[00:00:00] **Dr Mike T Nelson:** Hey, welcome back to the Flex Diet podcast. I'm your host, Dr. Mike T. Nelson. On this podcast, we talk about all things to increase performance, add muscle, improve body composition, and do it in a flexible framework, all without destroying your health. And on the podcast today, we've got a deep dive into the analysis of body composition.

[00:00:26] So if you want to get a better body composition, one of the big questions is how is the best way to measure it? So today we're talking all about DEXA scans and body composition in general with two experts in the field, Dr. Grant Tinsley, who has published a lot of work in this area and is focused exclusively on body composition.

[00:00:47] Plus some other cool projects and the one and only Dr. Eric Helms. And if you notice a little bit more background noise in these intros and outros, it's because I'm recording this from the car. Don't worry. My wife Jodie is driving right now. We were on our way to the Silverback Summit in Austin, Texas, which we're recording this as Thursday morning.

[00:01:10] This podcast will probably go out the following week. So by the time you hear this, the conference will be over, but super excited to see everyone there. It'll be super fun. And if you want more information from me and you want to hear about all the updates, conferences and research and much more. Go to MikeTNelson.com/podcast and see all the podcast episodes and also hop onto the free exclusive newsletter. Just scroll down below. You'll be able to get onto the newsletter for free and I send you all sorts of great stuff inbox. As I mentioned on the podcast. Today I'm super excited to have to grab Tinsley and Dr.

[00:01:53] Eric Helms, and we have a great discussion all about body composition and primarily looking at the DEXA scans. onE of the issues is that most people would assume that a DEXA scan is 100 percent accurate. Everybody, when they think about it, knows that. It's not true, but I've lost track of how many people I've had to talk off the ledge of looking at two DEXA scans that were done even by the same facility and the same DEXA scanner, but done only maybe four to six weeks apart and seeing different readings or people doing followups and being confused because they thought they're making progress.

[00:02:33] Now it looks like they're not. So we have a great discussion with the two experts in that field. So enjoy this podcast. Dr. Grant Tinsley, Dr. Eric Helms.

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[00:02:49] **Dr Mike T Nelson:** Thank you guys for being here. Really appreciate this and I'm looking forward to this discussion on body composition. So welcome to the podcast.

[00:02:59] **Dr Grant Tinsley:** Absolutely. Thanks for having us. Yeah.

[00:03:02] **Dr Mike T Nelson:** Thank you so much. I guess the main question that I get all the time, and I know you guys have done actual published research on this too, but when I was doing my PhD, I had the opportunity to obviously have access to body comp equipment.

[00:03:15] So I got in my head that I'm like, I wonder how many different ways I can measure body comp within a week. And so, I was able to get a Dexa, I did Underwater Wayne, I did a Bod Pod, I did a BIA with the expensive, like several thousand dollar thing with, the little things you put on the skin.

[00:03:32] I had two people do skin calipers, and I think that was it. And I had some real cheap methods I used, but they were horrible. So I got all the data back, and... Just looking at it, it was crazy. And I tried to, you'll keep nutrition the same and hold other variables as best I could, but it wasn't perfect.

[00:03:49] So I still trained during that time and water everything else. But it went from anywhere being, no, his body comp's okay to he's a fat bastard. And of course it's different equipment, different days, different times. But I was quite shocked at the range and I can't remember the exact numbers right now, but it was many, five to 7 percent in body fat, not percentage of air, like in body fat percentage.

[00:04:18] And that was shocking to me. So I'm just curious. I know you guys have done some end of one experiments too, and we'll get into more kind of detail with the actual research says off of that, because I think the general premise, people in fitness know that body comp will vary. And I knew that, but looking at the numbers, I'm like, Oh man, if somebody just came in and only did just pod, or he just did underwater Wayne, or, some of the better methods it was.

[00:04:45] More different than I thought it was gonna be,

[00:04:48] **Dr Eric Helms:** yeah, man. There's I have My first experience in published research, the first time I conducted a study was in for my master's

when I first got here. And I specifically looked at this crossover trial where we had 13 pretty well trained people, mixture of physique, athletes, strength, athletes, some combat athletes, and then just some real serious exercisers who went through two different interventions.

[00:05:12] Just two weeks of either moderately high or high protein diet on a pretty severe caloric deficit. But the really interesting thing that we did, this is my first time really having exposure to high quality Anthropometry and I was really excited about that. I get introduced to what is ISAC, which is not that common in the United States But it's very common in Europe and Australasia.

[00:05:32] Anyway, it stands for the International Society of Sports Kid Anthropometrists and anyway to get certified on it you have to do a total of There's four levels in level four like you're like the skinfold god or goddess But even just for the first level you have to have a technical error of measurement I think it's something like 2.

[00:05:52] 5 percent per site or something like that. That's pretty good Yeah, and so that scales with How large is the measurement on each site? So when you're getting a lean, a reasonably lean person, like in using this in the sports setting, it essentially translates to having less than 0. 5 error on each one of the sites.

[00:06:09] And you do two measurements, and if they're within that error, you're good. Spreadsheet. io calculates it. The third one, if you're over that amount, you have to take the third, and then you take the median. And then you add up your sum of eight. And when I got exposed to this concept and I had, because I wasn't certified yet, I did get it later.

[00:06:26] A good colleague of mine, Ruth Nadeau, she did the anthropometry for this study. And I'm looking at the numbers like, wow, like there's some of eight, because I think she was level two. You'd have a, on average, like a four millimeter, like actual error. So if you brought the same person back in two days in a row, they didn't change their diet, didn't change their nutrition, nothing.

[00:06:45] It might be. 60 on one day, 64 on the next, or as low as 56, anything more than the change across 8 sites is a real change, and that's something that you could use regularly. But what blew my mind, Mike, was that what most people do, because of 8 site skinfold means nothing to them, is they want a body fat percentage,

[00:07:03] **Dr Mike T Nelson:** right?

[00:07:03] Yeah, how shredded am I,

[00:07:05] **Dr Eric Helms:** bro? Yeah, you know I got to put this in my email signatures, right? Yeah, so You know So then we plug it in and I use to demonstrate it because it blew my mind just like it did for you that first time I used three different equations all Quote unquote validated and the means of this trained male sample in those three different equations one was 10 one was 20 one was 15 Holy crap.

[00:07:31] **Dr Mike T Nelson:** That's just from the equation difference, correct?

[00:07:36] **Dr Eric Helms:** Correct. So, one was a 7 site, one was a 4 site, one was a 3 site. And I don't think any of them were more precise either, than the others. And it just goes to show you that there are... A lot of assumptions baked into this and that there's the memes where it's like the small brain, the bigger brain, the lit up large brain, like the god brain the first step is, oh, percentages are, or skinfolds are trash.

[00:08:02] And the next one is, hold on and eventually you get to wait, raw skin folds are actually more reliable in actually some data, like if you look at a paper that came out of Gary Slater's lab, has less error than DEXA, and so there's so many levels to understanding this, obviously skin folds can't tell you the same things that DEXA can.

[00:08:23] Right. Yeah. I'm not going to tell you your lean body mass from that, obviously, but that was my first kind of introduction to the space where I started to realize that testing body composition was a whole complex kettle of fish. And and yeah, ever since then, I've been intrigued. And as a coach, you have to figure out.

[00:08:42] And I think this is underappreciated. Coaches, good coaches, understand that they need to be able to diagnose real changes, but they don't necessarily know how exactly to do that. And that's something that's built into good science. So anyway, I'll leave it there, but I had a very similar experience.

[00:09:02] **Dr Mike T Nelson:** Do you do any crazy measurements grants since you have access to lots of very cool, fancy equipment?

[00:09:09] **Dr Grant Tinsley:** Yeah, since we're talking origin stories in the interest of a

[00:09:16] little bit of a weird one. When I was a PhD student at Baylor I was conducting research related to resistance Dexem.

[00:09:30] And a little bit of bioimpedance but while I was conducting these studies, I was interested in the technologies, how to use them in the best way possible, but it was actually when I was volunteering over in the sports nutrition department in athletics. When one of the female athletes was coming in and she was about to get her DEXA scan and she asked me a question.

[00:09:50] She said, if I ate a meal containing a lot of fat before my DEXA, would it look like I have more fat? And I thought, that's actually an interesting question. So just from that question, I started looking into the literature on say pre assessment food intake and standardization. And around that time, a really interesting study had come out where they essentially carb loaded individuals for several days and saw that they could artificially increase lean mass.

[00:10:17] Now there was some debate, including a letter to the editor back and forth. The initial description was ambiguous about whether this was this final Dexa, where they saw the artificially increased lean mass. Due to glycogen loading, because it's over a very short three day period of time. There was some ambiguity on if this was in the fasted state or the non fasted state, but in the response to the letter, the editor, the author said it was fasted that, three days of glycogen loading, even when someone was fasted the next morning that they saw this.

