Why Fascia Matters

Brooke Thomas

about the author

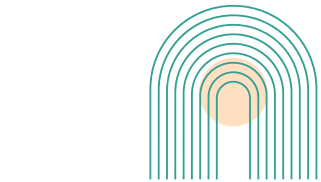
Hi there, I'm Brooke Thomas and I have been in the manual and movement therapy field for 25+ years as a Rolfer.

I have practiced in Napa, California, Brooklyn,NY, New Haven, Connecticut, and am now in Seattle, Washington. My practice is Emerald City Rolfing.

Much of this document is born out of questions I have gotten from clients over the years about how and why Rolfing "works".

The first version of this was written back in 2013 as I was running the Liberated Body Podcast, a podcast for manual and movement therapy professionals. I was fortunate to talk with a number of practitioners, experts, and researchers in the field.

If you are interested in working together, please head to emeraldcityrolfing.com to set up a free consultation call.



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CHAPTERS

1: what is fascia?

You may be noticing that the word “fascia” is a hot topic right now in many body related fields, so before we get to why fascia matters, here is a brief primer about why it’s getting so much attention these days.

Many have thought of fascia as a glorified body stocking- a seamless piece of tissue that Saran Wraps you just underneath the skin. While this is true of the superficial fascia, it’s important to understand that it is a richly multidimensional tissue that forms your internal soft tissue architecture.

In fact, fascia has been defined as all of the soft fibrous connective tissues that permeate the human body (Findley and Schleip 2007). These tissues come in a wide range of densities on a broad spectrum from cotton candy to a leather strap.

From the superficial (“body stocking”) fascia, it dives deep and forms the pods (called fascicles) that actually create your musculature like a honeycomb from the inside out. Imagine what it looks like when you bite into a wedge of orange and then look at those individually wrapped pods of juice- we’re like that too!

Fascia also connects muscle to bone (tendons are considered a part of the fascial system), and bone to bone (ligaments are also considered a part of the fascial system), slings your organ structures, cushions your vertebrae (yep, your discs are considered a part of this system too), and wraps your bones.

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Imagine for a moment that you could remove every part of you that is not fascia. You would have a perfect 3D model of exactly what you look like. Not just in recognizable ways like your posture or facial features, but also the position of your liver, and the zig zig your clavicle takes from that break you had as a kid, how your colon wraps, etc. To say fascia is everywhere is not overstating things.

In fact, it turns out that its everywhere-ness is one of the reasons it was overlooked for so long. Until recently it was basically viewed as the packing peanuts of soft tissue. Therefore, in dissections for study and for research, most of it was cleanly scraped away and thrown in a bucket so that the cadavers could be tidily made to resemble the anatomical texts people were studying from.

Fortunately research is catching up to what turns out to be a remarkably communicative sensory and proprioceptive tissue. And what fascia researchers are discovering is pretty amazing not just for fascia nerds like me, but for anyone who wants to feel good in their bodies. So without further ado, here is some of the newly emerging information about fascia and how it matters to everyone who lives in a body.

2: it's all connected

Let's say, for example, that you are in your kitchen and your leg is in your bedroom. This is an example of not being connected. You may also notice that it's an example of a potential plotline for Dexter-- Something has gone horribly wrong in this scenario.

All kidding aside, we probably understand that our body parts aren't detachable. But the problem comes when we think of them as *attachable*. Because of the way we all learn and study anatomy- whether the extent of your studying was singing "the hip bone's connected to the thigh bone" song in preschool, or something more extensive- we tend to conceive of human bodies as "attached" by magical soft tissue versions of tape.

In anatomy-speak we describe all muscles as having an origin and an insertion. So for example, the gastrocnemius muscle (our most superficial calf muscle) originates on the lateral and medial condyles of the femur, and inserts on the calcaneus, via the achilles tendon. This way of describing the location of the gastrocnemius makes it sound like it is taped or stapled to be "attached" at its origin and insertion points- like it's this separate thing that gets stuck onto other separate things.

It is convenient to think of ourselves as mechanical systems that get made by attaching parts, but we are not machines, we are living organisms. There is no point at which a human being gets assembled. We develop. A pregnant woman does not need to set time aside to remember to attach the fetus's lungs. Because the fetus

develops as a unified organism.

Back to the gastrocnemius description-- Rather than talking about its attachment points, a more clear and true to human anatomy description would be that the gastrocnemius *becomes* the achilles tendon (by weaving more densely until muscle becomes tendon) which then *becomes* the calcaneus/aka heel bone (by weaving more densely until tendon becomes bone). No muscle attaches to the skeleton anywhere in the body. It only *transitions* into the bone via fascia.

