people, look at these amazing data that we've just put together. What do you guys think? It's more hi, my name's so the guy steps up like hi Dwayne Jackson university of Western Ontario.

So when you did this study, we did this 10 years ago, and you know right off the bat that this is not going to be a a conference where people are learning at it's gonna be a place. Yes. So I used to actually ask people, I'd say, was that a question or are you telling me No? And it was funny how offended.

These guys that would go up to the microphone and tell, talk about their study to you while you're giving a talk in front of, four or 500 people. How different that is. Like you said, when you're doing this outside of that club, cuz it's tiny little club. And we think it's massive when we're in it.

When you go to the real big club, the people that come to see you because they actually want to learn something, it's a completely different experience. And even with you and I, we're doing this talk right now, really neat. We have two complimentary areas that we've, studied in. We've got lots in common.

We're around the same age. Everything is in line. This wouldn't have occurred if it was two academics.

[00:47:58] **Dr. Mike T Nelson:** Oh no. This would be two men. Especially if you met at a conference like eb. Exactly.

[00:48:04] **Dr. Dwayne Jackson:** We went to eb this would not have happened. And what's really neat about it is like we'd be laying out all of our dowers so you could see them.

It'd be like, oh yeah, here's what I did back in 1492. And it's really interesting because. I found that, and I still find it when I'm with academics. My ego flares up. Yeah. I'm a different person. I become a completely different person when I'm in an academic setting.

And I'm sure you probably do too, cuz you, you've, been indoctrined.

[00:48:31] **Dr. Mike T Nelson:** Oh yeah.

[00:48:31] **Dr. Dwayne Jackson:** Oh yeah. And the whole like idea of, oh, they're stooping me, like that used to drive me crazy. Someone's doing the same studies you're doing, like they read the same fricking papers that you read Yeah.

Came at the same conclusion and they're drawing in a study out. They didn't get scooped, Yeah. Like you just didn't work fast enough and they got it out faster. And so now nowadays it's really nice to be outside of that kind of iron curtain because you can, like you said, you can dance in it.

I have lots of friends, the same thing that I can help them out with papers and do that kind of stuff. If I wanna do research, I can. In fact, I have I have a bunch of blood lab work stuff here that I have, and I'm gonna get a metabolic cart out here too. Nice. You can play around.

But really at the end of the day it, it's. In academia, I found that the more complicated I made my grants, the cooler I thought I was and showed in my, when I first jumped into the, the fitness realm because I was just like, very wordy, way too deep science with no application. And then you of a sudden realize people just want to know the basic foundation the 25,000 foot elevation, view on this.

And then the actionable because they trust you. This isn't like academia where they're like, oh, I don't trust this scientist. It's more so this person's here to help me. I'm paying them good money to help me and I'm gonna learn from them. And I love that. And I do the same thing.

I learned, I learned lots from that last conference that I met you at and it's the Real Coaches summit and it's, that's the way it should be, learning from each other and growing.

[00:49:50] **Dr. Mike T Nelson:** Yeah, cuz it's even, we'll talk about your certification here too, but when I did mine, like the flex diet, sir, that was.

The biggest hurdle I was, problem I was trying to solve is this has to be within a set amount of hours. This isn't a college course, right? I'm covering everything from exercise to primary nutrition and recovery. So I, the first thing I did, being an engineer is okay, what are my constraints of the system, right?

So I said, okay, so for each topic, my technical lecture is only one hour. So if it's protein, dietary protein, I have one hour to convey the technical aspects that a trainer would need to know. And the carbohydrate one was the worst. I redid that thing five times. I got it down to, I think an hour and 10 minutes.

But it's, would've been easier for me to do like a eight hour electron carbohydrates. Yeah. Would it have been as useful to anyone else? Hell no. Like less useful. But then you've got other parts of the industry who. Everything is so simple is not accurate anymore, right? So how do you find the happy medium of, okay, here's what we need to know.

Here's what we think is going on. Here's the date it's based on, so go in this direction. And then I added what I call the big picture, which is like the context of, how everything fits together. I use metabolic flexibility as a theory, and then you have like your five specific action items, right?