[00:10:43] So, I ended up conducting some work in that area just out of interest. Cause I'm like, Oh, this is really. Again, interesting to me. So we did some studies where we provided the diet to individuals in a crossover study in a very high carb condition and a very low carb condition. And we ultimately saw errors due to food consumptions.

[00:11:00] If someone is not fasted, if they came in the afternoon, for example, we saw artificially increased lean mass. But after an overnight fast that, that resolved and there was no difference. So, anyway, that, that just off the cuff question that may have seemed silly at first glance actually got me interested in this area of methodology and standardization.

[00:11:18] And that's been one of the large areas of my lab's research since then. So, that was my origin story into getting deep into the weeds here

[00:11:28] **Dr Mike T Nelson:** and on a similar note to that, while we're talking about glycogen loading On an individual level, I would, and correct me if I'm wrong, I would assume that you would get an air, right?

[00:11:40] So let's say you've got dudebro69 that goes in completely fasted and glycogen depleted, right? They do some horrendous thing, they get glycogen relatively low. They could come in fast and they do their dexa, they go away, they, let's say hyper glycogen load for three days, come back in, fasted the next day.

[00:12:00] Wouldn't those two measurements be potentially different? And wouldn't the DEXA read that as lean body mass, or does that just all fall out in the in, in the wash because of how the measurements are done? Or some of the air calculations or other things in the deck itself?

[00:12:17] **Dr Grant Tinsley:** No you're absolutely correct.

[00:12:18] And there've been even shorter term studies where they've showed this, where they scan individuals. They get them off the table, essentially have them chug a bunch of water. Yeah, water.

[00:12:27] **Dr Eric Helms:** I saw that

[00:12:27] **Dr Grant Tinsley:** one. Back on. Yeah. And they see that it appears almost exclusively as, as lean mass. Now all that, of course this is context specific.

[00:12:35] What the magnitude is, if you're trying to trick it that way, where you're trying to really deplete, really reload especially if you're not going to do facet assessments, you can certainly, trick the DEXA so to speak. In general, there's been studies where they track people, they have a standardized assessment in the morning and then track them throughout the day as they've had one meal, two meals, three meals, and so on.

[00:12:54] And the artificial increases pretty directly proportional to the overall volume of food and fluid that's been ingested with some of that being retained throughout the day. So the overnight fast does a good job in the context of say a lack of extreme dietary manipulation. But certainly if you're trying to do something intentional knowingly or not, or if you're hitting different points where someone would reasonably be glycogen depleted have different, say, tissue hydration status as compared to another time point, even a short amount

of time later then yeah, you could absolutely see the type of area you're describing.

[00:13:28] **Dr Mike T Nelson:** Yeah, because a buddy of mine who had access to a DEXA in a different country, I won't say his name, but it wasn't either one of you guys. He had a DEXA done in a glycogen depleted state, and then he was a pretty large mammal, and so he glycogen loaded himself, his body weight went up by, I think, 6 pounds.

[00:13:47] And the DEXA reflected that he magically gained 6 pounds of lean body mass. But, based on what we just talked about. That would make sense. And again, this is an artificial state, right? Because one of the things I always think about is how much can you manipulate it on purpose?

[00:14:03] And then you have back to, okay, now if we want to see, like Eric was saying, a true change in what's actually going on, then it gets us back to, what are some of the best protocols and things to do because the clients are going to want to know, hey, I did all this work, I paid for this trainer, and I swept my ass off.

[00:14:21] Did I really get any leaner or not?

[00:14:25] **Dr Eric Helms:** Yeah. Yeah. There's this convergence between two factors, right? There's biological variance that is unrelated to actual change. And then there's the technical error of measurement and you need to have an appreciation, which is what you do with reliability studies of what encapsulates both.

[00:14:43] And you can do that on a group level. In research, but to understand that on an individual level is what you need to do in the real world. And I don't think people necessarily appreciate just how much acute things can change other things. You guys were talking about carb loading and there, I've done deep dives on like the science of peak week, right?

[00:15:05] And there's a study that came out that blew my mind, when you start digging into some of the Old physiological research like the sports science that came out in the 90s and 80s We realize a lot of our foundational things We just say that we take at face value are sitting on like studies of six people And this is not to throw our whole field under the bus But it's just to show the progression and that sometimes we do need to go back and question things So so for example, we all know That there are two to three grams of, water bound with every stored of gram glycogen, right?

[00:15:39] But when you actually dig into that research, it's a little flimsy and there is this Really interesting 2015 study that came out where they did this glycogen depleting, depleting protocol with cyclists and then And also in the heat so they got dehydrated and then afterwards, I think it's by Fernandez Elias 2015 really good study and Afterwards they either gave them Just like a glucose syrup or a glucose syrup plus a ton of water And they found that like the minimum amount of glycogen that can be stored is like two to three grams But in the group that got a whole bunch of hydration they were storing like 15 17 grams of glycogen bound I'm, sorry with of water with every gram of glycogen bound and the muscle, so it's what does that get picked up as, and so the interaction, not even just hydration status or glycogen, but the interaction between the two, and I think about what that physically, visually looks like, and one of the things we see as bodybuilding coaches.

[00:16:41] So, I think people underappreciate. The necessity of doing controlled conditions and fortunately, you and I, Mike, are sitting on a call here with a man who definitely appreciates Yes! Controlled conditions and I've actually been through those controlled conditions and I can tell you That's what I've heard rumors of this Yeah, so I don't know if that's a good segue but I think that's Perfect segue An example that's biological variation you can get in hours just from the interaction between exercise, hydration, carbohydrate intake, which is only a few things you can manipulate.

[00:17:17] **Dr Mike T Nelson:** Yeah, and I'll turn it over to Grant here in a second, but that, so one of the things related to body comp was similarly that just scared the crap out of me because, as you do your PhDs, you have to do your compositions. You can actually officially be a PhD candidate at that point. And I remember studying for mine and they can basically just ask you.

[00:17:34] Whatever they want, basically. And I had to do body comp assessments using bod pod for an energy engineering study we were doing. It was more or less just to baseline people. We weren't looking at body comp changes, but just, to describe what the group was we were working with. And I remember looking at the data on underwater Wayne and going, okay, what did they start asking me run these four stories through your head, or at least I did, they started asking me about bod pod versus underwater Wayne and the mechanisms and what about the data from underwater Wayne and so I.

[00:18:03] Had this three day thing where I went down a rabbit hole of like where all the data from Underwater Wayne came from. And it was horrified, and you guys correct me if I'm wrong, but I think the residual lung volumes was

still unpublished, I think, or at least the chart we were using at that time, which was scary.

[00:18:19] And I think the original data was from like three or four cadavers or something like that. It was a very small number that all these kind of things had been extrapolated from. And anyone who's ever done that measurement, right, do you stick you into this huge, pool of water, you have this fancy scale, but you realize real fast, if you've ever done a lot of those tests, is that the rate limiter for most people is how much air can you get out of your lungs and your heads underwater and to stick your head underwater and to get all the air quote unquote out of your lungs as you can.

[00:18:52] It's not an easy thing for people to do. It's extremely foreign to do, because your reflex is to hold your breath underwater. And you realize we had some people, I was running five, six, seven trials, we were doing this for a lab, and one of the students is they keep getting leaner! And I'm like, yeah, they're just getting more residual volume out of their lungs each time, but at some point you have to be like you're not going to leave you here all day to do 15 trials of this, so you have what is like practical, what is reality, and like all these things that go into the measurement that we just take for granted that ooh, underwater weighing is one of the gold standards, and that has like you're talking about glycogen, all of that.

[00:19:30] Sorts of issues that wrapped up in it at the same time to

[00:19:35] **Dr Grant Tinsley:** yeah, no great points I'll mention just that we don't need to go on this tangent but for the many people who have been victims of underwater weighing there was a paper I was able to collaborate on with Jeff Tesh was really the one Who is the kind of leader of this project, but it was validating underwater weighing with your head above water.

[00:19:53] So you're essentially submersed up to the jaw and it had a lot about like head volumes and calculations and corrections, but ultimately came out to be a relatively valid method. I know it's not used as much anymore, particularly because of bod pod being, related technique. That's Quite a bit more enjoyable for the participants, but just wanted to mention in case someone is doing underwater weighing, that there are some options of it, at least get you past that unpleasantness of being completely underwater and trying to get that

[00:20:19] **Dr Eric Helms:** stable weight.

[00:20:21] **Dr Mike T Nelson:** Very cool. Awesome. Thank you. Yeah. And so what do you want to add to this conversation ground? I'll leave it open ended on purpose. Cause I know you've done a ton of this work in this area.

[00:20:32] **Dr Grant Tinsley:** Yeah. First I just reiterate, Eric made a great point about technical and biological errors. Ideally if someone is certainly a researcher and even a coach, maybe who's assessing clients and has some equipment what you really want to know is both those components.

[00:20:46] So you're technically, or you could get from kind of an immediate test retest assessment. So say on Dexa, you scan someone Dexa, you have them get off, you reposition them completely, scan them again. Do this for a group of ideally. 10 people minimum and you can calculate some of these metrics to see what that technical error is.

