The Surprising Science of Your Barefoot Brain Transcript

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Introduction to the Neurosensory Foot

This is my passion, this is completely different than how I was taught and it actually improves dynamic balance. I love learning. This one of the biggest takeaways to understand the secret to longevity.

Hello and welcome to episode two of Root to Rise. So excited again to be kicking off this podcast. And I think it's completely appropriate for one of the first episodes to Be All About the Foot.

Now, the deep dive that we are going to be taking in the foot is going be a little bit different than maybe what you've heard before. Our focus today is gonna be on the neurosensory side of the foots.

This is my passion, this is completely different from how I was taught the feet in podiatry school, This really is the power that can be found within the human foot.

And when you think, neurosensor foot or when we think feet, in general, I really want you to be thinking about how it is designed to talk to and activate your brain through every movement that you're doing.

So we're gonna kick this off, the neurosensory foot. Now, to really understand the neuroscience side of the foot, we gotta go a little bit broader first.

We need to about our system as a whole, so the whole body, not just the food, right? The food is not in isolation.

Gravity, Ground Reaction Forces, and Longevity

The foot is an integrated structure that is talking to the way that your deep core, your hips, you glutes, and your shoulder, even your hand is stabilizing.

So let's go broad. Let's talk about total body sensory. Lets start with gravity. Now the story of human movement, optimization of performance and total body control is a gravity story.

Now gravity, oftentimes people don't think about it, but gravity is this sensory constant. Every morning when we wake up, we know that there is going to be this downward pressure on our shoulders.

That downward is actually what we push up into to maintain upright posture. And it is a critical component of, again, body awareness. cognition, motor control, and of course, a little bit of mood thrown in there as well.

Now, not only is gravity this downward pressure on our shoulders, but I actually like to think of gravity like a proprioceptive hug, And I will tell you in a moment what that word means, But it is like, A sensory hug.

It is allowing us to feel our body, to connect with ourselves. This hug is continuously telling us that we are safe. Here I am, here's my connection to self and I'm safe and then that creates a foundation for how you are encountering the world.

So one of the best ways that you can connect to gravity is actually by increasing gravity through weight or resistance. Take for example, a weighted blanket.

And I'm sure you've seen weighted blankets online. There was actually a great product on Shark Tank about weighted blanket and weighted products and how it helps people sleep.

Now the reason why weighted eye masks helps in people fall asleep is that it is connecting to their awareness of their body and essentially telling their nervous system, I am safe, therefore you can relax and go to sleep, right?

This powerful connection of being aware of where you are. So this gravity story. We got a downward pressure, we got an appropriate receptive sensory hug that is talking to our brain and our nervous system.

But let's talk about how it connects to your feet. Every time you take a step, 5,000, 10,00, maybe even 20,0000 times a day, your foot is picking up and striking the ground.

As your foots strikes the gound, that is where you experience gravity through the foot and your relationship with the groud. The way that this is perceived is as ground reaction forces.

So, you're foot relates to gravity to ground reactions forces Now, those ground reaction forces are tallying your brain, your nervous system, how hard you're striking the ground is actually stimulating the muscles to contract and to absorb energy.

It is building bone density and it actually improves dynamic balance. So gravity is critical. it is a foundation of everything that relates to movement and longevity and sensory as it relates our body, and to our feet.

Now, one way to, I guess, deepen our understanding of gravity to take a look at what happens when we take away gravity. So I consider these are lessons from outer space.

These are the lessons. From the astronauts. And yes, I have looked up research about what happened to your musculoskeletal system, your nervous system your sensory system when you take way this important critical sensory stimulation.

This is what we've learned from the astronauts is that gravity plays a critical role on how you maintain posture. Posture is a myofascial response, a muscle fascial, response.

So you take away gravity, you put a astronaut In outer space for a mission, most missions last around six months. What you will notice is a significant atrophy of their postural muscles, namely to their feet, to the deep core, their erector spinae muscles.

So anywhere where we're really using these muscles and that myofascial relationship for standing upright, you'll see significant attrophy in those muscles which means obviously when that astronaut comes back, that's where were focusing a lot of that rehab.

Now, another aspect of gravity that we can learn from the astronauts is the important role that gravity has on bone density. So we experience foot ground, ground reaction forces, the way that you actually perceive that stimuli is as vibrations.

Vibrations build bone density. This is one of the biggest takeaways that I want you to have from this show, from any of work that i provide is that ground reactions forces are vibrations Vibrations build bone density.

So what happens to the astronaut when you take away gravity and you takeaway ground reaction forces, you see bone loss. And the bone lost that you will actually see in astronauts is one to 2% every month.