Okay, now you know the big picture about how protein fits into metabolic flexibility, and now you've got your five action items for what do you actually

explicitly do. But that was like the hardest part for me to figure out because like yourself, like I didn't want it to be okay, just eat more protein.

Okay everybody knows that's probably not that useful. So how do you make it useful enough but accurate that people actually can learn from it and do the things that you want them to do? Which, that's a, but as a, it's a kind of a, it's a fun ever ongoing problem to try to solve

[00:51:41] **Dr. Dwayne Jackson:** too. I agree.

And it, it's really neat too because it's ever changing because of, like you said, we have a little bit of a broken telephone in the industry. Yeah. And by the time things get filtered through several different years of mouths and posts and everything else, it's sometimes a completely different thing than it started as.

So it's it's funny, like something as simple as post exercise protein or post exercise ex eating it actually wasn't really a problem until people started fasting. And then all of a sudden that, that period became a thing. But the problem is that all the old data from fed workouts, that stated that post exercise, if you've already had a relatively good protein carbohydrate meal before the training, the post exercise window, really. That important of thing, but it's more like a garage door. And there's a paper that actually calls it that, because it depends on how fed you are before the training session.

Oh, sure. And most trainers now say there's no such thing as a post-workout anabolic window. And it's no, that's not what they're saying. They're saying that if, if you're in a Fed state, the post exercise met anabolic window is just much larger. Yes. It stays worse for you if you're going in fasted after 16 hours.

You, you wanna get some amino acids in there and some carbs hopefully if you eat those kind of things after your training. So it's really neat how that's one that that's just one small example, but that's an example of something that's been broken down and, you obviously are teaching it with your course.

I'm teaching it in mine, and that is the I think having enough science in there really makes the difference. And it's like you actually, it's funny because I really struggled with. Digestion and metabolism. No. All substrate, right? Yeah. And so what I did was I, yeah. So carbs ended up being like, like two hours I think.

Oh, that's not bad. Yeah, it wasn't too bad because what I did was I really focused, they're really holding in on everybody hates, and that's a, that's the actual TCA cycle and then going into the respiratory chain for aerobic stuff, and

then the anaerobic glycolysis. And what I did was I made it so that once I went through that at ad nauseum, I showed them that fat and and protein can also feed into the same system, as, as long as and then that's what that, that's what's made it easier for my protein and fat talks.

But yeah, you're right. Like it's, it, you could as an academic, I really wanted to do the whole course on just one substrate cause Yeah, because just I felt like, oh, I'm not giving them everything. And that's a nice part of it, this exercise for us, as people from the academy because it, we also grow through this.

We also, oh, definitely we learn how to talk to the people that we weren't trained to talk to, right? We now learn that being complicated actually goes against your business model, even though that's what you're taught in academia to bullshit your way through things with big work.

And you also realize a lot of times that when people are defensive about their data, it's cuz they maybe don't understand it because a lot of times you can't get a simple answer out of them. And as you're working on these courses yourself, and I'm working on mine, you realize that what you're taught in class was way convoluted and you can teach it

[00:54:43] **Dr. Mike T Nelson:** way easier.

So Yeah. And then even I struggle with like how do I teach things that's accurate but may not necessarily be the way that was always taught. So for. For years I was taught like, oh, A T P C is just 10 seconds. And then you've got, your glycolytic pathways, which are like a couple minutes, and then you go into aerobic work.

And I remember seven years ago, I think it was Aaron Davis had a moxie, so a nears unit on somebody's leg. So looking at local blood flow in the leg, sticks 'em on a rower, has 'em do like a 32nd wind gauge. So just as hard as you can for 30 seconds. And he is showing the monitor of oxygen in the leg muscle.

And it starts at 85% and at the end of 30 seconds it's down to 15%. And I was like, oh shit, this makes no sense. The monitor's gotta be bad, right? It's gotta be, go through all this stuff, met the guy who came up with the device, blah, blah, blah. And what you realize. Oh, so you're always using oxygen all the time just at different rates.