I am not trying to belabor anatomy semantics. This is important because it gives us a more full understanding of how you just plain can't have something happen to one "part" of your body and not have it affect every other "part" of your body, albeit in varying degrees of intensity. In other words, "there are no local problems." (Oschman 2012)

Often in the fascia geek worlds we'll use the example of wearing a tightly knit sweater. If you tug on one end of that sweater, you see the tug travel long distance to other ends of the sweater. Or to put it in clearer (and, in my opinion, mind-blowing) terms, "the fascia is the one system that connects to every aspect of human physiology." (Langevin 2006) That's pretty remarkable! This system weaves in to literally everything that makes us human at both the macro and micro levels.

3: how we actually move

Just as there are no local problems, there are also no local movements. We are taught to view individual muscles as the things the move our skeleton. And while they clearly participate in that, a large portion of that tensional force is transmitted via fascial sheets, which, because they are our connectors, affect not only the local joint, but also regions farther away. It is less like a simplistic lever or pulley than it is like a complex network of sheets and bags (as what covers our organs) that transition into one another and orchestrate globally to create a body movement.

Or consider that muscles, which are presented as tangible and discreet things in anatomy textbooks, are not really a "whole". As in, the central nervous system does not activate a muscle as one whole thing. "The functional units of the motor system are the so called motor units of which we have several million in our body. Much like a school of fish that have learned to swim together, depending on the quality of the sensory feedback, these millions of motor units can be individually regulated." (Schleip 2003)

I love Robert Schleip's way of seeing the motor units of a muscle as a school of fish! It helps us to see things on a more nuanced scale. Your triceps, for example, are not really such a set-in-stone solid thing. They are more like this school of fish that is designed to "swim" in a way that creates triceps-ish movements in that location. But if you've looked at enough human bodies it becomes clear that it really isn't "a tricep, is a tricep, is a tricep". Sure your triceps are not going to flex your knee (unless Dr. Frankenstein got ahold of you), but on a more

refined level we understand that how we move is as important as what we move.

To put it another way, our central nervous system views us as having one system-wide “muscle” which has different actions depending on what motor units are firing. Yes, we’ve managed to catalog those actions as resulting from around 640 discrete structures, but the muscles just plain old aren’t as distinct as we tend to describe them. If you’ve dissected a human cadaver you know that it takes a scalpel to ferret out the separations between things. You don’t just remove the skin and see everything laid out in a shiny red muscle topography of individual structures.

How we move then *is* about activation of muscles that then act on our skeleton, but it is also just as much a gliding of long sheets of fascial tissue that allows use to move (ideally) uninhibited when the layers/sheets of fascia are not stuck on one another.

4: a masterpiece of tensegrity architecture

Speaking of “no local problems” and “no local movements”, let’s talk tensegrity. The term “tensegrity” was created by Buckminster Fuller in the 1960’s as a way to refer to “tensional integrity”, and in his case he was talking about it as it relates to an engineering principle in architecture. You may be familiar with his work with geodesic domes and his geodesic dome home. The short version is that these structures utilize distributed tension to create structures that are both lighter and stronger. If you want another good visual of this distributed tension, the Kurilipa Bridge in Brisbane, Australia is the world’s largest tensegrity bridge (and as a tensegrity nerd I think it’s stunning).

But this engineering principle applies to life as well! Donald Ingber applied a theory of tensegrity to molecular biology (as one example, the cell’s cytoskeleton is a tensegrity model) (Ingber 1998), and Dr. Stephen Levin coined the term “biotensegrity” to apply this to biology and in particular to the musculoskeletal and fascial networks that we’re talking about here. It’s gobsmacking, but it appears that from the molecular level on up, our body is a miracle of tensegrity architecture. We are composed of millions of geodesic structures (specifically icosahedral geodesics- Levin 1981).

Phew. Ok, why do we care? Well it (again) totally changes our framework from parts to whole. In tensegrity- in this case in regards to the human body- structures are stable and functional not because of the strength of individual pieces, but because of the way the entire structure balances and distributes mechanical stresses.

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Tension is continuously transmitted through the whole structure simultaneously. Which means that an increase in tension to one piece of the structure will result in an increase in tension to other parts of the structure- even parts that are seemingly “far” away.

The fascia is the essential structure that suspends, honeycomb-like, our structure from the inside out and, if you recall from chapter 2 when we talked about how it’s all connected, fascia is the one system that tethers into every other aspect of our physiology (Langevin 2006). Which means that balanced fascia makes for a healthier and happier structure/body, whereas unbalanced fascia sends us into the domino effect of a compensatory pattern, which we will discuss in more detail in the next chapter.

