

Flex Diet Podcast Review of CWI

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SPEAKERS

Michael Nelson



Michael Nelson 00:00

Hey, it's Dr. Mike J. Nelson here, and I'm still down in Texas, recording this. But on the flex diet podcast today, it's just me doing a review on cold water immersion, and its effects on muscle hypertrophy, and potentially performance. And as you know, this is a huge component of the physiologic flexibility course. So the podcast today is brought to you by the physiologic flexibility course, you can just go to [WWW dot physiologic flexibility.com](http://WWW.dot.physiologicflexibility.com). So in that course, in certification, I talk all about what are the things to make you a more robust human being to allow you to recover faster. So once you've mastered or gotten to the 8090 percentile of exercise and nutrition, what are kind of the next thing is to focus on the my biases, these are going to be some of the homeostatic regulators things that your body has to keep constant, or else you die. So one of them is going to be temperature, the body wants to maintain pretty close to 98.6 degrees Fahrenheit, however, we can be exposed to periods of high temperature and humidity, and periods of cold knows have different physiological effects upon the body. So one of them that's been investigated is cold water immersion, sitting in wonderfully fun, cold water. And I'm a big fan of it. I think it's super useful. Again, probably not for the reasons that are promoted. I have a freezer in my garage I've converted to allow myself to do cold water immersion once I'm at home. So in this podcast, we're going to talk about a recent narrative review that pulled together a lot of really interesting data on cold water immersion. And as you may notice, this was originally featured on iron radio. So Dr. Lonnie Lowry had the graduation ceremony, I was down here in Texas with limited internet. So we just sent in a clip, and I wanted to do one

on this new narrative review on cold water immersion, and thought that it'd be cool to run it here on my own podcast also. So if you want to hear more topics about meathead versus eggheads, you can listen to me and coach Phil Stevens and Dr. Lonnie Lowery on iron radio every week. So here's kind of a rebroadcast of my summary on cold water immersion and its effects on muscle hypertrophy, and athletic performance. Hey, there's Dr. Mike T. Nelson here and wanted to do a short review on a brand new narrative review that literally just came out not too long ago. Thank you to everyone who sent this to me. That's super cool. I know Dr. Andy Galpin has been on the show, and he did a posting on a buddy Dr. Scott sent this to me and some other people sent it to me also, it's entitled, post exercise cold water immersion effects on physiologic adaptations to resistance training and underlying mechanisms and skeletal muscle, a narrative review. So long title, this was published in frontiers in sports and active living, the main author is Aaron C, Peterson, S e, n. And you can get it as an open access, which is really good. I'd highly recommended you give it a read. I was published on April 8 2021. Really, really well done narrative review. Again, just for people listening to narrative review is kind of the author's I would say interpretation of the data and pulling together multiple data sources into one. I tell people and students that it's kind of like a good one stop shopping to start at. One of the downsides of narrative reviews is that it's still potentially going to be biased towards the authors. And one thing to look for is kind of errors of omission of maybe other studies that may not have been included. It doesn't go through a lot of formal statistics, like in a meta analysis, or a meta analysis, you're trying to pool data from other studies and use statistics to get a little bit more power by having more data. But either way, really good study very well done. The amount of time it takes to write these up is quite a bit and Great one stop shopping for cold water immersion. And what I like about this narrative review is that it was only really focused on cold water immersion. So I'm sure you've seen reviews and other just, even on TV shows, or if you see tours of high end training facilities, you'll see a contrast, there'll be a lot of the hot tub, and then they'll have a cold tub with sometimes circulating water that's cold, or they'll put ice in. And you'll have athletes kind of go back and forth. Some places only use cold water immersion. I stayed at a really nice hotel in Dallas when I was doing a presentation, oh, man year and a half ago, two years ago now. And in the spa center in the basement, they actually had a cold water immersion tub for anyone to use, which was really awesome. So as the name refers to cold water immersion, you're literally just sticking your body into water that's cold. Most of the time, the water is kind of stagnant, it's not circulating. That's not always true. But if you've ever gotten into a very cold stream versus even just cold tub, it can feel quite different. It's a moving water is going to have that constant temperature mean moved across your skin. And it's going to feel much colder, because your skin doesn't have the opportunity of heating just that little layer of water next to it. Like as a side note, if you've ever used like neoprene for diving, right, so a scuba type suit neoprene wetsuit, that actually warms a thin layer of water next to you. And the thickness of the neoprene will determine how