Yeah, and the simple model, I was taught that I can plug textbooks off my shelf right now when I'm at home. That's still regurgitating

[00:55:55] **Dr. Dwayne Jackson:** it's overlap to the systems. It's like as soon as the, as soon as the alactic system's burned out, move on to anaerobic glycolysis that out. Move into, yeah the aerobic

[00:56:05] **Dr. Mike T Nelson:** glycolysis.

Yeah, exactly. Yeah. And they're all just, I think of it as like overlap dials, right? You just got different rates that are showing up, and then you got stuff like, the glycogen shunt theory that, throws a monkey wrench and all of it, that a lot of academia just poo poos and says, that doesn't matter.

And then they've got newer data showing that, yeah. So it's, I always struggle with those things too, of I don't wanna just regurgitate all the stuff that I learned or that I've now had to spend seven years trying to unlearn, and it wasn't a hundred percent wrong. But I don't think the mental model I built off it did me any favors either.

Yeah. So it's like, how do you explain a little bit of a better mental model so that people can start from a higher level and not have to unlearn a bunch of stuff as they go through? I

[00:56:49] **Dr. Dwayne Jackson:** like it. Yeah. I know. I agree. It's there's a lot of that stuff that goes on. One of, one of the, one of the ones that right now in the not in academia, so not in biophysics anywhere where I came from, but in in the fitness realm that's really messed up, I think is the control of autonomic nervous system function.

So many people that don't realize it's a balance, again, they think it's too, they think parasympathetic. You turn it on. We're healthy sympathetic, you turn it on, we're unhealthy, we're stressed out or if we turn it on, it's during a stressful event and therefore, we need that for those stressful events.

So it's just a, it's just a, like you said, a dial. All right, turn it on. They don't really realize the simo vagal balance in a lot of cases. And what's really neat about it is a lot of people don't actually realize that our sympathetic nervous system bursts. On a beat by beat basis now, in humans, like when we measure it in the peronial nerve.

So we did some of this kind of work in the past in humans. If you measure sympathetic nerve activity in humans, it'll burst on the diastolic phase of every cardiac output, or, sorry, car beat every cardiac output. But the but not every

single beat, it just happens to be coherent with this falling of blood pressure in a single beat.

Gotcha. Rodents will be, rodents will burst a sympathetic nerve every single beat. So we measure it in our rats or in our mice. We hook onto the lumbar sympathetic chain and you'll get a burst. You'll get a burst that's coherent with the diastolic phase. So the, ah, blood pressure.

So because the the sympathetic nerve, the auto autonomic nerve system is entrained to the barrel reflex, then automatically when blood fl, when blood pressure, Dr. Falls during diastole. We are gonna see a possible burst. There's a chance for a burst of activity. The more stressed we get over time, the more of those bursts show up.

So really it's a matter of how much parasympathetic nerve activity we have, but we need that sympathetic to maintain blood pressure. That's the only way that when I get up off this chair, that I don't go horizontal, and feel dizzy, is simply because of those bar reflexes, increasing the sympathetic component and withdrawing the parasympathetic component.

So I teach a, my, my classes in about, we take out cardiomyocytes or we take out even a heart out of a in an animal model, put it in a Petri dish with a buffer with glucose and electrolytes. It'll sit and beat for a long time. And you've probably seen this before.

[00:59:07] **Dr. Mike T Nelson:** You mean Reanimate 'em, like the University of Minnesota does a visible heart model where you use the correct blood flow or you use a Lang Endorf model or hundred percent different ways of doing it.

[00:59:15] **Dr. Dwayne Jackson:** Yeah. Yeah. And if you just take it out, denervated it, and it just sits in that thing, it's gonna beat, it's gonna sit there and beat at an intrinsic heart rate.

And that intrinsic heart rate in humans is around a hundred. Yeah. And so automatically we know that when our heart rate's under a hundred, that we know that we're actually operating with more parasympathetic than sympathetic balance. And then as we get to a hundred, we're just withdrawing that parasympathetic nerve activity.

