

How to Build a Strong Core & Abs

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Dr. Andy Galpin

The science and practice of enhancing human performance for sport, play and life. Welcome to Perform. I'm Andy Galpin, and I'm the executive director of the Human Performance Center at Parker University. Today, we're going to be talking all about how to develop a strong core and great looking abs. And I figured we'd get started with a bit of a warm up to get your brain going and I'll ask some simple questions that all of you definitely know the right answer to.

Let's get started with some basics. If I picked a couple of different exercises, could you tell me which ones are better for developing your core abs and which one is least effective? Let's throw out some simple ones. What about a sit up versus a deadlift? I'm sure most of you are thinking, of course, it's a sit up, but are you really sure? What about if we did something like a machine versus a free weight exercise?

Do we automatically know that the machine will activate my core less, and then the free weights will do more, and therefore be better for my app development than the machine? I know what you're thinking. Oh well, when I have my free weights, I've got to create stability, and I've got to regulate it, that's got to be activating my core more. But is it really? What does the science really say about machines versus free weights?

How often do we train our core? Every day. They're small muscles. They recover. Are you sure that that's how it works? And so in actually preparing for this episode, I started to realize there's so many topics like this and how people are generally training their abs and their core that are not actually in line with the current scientific evidence. Which is funny because if we were to ask all of you, and basically every human being would like a strong core and great looking abs. So we all want it, but as the saying goes, you'll find more people that have a million dollars in the bank account than those that have a six pack.

Here's the good story, though. We actually can solve this problem pretty easily. We'll have to start off by actually understanding the difference between the core and abs. We also need to take into account what outcome I'm really looking for. And once we understand that, we'll actually understand how some of these questions are answered differently based upon my goal.

So in today's episode, I would love to walk you through exactly that. What is the core? How do our abs actually work? That will then give us insights into how we should train based upon our unique goals and demands. And spoiler alert there, we don't all mean the same thing when we say we want a strong core and great abs.

What variables do I manipulate? What exercises do I choose? What order do I do them in? How frequently, how heavy? What repetition range? All of these questions and more are going to be answered here in today's episode. And so my hope is you will leave this with all of your questions answered, having a better guide and understanding for developing your core and your abs for whatever goal you choose.

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If you're anything like me, you've probably gone through a phase of your life where you've done all of the sit ups and crunches you could possibly do, you've hit all the planks and you still not gotten many results. But I want to get started with how we got here in the first place. Why is it people take their abdominals and their core and train them with the endless crunches and sit ups with the planks?

Now, the reason most people train their abs this way actually comes from a good place. If you go back to the 1960s and '70s these legendary figures in fitness and strength and conditioning, like Joe Weider and Arnold Schwarzenegger, were big proponents of training a lot of repetitions. So tons of sets, tons of reps per set, many days per week. In fact, this is exactly how Arnold outlined it in his legendary encyclopedia training book. And so we started from that place.

Now, not all bodybuilders at the time subscribed to that. Some did it differently. But Arnold was one of, if not the most famous person in the field ever, and so that really carried into the

mainstream. You roll into the 1980s and you have now the explosion of pilates and Jane Fonda and literally the 8-minute ab workouts. And these are all focused on burn, burn, burn, burn, burn. Get your abs burning. And the assumption is the more they burn, the stronger they get. And while that's reasonably OK to think, it's not as precise and specific as it can be.

You had then the evolution in the 1990s and early 2000 with people like Janda and McGill, who started taking the abs more from the perspective of low back pain. And started saying, hey, your core is important to your pain, and so we should actually train it with the specific goal of minimizing low back injury or pain. People hadn't really done ab training for this purpose before that. We didn't really have discussions in the '70s, '80s, and '90s about why your back hurts, why your hips hurt is because your core is weak.

And so when we started to unravel this stuff scientifically and from the field, people had to start saying, OK, well, you may be trained like this if you want your abs to look great, but maybe you train like that if you just want your back to not hurt as much. And this represents the first bifurcation of this training approach. And so when you hear fitness professionals, physical therapists, maybe differing from your strength coaches in terms of how to train your abs, it probably goes all the way back to this initial changing point where what we're really talking about is what is our outcome goal?

On one hand, you've got people who are focused exclusively on making your abs look a certain way, and the others are coming at it from a functionality perspective. Now, I'm not here to tell you which one is more important, I am here to tell you, though, the perspective in which they're educating you will determine in large part what they say works better or worse. That's the thing we're going to have to keep in mind for the rest of this episode. Our outcome goal in large part determines what is better or worse when it comes to training our abs and our core.

Now, before we go any further, we need to actually discuss what I mentioned a second ago, and that is what's the difference between your abs and your core? If I asked most of you out there, you'd probably be like, I don't know. I thought they were the same thing. And of course, in large part, they are, but the precision matters right now because again, it will unveil insights into how we best train them.

Generally, when we say things like your abs, we're thinking aesthetics. How do you look rather than function? Not always, but in general. And we're generally talking about three big groups of muscles. The first is called your rectus abdominus. This is the six pack. This is right in the middle. The second are actually two muscle groups combined. And that is your obliques. These are the ones on your side. And then the third is your transverse abdominis.

I'll get into the anatomy in more detail here in one moment, but keep this in mind. So generally

we think abs we think aesthetics. We think those three groups of muscles when we go to the core, it is your abs plus a whole host of other muscle groups. We're generally now talking about performance and outcome-based activities. So it is your abs. It's your pelvic floor, your diaphragm, your rib cage.

We actually then go into your back and we start talking about the four big groups of spinal erector and the deep spinae muscles and the QL and lateral trunk and all these things if you're like, what are those? Don't worry about it or go look them up. It's not critical that right now. But what is critical is to understand that is as effective or important to your core as your rectus abdominus.

We also then have things like your hip stabilizers, your glute muscles. In fact, some people will look at the muscles of the upper back, and the shoulder girdle and call those a part of your core. So really what we're saying is your core is everything not your limbs, not your forearm, not your knee, not your toes. And so then it becomes really complicated because it's reasonable to understand that we probably don't have the exact same training principles for your upper trap muscle as I have for your diaphragm. And that's probably not the same as it is for your rectus abdominus.

And so right out the gates here, we start to go oh, OK I understand that now training my rectus abdominis to make me look like a nice six pack might have some slightly different principles than training my multifidus and my low back. That distinction right there will clear up a lot of misconceptions. Now, by the same token, it's also important to understand that training your abs is not exclusively for the purposes of visual appearance.

We have excellent research now at this point that will indicate things like a weak core will increase your likelihood of things like low back pain. So it's not just something I do to look better. We also have evidence from sport performance and admittedly this is a little bit weaker. You will not see a lot of research directly translating, for example, how many sit ups you can do with how far you can kick a soccer ball.

But there is some stuff that provides loose associations with general Athletic performance that says, hey, if you have an insufficient core defined differently in every study, that that probably leads to some slight inefficiencies. Most practitioners, though, we're going to tell you the eye test from the experience test that if a core is weak, you have a hard time transmitting force.

This is a fancy way of saying things like, if I am a rotational athlete, I throw a baseball, I hit a golf ball, I throw a javelin, and I am able to transmit a certain amount of force through my hips and my feet into the ground. But then my core can't handle that force, it may not translate into my arm or my hand as much net, resulting in me not hitting the golf ball as far as I should, or

throwing the javelin or baseball or what have you. So the framework I would like to move forward with here is something I've been using for a long time now and that is look, feel and perform.

So here's the outline. When I talk about look, let's assume this is people who are here primarily, if not entirely because they want their abs to look better. Again, as I just described, I don't have any issue with that. Totally fine. Everyone wants their abs to look better. But this is looking, right. It's oftentimes associated with things like hypertrophy and muscle growth there. So we want bigger, more defined abs. We want it to look a certain way.

The second category is what I call feel. And that is now more synonymous with things like pain reduction. And so I don't want to feel in pain. I don't want to feel weak. I don't want to feel imbalanced. And so look number one, perform, number two, is generally associated with probably that low back pain type of thing. Third one is perform.

And this is easy to understand in terms of I want to be more functional. I want to again hit the golf ball harder, I want to hit the baseball harder. I want to feel more balanced when I'm on my skateboard or my surfboard. These are all expecting strengthening your core to translate into more human movement success. So look, feel and perform. And what we're going to do today is walk through how your training should differ depending on which of these goals are most specific to you.

If you're listening to this and thinking, I want all that, I want my abs to look better. I don't want to have any back pain, or I want my back pain to go away, and I actually want my core to feel stronger and actually be stronger, then I would actually say great. Take a little bit from each one of these areas and apply them based on your situation scenario, and you should walk away with very practical, specific examples of what to do, what not to do, and how to better set up your training.

And so here's where things get confusing. If I took a crunch exercise or a sit up, if you prefer that term, and I asked a physical therapist or I asked a bodybuilding coach, or I asked a personal trainer, what do you think about crunches? You might get three completely different answers, and it could look something like this. Most are going to acknowledge the fact that sit ups and that type of flexion activity, we are going to activate, develop and engage the rectus abdominus.