If you are a visual person, take a look at pictures of the Kurilipa Bridge by doing a quick web search. This bridge is a functional bridge because all of its support cables are doing their appropriate jobs. If one of those support cables gets too short or too long, er, you probably don’t want to drive over that bridge. Its structure has been compromised.

Or, for a more familiar image of tensegrity, imagine a bicycle wheel. It is suspended from the hub (center), out via the spokes. If you clip several spokes, you’re not going to feel great about taking your bike out on that wheel.

As Dr. Rolf used to say, “Balance is strength.” Indeed.

5: the domino effect

Once we start to get a handle on tensegrity, we begin to better understand the domino effect- otherwise known as the dreaded compensatory pattern.

Many of you have experienced the domino effect without having had a name for it. First, your neck gets injured in a minor whiplash in that teeny tiny car accident that you had when you were sixteen years old. But you're sixteen years old, so no biggie. You ignore it and it gets better, or at least is better enough for it to become a part of the background white noise of your physical existence.

But once you enter college suddenly you have this nagging shoulder pain with all the extra typing and sitting you're doing. As the years go by you start to think of yourself as the "tight shouldered" person, and sometimes you have a pinching pain when you lift your arm. You also notice that when you drive it requires more effort to turn your head all the way to one side when you're backing up or changing lanes. Again, not that big a deal. More white noise.

More years go by and you are now not only a "tight shouldered person", but you also suffer from occasional low back spasms and have developed plantar fasciitis, which you assume must be because you're a runner and everyone says running is bad for you... it never occurs to you that the thing that started the dominoes falling

may have been the car accident at age 16 because it feels like a million years ago (even when we're only talking about a span of 10 or 20 years). So how could it be contributing to your current plantar fasciitis, low back pain, and shoulder issues? And how to address it?

Pinpointing the exact cause of any domino effect pattern is not very important. It's easy to obsess over the "why?", but ultimately we are people living lives and moving around in the world. Unless you want to live in a bubble, things will happen. In other words, you can't go back in time and undo the car accident at age 16.

Instead, find a practitioner* who has the ability to view your body as a whole, and is not going to just work on your current problem locally. The reason for this is because any compensatory pattern, by its very nature, is always going to be global. And so working only on the bit that is currently bugging you turns into a game of symptom-chasing Whack-A-Mole.

*I'm a Rolfing Practitioner, but there are many types of manual and movement therapy. I will give a short guide on what that means and how to find one at the end of this PDF.

6: a fluid tensegrity system

Let's hop back to the architecture of our fascia again. Not only does our fascia have this suspended tensegrity architecture, it also has a liquid quality too.

While it's difficult for us to understand how a support structure could be a fluid structure- because we're not exactly making hi-rise buildings out of Jell-O- it's true. Juicy fascia is happy fascia.

The best analogy I can give is of a sponge. When a sponge dries out it becomes brittle and hard. It can easily be broken with only a little force because of how crispy it is. However, when a sponge is wet and well hydrated it gets springy and resilient. You can crush it into a little ball and it bounces back. You can wring it and twist it, but it is very difficult to break.

Once we understand that we're like that on the inside, keeping our fascia hydrated takes on more importance. Our mobility, integrity, and resilience are determined in large part by how well hydrated our fascia is.

In fact, what we call "stretching a muscle" is actually the fibers of the connective tissue (collagen) gliding along one another on the mucous-y proteins called glycosaminoglycans (GAGs for short) which, depending on their chemistry, can glue layers together when water is absent, or allow them to skate and slide slide on one another

when hydrated. (Grinnell 2008 and Guimberteau 2005) This is one of the reasons that many injuries are fascial. If we get “dried out” we are more brittle and are at much greater risk for erosion, a tear, or a rupture.

So drink more water right? Well, yes and no. Staying hydrated via drinking continues to be important, but if you have dehydrated fascia it’s more like you have these little kinks in your “hoses”, the microvacuoles, which allow all of the subtle movements of the body [Guimberteau 2005]. When there are metaphorical kinks in the microvacuoles, the water you drink can’t actually reach the dehydrated tissue and gets urinated away, never having reached the crispy tissue.

To be able to get the fluid to all of your important nooks and crannies you need to get better *irrigated* (Meert 2006). And to do that, you’ve got to get work on your soft tissue to untangle those glue-y bits. Again, working with a good manual and/or movement therapist is helpful for this. See the end of the PDF for information on finding practitioners.