And then after that it's all sympathetic driven for heart rate. So it's funny because that's one of the things I really try to get out there with people when

they're talking about autonomic nervous system control. And they say oh, you gotta ha turn on the parasympathetic and turn off the sympathetic no.

You're gonna pass out. Sympathetic's always operating, and in fact it's operating a lot in the muscle tissue that's active during exercise. And we know that and we also know that the dilation that we see during exercise isn't neural, it's due to some lytic buffering system.

Some people say that, it could be adenosine. Some people say it could be, potassium. But we don't, we really don't know what that dilator is. But there's no dilating signal that's coming from a nerve to muscle, and they teach that in medicine. Did they really teach that?

Yeah. Yeah. So I have to unteach it. Oh, interesting. The course that I taught my course was it was a vanity course, so it was like, on what I do and unteaching the fact that humans, dogs do, but humans don't have vagal inputs to muscle that, that operate blood vessel. Was probably one of my main things I had to do.

I had to fight against that because it's easier to teach in medicine that there's a dilator nerve and a constrictor nerve. Yeah. Yeah. Except for it doesn't make sense when you start actually thinking about it logically. So yeah it's really neat. The the bidirectional miscommunication that can occur on both sides from the academics that say it's, this is the gospel and then when you go in the real world, it's may not be quite the same.

Yeah.

[01:01:06] **Dr. Mike T Nelson:** On the sympathetic side, I always explain it to people. I try to use the word sympathetic and stress and explain to 'em that stress stressors are not a bad thing. We chuck someone up into zero microgravity, like they all go to crap if they don't do any countermeasures. I think there's a story of trees without any wind at all.

Don't even grow straight. You need those stressors. You need those. Inputs because just like exercise, right? Everybody knows if I want bigger biceps, I'm gonna do bicep curls, I'm gonna stress the muscle a little bit to have it be, a positive response. But yeah, it's a, the other thing I used is if people have ever been on a beta blocker, or if you've been parasympathetically overreached, which it's kinda a debatable term, but if you get super high parasympathetic tone and you can't get your sympathetic system up, you feel like utter dog shit and your performance is not good.

[01:02:04] **Dr. Dwayne Jackson:** Absolutely. It's it the whole autonomic nervous system thing I think has been that's one of the ones that has been under and under-taught. So I'm glad you include that in your in your lectures and whatnot because it is, it's such an important fact when we're talking about exercise, because it is the thing like cardiovascular homeostasis.

Is the essence of autonomic nervous system control during exercise. That is the, that's what it's all about. And when we talk about, good stress versus bad stress and these kind of things like what's eustress and what's distress, it really is how long that sympathetic drive prevails.

Yep. After you're done withdrawing the stress. And so with exercise, we know greatly, right? We exercise really hard and we feel great within an hour afterward. My wife says I'm an asshole. I actually, we actually got into a little bit of an argument after my workout yesterday. I came in the house and I'm always like, really charged after my workout.

So I, I dig in myself into a dark hole and I really go for it. So I, so she wanted to go for a walk and I came in yesterday. She's you look like you're. Just finished my chest workout and she's yeah, we're not going for a walk. You look like you're really mad. I'm like I am. I just finished my chest workout.

But within 30 minutes it goes back down to, mellow Duane if there's such a thing. And and it's all good. But yeah it's not prevailing that prevailing stress, eh?

[01:03:19] **Dr. Mike T Nelson:** Yeah. Last random question, we'll let you talk about your search, what you got going on. Do you think, when you are exercising, what do you think about, and in terms of emotion, do you think it's better to have, for lack of a better explanation, some sort of anger or you're pissed off about something or to think that you're doing it for a higher power, greater good love, the other end of the spectrum?

I'm always curious about what people's perspective is on it. I think it's gonna be like a whole podcast of philosophy, too, but.

[01:03:55] **Dr. Dwayne Jackson:** Yeah, this is a neat one. So I dig myself into a dark hole. So my best workouts are when I'm the most pissed off. And that comes from that was trained a long time ago in my probably my twenties.