Remember, that's your six pack ab muscles in the front. But then the low back specialist might look at this and go, man, I hate crunches. I never use them. They're the worst exercise ever because it causes spinal flexion under load and it causes pain. Either it causes people to develop back pain, or those who have a history of back pain and might bring it back or aggravate it even further, and so on and so forth. And they're not wrong.

But then you might go to the bodybuilding coach who again says the opposite, I love it because what we want in bodybuilding to look like a strong core, we're generally talking about the rectus abdominis and not transverse and not actually the obliques at all. And then you're sitting in the middle going like, well, wait a minute, this world champion bodybuilder told me they're great, and then this scientist, this excellent practitioner told me they're terrible.

Well, they're both correct. It's a matter of what we're going after, why we're doing it, and what risks were willing to run. They're not wrong. Different outcome goals, different perspectives, different criteria. So this is the world that you're living in and I empathize with it and that's why I wanted to do this episode.

So as we get into these different goals, look, feel and perform, let's start walking through what exercises to choose the order to do them in the frequency, intensity, volume, rest intervals, and then how to progress these things over time. And we'll just start by going through one by one. So with that understood, how do our abdominal and core muscles actually work?

As I mentioned anatomy wise there's the three big groups rectus abdominus, your internal and external obliques are oftentimes smashed together, and just called your obliques, and your transverse abdominis, and then you've got those other set of core muscles. Focusing on the rectus abdominis first. You may be surprised to realize it's not actually one muscle.

In fact, if you've ever seen that person that has their shirt off and they either have 10 and you're like, that person doesn't have a six pack, they have a 10 pack, or they actually have a different number. Like they have 4 on one side and 5 on another, or they're completely offset. That's actually, because it's not one muscle. It is more like a series of little muscles with a load of connective tissue that helps it transmit force.

So the rectus abdominis actually starts just below your sternum, attaches to the bottom of your rib cage on the front side, and goes all the way down to the front of your hip bone. And so the main activity of the rectus abdominis is actually to pull your rib cage down. So when we get into things like a sit up exercise, sometimes people will actually be sore or have pain in their hip flexors when they do them. That's generally because the rectus abdominis again, is supposed to move your rib cage up.

And so if you're not executing that exercise properly and you're getting success with flexion by moving your hips rather than your ribs up, then the hip flexors themselves and things like the psoas major tend to get sore or fatigued. It's also in large part why people who get back pain from this type of activity get it. Oftentimes they're doing the exercise again incorrectly, and they're using more of the pelvis for the flexion portion rather than the rectus abdominis itself.

So that's that particular muscle. Again, that's the one we think about when we think of I want nice abs. We're almost always looking at the RA muscles. How we call it. The obliques themselves are on the side. So if you were to take your hands and point them down to the ground, so your fingers are pointing to the ground and you put them right on your sides so that your palm is on the bottom of your ribs and your fingertips are touching the top of your hips. Those are your internal and external obliques. They are the side muscles. They are also important for the aesthetics crowd because that's what gives you that V shape or that taper, or helps kind of wrap the abs around themselves to look a particular way.

The transverse abdominis or the TVA is the thing that helps us rotate from side to side. It is our rotational movement. Now this right here causes controversy. And I actually shouldn't say controversy, but misunderstanding. Because the obliques are on the side, and if you do any rotational movement, you will know exactly what I'm talking about. You'll be ahh, like sore on the sides. The mistake here is the next muscle group.

That transverse abdominis. The transverse abdominis is not the muscle or group of muscles that rotate you in the transverse plane. Do you see what happened there? You'd think that transverse muscle is what makes you transverse, rotate side to side, but it is not. It's the obliques.

And so because of that, people do not train the transverse appropriately because they're actually confusing what it does. The transverse abdominis is like a giant weight belt around your entire core. It goes from the bottom of your ribs from the front to the back, all the way down to the bottom of your hip from the front to the back, it's like a giant corset. It's this huge thing that goes down and connects the entire thing together.

Its primary function is to pull the belly inward. And so when have you ever seen people like yoga practitioners or jiu jitsu fighters who can pull their stomach way in and do the waves and control like that. That is extreme control of the transverse abdominis. That's not the oblique muscles.

So we want the ability to stabilize our rib cage with our rectus abdominus. We want to be able to rotate with our obliques, and we want to be able to pull the rib cage in with our transverse abdominis. Anybody with a lot of knowledge of anatomy will actually tell you again, none of these are individual muscles. They've got dozens-- the transverse abdominis has like 28 individual muscles within it. So these are just big groups like we refer to your biceps. Your biceps is not one muscle, it's biceps. People forget the S and the N because there's multiple, but you get the rough point here.

Now, some people like to train and approach the core based on muscle groups, others do it by movement patterns. So those collective three groups of muscles can make movement happen in several different ways. And the first is what I've already mentioned that is flexion. This is the

situp, OK. This is your body coming closer together flexing forward.

Then there's also lateral flexion. This is a side bend right. This is you reaching from one side to the other where one oblique gets stretched and one oblique gets crunched. Both flexion, but now we have more anterior flexion, and then you have lateral flexion.

You also then have extension. This is the opposite of flexion. It's kind of a bit wordy here but it's going backwards, right. This is instead of bringing your chest closer to your knees it's doing the opposite and bringing your back closer to your hamstrings. The extension portion.

And then you have rotation, of course, moving side to side. But around 25 years or so ago, people like, but not exclusively doctor Stu McGill and plenty of others were instrumental in saying, hey, look, we're approaching this movement stuff incorrectly. Because remember, prior to that, ab training was sit ups and crunches for Arnold and his friends, and then maybe our Jane Fonda's.

But what they started saying is really the main driving function of our core musculature is not movement, it's stability. And so like our biceps and triceps are there to move our elbow, to flex and extend our elbow. That's their primary job, and most of our muscles. The core is a little bit unique because it is not meant to be a large flexor. There's not a lot of human movement that requires you to bring your rib cage to your thighs, it's mainly there to make you stable.

And so the easy analogy I know some people hate it, but I actually think it works really well. If you were to take your hand and place it flat on a table, and I want you to keep your hand and spread your fingers as wide as you can. And I want you to keep that entire surface of your hands and your fingers on that table as firm as you can. And then I pulled your middle finger up as high as I can. And I pulled it up, pulled it up, pulled it up, pulled it up, and then I let it go. It'll snap to the ground. And if I do it again, it'll snap the ground.

Now do the same thing but I want you to lift your hand off the table, such that only the tips of your fingers are still in contact with the table. And now I want you to pull your finger up and snap it down. It barely moves. Not a perfect analogy here, but we're trying to get to the concept that says if you're in this case, the palm of your hand becomes unstable or is not stiff, this does not allow that appendage in this case, the finger, to contract with a lot of power and force.

The more stable, the analogy here being your core is, then the more force I can transmit to my appendages my arms or my legs. And so the rationale here was saying, wait a minute. Again, not training only for aesthetics, but training for performance or pain mitigation and injury, we need a stiff and stable core so that our other appendages can move with more force transmission and we're not putting our spine at the same time in dangerous positions.

Now, I want to be careful here. When I say stiff core, I don't mean rigid. I don't want you locked in and you can't move. It just needs to be stiff and strong when it's supposed to be strong and pliable and motion and movable when it's supposed to be movement based. So because of that, there was a-- you know, earlier in my career, there was this addition of core movements that are anti movements.

And so you have your flexion, and now we needed to add in anti-flexion exercises. We have rotation and anti-rotation. We have extension and anti-extension, and lateral flexion and anterolateral flexion. And this was a really big change. And so we consistently saw, well wait wait a minute here. Different goals, different training approaches. Aesthetics-- again we're going to in large part maybe focus a little bit more on movement-based ab exercises for feel and perform maybe hedging a little bit more in the anti-movement.

So we've established this idea of movement-based training and anti movement-based training, but we still haven't really fully understood why we default to doing the style of training that is high repetition, high frequency. Because none of our movement-based approaches, none of our other muscles get trained that way. So why did we get here and what can we learn from that?

Well, we also have to understand the core is different again because it does things like mostly avoid movement rather than active movement. It's also different because it's consistently activated. So your core muscles are usually at about 2% to 3% of their maximum voluntary contraction, which is like the most force they can produce when you're standing. And so again, unlike a tricep or bicep, your core is going at all times. Not much, but it is going.

When you do basic activities like lift up your backpack or grab a gallon of water or something like that, your core muscles get up to 30% to 40% to 50% of their force output right away. Again, most of your other muscles wouldn't get that high that quickly. Your core will actually get up to basically 100% during a sneeze. In fact, this happens to me all the time. It drives my wife nuts, but I'm a vigorous sneezer. Like, I don't-- I'm not a baby sneezer. I go nuts. And my core will get huge cramps in it when I do it because I'm at a full, full, full contraction.