[00:21:04] The ideal thing to do would be to also bring them in 24 hours later, say following the same overnight fasting protocol, trying to standardize all these factors. And then assess them again. And from that day to day, you can get an estimate not only of the technical error, but added to it some biological error because there's body is presenting in a slightly different state, even though you try to standardize everything our labs, then some of that one of my PhD students is.

[00:21:27] Working on finishing analyzing and writing that up now. And Gary Slater's lab which has been mentioned on this call already has done some great work in that area as well. Just teasing this out. Cause it differs for different methods. There are some methods like bio impedance, for example, that have incredibly high.

[00:21:43] For many of the techniques, incredibly high test retest reliability, really look just absolutely fantastic. But if someone comes in 24 hours later, a lot of things can happen in their body that will introduce a lot of biological error to the assessments. Other techniques that are less reliant, say on those internal components decks including as an imaging technique, but certainly things like, 3d scanning or anthropometry they, they might not be quite as susceptible to some of those same biological errors.

[00:22:08] So, just certainly lots of interesting points there if you are assessing, because of course, when we're actually assessing and change, it's always going to be on a different day. So the immediate test retest reliability will always make a method look better than it actually is when you're assessing it to someone one day, and then a separate day, typically, weeks or months later.

[00:22:27] **Dr Mike T Nelson:** Yeah, that's great. And do you find that the baseline for DEXA is normally pretty good? And the second part is, does it vary per machine? Because one of the, I guess the criticisms I've heard of DEXA is that the companies don't really necessarily tell you everything that's going on. Everyone seems to claim that their DEXA is the best.

[00:22:50] Dexa, but if you notice difference, you don't have to mention any names. They don't want to get you in trouble, lose funding, but from different companies, because I think to the outside consumer, they're like, I don't know, a Dexa is a Dexa.

[00:23:03] **Dr Eric Helms:** No,

[00:23:03] **Dr Grant Tinsley:** you're absolutely right. Similar to other methods, but this certainly applies to Dexa.

[00:23:08] Those are

[00:23:08] **Dr Mike T Nelson:** all methods. I'm just picking on Dexa. Yes.

[00:23:10] **Dr Grant Tinsley:** You certainly want the same device, the same software over time. If you are. For example, DEXA sometimes will be in a scenario where we're, updating something and they're trying to upgrade our software in those cases. I really want to know, okay, tell me what's being updated.

[00:23:23] Is this just making the software prettier? Are you actually changing anything in the algorithms? Cause that's essential to know. This is another reason for good reporting and research manuscripts, not just Oh, we use the GE lunar prodigy but the software version, how you adjusted the different regions, all those components.

[00:23:39] So there, there are some, there's some variability between different manufacturers even between different models that are the same, make maybe same software, slight idiosyncrasies between the devices. So I'm a, certainly an advocate both for research setting and practice. If you have the ability to do this for collecting your own reliability data.

[00:23:57] You might find published data on the same device, the same software, but there might be minor things that those individuals were doing differently than you in terms of what they had the participants do for

standardization, how they positioned them, how they analyzed it and just different, different machines.

[00:24:12] Even if it's supposed to be the same, not everyone will be completely identical in every feature. So I think it's certainly a good case something to look for ideally in research if they. If there's in lab reliability data as a reviewer, I'm often asking for that. And I understand it's a little bit of a pain to collect, but ideally if you have your own reliability data, and that's the same device you're assessing people on, it just increases your confidence more than, pulling a citation from someone else's lab and saying, on, on average, the precision error of DEXA is one and a half or 2%.

[00:24:41] So that's what we're going to assume ours is also cause as you mentioned, varies based on manufacturer and a number of other factors.

[00:24:49] **Dr Mike T Nelson:** Yeah, because at the end of the day, you want to know, like Eric was saying, are we actually measuring a real change, right? Because you can get a number that, to an outside person looks like a real change, but if your error bars, right, your error of what you can actually measure as quote unquote real are pretty wide, then it's Oh I guess we did the study.

[00:25:10] I don't know if it's any different. Yeah.

[00:25:13] **Dr Grant Tinsley:** No, I agree. And I think it there are a lot of parallels to like how we'd interpret statistical significance. For example, instead of this dichotomous, like this was significant, this wasn't. I view errors as a spectrum because there are a ton of different metrics out there.

[00:25:26] If you're looking at the precision of a device, it's like how high is your standard? There are some that just roughly would be based on something like one standard deviation Versus two standard deviation errors or more. So if you have just like very high standards, you might have such a large error, even on good device that you would need an enormous change in body composition where like the person would have known long before this, that they, they had changed their body comp.

[00:25:50] So to me, it's a level of confidence. It's like, how sure are you? So we might get a precision error that's based on just against roughly analogous to one standard deviation of. Of error, and if we exceed that, look, okay, that's a good sign. Maybe we haven't exceeded this really high standard of something we call least significant change.

[00:26:07] But we've exceeded some level of error, so I'm a little more confident this could be real, not as confident as if you just have this enormous change that exceeded every error metric we have. But again I view it as a spectrum now, if you have that tiny change where it's yeah, did you go from 16.

[00:26:21] 1 to 15. 9 percent body fat? Over these, eight weeks or 12 weeks, so low that it's smaller than even our, Titus devices with the lowest errors would still have, errors higher than that. So we would not interpret that confidently

[00:26:32] **Dr Eric Helms:** at all. Yeah. I in my book, I give an example of, I want to say, if you're using a body fat measurement that has a three or 4 percent error.

[00:26:44] Right. So it could be plus or minus three or four, whatever it is. And then I did a, just a random number generator to take the mean. And I just showed them, and I did this for legit. And I was like, all right, here's someone who decided to get. Dexa, we'll say with this three or four percent error, maybe a commercial one not like Grant's badass, like we're gonna make sure you're really good condition situation, but you're going into one of these mobile Dex units, which have become very popular and like in Australia, and you're getting tested every week, right?

[00:27:13] And. The, there were times where Oh man, you are crushing it on this diet of the times. And then what I did was like, okay, and here's what's actually happening is they are in a 500 calorie deficit sustained and we expect them to lose this amount of fat mass throughout this period. So here's actual, and then here's what you could get just rolling the dice with this error with the amount of that you should have lost versus you would have lost.

[00:27:36] And I show how like. First week, oh my god, you're crushing it. Amazing. Then you hit this massive plateau. So, then we go, okay, what would the person probably do in that scenario? They'd probably cut calories or increase cardio. Yet, they've been losing weight very consistently. And then, I got this another massive change.

[00:27:53] Oh, that worked. And now, all of a sudden, you're expecting and the thing you believe. And, you hear people talk about their own personal anecdotes. I normally hit a plateau after my initial, month of dieting. Then I got a cut real hard and then I make great progress.

[00:28:05] It's actually, you needed to do literally nothing and all you were doing was chasing ghosts and you run into that a lot people with people who

over test these things. And I think the assumption is the more access I have to high tech lab stuff, the better. But the reality is that if you use one of these devices that has.

[00:28:24] A smallest worthwhile change or least significant change that is greater than the expected change that you could experience in the time frame. You're getting tested. It can very easily and it's actually more probable than on an individual level. It will lead you astray and lead you to making adjustments that you otherwise wouldn't have, and a lot of the times.

[00:28:54] When I have an athlete I'm working with and they have access to something like this, it is me trying to talk them out of, the scientists, out of getting, these, at least the same frequency or the specific type of testing that they think they should get. And this extends to a lot of things like testosterone tests, and okay, are we really going to do three serial tests and are you going to do it first thing in the morning?

[00:29:16] Or are you going to try to do it after work one day and then on your lunch break on another and then you're, you actually don't want to get tested twice and you have this one value and compared to

[00:29:25] **Dr Mike T Nelson:** three. I got to train in the morning. I'll just measure it after I'm done training.

[00:29:29] **Dr Eric Helms:** Perfect, because that won't have any impact, right?

[00:29:31] That won't affect it. Yeah, so between people wanting to get nutrient slash blood tests and wanting to get body composition tests and then not knowing the difference it's a it's rough being out there as a coach, because You don't want to tell them that like data is bad, but they really do need a lot of coaching up on and just education on if we're going to get these tests, how do we use them in a way that will actually be helpful to us rather than potentially just like I'll look at him like.

[00:30:00] I don't know anything more. In fact I, from your pictures and your training and how you're telling me you're feeling, I have more information, but now I have to deal with you being exposed to this frightening or overly encouraging piece of data or perhaps accurate piece of data. I don't know.

[00:30:15] And now I'm coaching that, so it's it's a can of worms that has to be done right. Or it is not even just negligible and I think some people take from this conversation like, oh, that's not useful, but it's actually actively harmful in

many cases is what I want to get at it is getting bad data versus just data that, oh, I don't know, because it's one thing to look at a published manuscript.

[00:30:38] That's not you. And a group of 10 people and be like, Oh, okay. So we don't know when there's a real change. It's another thing to be able to say that to yourself, but then step on the device or step into the device or get the measurement and then it to tell you, Hey, yeah, you're three weeks out, but you're 17 percent body fat, just to pick a random number.