And it's funny because I can't get same workouts now without throwing on death. And actually feeling like a biker. I don't know it's really strange. And it's

something I've really tried to overcome. But the problem is when I don't get myself in that mind state and train, I don't see the benefits that I normally do as quickly.

And I also find that when I call, and I have tried the love and happiness workouts too a lot. And it's funny because you can even see it after I'm done I'm not as tapped. I'm not even close to mentally tapped. And when I look at the actual weights that I push during those times, They're like 50% and I think I'm going to failure.

Interesting. Always failure. And so for me, it's actually being mad. And that's why I've never ever had training partners unless it was someone that thought the same way. But it all comes from nineties bodybuilding.

[01:04:56] **Dr. Mike T Nelson:** It all comes from, yeah. Yeah. That was like the way everybody trained back then, as far as I could tell, like

[01:05:00] **Dr. Dwayne Jackson:** a bench press for me was and I don't think of it this macab anymore, but I used to think okay, I'm gonna take this bar and my biggest enemy's on the ceiling and I'm gonna throw this, 4 0 5 bench press at this person.

And I wanted to go right through the roof and I get myself into that state, turn on my music, be that guy didn't have smelling salts, but if I did not and push that weight. And it's funny now because I still have to dig myself into a state like that in order to get to failure. And I've only actually with I had a kidney transplant two years ago, and with the medications I'm on.

It's really hard to get yourself into that state. I'm not on beta blockers or any blood pressure meds. Those were another story when I was on those. Cause you can't get in that state cause you're sympathetic altogether. So yeah so I have to be in a very highly sympathetic state.

I have to be like I said, almost pissed off and but the problem with it it does prevail for about half an hour afterwards. Like where I'm not mad. Like I'm not mad at anybody. Yeah. Yeah. Very intense. That's my wife. That's, my wife calls it very intense. But I think I'm intense most of the time.

[01:06:02] **Dr. Mike T Nelson:** Yeah. No, I was just wondering about it because I probably 10 years ago transitioned out of just like in college and working in the PhD, blah, blah, blah. Everything. My stress relief was to go

exercise and worked good. But then once I graduated, I was like, oh, of course I still have stress, but it's not the, it didn't feel the same.

And then I started looking at the amount of injuries I had. Just luckily I didn't have too many in the gym, but from doing other stupid stuff. And I was like, how? But it took me probably, I'd say, a couple years to sort of transition. And my hypothesis again, who knows, is that there's less risk of injury and I can get to a similar level of performance now, but it's just more of being focused without being angry.

Were before the only way I could get focused was to get angry,

[01:06:54] **Dr. Dwayne Jackson:** if that makes sense. Yeah, I know. It's it, and it's funny cuz I have a bunch of friends that have said the same thing and I still get the de-stress feeling from it. But it takes, like I said, it takes about half hour to an hour.

Cardiovascular is where I actually do the hippie. Smoke a doobie and go out for a nice, big, long three hour hike. And we can do a lot of that out here. Yeah, there's a lot of doobies smoking and there's a lot.

[01:07:15] **Dr. Mike T Nelson:** They're in Canada. A lot of

[01:07:16] **Dr. Dwayne Jackson:** mushrooms too around here but what's really cool, what's really cool about that is I do buffer it with long hikes.

Yeah. And that's something that I really am mindful of. And like I said, I really tried in my workouts to, to get to the state that you're at and it just, I can't get there now, the injuries. Great point. That's one thing I am very cognizant of now, because yes, the approach I take, I can't take the same approach.

Like I have to warm up and I have to warm up like really good, like 30, 40 reps for the first couple of sets before I actually get into it. And so it's it has, it is something I really want to transition to. I would love my workouts to be peace, love, and happy. But my walks that I do every day are so I do get that really nice in touch with nature, stop, smell the roses.

And that's something I really need to do because I'm, a very charged guy and it's hard for me to relax my mind and that I do find relaxes my mind nicely.