Body Schema and Spatial Awareness

Take that by six months, that is 10 to 12% bone-loss in these astronauts when they come back from a mission. That is quite profound. Now another one is that the effect that gravity has on our orientation of space.

So how do we know where is upright, eyes are level on the horizon? This has a lot to do with our vestibular system. The vestipular is our inner ear and in the vestiular you have this inner ear fluid and you have these canals and spirals that it's going through, but the inner your fluid of your vestibular system is very important how we relate to stable orientation, balanced head.

So, what you notice in astronauts is that you get a lot of disorientation, a LOT of dizziness. They don't know what is

up, down, left or right. This can induce a lots of nausea and if you're thinking of like a seasickness or emotion sickness, very common that, you could see that in the astronauts because of the loss of stimulus to the vestibular system from gravity.

We got one more here. Gravity's effect on circulation. We know this when we stand. So when are on earth and we are standing, we stay on long hours, what starts to happen to your feet and your lower legs?

You start to get fluid accumulation, right? You start to get the fluid and the blood and lymphatics stuck down your ankles and your feet swell. We understand that there's varicosities or varicose veins is when the the veins has a hard time getting back up against gravity through our venous structure to our heart, so we understand the effect of gravity on circulatory.

So the lesson for the astronauts is if you don't have that downward pressure, which is important to the circulatory system, everything starts to go up.

So they will get a lot of face swelling, a lots of shifts within their vision. Some of them can actually lose their visual or compromise their visions during a mission because of that lack of gravitational downward pressures on that circulator system.

Completely fascinating. I love learning from different professionals. Actually doing research sounds crazy. Love doing a research around astronauts' gravity.

When I was studying surface science, I loved to read research studies on constructing high-rise buildings and how thick did the concrete floors have to be to take away vibration.

So all these fascinating research that clearly I need to have a life because all I do is read research studies, but it's all for your benefit. So let's take this awareness, the stimulation of gravity to the next layer, to next level.

We need an awareness of our body in space in order to move it well. Oftentimes, I will say that in order to move well, to efficiently, move accurately, this physical entity, our body that you are sitting in right now is your physical canister.

To move that canister well, you need to know where it is, right? And the way that we know, where is is because of sensory stimulation and gravity plays an extremely important role in that.

Of course, your feet play a very important in role that, we'll talk a little bit about proprioception, mechanoception. But it's the very powerful neurosensory systems that allow us to where we are in space.

Now that is referred to as a body schema. Body schema by definition is your mind's mental picture of where you are in space. So if we were to shut our eyes, we would want to be able to see and feel the size and shape of our body in Space.

And then we use that information subconsciously every moment of every day, when we are moving, right? One of the best examples that I always give when I'm talking about body schema is, let's say that you are in a crowded restaurant, you're eating dinner, having a fabulous time, oh, now you gotta go to the bathroom.

So you need to work your way from your table, among all the other tables and chairs, and the patrons, the chairs and tables are all at different spaces, And you have to weave your ways between those chairs to get to your bathroom, Now as you're doing this, those chairs are going to be different distances from each other, maybe a little bit wider, a bit closer, and maybe some are actually so close together that you know you aren't going fit between them.

So you are using this in the background of your nervous system to decide, am I going walk through those chair straight on, turn my body to the side, shift and kind of shuffle through those chairs side leading.

Practical Ways to Stimulate Body Awareness

Or again, as I'd said, you're not gonna fit through them. Let's go another way. That's just one of the best examples to understand how we relate to external objects with our brain's awareness of our size and shape in space.

that is a neurosensory story and it translates to movement awareness, movement accuracy, and movement efficiency. Take for example, someone who has had a stroke, they have MS, Parkinson's, maybe it's an athlete who had concussion.

Research has shown that there is a disruption in the accuracy of their body schema. call it mind-body awareness if you would like, but it is this accurate perception of their size and shape in space.

This is where you start to see clumsiness happening. You bump into things. you are overreaching or underreach. Maybe you misstep because you didn't know that the step was as high as it was or that you did not lift your foot high enough.

So we use this this dance with our body schema every day throughout every movement. So it's very, very powerful. If you are looking to support movement and longevity, you need to understand body's schema and connect to it.

Here's some ways that can help you better connect to your schema or your awareness of your body in space. These are going to tap into the Neurosensory System.

First one, already mentioned it, but it is adding weight or resistance. You could use wrist weights. So the wrist weight like balabangles that exist, there's another one called cali weights, and they're half pound, one pound really up to two pounds.

I wouldn't do any higher than two pound per wrist. if you are trying to increase your perception of your schema. This is great. I will have my patients who have movement disorders or who are post concussion or brain injury.