[00:30:56] **Dr Mike T Nelson:** Yeah. I've had to talk several people off the ledge of. And this is happening with my own clients where, one of them last year, everything was going great. He's Hey, I'm probably going to do my DEXA again. I'm like, yeah, cool. That's fine. I was, I think six or eight months apart.

[00:31:13] I'm like, okay. Yeah. It should be good and gets it back. And he's, the numbers just, they were not even just a little bit variable. They were like, not close at all. Unfortunately, he had to go to a different place. He had a different technician. And in that case we finally figured out that they put in the wrong equation.

[00:31:29] The place that he went to wasn't used to testing athletes, and this guy was pretty lean, and so they had used the wrong equation. So I said go back, have him use the other equation, and then it was at least reasonable because it was so far out of the area where I knew something was wacky. But like you said, the harder ones are where you're not sure if it's really an outlier, or if it's legit, it just, it feels like it doesn't fit, but then you're trying to explain to the client of, maybe this is an error, and look at all your other data, this doesn't match, you're hitting PRs, you look leaner, like your calories are down, your weight, And so that's the harder situation because in their head they're like, this is a gold standard, this is a DEXA, and you're telling me that DEXA is wrong?

[00:32:13] I'm like, it's not necessarily wrong, there's variables, there's errors, and yeah, it's just a very... Hard conversation to something that at face value you would think would be more useful. And a lot of times I find if the frequency is too close, it like I just now when I do a consulting call, if someone says, Hey, yeah, I want to show you my decks as I've had every month for the last four months, I know it's going to be a shit show and you feel bad for them because they are.

[00:32:43] Actively doing something that they think is correct. And they want to know what it is so that they can, make changes to what they're doing. So they

have all the best intentions in the world. It's just a lot of times I think it just adds a ton of confusion to the mix.

[00:32:59] **Dr Eric Helms:** Yeah,

[00:32:59] **Dr Grant Tinsley:** I agree. I'd say two things on there to make it less bad than it has to be one would certainly be on the standardization.

[00:33:08] And I know it's hard if you're, working with clients who have access to different facilities in that case, going to a different scanner. As you found out, had a very large effect. There are some decks of softwares where you can literally check a box and it will change the body fat percentage by 5 percent because it's whether or not it applies this correction factor.

[00:33:25] But yeah, as, as standardized as everything can be. And then I think everything ideally would be given as a range. If you aren't able to get your own reliability data, if it's a mobile dex or something, you can look up, several sources and be like, okay, this, this is the percentage we're going to say plus or minus 3 percent based on several trials or two and a half percent or what have you and then when that 15 percent comes back, you're like, okay, it says 15, this really could be 13 to 17 you were 16 last time we assessed.

[00:33:52] So we're not super confident there's a change here. So take this with a grain of salt and, similarly to some of what you guys are saying, where you're having to deal with that. I often, get asked about body composition assessments for athletic programs or individuals.

[00:34:07] And even though I love body composition, and this was one of my main areas of research, I feel like I'm often de emphasizing when that's the need for testing. And then also de emphasizing the importance of that piece of information and trying to put in that context of, performance in the gym, subjective.

[00:34:22] feelings, other things that they might be monitoring closely, if they know what they've done with their nutrition, all these factors. So I think it can be useful in some contexts, but it is hard when you have access to a good device and someone, it spits out and it looks so precise.

[00:34:35] It's 17 looks pretty, pretty 72 percent yeah. Pretty pictures, all of that. So yeah, it's certainly a challenge.

[00:34:43] **Dr Eric Helms:** I went going back to my interest in bodybuilding peak week. So I've got my student Kai Homer, who's going to be submitting his masters pretty soon. And what he did was he had this case series, which is going to be a crossover trial when we go to fully published.

[00:35:00] But just for the purposes of his masters, it's four different people who are either competitive physique athletes or people who are in that kind of condition who specifically dieted for that the study and then they did either a carb load condition or a no carb load condition and then did a pump up or no pump up.

[00:35:18] And then we also got pictures of them doing bodybuilding poses, ultrasound as well as skin folds. And we have the reliability data, of course, on the skin folds and the ultrasound. And then those pictures were actually black out the face and bodybuilding judges and have them rate, which one looks better.

[00:35:35] And I could be wrong, but my guess is going to be that the human eye of a bodybuilding judge, I don't know about the reliability of it. That's something we would, that's harder to test, but I think it's probably more precise. anD you can see things that, that, but I think an untrained person, like it's an incredibly, it's going to different person to person, but I think an untrained eye, maybe not, but for a trained eye and like a bodybuilding judge, I think they can pick up on things that are not going to get picked up by anthropometry.

[00:36:06] And what I really would like to see in the future is like a scalar comparison of like, all right if we see this many, millimeter change in a skin fold measurement or centimeter change in a muscle thickness, what does that visually correspond to? bEcause a lot of the times not a lot of times, all of the time, people are not actually trying to get to X percent body fat.

[00:36:30] They're trying to look a certain way. And we don't have the ability to relate those two things. People can do it with measurements. If you go, I got a 30 inch waist okay, Oh, you got a tiny waist, right? I got 20 inch arms. Oh, you're huge. Right? So I think it would be nice to be able to have a more visual understanding of what are these changes and and understanding what does a real change look like when does it meet the threshold for.

[00:36:57] A visual assessor to be able to pick up on it. And it'd even be cool just to be like, alright, we took a hundred bodybuilding fans and we showed them your before and after pictures and how many of them noticed the change? And how did that pick because this is ultimately something typically we don't

think this way in objective science because we're who cares people think that's subjectivity is bullshit.

[00:37:16] This is why we do p values and measurements, but ultimately that's what That's your whole sports graded on that. Exactly, right? So you should know that. And and ultimately I think Like I've done a lot of ultrasound data, but I, like I don't know what is like Alright, so you grew 10 percent increase in your biceps ultra Can I tell?

[00:37:39] I don't know. It's not something

[00:37:41] **Dr Mike T Nelson:** that we think about. Yeah. And even that comes into the bias of the person if they were their coach. So I don't work with a ton of physique athletes, but I do with a handful once in a while. And one of the things I do is as it gets closer to their show date and even, closer, eight, 16 weeks out, whatever, I take their pictures and send them to people like yourself who are not biased and will give me honest opinion.

[00:38:09] One, I don't know if I trust myself at that point. Like I know. What I'm looking at, but yet I don't have a ton of experience. And two, I always wonder about what is my intrinsic bias? Because I know how hard this person has been working to do it. And you can see big changes, but am I going to miss small things?

[00:38:28] Because I want them to be successful. And I know how hard they've worked and how miserable they've been. And then third is just having a non biased person to be like, Hey, I sent it to these people, I don't tell them who they are, here's their feedback. And does the feedback match up? Right, so I send it to three different people.

[00:38:45] All three people, do they say the same thing? Do they say something a little bit different? I don't know, that's just something I've done because I'm always also curious in the process, and if they all line up, cool, then we know what to do, and I'm out of the picture, so they can't be mad at me.

[00:39:02] **Dr Eric Helms:** No, it's an interesting one for sure, and I think You know, case studies are often not something that we look at is the same quality of evidence as group based trials. Which they're not. If we're trying to inform, your average best practice for somebody lands in the bell curve of, response or distribution of whatever variable we're talking about in humans.

[00:39:24] But I think doing case studies is a very good experience for. Someone in sports science because you're default is all right I ran a comparison to trials my power Calculation was I needed ten or more in each group because that's what my advisor told me in ten ten is two digits So that's better and then I ran in a Nova.

[00:39:42] I don't know what that means I just know that I'm supposed to do SPSS It's black box, but when you do a case study And then that's acceptable, right? Like that first example, that's fine, and if the p value is less than 0. 05 then there's a decent chance that whatever happened in that group was significantly more than that group.

[00:40:03] But when you have to do a case study, how do you convince there's no standard deviation, what do I do? And and you have to come up with creative designs, you have to get outside of your little, typical, standard way of doing analysis that you haven't done differently in 15 years or as an example of some of the old school folks in our field and then you got to go, okay how do I show a real change?

[00:40:25] So, for example, I did and we're writing this up, I stretched my calf in the stretching orthosis for 12 weeks. both calves. So instead of being able to just compare to my other calf, which would have been the easy thing, I'm not going to do that. I want both my calves to grow. And we had to come up with a design that allowed me to stretch both calves for 12 weeks.

[00:40:46] And then how do we compare that? So for four weeks of me just doing my resistance training with no stretching, we got a weekly, of ultrasounds on my calves. And then we went, all right, so this, for this four week period this is going to be the typical change and we have to see something that is greater than some amount more than that.

[00:41:04] So we had to come up with a metric that described what is my typical variation to then, all right, let's create a figure and look at the plot over the next 12 weeks to see at what point did I exceed that. And I think that type of thinking is really good because it encourages someone to actually assess, like, how do I know it's real?