[01:08:09] **Dr. Mike T Nelson:** Yeah. Yeah. People watch on my workouts that the blaring death metal, they'd probably be like, I don't know, he seems pissed off, but it just seems weird.

But it, I always think of one of the guys Ivan Moody from the Five Figure in Death Punch was telling the story of the first time his young daughter ever saw him perform. He's cuz normally they would, sometimes come on tour. Normally they'd be at home. And so she got to the age where she's come to the show.

So she's off on the side when he comes off after the show and his daughter's just like crying and he's you know what's wrong? She's what happened? Why are you so mad? And then he realized, he's oh my God. Like she's never seen me perform. She's only seen like the complete utter opposite her entire life.

So to see that was very shocking cuz it was so different. And then a lot of, I used to do interviews with a, I was in a radio station for a while with a lot of death metal guys and I, 90% of 'em are just like probably the most relaxed chill people like George Corpse, grinder Fisher from Cannibal Corpse, like one of the nicest dudes you'll ever meet.

But if you see him perform, you're just like, oh my God, I don't wanna meet this guy in a back alley. And you ask him, you're like why are you so chill all the time? He's oh, I get to yell and scream, but all sorts of crazy shit on stage for an hour. Of course I feel great after gets it all out.

Yeah. So that training might be like that too. You just get it out of your system and then you're like, cool. Everything's good after that.

[01:09:31] **Dr. Dwayne Jackson:** And I, and I honestly think that's a big part of it for me. I've always been a very aggressive guy and And by aggressive, I don't mean going around and picking fights with the average person.

Yeah. I clawed my way to the top in medicine. And my wife always pointed this out to me, right? Motocross, single sport, no real rules When you're on the track, you can do whatever you want to people on your bike and throw these 250 pound machines at each other. And so I did that for all my formative years while competing in body building during Right.

So the programming's pretty strong and it's really neat to actually, the psychological stuff is what my this is my now that I'm 50, this is the this is the stuff I'm working on now is really being able to control my own mind. Cause

when I was younger and I was taking 75 milligrams of ephedrine before my workouts, holy shit, shit,

[01:10:17] **Dr. Mike T Nelson:** that's

[01:10:18] **Dr. Dwayne Jackson:** five milligrams of tablet when it first came out.

Five. Yeah. And so back when I was doing that, there was no foot off the gas pedal. Like it was gas pedal down. Straight A's in school, win body building shows, win motocross races. It was just all about just win at all costs. Do this thing. And that's why I have a kidney transplant.

You can only pedal to the metal it for so long. Yeah. The blood pressure and everything else that comes along with it, it's gonna take something out. So for me, yeah. This next phase of my life is really about that's why we moved out west and everything else is about being able to harness that inner, hippie.

There is one in there. I know it's, yeah. Yeah. Cause I, because I feel it every time I go for my walk. Yeah. It's really neat you ask that question because it's something that actually, like the, yesterday we dealt with I literally walked to the house and it was like, whoa, you look really mad.

And I'm like, no, I'm not. I'm just really energized.

[01:11:11] **Dr. Mike T Nelson:** Cool. Tell people about your certification. I know you've got a line of supplements, you've got some mushroom products, you've got all sorts of stuff going on. So tell us about

[01:11:20] **Dr. Dwayne Jackson:** it. I've got all kinds of hands and things. Yeah. So I run a course with prescript, so it's my own course.

I just do it under their hospice and it's a nutrition course on body composition. Really, I just, I, it's really just a a kinda like what you said. It's a 14 week course that would cover numerous different exercise physiology courses, anything from, the progressive overload.

To matching. To matching, whatever your research, or, sorry, whatever your exercise programs that you're programming are to the nutrition that you need to actually support that program.

[01:11:50] **Dr. Mike T Nelson:** Yeah. Cause almost nobody does that.

[01:11:52] **Dr. Dwayne Jackson:** Yeah, it was, it's weird, eh? Yeah, so that's why it was actually funny in the course, cause I spent a lot of time doing things that I, that aren't nutrition related.