This is the same thing happens to me-- sorry, it's a little bit gross, but if I vomit. It's like the most intense core contraction I've ever had from top to bottom. And so your core has this ability to be like slightly on to go, really high activation really fast where other muscles struggle for that. So plant that in your back of your mind. We have a muscle group or groups of muscles that are active a lot. They're one of the only muscle groups that almost never turn off. Most do, OK.

We also have the understanding-- we've known this since like-- I think there was a series of papers in '96 and '97 that came out from Paul Hodges and Karleen Richardson, and it was this idea that's called fast-forward stabilization. So you may not realize this, but your core will actually

turn on about 100, 150 milliseconds before your limbs will start movement. It's an anticipatory response, and it goes right back to that finger in hand analogy I just gave you. In order for my finger, if my finger is an arm or a leg to snap and contract, if that core isn't pre-activated, the arm itself can't do anything.

And so way before you will actually acknowledge it. When you have an anticipation of a movement happening, whether that's because you practice it a lot or you've already pre-registered it subconsciously, you'll have that early activation of your core before your movement. So that is another thing. It's activated early. It's on all the time. It's being used for lots of different things.

And then there's also this idea floating around that, OK, muscles like your calves, muscles like your abs, that are slow twitch, that are postural, that are on all the time, either need more training and/or can recover faster so you can train it more frequently. This is the idea that you should train your abs every day, or your calves every day or most days. And it's based on the rationale of what I just said, as well as things like, oh, maybe our core muscles are way more slow twitch and other muscles are faster.

The reality of it is, and we don't have a lot of data on things like fiber type for our core muscles, but we do have research going back to the early 1990s on autopsy models. So this is when we-- you know, unfortunately, folks come in after they've passed and we're able to look at that. And you're going to be pretty surprised to realize that the vast majority of the muscles in your core are pretty much 50/50 fast twitch, slow twitch. Which is almost exactly what things like your vastus lateralis and your quad are.

And so let me ask you this. If I started this conversation off by saying, do you think that you should train your core the exact same way you train your quads, you'd be like, no way. When in fact, muscle fiber type wise, they're very, very similar. And so now we're getting to the second place. It's like, OK, well wait a minute. They're they're activated a lot, but they're the same fiber type profile.

They have this anticipatory response. And when you look around the research, there's actually no literature at all suggesting that the training principles should differ in your abs versus those in your quad. OK, we've already thrown a lot of people's thought process out of whack here. It's right back to what I talked about at the beginning.

If I were to say, do you want to train your quads for growth, do you want to train your quads because of knee pain or hip pain, or do you want to train them because you want to jump higher, you would assume that the training principles differ, right? So when we start to break down the physiology, and the characteristics of the individual core muscles themselves, we start to realize

that's not a good rationale to train them in this weird way, where we do, again, hundreds of repetitions per day. We do them every day, or we think that they respond differently.

They are skeletal muscle. They're not a different type of muscle. They're not a different fiber type. They have a slightly different function. But they're not these all day activated, so because of that they have to be trained differently or they recover faster or anything else like that.

There are some unique considerations that do matter to training, though. And specifically what I'm referring to here is the spinal health type of stuff. So unlike your quad, where I can load it really heavy and I can really isolate it and smash it and not be too worried about any other tissue getting hurt, we don't have the same freedom with our core.

So I can't have you do, for example, five sets of one repetition at your one rep core max. I mean, I could probably, but my likelihood of causing an injury or exacerbating an injury in our back or hips is really, really high. So it's not in the fibers or the muscle itself, it's what's associated with that tissue. It's what's around it. And again, I'm specifically referring to your spine here.

So there is some evidence and this is controversial, but there is some evidence that high repetition loading with the lumbar spine during movements like, one can imagine sit ups and things like that has been linked to elevated risk of injury. You can see those data pretty clearly. At the same time, and I actually was an editor for a pro-con piece many years ago in strength and conditioning journal, where people were arguing back and forth about whether or not the crunchy or crunch exercise specifically is safe or not, you'll actually see evidence that it is plenty safe.

If done appropriately, if done right, flexion-based ab exercises are not necessarily going to guarantee back injury. But if you're coming from a perspective or a population where you're trying to either deal with somebody who has back pain or people that are consistently getting it, I understand why you're super sensitive to that exercise. Many people in that world do not like it either because they've seen it cause pain, or they're thinking, there's just other ways I can train those muscle groups, why run the risk?

But at the same time, that's not fair then to throw the exercise out completely and say things like, it's going to cause back pain. Hopefully that helps you understand a little bit of why that exercise specifically, and really what we're talking about is a broader concept of should I train the ab muscles more like my quads and other muscles, or should I have entirely different principles?

And what I'm generally trying to argue is there are maybe some considerations, but I don't think throwing everything that we've ever known about training out is the appropriate response either, because the data just aren't there. It just does not indicate that that is necessary.

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I think we can start jumping into saying, OK, I'm bought, I'm sold. I understand there's different perspectives. We need to think about this differently. If I'm trying to maximize how I look or how I feel or how I perform. How do I know if my core is strong enough? How do I test it? And then what do I do specifically to train based upon these three goals?

So let's go ahead and jump into that first part, which is, and if you're a long time friend and listener of the show, you know that I always like to do my three Is which is how do I investigate, how do I interpret, and then how do I intervene? And so, friends, here we go with our very first I and that is how do I investigate? How do I measure? How do I know if my core is strong enough? Well, there's no direct answer here because of some of the things I just said.

You probably don't want to do a one repetition max situp. I can't think of a situation in which I've ever done that. So it's a little bit different than your quads, your hamstrings. But you can take this from the same perspective of is it a movement that I want to test, or is it an actual muscle itself? Most people will do movement type of testing. And there's some common ones, some classic ones.

You know, one I've used-- actually for, for many years we did all the testing for the Anaheim

Ducks, the hockey team as well as the La Kings. This happened in our Lab probably, I don't know, seven or eight years in a row. And we would do like this offseason testing and all the players would come in. And we would look at this.

And one of the tests we always do is called a bearing Sorensen trunk extension test. It's really cool. But imagine laying on your stomach on a table, and then you scoot all the way off the table till only your waist and legs are on the table and your upper body is hanging off. So if you just relax, your upper body would fall forward and your body would be in like a 90 degree angle with your head pointing towards the ground.

So what the extension test does, and it's really a muscular endurance test says, OK, raise your upper body up until your entire body is parallel to the ground and hold it as long as you can. This test has been around since like early 1980s. It's been there forever. It's really pretty awesome. It's pretty crude. And again, it's not really a one rep max test. It is a test of functionality.

And what the assumption here is, if your muscular endurance is low and you can't hold that position for very long, then we can make some assumptions about your overall strength and your spinal erector and back extensor muscles. And as I mentioned earlier, those are critical components to your, "core strength." So that's a really, really common one. It's also safe. I don't have to load anything. I don't need technique and warm ups. And it's a pretty easy one that's been used a lot.

You would also look into another classic one's called the sum of five. These are-- like it's a five-level core test that can be done. And again, I'll put some links up so you can go check it out. I'm not going to walk you through all of them. But it's things like level one, I think is a laying on your back and you're going to raise one leg up until your leg and your hip are both at 90 degrees.

So you're laying on your back and you raise your hip up, and so your femur is pointed directly in the air. And then your shank is at a 90 degree. So 90 degrees hips 90 degree at knee-- sorry that got kind of wordy there, but I think you follow me right. And you do one leg at a time. That's kind of level one. You raise that first one up and then you raise that second one up.

And what you're looking for are things like your low back in order to raise your leg up in the air, does your low back have to come off of the table that you're laying on, suggesting that the only way you get to true hip flexion is by using hip flexor muscles, rather than core muscles and things like that. So that's roughly what it's going to look at. As I mentioned, there's like four or there's actually five levels of this with the highest level actually is really hard. It's a really cool double leg thing.

So imagine both legs are up. So you're laying on your back and your knees are on your chest

and your calves are on your hamstrings. So you're like hugging yourself. You get to that 90/90 position, and then you lower both legs at the same time. Back down to the ground. So without holding on to the sides of the table, of course, your hands, I think, are on your chest or curled up.

That's actually really hard to do and you have to have a lot of core integrity and strength to be able to lower them both down. I think the technical thing is you got to be within 12 centimeters of the table, and then you extend until you are entirely flat and parallel. Again, if I'm losing you on description, you can Google these things. Sahrmann, S-A-H-R-M-A-N-N. It's like the sahrmann 5 and other ones. There are dozens and dozens and dozens of tests like this. This is not an exhaustive list.

From a performance perspective, those tests I just mentioned certainly would qualify. If you have access to a laboratory or if you're looking at a higher gold standard grade here, you would look at things like EMG. So these are little sensors we can put directly on the muscle that test its activation. Most of the research in the abb and core space uses EMGs. And the inference here is a muscle that is activated more is therefore working harder, stronger or better.