[00:41:24] And that is. Basically the type of thinking that I think we're talking about here. And when you don't have that's the biggest pitfall of body composition testing. So, so yeah, I, I think it's a fascinating area. And I think it's really intriguing when you look across methods. You're trying to figure out what's really going on, what's real and what can influence these outcomes.

[00:41:44] And you can ignore what influences these outcomes. So long as you're willing to accept that a real change might have to be frigging massive. And you can only get tested every two or three months. For example, 2019, I was fine with. Just getting my some of eight skin folds tested every month, and not worrying too much about what was going on I still did it Saturday morning But like it wasn't a huge deal to me like if my workout wasn't exactly the same on Friday or the fact that I worked out on Friday and I came in on Saturday as long as I kept doing that I didn't try to control my exact water intake.

[00:42:19] I didn't do USG like Grant had me do to make sure that it was good to go at his lab. I just did my typical thing. It came in Saturday morning because I knew, look, if we're full for four weeks during contest prep, if I can't see a change knowing that the technical error measurement that my student who is doing anthro has, then I'm probably going too slow.

[00:42:39] So it's that type of calculus that I think you have to think about when you're looking at individual change And I think rarely does that happen in the real world and unfortunately doesn't happen consistently enough even in the research world But it absolutely does in well done studies and there are people leading the charge like grant on that And

[00:42:58] **Dr Grant Tinsley:** you bring up a good point when, anytime you're dealing with an individual, it's harder because when we have a group, there'll be some of these individuals say such as Eric, you have a, some feature like the density of fat free mass, something about them that's different than you would assume.

[00:43:12] But those people usually get canceled out by the people who are different, the other direction. So, if you have a decent method, enough people and you standardize. That's why we can use quite a few of these methods in research. So if we're trying to see, did this dietary change work on average changing this resistance training variable, did it do anything on average?

[00:43:29] We can look at that, but yeah, when you have the one person, you don't know, they might be that person. He's just dead on the group average. If you'd done this as a whole study, they could be the extreme outlier in one direction, extreme outlier in the other direction. So. Yeah, I totally agree with what you're saying, Eric, that you have to be creative in how you think about it in a case study, if you're conducting it for research or just your own self research, working with the client, what have you you do have to approach it differently because you don't have that advantage of other people canceling out some of that noise.

[00:43:56] And you don't know if that one person is the noise or if they're actually, totally fine.

[00:44:01] **Dr Mike T Nelson:** Yeah. Even. On peer reviews, if I don't have it a lot of times, I'll just ask for just just give me the data on an XY axis with this, an old school scatterplot, like just put all the data on there with the, the two things you're comparing, because does it look like this?

[00:44:15] Does it look like this? Is there like two dudes up here? One dude down here? You can get an, an idea by looking at standard deviation, all that kind of stuff. But for me, there's just something about looking at it. Visually, that gives me some idea. What you were saying is if there's two people way up here, most people here, I remember seeing this Stu Phillips data years ago on hypertrophy study.

[00:44:36] Most of the people were in the middle, two people were way up here and one poor bastard somehow lost lean mass during the study, right? And you're like, Oh. That's interesting. And my brain is like, what are the two dudes up here and what happened to that poor bastard down there? If you just looked at the pool of the data, because they had enough people in the middle, the data looked, pretty good.

[00:44:55] Like you just look at the standard stats, you're like, that's amazing. That looks pretty good. But when you see it plotted, you get a different perspective. And like you guys were saying, it also prompts other questions of, okay maybe there is something going on with those people. And what do you do at that point?

[00:45:11] **Dr Eric Helms:** Yeah, and in a group based study you, there's even debate as to should you do anything about that, right? Yeah, exactly. Because if you got a sufficient sample, you would expect a, the sampling variants of people who, let's say, followed the protocol poorly and didn't grow would be equal between groups, right?

[00:45:34] You can do outlier analysis and you can do things like that, but Ultimately, you have a large sample because you need to control for the fact that people bounce around like that. And some could be hyper responders, some could be low responders, some could just be shitty at following the protocol. Some might have trained extra, it's actually even hard to determine what are the individual characteristics. Is someone actually a high or low responder? So this is cool and it's a tangent and I won't spend much time on it because I know

we're, we've got body comp stuff to talk about. But over at FAU, I'm an external committee member for Zach Robinson.

[00:46:13] He's doing his PhD under Dr. Mike Zerdos. And his PhD is all on Like understanding individual response and the protocol that we actually have to do is a within subject crossover. So your right leg does something, your left leg does something. So controls for all those individual differences, right?

[00:46:35] Because they're both attached to the same stomach and heart and nervous system. aNd the crossover controls for the order effect, right? But then you have to do it twice. Because something that people don't really appreciate is that, what is the random amount of responsiveness you might get between two different things?

[00:46:55] Maybe your left leg was, or right leg just responded better to that protocol this time. We have to see if there's a difference. Doing it twice, right? So so not only are you it's like again that same kind of meme where it goes from small Brain to lit up big brain. It's okay crossover same person does two protocols.

[00:47:13] Okay? Were they doing the same thing in both things? Okay. Within subject Okay within subject crossover and then the last one was like, oh shit within subject crossover repeated twice And that then you realize That you're quadrupling the amount of time that it takes to run one subject through the study compared to a traditional parallel group design.

[00:47:33] So it's oh, now I understand why we have all these kind of big picture group based data, but we don't really have good data. on what discriminates between the high responder and the low responder because it is just a monumental mountain to climb logistically to actually figure out whether it is a real low or high responder.

[00:47:56] So yeah.

[00:47:57] **Dr Mike T Nelson:** Yeah, no, that's good. I appreciate that. And it's also good for people listening to realize that my pet peeve is people who have never published research telling researchers how they completely effed up their study. It's okay, maybe you should just ask them Hey, why did you decide to do this?

[00:48:14] Because I can guarantee 99 percent of the time like you were saying There's usually a good reason, right? And then we can come up with studies that

are theoretically amazing and have sound design. But if you can't get a single human subject to complete them, they're utterly worthless, right? So there's always these kind of, trade offs in the background that have to go on to get something actually published too.

[00:48:35] So, I know, Grant, you got to check out in just a bit, but. This might be a hard question to answer, but if someone is, let's say, a hypothetical, they're 15 percent right on body comp. Let's say we did MRI or we did some fancy other technique and we know theoretically they're right on 15%. Could you speculate as to what percentage in a DEXA they may be plus or minus?

[00:49:03] So for example, I've, I'm guessing on this, but I'm guessing in terms of body fat percentage, like you're talking before. I think they might be 2 to 3 percent higher. So on the high end, maybe they could be 18%. On the low end, maybe they could be 12%. Is there any sort of heuristic or framework or anything that people could use to wrap their head around it?

[00:49:28] Because I, I think people think that, oh, maybe 15%, but I think the variance could be higher than what most people are

[00:49:40] **Dr Grant Tinsley:** envisioning. Yeah. So I guess a couple of things here. One, I think at some point you, you could be in a situation where you're always chasing the better method. If you have Dexa, there might be, even though there is some error, like if you compared it to a, I say higher model, like a four compartment model if you could have whole body MRI it would give you a little bit of different variables, but you could still get very good very good data from that.

[00:50:06] I think at some point you have to, yeah. I guess accept that this may not be truth, but if this is a good enough method, don't me track. If that's really what you want, wanting to track, then you might have to accept it. Similar to what we were talking about before, you could have the person there, they're 15 on Dexa and you took them in and did whole body MRI, converted that to body fat percentage.

[00:50:26] You did four compartment model and they're pretty dead on. They're all within a percent. Then you have other individuals who deviate widely and. This isn't random. This is due to different properties. Each method has certain assumptions. This is even more true. Dex is a little bit better in this regard, but say something like bod pod or underwater weighing great examples where we're splitting all of body mass into fat mass and fat free mass.

[00:50:49] But there's a lot going on in fat free mass that differs between individuals sometimes systematically in a group like resistance trained individuals but certainly at the individual level, you could have something where someone has a higher or lower overall density of their fat free mass, and that will directly, from the calculations, directly influence.

[00:51:07] Say how high their body fat is. And because of that fat free mass is on the device. So, I don't know if I have a simple answer to that. It could be the method you have is spot on. We've seen this with 20 consumer BIA devices. There's some individuals where it is exactly the same as their four compartment model, this 20 device in that.

[00:51:26] And it's good for you. And most people don't know this, but good for you. Other people, it's 10 plus percent different. And it's some of it could be random error, but a lot of it can be explained. If you look into really the nitty gritty, if you're able to do all these assessments and look at the proportion of water and protein and mineral and things in their fat free mass, that will often ultimately end up explaining.

[00:51:46] Why certain people tend to measure high on a particular method or low on a particular method. And we do have a great case study of this sitting right here with us on the call. Just since we, we did this recently with Eric. He was one of those people that presented with some of these different characteristics.