Directly. And that's basically, when you're designing, I don't teach them how to design any exercise programs, but I tell 'em, if you're doing these types of things, and I show 'em actually all the different metabolic pathways with overlapping aerobic. Yep. And I show them how it all works.

And then I explain to them like, here's the reason why you need to consider these nutritional aspects during these different phases of training. If you, and if you're not periodizing training, then you need to start, and if you're periodizing training, you need to periodize nutrition.

So that's the front end. There's a lot of at the very front end, I talk about all the modalities to measure body composition. Really boring. I hated it when I was an undergrad. Yeah. We

[01:12:35] **Dr. Mike T Nelson:** had that lab.

[01:12:36] **Dr. Dwayne Jackson:** Yeah. And it's, and it sucks, but it's a body composition course.

So we gotta talk about those vitalities. At the very front end. Yeah. And then we just go through all, the metabolism and digestion of carbohydrates, fats and proteins. Talk about micronutrition and the importance of that. Cause that gets lost a lot in the the whole macro thing.

And when you see other people's diets, you're like, oh,

[01:12:55] **Dr. Mike T Nelson:** I've totally forgotten. Yeah. Chicken and rice again. Okay. Got it. That's right.

[01:12:59] **Dr. Dwayne Jackson:** And then, yeah, and then we wrap it up with some kind of for lack of a better term, like hacks, right? So it's all just about, sleep, alcohol use stress, gut health.

And I basically wrap up all the stuff that I've experienced with my client base and give them pointers on how to maneuver through those things on a nutritional aspect. So it's, yeah, it's a fun course. It's like I said, 14 weeks. I'm just finishing up now. I think I got two weeks left.

And then we'll run it again in the fall. Nice. That's that stuff. Yeah. And I've also got a gut health course that we, I did for them pre-recorded. So it's gonna be so look on Prescript. There'll be a gut health evergreen course on there. It's just not live. I teach all the stuff live right now with this, but they record it.

Oh, nice. Most of the people watch the recordings. Yeah, it's a weekly live thing. And yeah, so I I also formulate, so I've formulated for decades for all a lot of big companies. I'm currently with HD Muscle chose to leave. I was with a TP lab, which is a pharmaceutical grade brand here in Canada.

And I decided to leave it because HD was that's shinier. I was with at t p for four years and really didn't get much traction outside of, working with pharmacists and physicians. So I wanted to dump, jump a little more into the body building realm in the fitness realm. So I went with HD Muscle.

It's, like I said, it's a shiny brand. It's a young brand. Very good brand though. High quality formulations. I do all the education and formulating for them, and I own a company called Vibe Mushrooms. I'm a co-founder with another friend and we've had that going since almost a year now. And we do functional mushroom extracts under my strict guidance on how to produce them.

And this is a problem in the mushroom industry right now. Oh yeah. Is that, it's just it's just, it's wild west and you can just grab dried mushroom. Hey, there's

[01:14:38] **Dr. Mike T Nelson:** mushroom dust in there. Hey, it must be great.

[01:14:40] **Dr. Dwayne Jackson:** Exactly. And so what? And, hey, it's 35% beta glucans, and you're like, okay.

So it's got the same polysaccharides at every fucking mushroom has in it for crying out loud. So what I did was I did a lot of research on the traditional Chinese medicine pharmacopia and I used their, cuz it's medicine actually in China and Japan. It's adjunctive medicine for cancers and blood pressure and all kinds of stuff.

So I so I basically took, we have we have four, five offerings. So we have lions main red rahi, Turkey tail, and cor decept. And then we have one that's a blend of the four, an equal blend of the four. And what I did was, for each unique extract, I made sure that we followed the Chinese pharmacopia so it became like a medicine in China.

And by doing so, I realized that there's not a lot of companies doing this cause

it's

[01:15:26] **Dr. Mike T Nelson:** very expensive to test No.

[01:15:28] **Dr. Dwayne Jackson:** Yes. And very expensive for, to get them to actually do these extractions, like 15 to one extractions, these kind of things. Nonetheless. We have the top pharmaceutical grade product on the market right now.