So if you wanted more detail about the precision activation of the muscles for you, you're going to have to do something like this. You can also look at things like a proteus machine. I know this is a company that I have been involved with in the past. We've put some research out on doing rotation. It is the only machine that I'm aware of and they're not very common. They're hard to find. But you can actually do rotational movements on this in a lot of different ways and you can get direct power testing velocity and force outputs on it.

I don't know of-- again, theoretically, you could probably do this with any machine that has a force transducer or velocity transducer on it, but that's the only real one I know of that has that information directly on it. So again, maybe not something all of you have to do. It is more difficult, more challenging. But if you really wanted to know what your rotational power is or what your flexion or extension power and stuff are, you could do it on a machine like the Proteus.

Lastly, here is look. Unfortunately, and as you'll see from the research here in one moment, investigating muscle growth for your core muscles is extraordinarily challenging. There's very, very, very little research on muscle growth in this area. You could, in theory, try to find an MRI or an ultrasound machine, and I think you're going to struggle.

What we have been doing more recently, personally, is I have a program actually called optimum muscle. This uses a Springbok MRI technology, and it's actually reasonably affordable for some. It's pretty fast and you can get an MRI scan done, and it outlines the exact volume and size of over 140 muscles on your body. And so you can look at symmetry, you can look at fat infiltration, and you can start to see things like this either at a baseline or as a pre and post. We did this and

we trained like this six months later. Did my core actually grow?

It's really unfortunate, but you can't measure your core muscles with a tape measure. You can't do-- like images are hard to do because so much of how your core appears is based upon your body weight and your fat. Most other muscles, it's a little bit easier. I can take a picture. I can use a tape measure on your biceps and triceps and deltoids and see if they're bigger.

If you really want to know the size of your obliques and your spinal erectors the only thing, again, I am really aware of is that type of MRI technology. But to be really clear, I have a conflict of interest here. This is something I make money on and sell to people. So don't need to do it. Plenty of you can get everything you need from your core and abs, doing those functional tests or any other thing that we've used before.

From an investigation perspective. I don't want to go much further. That's about all we have. And again, if you have a specific need or desire. You can look up other tests to perform.

I would actually rather move directly past interpretation and go right into intervention and start talking about which exercises we select, the order we do them in, the frequency, the intensity, the volume, the rest intervals, and then how to successfully progress these exercises, because as I've mentioned several times now, the progression strategy in concept, in theory, should be the same as progression for any other muscle. But we do have practical and realistic considerations to make that tell us we maybe should have a different style of progression.

All right. You've collected these data, you've run some tests, now how do we properly interpret these? I'm hesitant to do this part, because I want to make sure all of you continue to train your abs regardless of how you score. But that said, let's take some context in the results. I'm going to run the gamut from scientific information and evidence to what I actually personally like, and I'll distinguish when I'm doing the former versus the latter.

First off, is that classic Sahrman test? Generally, if you're at level three or lower, this is what I would personally call highly problematic. You're probably experiencing back pain or really close to it. So I would spend a lot of time as a primary focus if you're at that. If you're at a 4 or a 5-- I would personally like to see 5 always.

And I guess maybe to clarify, these are typically not scored in terms of force output or duration of time, these are simply can you execute the exercise without that low back. Moving off of the platform. So it's pass/fail kind of stuff. So I want to see a 5, realistically. 4 is probably more common at best. Below 3 we're making our movement and our core and abs a very, very high priority in our training program.

The other exercise I mentioned, the back extension test. The number you're going to see there, I

think the original number was like 178 seconds such that if you scored below that, then you were increased likelihood of having low back pain. And I think the top end number is 200 seconds. So if you score and hold that position for longer than 200 seconds, so you're talking, you know, 3.5 minutes here, that you're less likely to be experiencing back pain.

None of these can tell you 100% if you're going to have back pain or don't, but again, it's more or less likely. Most of the time you're going to cut that test off at four minutes. So if you're anywhere over 200 to 240 seconds, you're probably going to, you know, check that box and say if you do have back pain, it's not because of low back or any of our extensor muscles, muscular endurance or fatigue.

Some other things I can give you that are-- you know, again, my personal experience and not necessarily scientifically supported or extremely thoroughly supported. And these are things like do you actually have active control of your transverse abdominis. So can you pull your abs inward. This might sound silly. You're like, of course, I can, but many people can't or they can, but it's very, very minimal.

So this is an Andy pass or fail. I'm just going to judge this based on my eye. Can you really move it in? You don't have to be in that position where we can pull our abs so far in that it looks like, you know, an inch difference between our anterior side of our stomach and our back, but we should have some good separation between our rib cage and ability to pull our stomach in.

You can do this in a couple of different ways. You can do this seated. So can I pull my stomach in? Pull my belly button in closer to my spine when I'm seated? Many, many people will struggle with that. Sometimes it's easier to actually go in a quadruped position, so on your hands and knees, because your stomach will fall to the ground and it actually puts external pressure on it.

And then we'll ask, can you pull it back up and in, and more people will probably have success with that. Even if they're not good at it. It's a really good test. It's a really good way to actually train, just to say, can you activate and control that? I don't have exact numbers on how far it should go. You get the idea. This is just more of like a can you pass or fail?

Another one like that that I enjoy and use very frequently is the obliques side of that equation. So if you take your two hands, and you make an L with your hand so that your thumb is, you know, pointed sideways and your fingers pointing up, just like you'd make an L with your finger. And you put those on your sides just above your hip.

Can you move your hands outward without-- in fact, those of you watching, you can see I'm doing this as I'm talking. There's a small change in my voice, but I should have active control of my obliques and my transversus abdominis so that I can move my hands outward while still

having a breath, while not having to hold, not having to contract and have everything tight. Can I activate those things separately?

So again, a way you can make this easier is you crunch down. So imagine you're trying to connect your fingertips and your thumbs and you're smashing your sides together. And when you do that, just like the quadruped version, you're more likely to be able to do some contraction if you go from normal to just pushing out, very few people have success there. Similar thing can be done from the posterior side. So putting your fingertips just above what's called your PSIS, so that little kind of top bone in the back of your pelvis. Can you push it backwards and out?

If you can, we have a better ability to brace in a 360 degree fashion, rather than just getting all of our bracing strategy from the front side and locking down or overextending. So that's a combination of, you know, again, kind of back of the envelope things I personally like to see in contrast to the direct numbers to hit, to understand whether you're good, bad, or indifferent.

So that's a little bit of context of how to interpret the results from the tests that you're doing. I don't think we need to go much further here, because I actually would like to spend the rest of our time getting into our third I, and that's intervene. How do we manipulate these modifiable variables? How do we choose the exercises? How do we order them? How do we pick our volume and intensity and our rest intervals? And then how do we progress them?

As we've discussed, a little bit in the physiology section of the conversation, they do have unique requirements. The physiology is not quite different, but they are other things we need to associate with that will interact with and alter how we take our progression style. We still want to progressively overload, but we need to think about it a little bit differently for our abs and our core relative to some of our other muscles. So let's get into that stuff right now.

The first stop I want to make is just getting on the same page with what a core exercise, actually, is. By now we know the difference between core and abs, but more specifically, these are often described as things like isolation exercises versus functional or versus dynamic. Or in the literature, you're going to see these sometimes called integrated exercises. So the isolated or the abs specific exercises are your planks, your back extensions, your side bends.

Colloquially, if you just think about this as exercises, I'm doing primarily to target my abs. That is the optimal target. The other side, the dynamic, the movement, the integrated exercises are ones that activate, utilize, strengthen, enhance my abs. But they're also doing something else and larger. These are deadlifts, overhead presses, lunges, carries, pushes and things like that.

A lot of research. These are fantastic for your abs. Where people will disagree, and earlier in the episode I gave the perspective of the powerlifting or weightlifting or strongman, they tend to

default to saying, hey, I'm doing these big dynamic movements. I'm doing carries and walks and stuff like that. My core is going nuts. The research supports that. These are very, very good at activating your core. Where the problem lies is therefore, I don't need to do any of these core isolation exercises. And the research would actually suggest that's probably incorrect.

The other pilates type of equation, and no offense to all my pilates girls and guys out there, but they have a little bit of the opposite approach. Which is to say, if I want to get my core done, I need to do a bunch of different core isolation exercises. One of the things that we know here is if you were to look at the research and you look at the reviews and the meta analysis, we need a lot more work in this area. It's actually-- there's not a lot here. There's enough, but we need a lot more.

In general, based upon the evidence we have right now, though, you will typically see that free weights and suspension type of exercises, will activate core musculature more so than isolated exercises. That said, you will also see those free weights and suspension exercises alone do not sufficiently cover the core musculature.