[00:51:59] So for example, uh, he had a lower bod pod body fat percentage than his multi compartment while we did not to the same extent as the other individual Omar who retesting. He had more extreme deviations. In his fat free mass properties that caused him to measure much lower on bod pod rather than just a little bit lower but then on bio impedance in contrast, Eric was incredibly lean, but it was pulling some higher values, up in the teens, one, even in the high teens, that certainly isn't I don't think accurate.

[00:52:28] But when we looked into it and we saw his proportion of body water it was lower than predicted lower than assumed by these devices. So someone could look at it and just say Oh, these devices are junk or this is all random. But when we looked at it, there were actually reasonable physiological explanations.

[00:52:46] Just based on, Eric being a unique individual, his fat for mass characteristics, he was doing, intentional things with his diet then and is now I know as well. So a lot of factors going into it, but we were able to actually tease out why that happened. So again, for the most people don't have access to that

information where they can say, oh, yeah, I know the reason why measure high on my home body fat scale.

[00:53:05] It's not only because it's not the best advice, but also because I differ from what's expected in these ways. But just know if you're an individual listening to this, you could differ in those ways. So it is possible if you're pulling a weird result, there may be a real reason for it. Beyond just the device itself.

[00:53:21] **Dr Mike T Nelson:** Awesome. I know you gotta head out, but last thing, if people are looking to do DEXA or some other measurements, any words of wisdom that they should at least be aware of?

[00:53:35] **Dr Grant Tinsley:** Yeah, a lot would be reiterating things. We've talked about the frequency does matter. There are some who advocate including the International Olympic Committee ad hoc working group on body composition.

[00:53:46] I think they advocate for no more than four assessments per year for a technique like Dexa. Now, certainly if you have, we have Eric over here prepping for his competitions, imagine he might be interested in some variables between, skin folds, circumferences, weight, other things that might be tracked a lot more frequently.

[00:54:01] But for some of these lab grade method methods, partially because of the cost, the availability, all these things I think the situation you were describing Mike, where someone's doing monthly DEXs, I think it really is. Too frequent in almost all contexts, you could probably come up with a scenario where maybe it would be justified again, if someone is doing like their, aggressive prep protocol, maybe in very tight standardization to the extent they can, maybe you could make a case for like monthly testing.

[00:54:26] But yeah, so I consider the frequency of testing what's reasonable, whatever method you use, try to get the highest quality data you can by standardizing everything you can about yourself, just being as anal as possible. Because you, we don't know what we don't know. There's some variables we know will influence this.

[00:54:40] If we chug a bunch of water before tests, we know that will mess up a lot of them. But just everything you can in terms of like your training or restroom training dietary patterns, all of these things that the more you can

standardize, the more you increase the chance that that value you've controlled some of this biological error in it and that values a little higher quality.

[00:54:59] And then again, interpreting as a grain of salt, conceptualizing, even if you don't have the exact reliability, conceptualizing this as a range hopefully you could find some information, even if you're not able to get your own reliability data from a coach from the published research, just giving you an idea, it's okay, I'm getting the stack set, but I should interpret this as plus or minus two and a half percent.

[00:55:18] And that can help people, it is, it's in some ways frustrating. The other ways it's helpful. It's okay, I saw this small uptick in body fat that doesn't really match with everything else I'm seeing, how I feel like I look, how my clothes are fitting, what have you. And it can give you some confidence saying okay I know that's within the area of device.

[00:55:33] So, that's something I'll take into account. So yeah, high quality of data and interpreting with caution would be my two, two big picture points there.

[00:55:40] **Dr Mike T Nelson:** Awesome. Thank you so much. And where can people find out more about you? Yeah.

[00:55:45] **Dr Grant Tinsley:** So, I have a personal website. It's just my name grant tinsley.

[00:55:47] com. It has information about our research lab and links to social media. I do share research primarily on Instagram. And my handle there is just grant underscore Tinsley underscore PhD. So I'd be happy to connect there. And yeah, it was great chatting with you both. Sorry to have to jump off here a few minutes early.

[00:56:02] Yeah,

[00:56:02] **Dr Mike T Nelson:** no, no worries. Thank you so much. We'll see. I appreciate all your time. That was awesome. Thank you. Thank you. Any other practical body composition words of wisdom?

[00:56:16] **Dr Eric Helms:** Yeah. I think some of the things that I would recommend to people is just to remember why they're getting tested. You're not actually trying to go for a body fat percentage.

[00:56:25] You're trying to go for a specific look on almost all cases. And a litmus test that I will sometimes ask my clients is all right when they're, when they give me pushback or they really want to have a body fat percentage, I said, all right let's say your pre test before you've even done a diet, let's say your goal is 10 percent body fat and on your pre test.

[00:56:44] It comes out as 10%. Are we going to pursue the diet? They're like yeah. I'm like, you don't actually care what the number is. You care about what is associated with that number. And I think that's getting the kind of the foot in the crack of the door. But most people, they have a much better schema of what is a body fat percentage.

[00:57:05] They associate it with something, right? So I would encourage people to get different associations. If you can get high quality circumference measurements or skin folds, those are accessible to everybody. They're not super, super expensive. You can get this, the self closing tape measures.

[00:57:24] **Dr Mike T Nelson:** Yeah. My own tape, I send those to clients all the time. It's Pretty damn good even in the hands of someone who's never done it before you can get pretty good with it real fast Yep.

[00:57:35] **Dr Eric Helms:** Yeah, and you're not alone. I know Andy Morgan's a big proponent of this and basically what you do is you just get the myotape and You measure your same circumferences like three times in a row like right now Until you can get down to being within a pretty good Amount of error, like if you can get within a centimeter each time you measure on yourself, then that's something where you can go, okay, when would I expect a centimeter of change in a given metric or, for those who are operating in in, in the States, that's like a, what, a quarter inch ish, right?

[00:58:09] So if I can get the same measurement within a quarter inch, okay. So when can I expect a quarter inch change now? Okay. I can do this every two weeks. I can measure my waist. If I'm in a reasonably aggressive deficit that probably is not an unrealistic expectation. And that type of thing is a great compliment because the scale measures everything.

[00:58:30] If you look at any good coaches like spreadsheets, they're typically calculating like a rolling average or every two week average or something from all the body weight weigh ins because the day to day scale fluctuation, I think people are really familiar with this, it can be all over the place, and that can be really psychologically stressful if you're not aware of what that means and

sometimes even if you are, so having these additional kind of assurances as to whether or not you're actually making progress or not can be really helpful.

[00:59:00] In, and trainers will often talk about this more subjectively all the time. But do your clothes fit differently, and so, so if you can sit there and go, my scale weight hasn't changed for two weeks. It's been bouncing all over the place. But my waist measurement's down.

[00:59:13] And it's disproportionately down to other metrics. That's probably a good indication of you're losing the right things. And if you're also performing well in the gym, awesome. If an A broke, don't fix it. So, even though it might be great to go to a Dexa and, if Grant had more directly answered your question, he might've said, a really good place, 3 percent error, go into a different place every time four, five, six, 7 percent error.

[00:59:36] If you go in different conditions to two different machines with two different raters. And then, in that latter case, it's probably not even worth doing it even once annually, but I do agree with that. Every quarter, sure, something like that, I think is very reasonable. And especially if you can do it in the same conditions with the same technician on the same equipment and the same site.

[00:59:55] If you've got like a local university, then yeah, you can get four annual DEXs. I see no issue with that. And then you can think of a range that's probably, I don't know, plus or minus 3%. I think it would be a reasonable assumption. Might not be, I think that's all good advice, but then you got to think, all right, if I'm only doing this every four months.

[01:00:13] Like, how long is my summer cut?

[01:00:14] **Dr Mike T Nelson:** Three months? Yeah what are you trying to accomplish during the four months? Exactly.

[01:00:19] **Dr Eric Helms:** And also, shouldn't you be able to tell something happened in three or four months on your own? So, so I think a lot of the times in practical settings it does come back to performance, pictures, maybe tape measure, and potentially skin folds if you have access to someone who's very good.

[01:00:36] Because that measurement is the only one that I'm aware of. Although it doesn't spit out a body fat percent. It's just getting the raw skin fold change where you could do it as frequently as a monthly or even twice a month.

And know whether there was a real change or not just based upon the data in the hands of a very good anthropometrist.

[01:00:55] So again, great for group based stuff, but needs to be really attentively. Thought about when you're doing it for an individual change. And or it could not just be negligible, like I said, but actively harmful, misleading.

[01:01:11] **Dr Mike T Nelson:** And when I was doing my PhD, I ran one of the 400 level labs. So we had a body comp lab.

[01:01:16] So we'd come in and we'd have them, do bod pod and all this stuff. So you get to operate the bod pod and you get to see hundreds of students like ad nauseum and then next quarter you can see hundreds more of them. And after a while you get bored. So you're like, you play the game of let's guess this person's body fat, not in a, negative or weird way.

[01:01:34] You just, cause you're curious, right? And you want to see, okay, how good can I get? Visually, because I can look at them, I've got the data, and again, there's some error with the data, and do they follow the, what they're supposed to do, but... What was fascinating is the numbers don't work out as clearly as what people think, right?