much of that water is exchanged, you can look at stuff that have like seams that are sealed versus not, all that is doing is changing how much of that water is exchanged out, your body will heat up that layering helps keep you warm. If you ever gotten into a cold water immersion tub, I have a converted freezer in my garage, sealed all everything in 15.6 cubic inch freezer, filled it full of water. Right now when I'm at home, it's around 38 degrees Fahrenheit. When you get in, it's very, very cold, obviously. But just even sitting there for a little while it feels a little bit better part of that is because your skin is going a little bit numb. But part of that is you're warming up that little layer of water next year. And when you move all of a sudden everything feels cold again, because you've disrupted that. So there's a little bit of difference in you know, some of the the situations that you can have it set up. And the other part too is that it gets really complicated really fast, because you can look at all different types of parameters, we can look at what we'll talk about coming up here, briefly hypertrophy, different aspects of sports performance,



08:06

related to hypertrophy, lean body mass, you can look at more explosive sports, you can look at endurance performance.



Michael Nelson 08:15

So there's all different markers of physical performance to look at. And on top of that, you've got the basic parameters just like weight training with your dose, how cold is the water? Again? Is it moving or kind of stagnant? And how long are you in for, those are going to be the main things that are going to determine the effect. And like most things in physiology, it's not necessarily a linear effect. So we want to pay attention to that. And unfortunately, there isn't really a super standardized protocol for cold water immersion. So based on the research, each author is going to do their best interpretation, but it's going to be a little bit different. And so that makes it kind of hard to pull all this data together. Again, my bias, I did a whole course on physiologic flexibility. And we have a whole module in there on cold and especially cold water immersion. So I've spent, oh god a long time looking at all the research and as of a couple months ago, went through all of it again, and all of that is in in the course there. I wish I would have had this narrative review when I did the course would have saved me a lot of time, but so let's get into it a little bit here. Their definition I hear of cold water immersion is a protocol is typically gait involves submersion of the limbs and or torso for five to 20 minutes in very cold water temperatures between eight to 15 degrees Celsius.



09:51

Right so if you're looking at that, in Fahrenheit, the warmest water for cold water emergent, I've seen them Fahrenheit is around 50 degrees Fahrenheit.



Michael Nelson 10:01

Now that seems relatively warm. But if you've ever gotten into water that's 50 degrees Fahrenheit, it's cold,



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it does not feel very good at all. There's some interesting early data looking at cold water immersion for recovery and a bunch of other things. But we're going to basically focus on what are some of the changes that they saw.



Michael Nelson 10:25

So the main thing that you're probably interested in which I was interested in also is changes in skeletal muscle hypertrophy or gains.



10:34

If you look around the old internet, now, it would seem that cold water immersion will absolutely crush all of your gains, and then you should never do it. And it's an absolutely horrible idea.



Michael Nelson 10:45

And when I first started looking at this literature, I was kind of like, Yeah, I don't know, that seems a little bit too over the top. And, like in fitness, everything is,



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you know, oscillating from one extreme to the next extreme. But when I looked into the actual data, in summary, I would have to say that cold