Really easy, then, to say the obvious answer most likely is to do a combination of those big free weight movements, probably some suspension exercises, and then certainly some independent isolation exercises. Suspension exercises, if you're not familiar, think about things like being in a push up position, and then instead of having your feet on the ground, you have your feet in the loops of a TRX band, or have them on a stability ball or some other place that puts your feet up in a different position.

What we need to think about is, OK, I probably need to think about all of these in most of my programs, but I can spend more or less time on one side of that equation, depending on the goal, which I'll get into directly. One of the things you'll also see some evidence for in the research is that after you've gotten reasonably trained, the isolated exercises don't necessarily work as well as they used to.

So early in your training journey, whether it's been a long time, you've taken some time off or you've never exercised and you're just starting, you might be fine simply doing the isolation exercises. But after you've reached a certain level of fitness, strength, activation ability, it's probably going to behoove you to move on past that.

Now, whether or not you still continue to do some isolation exercises, that's fine, but if you only stick to those, again, the current research would indicate that you're leaving potential gains in performance and aesthetics on the table by only staying with the isolated exercises. And just while we're here, examples of isolation exercises. Again, these would be your classic core exercises, your planks, your back extensions, your side bends. These things. These are isolating

the ab or core muscles and either not using other larger muscles and appendices or using them very minimally.

So that's really what we mean. Isolated doesn't necessarily mean isometric and not moving, it just means you're targeting those cores. And I'll explain really quickly here why that actually matters and why those don't work as well as those bigger exercises because of my very next point, which is the one thing you'll see really consistent here. The key driving principle in effective ab or core exercises is contraction intensity.

So if you can contract your abs really hard with a bodyweight movement or an external load or a machine, it's clearly telling you those things were not the variables that mattered. What mattered is you simply got yourself in a position where you were safe, you didn't get hurt, and you were able to contract really, really hard. That's the key differentiator.

And it is clear as day, once you go through all the literature, that is the thing that always has to be there to work. If it's not there, it doesn't work. And how you choose to get to high intensity is really up to you.

What we're talking about here is a great example of what's called the size principle. So the size principle says that you have these motor units. So this is all the motor neurons in your body and then the motor units and the muscle that they activate. When you start to produce a human movement, you will always start with what are called low threshold motor units. These tend to but are not always slow twitch motor units. They tend to, but not always are smaller, but they are the ones that are more energetically efficient.

And when you need more force demands, the way that your body increases force output is that you turn more of these motor units on. You may be actually surprised, but you don't have the ability to regulate force production at the level of muscle. Such as to say, at the individual muscle fiber itself, you can't contract it at 60% or 70%. When a muscle fiber contracts, it contracts at full force. That's the only option it has. It's all or none principle. All or none.

So the only way that you up or down regulate force output is you turn on more or turn off more of these units. So when you don't do activities that require high force, you don't activate the high threshold motor units because they are exclusively reserved for very high force demand. And so we see this as a consistent principle across all skeletal muscle, and it holds true in the abs and core as well.

If I told you right now that we wanted to get your quad stronger, and I'll keep coming back to this parallel and you said yes, I want to maximize my muscle size in my quad. I want the biggest quads ever, or I want to break a world record in leg extension strength or something. And I said,

awesome, we're going to do wall squats. You'd be like, what?

Like awesome exercise. Great for muscular endurance, but no one in the history of the world who got the biggest quads ever-- You know, Platz didn't do wall squats only. And power lifters-- you get the point here. I'm not saying you can't do them, but if that's your only approach, you're going to be very hard to convince any athlete or coach that that is the best way.

That's the same thing you're doing with your abs, when all you're doing are planks and three sets of 20 crunches. You're forgetting the size principle, which is huge numbers of your motor units are not being activated. When they're not activated, you don't actually get stronger. You get better endurance, but you don't get them stronger.

The equivalent here exchange would be yeah, sure do your wall squats where you're holding that 45 degree position against the wall. And then also add in some leg presses or leg extensions or whatever leg exercise you like. Fatigue and burning are not the same as force production. There's an overlap, of course, but you see the major difference here.

The problem is, as we've mentioned, it's really hard to load up your rectus abdominus like it is easy to load up your quads on a leg press machine. I can't put 400 pounds on a side bend. It doesn't work right. I can't hold even maybe 50 or 60 pounds in front of me and do a Russian Twist. Like it's just very difficult for most people to do.

So again, principles are the same, but we have to think about the loading strategies a little bit differently. But we need to get to the loading strategies. In fact, I'll be so bold as to say most people who do not see progress, whether that be aesthetics or in strength in their ab or core muscles, it's because they're forgetting to add load or forgetting to progress with intensity. The general strategy we see here is always either do it longer, add more seconds, add more minutes to my hold, or do more repetitions.

Those are fine. Those do represent progression, but there's an entire other pathway here, and it turns out your core muscles and abs respond better to that strategy than only using more time, duration and fatigue management. And so when we think about these dynamic movements, and we compare these two our situps, if I know that the load matters a ton, it's far safer and easier for me to put a several hundred pounds on a sled and push it than it is for me to put several hundred pounds on and try to do that sit up.

And so again, make sure you're tracking with me here. If I know I have to get the rectus abdominis and transverse abdominis and internal and external obliques to contract at its highest force capacity, and I can do that by putting hundreds and hundreds of pounds onto a barbell and doing a Squat with it, or a deadlift, I can actually get that muscle to activate more, to turn on and

produce more force than I can with a side bend because of the limitations and loading of the side bend. Does that distinction make sense?

That's why those big movements are critical to maximizing ab and core development. It's not the fact that they're isolating your core any more or less, it's that they are a safer way to maximize their force contraction ability. It causes fatigue and training in other areas, but that's really the only way we can push intensity and force demands of our core muscle that doesn't put our spine, and our hips at tremendous risk.

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What are some direct examples? I'm going to give you some exercises that you'll see commonly that are based on the movement patterns as well as the muscles themselves. So whether you're in this thing and you're choosing again your exercises based on movement patterns or muscles, you'll have some options. And I'm not going to go through all of these, though I will make more available in the show notes.

So from a movement perspective, again remember we're looking at flexion. We're looking at lateral flexion, we're looking at extension and rotation, and then of course, the anti-movement and all of those areas. So as easy example one we've been using very, very commonly the classic flexion exercise are the crunches or the sit ups. There's also things like jackknives and other get your feet closer to your head kind of scenarios.

There's also then the anti-flexion exercises. These are far less common. You maybe have never

done any of these or done a small amount of them. But these are things like the pauloff posterior hold. So the pallof spelled P-A-L-L-O-F exercise. Again, you can look that up. And it's the posterior or the back kind of version of that.

You'll also see things like a supine plank. So for those of you that remember a little bit of your biomechanics, if I were to take your hands and hold your palms up to the sky like you were holding a bowl of soup, and you didn't want to spill it, that's what supine is. And if you put your palms down to the ground, that would be pronation.

So a supine plank is when you're actually the opposite, so you're on your back, and you're facing up in the air, and then you're holding that. So remember you're doing anti-flexion. You're not flexing up but you're avoiding unnecessary flexion. You do the same thing in a suspended fashion. So you could do a suspended supine plank.

From a lateral flexion perspective, this is your side planks your hip dips. Some people do these on a physio ball or a Swiss ball. And you could do like a side crunch. Or some people call these, you know, oblique v-ups or oblique setups, and you can just, kind of, imagine this lateral flexion. The anteversion is probably a little bit easier to understand than the anti-flexion. Anti lateral flexion are holding that thing from moving sideways.

So this is a side plank with a row. So imagine being in a side plank position. And then you're actually with a cable and you're rowing it to yourself. You could simply do a lateral plank as well. You could do a suspended lateral plank. And so in that particular case imagine you're on your side and your feet are, you know, in a TRX band.

And let's just say you're on your right shoulder. Your right elbow is on the ground. What's happening is you're not actively flexing, but you're stopping your side from dipping and hitting the ground. So you're avoiding unwanted lateral movement. That's the anti version here.

If it's easier for you to think about anti-core exercises as simply eccentric or avoiding eccentric movement, that's fine too. But you're not actively moving, you're avoiding movement in this case. You could also think of them as like slight plays on isometric exercises. Similar thing. If none of that made sense, don't worry about it. Just keep thinking of the anti-movement.

So that's flexion and lateral flexion. Then we have extension. So these are your supermans. You're laying on your stomach, and you're lifting your quads and your stomach and your ribs up in the air and you're flying like Superman through the air. Back extensions, reverse hyperextensions, straight bridges, swiss wall bridges, swiss wall reverse crunches, like there's reverse extensions, rather. There's all kinds of variations of this stuff.

The anti-version would be things like the pallof hold. So again, you're kind of going up there and

you're holding that position. The prone plank-- so remember supine and prone so now you're in the opposite position. You're up and holding. You could do it with suspension as well and so forth.

And then finally, the rotation exercises. More advanced versions like windshield wipers or Russian Twists, so on and so forth. The anti versions of this would be again, various pallof holds. Or supine laying, pallof holds and so on and so forth.