[01:01:52] Like you were saying, people have this thing of Oh, I hit 15%. I'm going to look this way or I hit 10 percent or 20 percent or whatever. And I think they would be shocked if you had a way to measure like legit body fat percentages. And I guarantee you could show people look radically different at just 15 percent.

[01:02:10] They're all 15 percent. I've noticed especially even more in females too because just where you're storing fat will change quite a bit. Like we had a fair amount of athletes that would come in and We'd also play the game of trying to guess, both guys and females, like what sport did they play?

[01:02:26] Right? Just watch the Olympics. Like you see very different forms as a result of, what they're trying to perform for their sport. And so it was interesting to see people visually, you're like, wow, that person does look quite a bit leaner than that person. But the data was very different in some cases.

[01:02:45] So again, I think people, like you said, have this. Visual of where they think X percentage is, and I always try to have the conversation similar to you where, okay, let's just get a direction. And then we'll just decide along the

way. Right? Instead of, oh, you have to be 17 percent or you have to be 13 percent or because.

[01:03:06] They're more going for a look, they're not going for a percentage. And I think I've had the inverse, where I haven't had that conversation ahead of time, and they get to whatever percentage it is, and they're like, Whoa, I don't, this isn't what I thought it would look like. Or the reverse.

[01:03:21] So yeah, it's, again, Can be useful, but again, what is it used for? Is it just curiosity or are you trying to determine directionality or are you trying to determine your own goal?

[01:03:33] **Dr Eric Helms:** Said, totally agree. I got

[01:03:36] **Dr Mike T Nelson:** a couple of minutes here real quick and I just wanted to hit on, you published a very fascinating new study looking at the age old question of how much surplus do you, should you be in to gain lean body mass?

[01:03:51] Which I know is a whole loaded question. Laughter.

[01:03:56] **Dr Eric Helms:** Yeah, and I should say it is in preprint. So we have not fully published it, but I haven't okay, but we just got our peer review back Literally two days ago. Oh, okay for sports medicine open and it wasn't rejected. So that's generally a good sign

[01:04:14] **Dr Mike T Nelson:** That's a good sign.

[01:04:14] That's a good sign

[01:04:16] **Dr Eric Helms:** So we're working on addressing the comments and we've got a resubmit by the beginning of October. So nice Good chance we could see this published in in press, not fully in print by end of the year. So that's cool. yeAh, what we did in this study took a long time, so shout out to Legion Athletics as well as Renaissance Periodization.

[01:04:38] Oh, we were able to Legion fully funded the study and then the guys over it at RP Mike is retail has always been very generous as well as Nick Shaw. And yeah, we were able to pay a dietician, Steve Taylor to, to manage each individual's stuff through the RP grant.

[01:04:56] **Dr Mike T Nelson:** But for a very important if you're not controlling calories, then

[01:05:01] **Dr Eric Helms:** yeah, like it's one of your independent or dependent variables So, So yeah, what we did is and we started literally in 2019, but covid delayed it massively as we wanted to compare a very slight surplus to a more quote unquote kind of normal surplus to maintenance energy intake in train lifters And see how they went after eight weeks in terms of changes in both muscle mass, strength, and adipose tissue.

[01:05:26] So, just like we've been talking about, we measured eight site skin folds pre and post. We measured biceps, triceps, and quadriceps muscle thicknesses via ultrasound. And then we also measured changes in bench press and squat 1RM. The actual surplus sizes, the targets, which were actually based upon rates of body weight change, was a 5 percent surplus, a 15 percent surplus, or trying to roughly maintain weight.

[01:05:53] So everyone who enrolled in the study we had them go through a weight stabilization phase so that for at least two weeks we saw plus or minus one percent on their initial weight. And then they got enrolled, randomly assigned to one of these three groups. We were blinded to it, which group they, they were assigned.

[01:06:10] As the people who are training them, they came to the lab and trained with us three days per week. Only the participant and the cause they can't not know. And of course, they're the dietician who's running their diet, knew which group they're in. And it was just based upon. Looking at their average body weight every couple of weeks and then making an adjustment and then individual consultations with them to help them meet the requirements of the nutrition, which was at least 1.

[01:06:33] 8 grams per kg of protein, at least 20 percent of calories from fat, at least 40 percent of calories from carbohydrates and the rest feel free, hit these good thresholds. wE clamped their supplement intake. So whatever their habitual supplement intake was had to stay there. And then the training protocol was a full body program three days per week, which is, I think, a limitation of the study.

[01:06:56] But it's the name of the game. So they came in and did squat and bench each day and then they did back shoulders and biceps. And the bench and squat programs were basically squat or strength programs, but slightly higher

reps because we're still trying to get hypertrophy out of them, but they were a little bit submaximal.

[01:07:15] We use percentage one RM and RPE. So they trained from like a six to eight RPE to seven to nine to eight to 10. So getting closer and closer to what they could handle at a given percentage. And going from like the mid 60s all the way up to the 80s, 90 percent of 1RM on the bench and squat, but then they just did three sets to failure on shoulders, delts, and arms on the days they came in with different exercises.

[01:07:36] So they trained hard and everybody got stronger which is, a good sign. And there were mean increases in ultrasound muscle thicknesses, but the actual comparison between groups was such that. We saw some unexpected findings, and when you look at the group based group comparisons, there's two major issues.

[01:07:55] One, COVID kind of nuked our sample size, so we only ended up having 17 people finish. There was like 6 in 2 groups and 5 in 1, and that was far less than our power calculation of what we thought was an appropriate amount to not get a false positive or false negative, type 2 errors.

[01:08:14] So, post hoc, we decided, look, let's... Let's do something in addition to this. Another thing that you could tell from the group based comparisons is the mean change in body mass was actually the same mean in the 5 percent and the 15 percent surplus group. So, the practical ability of someone to follow a very small surplus or a moderate surplus, when you're only looking at 5 or 6 people, like I think with larger samples, we would have seen, the disparity in those means grow.

[01:08:43] But, If just because you gain the most weight doesn't necessarily mean you are always in the 15 percent surplus group. Yeah. So we had some people on maintenance who gained a little bit, we had some people in the 15 percent group who only gained a little bit, we had some people in the 5 percent group who gained too much.

[01:08:57] So what we did was post hoc, we ran a regression analysis on everybody just based on body mass. So instead of the intended surplus, we basically ran a regression. On the actual surplus that based on change in body mass, which is now we have the power of the full 17 person sample, right? This is something we can really hang our hat on, in my opinion, and it's getting closer to the experimental question of when you try to gain weight faster or slower, it's a facto.

[01:09:27] Larger or smaller surplus. What happens? And this is where we had our highest confidence findings. So we use what's called a Bayesian analysis, which is distinct from the frequentist testing of null hypothesis testing. Bayesian it tells you about probabilities and it makes much more probabilistic statements rather than dichotomized based upon, PLS, the 0.

[01:09:49] 5 rejecting all hypothesis and then just report, confidence interval. That's fine. But we did is what reported what's called base factors. And they're interpreted pretty straightforward. A base factor is just the probability that one thing happened more than another. So if we had a base factor of, say, 10 that Higher body mass gain was associated with higher gains in skin folds.

[01:10:13] That means it's ten times more likely the more weight you gained to have an increase in skin fold than not, right? It's like an odds ratio essentially. So anyway, our highest confidence findings by far were that body mass was positively and linearly associated with increase in eight side skin folds. So the more weight you gained in our study, the more adipose tissue you gained.

[01:10:36] Unfortunately there was no relationship between strength tricep or quadricep muscle thicknesses. And there was just a very weak, I want to say the base factor was like one point something. I don't have it right in front of me. For biceps muscle thickness and weight gain. So interesting thing there is that when you think about the study protocol, The biceps actually got the most direct and indirect work back and biceps every day.

[01:11:04] So if you add up the number of sets, they're the only group that kind of hit like a, what we consider like a more appropriate mean volume for hypertrophy if you count indirect and direct work in the same way that like the Schoenfeld meta analysis did. So the muscle group that got that was only being trained to failure, so lap pulldowns or rows to failure and then bicep curls to failure, a variation of both of those every single day.

[01:11:26] Right. Was the only muscle group that seemed to respond slightly better to gaining more weight, but it was probably not worth it when you look at the meaningfulness of that change The base factor strength looking at the biceps versus the base factor looking at the adipose tissue, or I should say the skin fold changes So strength didn't seem to do better and neither did muscle mass globally But there might be a hint here that, hey, these are trained lifters, so the people who are in the study they had to be squatting 1.

[01:11:59] 5 times body weight and benching body weight for men. And then it was just downshifted from their 0. 25 for women. So all the people in the study

were reasonably well trained. Some of them were competitive physique athletes. Some of them were competitive power lifters. Many of them were not. So it was a kind of a broad range of quote unquote trained people.

[01:12:18] And. I would guess that most of them were training more than three times a week on their own before they started the study. So we train them hard and I doubt many of them were training squat and bench three times a week, nor were they training each one of these muscle groups in all cases, three times a week.