Excellent stuff. We've just ordered our second big round of orders from our supplier and everything else, so I'm pretty nice with that. Yeah. And it's been going well. It's it's a work in progress cuz it's a startup, but it's it's been going quite well. So I've got those things going on and then I've got my, my, my own stuff with my training and my teaching and stuff and my training stuff I mainly work with.

I work with a lot of really ridiculously special cases. And by special cases, I'll say that they range from 800 pound people losing weight through to transplant recipients. So I've got seven or eight transplant recipients of all different kinds on my roster right through to, and this is a real special case, but celebr.

And the reason why I say they're special cases is because it's a completely different world to work with these guys. Not, or celebrities because their work, it just sucks their work environment. Yeah. It really sucks. Yeah, they're overworked like you wouldn't believe, right?

[01:16:35] **Dr. Mike T Nelson:** Yeah. Especially a lot of movie actors that stuff.

It's just, yeah, it's a weird it's its own world.

[01:16:40] **Dr. Dwayne Jackson:** It's crazy. Yeah. So I've got some pretty, pretty high level guys on that end. So it's the training stuff's been really fun for me because generally people send me people that they can't get their goals with. And so I like that because it allows me to use my inner scientist and that kind of gives me that, that feeling that you get when you have to dig into the literature and really try to find a way to get around things.

I love it. Yeah, that's about it for

[01:17:03] **Dr. Mike T Nelson:** me. Yeah. Awesome. Thank you so much for all your time and sharing all your expertise. I highly recommend people check

out all the stuff you've got going on there and Yeah, always wonderful to chat with you again. Really appreciate it.

[01:17:15] **Dr. Dwayne Jackson:** Likewise Doc, thanks so much for having me on.

I really appreciate your time too.

[01:17:19] **Dr. Mike T Nelson:** Yeah, thank you. And we'll talk to you very soon. Talk soon,

[01:17:22] **Dr. Dwayne Jackson:** brother. Have a good one.

[01:17:23] **Dr. Mike T Nelson:** Thank you so much for listening to the podcast today. I really appreciate it. A huge thanks to Dr. Jackson for coming on here. I know he is a super busy man. He is running multiple different things, so make sure to check out all of his links below from the Mushroom company to his supplement line to his course that he has with prescript all on nutrition and digestion.

I haven't gone through his course yet, but just haven't talked to him for a while. I'm sure it is epic. And this podcast is brought to you by the Flex Diet Certification. It will open again June 5th, 2023. Go to flexdiet.com for all of the information. If you're looking for a complete system to maximize primarily nutrition and recovery for both yourself, or if you're a coach or a client, go to flex diet.com, and that's exactly what we cover.

I go over the big picture using the concepts of flexible dieting and metabolic flexibility. We've got an in-depth lecture that's limited, as I mentioned here in the podcast to about only one hour. Yes, the carbohydrate one did run over a little bit. But this is useful because you can learn all the technical aspects of each of the interventions from protein to micronutrition, to sleep to much more, only within about an hour's worth of time.

And then part three for each one is five specific action items, so you'll always know exactly. What did you need to do in order to put this into practice? Because it's not just the acquisition of knowledge that is the best, it is applied knowledge. So I wanted to set up a system that had the big picture so you understand context, you understand the details from a little bit more of the research side.

And we go through and explain all the geeky terms so you don't need to look all of them up or anything like that. And we have the application. So that you know exactly what you would need to do in each individual case. So go to flexdiet.com for all the information there. You can hop on the wait list.

It'll be open for one week, starting June 5th, 2023. Thanks again to Dr. Jackson for all of his information. Make sure to check out all of his info there and his great stuff he has on Instagram. Thank you very much for listening to the podcast. As always really appreciate it. If you have just a couple seconds, please leave us a review for whatever stars you feel are appropriate, and if you can take the time to write out a few sentences.

That goes a long way to help us with the little algorithms to move the show up. Thank you so much for listening. Really appreciate it. Talk to you all next week.