If you're all at all like what was that specific exercise? None of these are special. So you could Google any anti-rotation movement. Pick the ones that you like the most, play with different ones. I actually use a large, large, large variety of these. My favorite rotation exercise currently is imagine having a cable. And that cable is set up at about, you're kind of mid rib range. And then I spread my feet out really, really, really wide.

And I have a bar or a rope on the cable and I stand horizontal to that. And so you can imagine the machine is to my right and I'm, you know, facing a different direction. My head is away from it. And then I'll rotate my upper body, reach to grab the cable. And then rotate my upper body and pull the cable and the rope in front of my body all the way to the other side.

If you're watching this video, you can see me moving that way. My lower body does not rotate, so my feet stay forward, my feet stay wide, and I just pull straight in front of me from the right side to the left side. And then, eccentrically, I slowly let it go backwards. I have no idea why, but this feels phenomenal for me.

My obliques light up, my back feels great. Core is all over it. I just feel awesome. I don't know if you like that exercise as much as I do, but I don't know any research behind that. I just think it's a great exercise.

So there's tons and tons and tons of creative ways to go about these things. I don't want you overly fixated on the exercise choice. What you want you to think about is which movement pattern am I going after flexion, extension, rotation so forth, anti or movement-based. And then finding any number of exercises that fit that pattern and experimenting. Finds the one that you where you feel the great contraction. Because it's impossible for me to predict and tell you which ones you like.

For example, the one I just gave you. Some of you might hate that and be like, I don't feel this at all, or I don't like it or whatever the case is. So because there's so many exercises here, I don't want to get too bogged down on the specific exercises and walking you through how to do each individual one. It's the concepts and the movement patterns we want to go after.

If you're programming based on the muscles themselves rather than the movement pattern, it's a

little bit simpler to explain. Rectus abdominis is pretty straightforward. We've been over this multiple times now. It is weighted cables, it is crunches and reverse crunches, it's leg raises, it's ab wheels, it's roll outs, it's various exercises like that. The obliques, any type of rotation, any type of anti-rotation. So the pallof press, the wood chops, the suitcase carries, the planks all of these are going to target the obliques.

The transverse abdominis. Remember, it's not rotation, it's pulling the belly in. This is when your dead bugs pull perfect. This is when you stir the pot exercises you know. So your hands both of your forearms are on a physio ball or a Swiss ball and you're rotating clockwise or counterclockwise and you're, you know, quote unquote "stirring the pot."

So this is causing you to pull your abdominals in while you're making movement, and you're avoiding unnecessary and unwanted movement. Those are more effective. I'm sorry to say this for the third or fourth time now, but it's a really important point, it's the forward and backward stuff that tends to be best for your rectus abdominus, not the rotation. So just think about it that way.

So if you're programming for the muscle, that's really as far and as complicated as you have to go. With that basic information, I want to go directly into specific considerations for looking versus feeling versus performing. And let's start off, of course, with our look.

So if your primary here because you want your abs to look better, I have to say something. We have not yet acknowledged and that is the fact that the vast majority of aesthetic appearance in your core is simply a body fat, body composition story. Which is a nice way of saying, you know, your abs are made in the kitchen, not the gym. 100% true. Maybe we'll come back on another episode, or listen to one of our prior episodes on fat loss to talk about that, but I really want to stay focused today on just the training aspect of it.

So yes, the best way to have more defined, more visible abs is to have very little fat, particularly around your core. But that said, what are the training implications if either you've got the nutrition down or you don't care about it quite yet, or whatever the case is? I said this earlier, but there's actually very little research on which types of exercises or training protocols are best for muscle growth of the core.

We've got a lot of that for your arms and legs and everywhere else, but we just don't have it for your core muscles most. So that said, this is when we have to default to basic training strategies. I went through that time before to set up the fact that physiologically, it's very, very similar to your other muscles, so that we have no rationale to think that for muscle growth, our training protocols differ for our core. What does that mean? You're looking at rest intervals of anything you want.

There's excellent research. Muscle growth is equal whether you use short rest intervals, say 30 seconds between sets, or you use long rest intervals, up to 3 plus minutes between sets. So you can do either approach there. In terms of a frequency, this is going to throw a lot of people off. You don't necessarily have to, and you probably don't want to train your core if you're trying to maximize its growth more than two to four times per week per muscle group.

I just don't think we have any evidence, and the evidence we do have would suggest you probably don't want to train these muscles every single day. It doesn't work best for any other muscle, it probably doesn't work best for our ab muscles either. I should have also mentioned this a second ago, but while body fat will, of course, make your abs more visible, making them larger will as well.

So we don't want to just ignore our abs. If you want a better looking stomach, you should consider training to get bigger ab muscles. But you do want to have maybe some special considerations. Because the rectus abdominis is prominent, it is reasonable to say you want to put as much, if not more, emphasis on that muscle group than somebody in the perform or feel category. So that's a unique difference here. You should do more rectus abdominus work.

You can program by movement, but you should definitely make sure you're programming by muscle group here as well. You also want to train rigorously your obliques because as I said at the beginning, this will actually pull the waistline in and make it look like you've got this shredded side. So we want to train them. We want to train them with the same principles.

You can use whatever interval you like. You can probably train the muscles, you know, two to four times per week. And you want to use. You know, that classic 10 to 20 working sets per muscle per week. Split this up however you'd like.

You want to train hard. Something like one to two reps in reserve. So this means at the end of every set, you could feel like you could maybe do one more rep, maybe two at the most, but not more than that. So it's got to be to failure or really close to it. And like every other muscle, you need to have some form of progressive overload. And as we described, more reps is not necessarily the only or best approach to that.

The exercise choice you select. I've given you some insights a second ago, and I apologize for kind of bouncing around a little bit here, but what you also might want to consider is the unique effects of the transverse abdominis. So because it is that belt, and you'll see this actually pretty commonly in women postpartum, they feel like they have this little pooch. Or they're like, man, I'm lean again, but this thing is sticking out.

Well, because the transverse abdominis pulls your stomach back in, by working that, you might

be able to get yourself close to that appearance of a flatter stomach. So do not disregard the transverse abdominis, even for aesthetics, even though you can't see it directly. A real critical missing component for a lot of people who are failing this because you're doing all RA work. You're doing the sit ups and crunches in there, and maybe you're doing some side bends.

You're not doing rotations, but you're not doing anything for the transverse abdominis, so it's having a harder time, kind of, pulling that stuff in and tight. Other weird considerations here are things like your posture. For example, if you have tight or however you want to phrase this hip flexor muscles psoas major, and it pulls you into anterior tilt. So it pulls your hips forward. Especially if this means it flares your rib cage up, or if you have an underdeveloped diaphragm or a combination of these, you might actually look like you have a more rounded, more distended stomach when you actually don't. And so this is a case, and I've seen this work where when you correct those things, the abs quote unquote, "look better," even though you actually didn't lose any weight and you actually didn't add any muscle size there, but you simply corrected that position.

And if you don't know what I'm talking about, just exaggerate it. Like flare your hips way up in the air, arch your back really, really, really hard. And you'll notice your stomach shoots way out. And then do the opposite. Kind of like tuck your tailbone underneath you, pull your ribs down and you realize, wow, I'm pretty flat there.

So if you're in one of those exaggerated or poor positions, simply actually moving that around and getting into a more neutral spine position might be a part of your equation if you're here exclusively or primarily for lux. In, kind of, summarizing this group up and finishing it we do have, I don't know, six or so studies that have actually directly looked at either ultrasound or MRI-based imaging of muscles in the core.

And what you're typically going to see is a magnitude of effect, that's pretty similar to other ones. So depending on the study you look at, you're going to see rectus abdominus can grow by-- you know, grow being defined as muscle thickness by 10% to 20%. Those are pretty common. A lot of the research here are in these kind of weird models where they put electrical devices on your stomach and contract your muscles for you. And there's various different models for that.

There's also been like there's actually a series of classic direct pilates studies. There's been studies in normative obese core populations or normative weight, sorry, obese populations and foam rollers. And like there's kind of weird combination of research. But if you smash it all together, you're going to see, again on average, about a 10% to 20% increase in muscle thickness. So I know the core can grow.

And what you'll see across these studies that are all, you know, 6 to 12 weeks, and whether

you're using MRIs or ultrasounds is when you do the right training principles, these muscles grow just like everything else. And right training principles here is defined as not hundreds or thousands of repetitions, not daily, but more traditional muscle hypertrophy programming styles.

So that's the state of the research. Now I've never focused my career on aesthetics. I don't coach bodybuilders or fitness competitors and never really have. But I personally am of the opinion, based upon the evidence that we currently have, that if the primary goal here is good looking abs, I would recommend choosing a roughly 50/50 split ish between those big, complicated, complex movements and the isolated ones.