As they're doing their rehab, they have a light little wrist weights on throughout that entire rehab process. It is helping the brain see their body as it moves in space.

You could do a weighted vest. There's some weighted vests that are easy to hide, You don't even know that they're under the clothes, so that's very important as well.

There is weighted apparel such as Kilo Gear. That is one that you can just add these small little credit cards of weight to the system to help you feel the body in space.

Love, love, Love adding resistance. And then of course weighted blankets, weighted eye masks, very calming to nervous system. Now another way that could go is, one of my favorite, and that is going to be So touch or tactile and accessing the skin on your body.

This of course would be take off your shoes and socks, get out of the cushion, stimulate the nerves in the bottom of your feet, but you also have those nerves on the hands.

So what could you put in your hand to wake up the nervous system? I oftentimes tell people just simply holding your cell phone. I know I'm giving a cue to tell to have their phone in their hand, which they probably do all day, every day.

But by walking around moving, especially if you have balance issues or a movement disorder and you hold the phone your hand just while you're walking, It is waking up and stimulating the brain.

One of my favorite. Of course, throw in Noboso. Nobozo are these sensory-based textured products. We have sensory sticks, we have a hand activation kit, recovery socks, textured insoles.

All of those are designed to connect to your awareness of your feet, hands, slash body in space. I love dry brushing. Dry brushing is great. So dry brush and then go do your rehab or your exercises.

Use the neuro stick from Neboso, it has texture on it. Maybe use some sort of tapping, right? I'm just waking up the nerves in my skin by stimulating them.

One last category I want to share is compression. So compression, this could be compression apparel. Again, one of my favorite, when I have a patient who has had a stroke, I had them do all of their rehab, their exercises, have them move with compression Apparel on.

Compression sleeves. Kinesiology tape is another great one. So you are trying to stimulate the nervous system gravity through these different techniques.

Proprioception in the Foot and Ankle

And then these are all incredible ways to, again, connect to body schema. Your awareness of where your body is in space. everyone from a child to an athlete to a mom to someone who has had a neurological injury everybody needs to know where their body is in space they need to feed and train and support their perception your perception of where you are and how is this canister moving that is a neurosensory story that Let's get back to the foot, more specific to foot.

Okay, now when it comes to neurosensory foot there are two main sensory systems that we're talking about. And if this gets a little bit technical and just ride with me for a moment, I'm going to give it to you in a way that you can take this information, it's tangible and you use it.

There's two many types of nerves in the feet and the ankle, proprioceptors and mechanoceptor. So two different ones, again, stay with here. Proprioception is going to be an awareness of where your joint is in space.

So this is joint specific proprioceptors are found around your joints and here's something if you could imagine this. Every joint in your body is surrounded by this spider web of connective tissue.

It's wrapping around what's called a joint capsule, and then it radiates into your ligaments, into you fascia, what is called periosteum, your retinaculum, tendons, all these Fascinating words that is just a spider web of connective tissue and all of these connectives tissue extensions are packed with sensory nerves with proprioceptors.

These propriocepters around your joints feed what is called joint position sense. to help you understand this. Your foot has over 100 ligaments within it.

On the top of your foot, there are dozens of little tiny ligament that are packed with nerve endings that telling your brain every subtle movement of you foot so that you can control it, you know how it translates to total body control and awareness, it helps optimize performance.

So proprioception is really a very powerful neurosensory input from your foot. Now probably where some of the listeners may think of proprioceptors and the foot and ankle, has to do if anyone has experienced an ankle sprain.

What happens after you sprained your ankle? Of course it's a little unstable for a bit, but you go to the physical therapist and what do they have you do?

You stand on an erics pad, you stand a wobble board, your doing single leg exercises, You are essentially training Through these unstable surfaces, you train proprioception.

Proprioception tells us where our foot, ankle, joint, body is moving in space. I'll give you a quick example to appreciate this propriocession and why it's so important to support movement and longevity.

Have you ever been walking, maybe you're texting and walking or something, but you are walking and you step off

of the sidewalk curb, right? And you just, you kind of misstep.

Your foot falls a little less accurately than it should have. So you felt a in your ankle right just a little boop into it what's happening here is that as your angle does that little movement you stretch the tendons the ligaments these nerve endings and what it does is it very rapidly talks to your brain says uh-oh joint shifting out of centered position activate the muscles boom you correct your foot you caught yourself and you prevented yourself from getting an ankle sprain.

That process is a proprioceptive response. Proprioceptiv responses slow with age, which means by the time your nervous system would have sensed the stretch and sent the signal to activate the muscles, you are already on the floor, sprained your ankle and fell.