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Michael Nelson 11:04

water immersion with a few caveats here does appear to affect muscle hypertrophy in a negative fashion. Meaning that if your goal is all out hypertrophy, which again, if you are an athlete may or may not be your goal. But if you're a physique competitor, or potentially power lifter, or just trying to gain more muscle, then obviously this is going to be of interest to you. Again, the really big caveat with that is that almost all of the studies that have looked at hypertrophy, have used cold water immersion literally immediately after training. So they would do their training sessions, a lot of times, it's just standardized, to whatever protocol they think is best for hypertrophy. And then they would subject and some studies, they would split them into groups, one group would get cold water immersion and the other group may not, they would just kind of sit there that is more subject to a placebo effect. Other groups, they would maybe do single, then they would put one limb in cold water immersion the other limb they would not. And they would do the same type of bilateral training on both limbs. So there's different ways of doing it. But pretty much all the studies that I know of that have looked at muscle hypertrophy, have done some cold water immersion immediately. After training, if you're not doing that, let's say you're doing in my case, I tend to do my cold water immersion in the morning after doing some cardio stuff. And then I'll do lifting, most are Nunes later, I can't take the data that they've observed in the studies, and even transfer it to my case or the clients that I work with. Again, this doesn't mean that the data is not useful, we just have to keep in mind the context of how the experiments were actually conducted. So in summary, what they said here in the study is quote, to summarize, there's mixed evidence for the influence of cold water immersion on indices of skeletal muscle hypertrophy, with three of six total studies showing attenuated muscle hypertrophy of either the thigh or the wrist flexor musculature. And both of the two available studies showing a negative influence on cold water immersion on muscle fiber, specifically type two fibers. Ankle there is no evidence that post exercise cold water immersion has beneficial effects on measures of skeletal muscle hypertrophy. If we look at some of the actual data, they did some really cool charts in this study, which I would highly recommend you pick up and look at. But they did a simple plot. And the confusing part is that not all of the studies use the same method to determine muscle growth. Right. So in this, they kind of split them up between a whole muscle cross sectional area, which is literally as it sounds, we're going to look at a whole muscle, we're going to measure the cross sectional area. There's also studies that have done muscle fiber cross sectional area. And then we've got kind of what I call full body, lean body mass changes. Usually this is using dexta. And I tried forever to figure out exactly in terms of the amount of muscle that it may be costing you and a percentage. And the downside with the lean body mass changes with dexta is they were generally done by only one author and it was hard to figure out what The amount of muscle is because it was looked at as a percentage change from baseline. So if we look at the whole body level and then go more microscopic,



15:09

from the charts like lean body mass in the control group versus cold water immersion for lower body.



Michael Nelson 15:18

In one study cold water immersion was slightly better. Again, we're talking by like one to 2%. Another study looking at upper body, cold water immersion was slightly better. Again, another study looking at total body, cold water immersion was a little bit less. Now again, the big caveat with this is if you're looking at this via dexa, and the authors did a really good job of trying to standardize the dexa, you're still kind of within the air percentage of I would say, the dexa measuring machine. So we're not seeing a massive changes in lean body mass at a whole level with cold water immersion. But how much of it changes debatable at a whole body level. If we go more microscopic, I mean, look at Whole muscle cross sectional area, there's been a few more studies that have looked at that. And we see some of the studies showed Coldwater immersion having a negative effect like a minus 5%, almost one of those studies showed around a negative maybe two to 3% drop compared to control group. Some other studies looking at forearm circumference didn't see much change. Muscle thickness in the wrist flexors control group was much higher than cold water immersion. Same thing with a study from Roberts, looking at quadriceps. Another study looking at thigh circumference was kind of a split. So most of the data again for whole body or I should say whole muscle cross sectional area shows that the control group was better than the cold water immersion. Again, the range of effects here we're talking about, the biggest change was seen by Roberts 2015 muscle mass of the quadriceps was about percentage from baseline looks about 15% in the control group, cold water immersion was around maybe 3%. Again, smallest change we saw was was no change. So pretty variable data on that. If we look at muscle fiber cross sectional area, again, it's relatively variable, right. So Robertson Roberts again, same study 2015, again, showed that cold water immersion saw a percentage decrease from baseline. And same thing with type two, that was a type one fiber, type two fibers, control group again was a little bit better. And then the other two studies were kind of split. So most of the data from fiber cross sectional area. So it was that cold water immersion does appear to be having a negative effect on muscle hypertrophy. Again, the hard part is trying to scale from whole muscle cross sectional area and muscle fiber cross sectional area to a whole body level is pretty hard to do. Right? So, for hypertrophy, I would say, Yeah, do it immediately after training, if you're really really trying to maximize hypertrophy, probably not the best idea. However, doing it in another part of the day. We don't know what the effects are for hypertrophy.



18:52

Briefly for dynamic strength. I'm not as much of a difference there, I would say looking at all the data on their charts, kind of a tie, isometric strength, Navy, a slight impairment in the cold water immersion versus the control group.



Michael Nelson 19:08

Again, not super clear on that. And then the paper goes on to talk a little bit about strength endurance rate of force development, ballistic movements, they do talk about the metabolic effects looking at protein synthetic response, anabolic signaling. And all those studies. Well, I find them super, super fascinating. I tend to look more at what is the performance or the phenotypical changes. And so what is the outcome?