I think this gives you the ability to load them properly, to maximize the size principle, to get force production done and drive mechanical tension. This is the primary driver of muscle hypertrophy. It also allows you to keep the volume down directly on your core and your spine.

At the same time I would incorporate a lot of these isolation exercises because of the opposite. Your legs and your arms might be already tired from something else. And so by doing the isolation exercises, we can make sure that the rectus abdominis gets target or the transverse abdominis. And we're not failing because our quads got tired. We're not failing because of some other load reason.

So I think it's pretty good rationale here to say use a combination of those big dynamic ones and the isolation exercises to maximize the aesthetic appeal of them. I would also make sure I'm doing a combination of movement-based exercises, as well as the anti-movement ones. The anti-movement ones are again, nice because you can do a lot of them and you're not doing a lot of increased risk or load on your spine, which should help you lower your risk of injury or even mild aggravation.

So from an exercise choice perspective, that's what I would recommend. Today's episode is sponsored by LMNT. LMNT is an electrolyte drink that has an electrolyte ratio of sodium, potassium, and magnesium, but no sugar. Hydration is critical to performance, both physical and mental, and countless studies have shown that even a slight degree of dehydration, even as small as 1% can lead to decreases in physical output and mental performance.

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So with that out of the way, let's transition and talk about those that are primarily focused on getting their core to perform at its best. There is actually a lot of research here, very similar principles. You can still go back to rest intervals. You can really use any, but we're probably looking at higher right.

Because when we induce a lot of fatigue we can't load, we can't load, we can't activate as much and we're not getting to the spot we need to be in. So probably personally hedging more on the minute to two or more minutes of rest intervals between sets. We're looking at three to five days per week, very similar to normal traditional strength protocols. You know, 6 to 15 working sets per muscle group per week. You know, 1 to 2, but probably closer to one repetition reserve with, you know, some strategic and intentional progression strategies.

So this could look like something where instead of doing a 50/50 split between the big exercises and the isolation, I'm probably leaning more like 75% big, 25% structured core exercises, because that research is so clear that the big exercises activate the core more. And since that's what I'm trying to do, I'm using the core exercises to become a better athlete or to improve my movement, I don't necessarily need to maximize the RA itself. I need to make sure that the RA is strong enough to hold tension so that our body parts can move, that it can avoid unnecessary movement, but I don't need it to look a certain way. I don't necessarily need it to grow at all. So a little bit of a difference here.

We can go all the way back to the very beginning. And remember, when I teased with some of those questions. I'm not going to answer them directly right now, but I think and I'm hoping you can answer them for yourself. And don't worry, at the end I will directly answer them if you still haven't figured it out.

But looking at the research that has directly compared different types of activities. You will see squats and deadlifts and carries and sled work and overhead presses oftentimes activate the core muscles more than the isolation exercises. And since we know we're using this as a means to transfer force from one part of the body to the other, it just makes more intuitive sense to focus on that.

I've made that point, several times, so I think we can actually move past it a little bit and get

directly into our third category, and that's feel. And again, I'm usually using this as a euphemism to say spinal health, back pain or avoiding those things. Of the three categories, this has, by far, the most research. And it makes sense.

There's a lot more people in back pain. In fact, you'll hear wild stats like 80% of people will experience low back pain at some point in their life, and like 50% to 60% are experiencing it chronically. So we should have probably a lot more research here than we have on which exercises transfer to football better. Makes sense.

We're probably now going the other end of the spectrum where we might do, you know, 75% or 80% isolation exercises and, you know, 20% to 25% the big exercises, because we have direct intention now. We want to be a little more cautious. And we need to ensure exact movement patterns are doing what they're supposed to be doing because we're trying to correct dysfunction. And we need to make sure that individual muscle groups themselves are not underutilized or lacking function.

This is a situation where we can go more frequently. If you want to go every single day here, it's OK because we're not progressing these with intensity very often. We're not trying to go really, really, really heavy with them. We're generally, by definition, choosing exercises that I can't actually load that heavy anyways. And we're oftentimes using it as a neural grooving pattern.

So I'm trying to establish either pain desensitization or activation or small blood flow changes. So more frequently matters. No one ever got overtrained by doing bird dogs every day. So we just don't have any real risk there because the load and intensity are actually pretty minimal but we can still chase fatigue. We can induce certainly some strength gains, we can induce some muscle growth, and then we can actually restore some functionality.

So you can do these as little as, you know, three days a week up to, you know, seven days a week. You can do a lot of work sets, you know, up to even maybe 30 working sets per week per muscle. You can, you know, get much closer. You can take these to full volitional fatigue. You can take these until you're getting as burned as you possibly want and not worry about, you know, again, overloading some tissue.

If at this point, we look back at the very beginning and we go, OK, that's why my physical therapist recommended these exercises or programmed it this way. But that's why my bodybuilding coach said to do this, or the person I follow online said this exercise was terrible or love and every combination in between. So I hope at this point, you have some clarity and some relief, and you can think about where you're at now or when situations pop up in the future, and you can start to go, OK, well, now I want to modify my core training either ramp it up or actually maybe even peel it back.

Do different styles, do different intensities, do different rep ranges, do different exercise choices based upon the actual demands and needs that I have. I think it would be helpful, though, to give you maybe a particular example. And so if you're up for it, I'll just give you one right now and I'll walk you through what a sample week could look at the highest level.

I'm probably always going to pick at least one exercise, from the flexion, one from the rotation, and then one from each of those in the anti. So four unique categories, not necessarily every day, but certainly every week. I will rarely pick a muscle group specific exercise. I almost always default to movement. But if you want to pick a little bit more or in addition to that based on the muscle group, that's fine too. So it might look something like this.

Say you want to do your abs or something in your core 5 or six days per week. You could mix and match and you could say something like, day one, I'm going to do heavier load, 6 to 12 reps, two to three working sets and go heavy. And I'm really chasing stability here. So I want to make sure that my core can be really stable when I get things really heavy.

Great. So because you're going heavier, you're going to do less repetitions per set and probably less total working sets. And then I might pick again one exercise, from each of those broad categories. So maybe we start with an anti extension exercise. And I pick an ab wheel or a dead bug and I load it. I know that these exercises are going to be really high in RA and TVA activation, but my spine is not getting overloaded. I don't have a barbell on my back. I'm not flexing or extending with really heavy loads because I'm on my back.

And so maybe I'm carrying and holding a really, really heavy, maybe a 50 or 60 pounds kettlebell. And I'm doing my dead bugs with that. So I know all of you have probably done dead bugs, but most of you have probably done it with just your body weight, but you can load it too. You can put load ankle weights on, or you could use bands, or you can add additional resistance where it's actually failing because of closer to heavy than it is because you did 50 repetitions, all with great technique, of course.

So we've knocked out anti-extension. We've focused on prioritizing stability, but we went heavier. One exercise there. Then we add maybe an anti-rotation/anterolateral flexion exercise where we're looking on stability but it's actually dynamic stability. So in the case of the deadbug everything is being locked down like nothing is moving except for arms and legs. The core is completely stiff.

Where if we do something like a suitcase carry. So if you're not familiar with this exercise, imagine carrying a really heavy dumbbell on one side and walking. And so your core is actually doing a, you know, a quote unquote dynamic exercise, a human movement while you're externally loading one side. And so your body has to work to not fall to that side of the weight.

So it's anterolateral flexion.

And it's also anti-rotation because you actually have to rotate your core to walk. But because the load is there, it's going to want to rotate more than you need and so you have to avoid unnecessary rotation. So again, another thing you could load really, really heavy. You could take this to as heavy as your grip will allow. And what you're doing is not training your grip per se, you're training your ability to move with a non-bending body and a non over-rotating body, and you're just going to walk. Really, really hard. Great for your core, but you're not going to get a lot of systemic fatigue from that. It allows you to go heavy for 6 or 12 reps.

And then maybe you pick one other exercise that is now not an anti-movement, like the first two, but an actual movement one and we pick a flexion exercise. Maybe we do a cable crunch where I can load it heavy, I can pull down, and I'm still going to do my 6 to 12 reps. Not much going on in the spine here. We're totally safe, but we're able to go really, really, really heavy. We've done some dynamic movements, we've done a little bit more of an isolated exercise, and we've put it all together. And you could do that, say three days a week.

Or you could do that one day a week, say day one, do a different style on day two, and then come back to this style on day three. So you could mix and match it. What I'm-- again, maybe to be a little more clear, this could be your entire strategy of how you do your abs for six or eight weeks. Or you could have what we would call an undulating system where you kind of do this day one and then do maybe a higher repetition strategy day two or day three of the week.

And now you're doing your sets of 15 or sets of 30, and you're working on some of the other stuff that we've talked about in the past. So you can mix and match these into one week, or you could separate them into multiple months of training style. Again, one example. Hopefully that helped you, kind of, conceptualize all the principles we talked about and what that could look like in one program.