So this response very, very important, okay? This is a huge part of what I focus on in my practice is building rapid proprioceptive awareness through targeted neurosensory training.

And so make sure you're training those ankles and balance so that you are resilient, you have fast reaction time. Part of that fast-reaction time feeds into the other nerves that we want to focus on in the foot, and that is mechanoception.

Mechano-ception different than proprioception, mechanoceptors are nerve endings that are found in the skin in bottom of the foot and the palm of your hand.

These are your touch nerves, these are the nerves that we focus on when we talk barefoot science, minimal shoes, neboso, vibration platforms, you are targeting mechanosceptor.

These mechanoceptors, there are four main ones. We're not going to get into the weeds on them, but the touch nerves in the bottom of the foot, palm of hand are sensitive to three main stimulation.

Mechanoreception, Texture, and Vibration

That I do want you to know, okay? First one is texture or two-point discrimination. Two-point discrimination is braille. So when your hand is reading brail, go to an ATM and look at the brailled dots.

When your finger reads the Braille dots, you are stimulating a mechanoceptor that is sensitive to two- point discrimination. Fun fact, that same nerve is stimulated when you use the Naboso products.

So Nabosos textural pattern is actually two point discrimination and we often say Nabosa is braille for your feet. Fun way to remember that. Another stimulus to the bottom of your feet, palm of the hand, is going to be skin stretch.

So stretch, that's where any sort of taping, massage, etc. will stimulate it. Technically when you walk, there's horizontal shear forces that will simulate it, and then your third stimulus, to nerves of feet and the hands is, already mentioned this, vibration, vibration.

Vibration comes from the ground and ground reaction forces. Very, very important stimulus. Now, I want to give you two fun facts here. Your first fact is that 70% of the mechanoceptors in the bottom of your feet are sensitive to vibration 70%. The way that I interpret that as a movement specialist is that the most important stimuli coming into your feet is vibration.

Vibration is ground reaction forces, which means we as human beings, homo sapiens, we're designed to move. That is important. We were designed. If you want to live for a long, long time, you got to never stop moving, never, ever stop.

You want it to be able to support longevity through movement. And it is innate within our nervous system. Second fun fact here is that the peak sensitivity of these nerves in the bottom of your feet is age 40. By the time you're 70,

you need twice the stimulation to create the same response.

Oh my goodness. This is where I've created a program called Barefoot Baby Boomers because as we age, again, we lose the sensitivity our feet. It's like the vibration or the stimulation is muffled and your nervous system can't hear it.

So as we age, we either need to take away anything that is a barrier to sensory stimulation, such as thick cushioned shoes, or we need a figure out how to turn up the volume to the sensory simulation of your feet, Such as with the Noboso insoles and socks.

So that is how you can start to use this information of mechanoception and proprioception. So what I tell people is by understanding the neurosensory foot, the different nerves, what they're sensitive to, how they work together, it actually helps you understand the secret to longevity from the ground up.

So how could you start to bring texture into your day? How can you bring skin stretch? how can bring vibration? How can make sure that the shoes you wear, the surfaces you train on, the socks that you're wearing either help slash hinder the sensory stimulation coming in.

So we want to almost do like an audit. An audit of our footwear and our from the ground up movement environment, right? So what I would say is if you can try to get into a less cushioned shoe, allow that stimulation to come in, Can you bring in texture?

Can bring you in vibration, like a whole body vibration platform? can you make sure that you are training your proprioceptors every day? At Nabosa, we have a kinesis board, super easy to just do five minutes of balance exercises a day.

If you don't have kinessis boards, just five minute of single leg exercises every. I actually tell people to do this when they're brushing their teeth or getting ready in the morning, making their coffee.

Stand on one leg. And when you stand on leg and do your balance exercises, 10 seconds per leg is the goal at which you are looking for. So we really want to be able to access this powerful sensory stimulation.

Now, the last thing that I want to bring here is this neurosensory side of the human foot is then continuously talking to the brain, to nervous system.

It is shaping the schema. Right? Movement efficiency, the way that we relate to ourself, that way we that relate others, to the ground, and the ways that related to really external objects.

So the story of longevity, story movement longevity has to begin from the grounds up by understanding the neuro sensory foot. And with that, I want to share with you a little footnote.

And, with this footnotes, which I'm going to be doing at the end of every episode, i'm gonna share one of my favorite quotes that kind of ties into what we discussed throughout that episode.

So, this episode's foot note, end quote, is, To be human is to be sensory. Every feeling, action and connection begins with our senses and it is through them that we define who we are.

I hope you enjoyed and I'll see you on another episode. All clear.