19:44

Did you add more lean body mass? Did you move the weight faster?



Michael Nelson 19:49

Did you lift more weight? Like what is the actual performance outcome of that one because that's what more people care about. And I think the interesting molecular effects just kind of lead us to setting up better experiments at a whole body level. There's some interesting stuff on ribosome biogenesis. And they go deep into a lot of the other molecular effects here, they did put together a really cool chart called resistance exercise plus cold water immersion, I'm not going to go through all of it, you should check it out, it has some of the potential mechanisms of what we think might be happening. One of them is we may see a blunting of mTOR one signaling, this may be turned down. And if this happens, you're gonna see a decrease in muscle protein synthesis. And if that continues, you're gonna see a decrease potentially in muscle mass, such as one of the mechanisms of how cold water immersion may be affecting it. Other things are potentially Myostatin IGF one, we've got some Heat Shock proteins that can be changed myogenin potentially changes which may be related to satellite cell count and the concept of my own nuclear domain, or my own nuclear content. There's lots of lots of different things going on. One of the things that gets brought up a lot is, is there a change in inflammation? Most of the data I've seen on that, I would say probably not, although it's still questionable, the amount of cold water immersion you need to do, in my opinion, to change inflammation is pretty darn high. So I'm not really sure that that is happening. briefly on the endurance effects, I think there may be potentially some benefit to augmenting endurance response. Again, there is not many finished studies looking at actual changes with that. There is

some very interesting molecular data that's still very early. So I personally am not too worried about doing cold water immersion. For a short period of time after my aerobic training in the morning, as an no one I've done with a few clients, I haven't seen



22:07

a change with that. Again, for hypertrophy, if that's your ultimate goal,



Michael Nelson 22:13

again, probably not the best idea. So again, read the study, super cool. The big grand takeaway, if you're all our goal, is hypertrophy, doing cold water immersion immediately after training? probably not the best idea. Again, how much of an effect is that going to be? Very hard to say at this point. Other potential benefits, I would say with performance is still up in the air. I know that some athletes feel really good and see performance changes with it. others do not. I would say it's kind of split right now. So you'd probably have to do your own testing to see what do you what do you feel. So even if you do it immediately after training, and might be costing, you know, hypothetically, a little bit of muscle, but athletes feel better, and they can add a whole nother day of training, that may be a trade off, that's really worth it for them. Again, it depends on the goals and what you're doing. This study didn't get into it, but I do think there may be a benefit with the robot training. So setting it up, I like to do it in the morning, after doing some aerobic training, I tend to feel better, I'm not worried about any counter effects with that. And then do my weight training in the afternoon. If you only have a limited period of time to do it, do the weight training. And then maybe a couple hours later, you could do some cold water immersion. No data right now on the exact timing of that. So we don't really know. But anyway, I wanted to talk about just a somewhat brief summary there. Post exercise cold water emergent effects on physiologic adaptations to resistance training, and the underlying mechanisms in skeletal muscle narrative review by Aaron C. Peterson, and the journals frontiers. Thank you so much, and take care. Thank you so much for listening to the podcast this week, the cold water immersion summary, which was also featured on iron radio, podcast, too. So this one is brought to you by the physiologic flexibility. certification is currently not open right now. But you can get more information at physiologicflexibility.com. So where we talk about the homeostatic regulators, things that your body has to hold constant, and how you can train them. The benefit of training them is enhanced recovery and greater robustness. So to me Once you're good at exercise and nutrition, probably throw sleep and some basic recovery stuff in there. I believe that this is the then next level of things to focus on. So the strategies and the certification cover everything from different breathing techniques are cold water immersion, sauna via heat exposure, high interval, or I should say high intensity interval

training, which can alter pH temporarily. And even things such as a ketogenic diet. And so a ketogenic diet, to me is kind of the backup to your normal metabolic system. And maybe we should run this backup once in a while, right? Because one of the other homeostatic regulators is going to need blood glucose. So doing a ketogenic diet for a period of time, I think can be useful in making your body more robust. So you can find out more information go to [physiologic flexibility.com](https://physiologicflexibility.com). Thank you so much for listening to this podcast, as always, really appreciate it. If you can. Give us an honest review and some stars on whatever platform you listen to, would be greatly appreciated. Thank you so much.