I want to before we depart past that, though talk about this progression because I brought it up multiple times now. It's very clear, we need to progressively overload our core muscles like everything else. What I personally like to do, and this is, again, my personal opinion now, is to use a strategy that is in five steps.

So step number one I like to start with isometric exercises. So these are ab exercises in which you're not moving. I want to emphasize control here, and we want to develop fatigue resistance. So can you hold the proper position number one. That's what I want to start with I don't like loading I don't like moving until I know you can actually just get in the right position and hold it.

This could be your plank exercise. Can you show me that you can hold it for 60 seconds or 90

seconds or 45 seconds, depending on your age and fitness and stuff? So I'm resisting fatigue, which means I'm getting more confident you're not going to break down your position later in the training.

Now, we might stay on these isometric control exercises for six months. We might stay there for six days. I don't want to progress to step two, though, until I'm really, really, really confident that your obliques can hold the right position, that your RA can hold, the right position, that your glutes can hold, the right position that your back in all of those global core shoulder girdle, all of it. We want to be able to hold the right position first.

Once I'm convinced of that, I'm cool with going on to step two. Step two is the anti-movement/kind of eccentric with fatigue resistance. So now great, you can hold a lateral plank while you're tired. Amazing. Can you slowly lower laterally? To me that's more difficult. So imagine doing a side bend. The progression would be again lateral plank, and we're good there. You can hold the lateral plank for say 60s. I'm good.

Now, the next progression of your exercise would be to stand up and do a lateral bend. And we're going to focus on the eccentric can the lowering portion. So show me you can extend the movement with a little bit of load and a lot of repetitions and still continue to move properly. If you can do that, then I'm OK with us adding some load.

So phase three is still the either anti-movement or the active eccentric movement but with some load. We can get heavy now. Lower repetitions, less concern about fatigue and really just actually pushing strength here. Step four is now the movement side of the equation. It's the concentric action with fatigue. So now can you actively pull that thing up. Can we do the cable crunch? Can we do more movement-based stuff for fatigue? And then step five of course, is, can we do the movement stuff with load.

If you can get through all these things, then I'm very comfortable letting you do whatever movement pattern we want and going fast and going heavy and going to fatigue and I feel like you're going to be in really good position to do that. So that's my personal five-step progression. It's isometric control with failure being induced by fatigue. Then it is either anti-movement or direct eccentric movement where failure comes from fatigue.

Step three is the anti or eccentric where failure comes from load or heavy. Step four concentric failure fatigue. And then finally, step five is can you move actively concentrically with the really, really heavy load? A really quick example of that could look something like this.

So step number one that isometric control and fatigue resistance is your plank. I gave you examples of lateral plank. But for this 1 through 5 example, we'll just say a normal Plank. Phase

two the anti-extension eccentric fatigue. Resistance one could look like a reverse crunch. Still the same movement pattern, still the same muscle group. It's a reverse crunch, it's a dead bug. And we're going to do 30 or 40 or 50 or 100 repetitions of it.

So now you're actively letting the rectus abdominus move eccentrically under control, and you're going to get tired by doing it. Step three, we would progress to say a decline or a weighted crunch. So again, we're doing the eccentric portion. So you're going to start up, maybe with your elbows toward your knees. And we're going to work on holding a plate or a kettlebell or a dumbbell and lowering it back down to the ground.

Now why this becomes a challenge is this will expose bad technique. One coaching cue I like a lot here is when you're doing flexion work to move one vertebra at a time. This is on the way up, and the way down. Again, I don't know if that much research here, but I personally have found in myself as well as clients and athletes, you're far less likely to aggravate back pain with flexion-based activities when you literally curl up and curl down one vertebrae at a time.

So we would work on that. And we would load that assuming perfect technique. And if technique starts to falter, then we consider that a failure, and we just continue to work on the strength side of that equation. The fourth progression here might be going even further with that, and adding a cable crunch where we can actively move in the concentric.

So now imagine, you know, you're kind of on your hands and knees and you have a cable over top of your head, and you're using that to pull the cable down and pull yourself into the crunch. So instead of resisting, you know, lowering the sit up, you're adding load where you have to pull the sit up with more force and more load. In this case, we're going to do a lot of repetitions. This is your classic sit up.

Fifth and final phase here would be adding load to that. So, you know, holding the dumbbell or holding the cable with added load and doing the crunch for really, really heavy for 5 to 8 reps. Most people, I'm confident in saying, have never really tried to go heavy with any of their ab movements, and most people that do try it are stunned with how fast their abs grow in both strength and particularly in size.

So at this point, we've actually covered a lot of ground. In going through look, feel and perform, we talked a lot about exercise choices. I kind of buried in there, really quickly, frequency, intensity volume and then talked lastly about progression.

The one variable, we have not mentioned yet is exercise order. So we want to think about this as an issue of priority. Most people do their core or ab work at the end of their training session. I'm fine with that. If we understand the point. Typically, my rule of thumb. Do the thing that is your

highest priority on that day first.

So if you're there with the primary goal to target your abs for look, feel, or perform, then you might consider doing it first, but I'm fine with you doing it last. If you feel like fatiguing, your abs will take away from another equally or more important movement. So if you're there to work on your abs, but you also want to really increase your pull ups or your squat or your lunge or anything else, you might necessarily not want to fatigue your abs prior to that, because that will actually lower your ability to either execute that exercise or increase your injury risk of doing it because you're pre fatigued.

So I want to finish by going back to the beginning. I asked some kind of silly and bold questions, and I promised we'd come back to it and here we are. If we take into consideration things like what muscles or what exercises activate our core more. Let's see how you do in this little quiz. So we'll go in reverse order.

First, what do we now think about training frequency? Do we still think that training every day is how we have to train our core, or even the best? Surely not at this point. I'm OK with you doing that or in fact, I could argue it is good if the goal is feel. If the goal is activation. If the goal is movement correction. We need to practice different movement patterns.

But if we're trying to maximize either perform or aesthetics, we probably actually want to hedge more towards two to three or four days a week rather than seven. So in reality, it was kind of a trick question because it's correct to do both ways, but it's not correct to do them the wrong way when we have different goals.

Another thing I brought up were things like machines versus unstable surfaces, or machines versus dumbbells and kettlebells. Are those things, in fact, more functional because I have to create more stability? Maybe, but not necessarily. If you were to take a 5 pounds dumbbell and do a 5 pounds lateral side bend, and you compared that to a one repetition max leg press, I don't think that study has ever been done, but I'd be willing to bet your obliques, your rectus abdominis and your transverse abdominis are contracting far harder on that leg press than they are that side bend.

If we're equating for load and other variables, sure. When you have to stabilize your body versus when a machine can do it for you, you should get more activation from the free weights. But just because it's a free weight and just because it's a machine, it does not guarantee that fact. Execution matters here more than exercise choice.

I also brought up things like a bench press or a Deadlift versus a sit up. And where we have to remember here is while a sit up in this example might be more specific to the muscle in the core,

because I can't load it very heavy safely for most people, I'm going to be limited in force demand. That limitation, in force demand is very similar to what we just got done talking about and so in this case, a bigger, more dynamic exercise might in fact, be more effective for strengthening or even growing your core muscles.

And the last one I'll give you here, which is something we didn't get into too much, and I'll leave as a teaser, and that's the entire topic of weight belts. You'll hear controversy on this, but to me, I think the science has been settled here for over a decade. If you take a weight belt, and you put it on really tight, you cinch it all the way down, you might see a regression or a drop in muscle activation during any given exercise.

But if you put the weight belt on just barely kind of snug, you can actually see increased core activation because it gives you tactile feedback. As the examples I gave you earlier, when I said, put your hand on your side or put it on your back, or get in this different position because it causes you some tactile feedback. And you-- oftentimes people have a better ability to contract when they have that feedback, the same is true of a belt.

The evidence, as it currently stands and my personal approach, is to think about belts like this. If I need to use it as a way to cue or to learn an activation strategy. Then I'll put it on there. But then ideally we progress to the next step where we can remove it and we have conscious control of that musculature or that movement pattern independent of an external stimuli.

If we're going to be loading really, really heavy, maybe 85% or more of our one rep max on a bench or a pull up or an overhead press or some big movement, and someone feels more secure and more stable, and they want to add a belt, then I'm absolutely OK with that because we're no longer using that movement to train the core, we're actually trying to get better at that movement.

And we have plenty of ways to train our core on separate exercises. So slap on a belt, even if they want to cinch it down super tight, because we're trying to get stronger in the deadlift or a lunge or something else. Totally fine there. But what we probably want to do is say, OK whenever we fall, say below 90% or below 85% maybe don't use our belt because we need to make sure that we're developing enough muscle strength in that movement to be safe when we load it heavier.

So hopefully that gives you a little bit better understanding about how I think about using belts and how they can both undercut ab development as well as accelerate ab development. It's entirely based upon not the technology or the equipment itself, but how you're utilizing it, when you're utilizing it, who you're utilizing it with, and what the ultimate goal or outcome is.

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