[01:12:34] But if we were to think about what would be a more ecologically valid design, getting people to come in and train four or five days a week or looking at what they were previously doing and assigning them something relative to that, that might've increased. the relationship between, weight gain and muscle mass gains or strength gains.

[01:12:52] If it had been a little more tailored in that way, but that's a hard thing to do. It's logistically challenging. You can't necessarily get people to come and travel to your lab and train with you in a similar way that they would train at home with equipment, availability, research assistant, availability, and the need to pay research assistants when they come in.

[01:13:09] And

[01:13:09] **Dr Mike T Nelson:** just the fear of people dropping out too. It's I'm in your study and I got to train in your lab. I got to commute. I just go up to my garage, bro. 100

[01:13:17] **Dr Eric Helms:** percent exactly. And like we were able to give them, vouchers for gas, but it was a fixed amount and some people were traveling 2030 minutes to come train us in the lab.

[01:13:26] And if they miss more than I want to say two scheduled sessions that we had to exclude their data. Yeah. So that's a high probability when you have four or five times a week for eight weeks. Yeah. Yeah. So anyways, the overall take home Is that if we just strictly interpreted this as a scientist's, in the context of training three times a week with a heterogeneous group of trained people over eight weeks, the main thing that happens when you try to eat more is that you get fatter.

[01:13:57] **Dr Mike T Nelson:** So, unfortunately. The one thing I think that jumped out to me was that, It's harder to maintain a fine amount of surplus than

I think people realize, right? And this makes sense. Like you've worked with a lot of people. I've worked with a fair amount of people at this point in my life. And there's just, I remember talking to Ben House and I was down there in Costa Rica.

[01:14:22] And it never ceases to amaze me. The amount of variability from one person to the next, like the more you work with people, the more I'm just. Floored at the amount of variability on the extreme ends, right? Cause both of us are working with, very biased populations and et cetera. But again, paper you'll have, okay, this person, they should easily stay in a caloric surplus.

[01:14:45] So you add more calories. Wait, it's not going up. What the hell? I had more calories, not going out. And then you've got Bob over here who on paper looks the same. Bob's in the caloric surplus week two. He's cool to go. And obviously there's a lot of factors, there's stuff with NEAT, Levine study of overfeeding and hyper responders to that.

[01:15:02] Some people move around more, some people don't. And, so I think that to me is what kind of jumped out to me of something that from the outside, you think, Oh, this is going to be a super easy thing. They just, we've got a dietitian, they'll be in a caloric surplus the whole time. But that's far from an easy feat to achieve, especially when you're trying to get fine scale difference between groups.

[01:15:23] **Dr Eric Helms:** Totally agree. So yeah, one, one practical take home from this might be, look, if you want to try to bulk, obviously you need to train train hard and train a fair amount so that it doesn't just mostly become adipose tissue. But also, yes, while I would probably recommend slower rates of weight gain based upon the study, like gaining 0.

[01:15:43] 5 to most like 2 percent of your body weight per month practically. Maybe a 5 percent surplus is just something that's too hard to follow, like it'll turn into a 10 percent surplus sometimes in any way, or sometimes we made an, so it might make more sense just from like ease of prescription to go, okay, a 10 percent surplus is the small range.

[01:16:01] And then if you gain body fat too quickly, that's okay. We just have a preplanned mini cut. So I think that's 1 possible interpretation, a more strict interpretation of what the maintenance group did just fine, so maybe you don't even need to try to be in the surplus and just focus on progressive overload eating enough and then maybe some point in six months you should be up, a couple of pounds.

[01:16:21] And I think both of those are valid, but we do need more data ultimately to really uncover that and it's probably more important, like you said, on an individual basis, how well you respond rather than trying to make these group based norms when we're talking about trained people, because trained can mean a lot of things.

[01:16:38] **Dr Mike T Nelson:** Yeah, the longer I keep doing this, the more I keep thinking, I just keep looking at more of their performance than anything else. Obviously, I'm gonna look at body weight, I'm gonna look at circumference, I'm gonna look at pictures, all that stuff. But to me, I just keep coming back to If you are doing more volume, more intensity, more density in the gym, if your goal is even hypertrophy and that's relatively standardized within whatever program you're using, unless your calories are just completely horrible and you're like way off the mark, like if we think you're at least at maintenance or airing a little bit high, even if we're off a little bit, That just seems to auto correct a lot of stuff, because in advanced people if they really are not hitting the Clark surplus, and I've seen them go into a deficit their training normally just goes with it.

[01:17:23] Not all the time, there's people I find who can buffer that more often, but it seems like you'll see something in it, or they'll start walking less, or there's some... I don't know, I just find myself looking at the output indicators more than anything else on a day by day, week by week basis. No, I totally agree.

[01:17:43] Cool, man. Thank you so much for the time and thank you for, doing the study. That's super interesting and yeah, it's one of those questions where... We know what direction to go, but that's been the age old debate as long as I can remember of, you're going to bulk, like how much do you do in a pound a week?

[01:18:00] And then you have people do that and they're like, Oh, but I'm too fat on the other side and like all the debate in between. So it's cool to actually start to have, some early data in that, which is awesome.

[01:18:10] **Dr Eric Helms:** Yeah, we finally got a handful of studies now. Like we had just maybe two or three prior and now actually, Grant earlier he did a similar study to this.

[01:18:20] And like I think we're not far off where we're going to see is probably someone meta analyze all these and look at it together and give some decently powered recommendations. But I would say for now, yeah, probably if

you're a novice, absolutely, and you're comfortable with gaining a little body fat, you can gain as quickly as 2 percent of your body weight per month.

[01:18:41] But I think most people. We're looking to go through a phase like this it should probably be closer to 1 percent per month as a decent target rate of weight gain. And and just be prepared that it still won't all be muscle. Yeah. Yeah.

[01:18:55] **Dr Mike T Nelson:** Yeah. That's the last point I remember talking to Ben House about this too.

[01:18:58] I'm like. It just, for whatever reason, a natural athlete, it's almost impossible to take body fat to fuel your caloric excess. In theory, it makes sense. You have plenty of extra calories on your body, even a lean athlete. Physiology just doesn't seem to work that way. There's just something magical about being in a caloric surplus for just the ability to train, to want to train, to do more volume, just to, to add more mass and just, yeah, just time and time again, that just appears to be true.

[01:19:33] Yeah, man. Awesome. I

[01:19:36] **Dr Eric Helms:** appreciate you having me on for sure, man. I always good to talk

[01:19:39] **Dr Mike T Nelson:** to you. Thank you. Where can people find more about you? I know you've got a website. You're way over in Kiwi Latin there. You've got some books.

[01:19:47] **Dr Eric Helms:** That's right. Yeah. So probably best place if you're interested in like staying up to date with research would be massresearchreview.

[01:19:53] com where we do stuff like this. Huge fan of them. Thank you. Much appreciated. If you're interested in coaching and courses for athletes and coaches on Bodybuilding drug free bodybuilding specifically that's 3d muscle journey calm if you want to read my thoughts About all this and my prescriptions and what my recommendations are on the books that I referred to earlier Those are the muscle and strength pyramids, which you can find on Amazon as well as on the website, muscleandstrengthpyramids.

[01:20:18] com. And then finally, if you want to listen to me talk on reels or share cool podcasts I've done like this one or whatever, you can follow me both on threads and Instagram at Helms3dmj.

[01:20:31] **Dr Mike T Nelson:** And you've got a podcast too. You're on

[01:20:34] **Dr Eric Helms:** iron culture, the 3dmj podcast, man. I'm on a lot of podcasts. So you're everywhere.

[01:20:39] I love to be everywhere on the internet.

[01:20:42] **Dr Mike T Nelson:** Awesome. Thank you so much. I'd highly encourage everyone to check out your stuff. It's always good stuff. I learned everything. I read mass every month and always learn new stuff from them. So it's all the other stuff is great too. So thank you so much. Really appreciate it.

[01:20:55] Thank you, sir. Thank you.

[01:20:57]

[01:20:58] **Dr Mike T Nelson:** Thank you so much for listening to the podcast. Huge thanks to Dr. Grant Tinsley and Dr. Eric Helms for being on the podcast. Really appreciate them taking their time out to do this.

[01:21:10] We have links and everything down to below for all of them. Make sure to check out all the great stuff they put out. Really appreciate them coming on here to clear up some of the confusion about especially DEXA scans and looking at better ways to measure body composition. And if you enjoyed this content, and you want more content, go to MikeTNelson.

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[01:21:55] So go to MikeTNelson. com forward slash podcast. Podcast. Thank you again for listening to this podcast. If you could hit subscribe and and leave us a review, all that stuff helps with the distribution of the podcast. And if there's someone you think that may enjoy this one, especially related to body composition and DEXA, please send it over to them.

[01:22:16] Thank you so much. Greatly appreciate it. And we will talk to all of you next week.

[01:22:21] Personally, I don't care for puppets much. I don't find them believable. I don't believe you!

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[01:23:41]