7: its springiness wants to help you out

What do you get when juiciness, connectedness, and tensegrity harmonize? Springiness! When your tissue retains (or regains) its natural spring, the rebound effect of the fascia allows you to use less muscle power, and therefore fatigue less rapidly. Want to jump higher, run faster, and throw farther? You'll need to pay attention to nourishing the suppleness of your fascia to enjoy its elastic qualities.

For example, when you run with healthy fascia the force you transmit into the ground gets returned to you through the whole tensional network of the fascia. It's like you have built-in trampoline action going on.

However, walking, running, or just plain old day-to-day regular movements with dehydrated and compromised fascial health create an increased impact on your joints and other soft tissues. You can even hear this in people's footfalls. If you're hitting the ground with a loud thud each time you take a step, you have likely lost some of the literal "spring in your step".

Alternatively, a fascial network that can take advantage of its trampoline-like rebound effect creates quieter movement. (This is not my suggestion to you to start tip-toeing through your house! The sound of your footfalls is more an indicator of a more global issue than something you can suppress by quieting your steps.)

And of course you don't have to look at the gait patterns of too many elderly people to see that the

disappearance of the spring is causing them plenty of grief.

Or consider the much more basic and overlooked quality of springiness that we take for granted every day- that you can pull your skin away from its underlayers and it will spring back (Guimberteau 2005). This of course comes into play with aging as well, as we notice the "spring" start to diminish. As Thomas Myers said, "Aging can really be considered a process of drying out."

I am sad to report that I have not solved aging. No amount of manual therapy or movement will allow you to go untouched by the aging process. Skin will (sigh) not spring back as it once did as the years go by.

However, the *quality* of how we age can be impacted a great deal by how you move and by manual therapy. Everyone's body has its own history with accidents, injuries, and illnesses. Some of us have lighter histories than others. In other words, some of us have had to cope with more than our fair share. If you have had to cope with a lot of illness or injury, it's not because you didn't do the right kinds of movement the right way. It's not because you didn't seek out a manual therapist sooner… And if you have a body that feels fantastic and has little history of injuries or illness, likewise it's not because you've done all the right things.

After many years in this field, I understand that luck is real. But within our own lucky or unlucky histories, there is hope that we can feel as good as possible because there are intelligent ways to address the "issues in our tissues". Keeping as much of our springiness as possible is one of the ways we can help ourselves out.

8: variation matters

Viscoelasticity is the combination of two words: viscous (like dripping, gooey honey), and elastic (like a rubber band which snaps back to its shape). Because human tissues have both viscous and elastic qualities, they are described as viscoelastic. When something is viscoelastic, it means that it experiences time dependent strain. We will sometimes use the word “creep” to describe the the slow deformation of tissue under constant stress. (Dalton 2011)

As in, we become the shapes and movements we make most of the time. So if you sit in a chair all day while sitting on your sacrum (i.e. in a version of a c-curved spine) it’s not surprising that the viscoelastic quality of your intervertebral discs often leads to a disc herniation at L5-S1. That’s an example of creep. So yes, disc herniations are just as creep-y as they sound.

“Creep” is one version of how we respond to loads. For another example, if you decide to only do bicep curls with very heavy weights every day, you will eventually have wildly out of proportion biceps muscles compared to the rest of your body. This is because your body responded to that load that you chose to put on it.

On the opposite extreme, if you have a cast on your leg for a period of months and that leg cannot move or fully bear weight, when you get the cast off you notice that it is a withered, tiny version of your other leg which was able to participate in normal movement and load bearing during the time you wore the cast.

All that is to say, how we move, and how frequently we move, and in what range of variation we move makes a big difference in how we experience our bodies in the present tense, and also how we age.

Movement also gets the hydration that we talked about in part 6 out to the tissue as well, but that movement also needs to be varied. This means variation not just of the movements themselves, but also variation of tempo. Not only does moving constantly in the same ways and in the same planes put you at further risk for joint erosion (a là osteoarthritis), but you are also dehydrating the fascia in a particular pattern, thus setting you up for that brittle tissue that injuries love so much.

So fluid + loads = either healthy, juicy tissue, or brittle, dehydrated tissue. The outcome of that depends on the how, how much, and how varied parts of the movement equation.

9: the original information superhighway

Remember the Kurilipa Bridge from chapter 4 on tensegrity? Picture those tensegrity cables now as not just inert supports, but also as a super high speed internet cable which threads information through those supports. Yowza. We'll talk about a few ways that this happens: It turns out fascia is our richest, and our largest, sensory organ with ten times higher quantity of sensory nerve receptors than the muscles (Van der Wal 2009). In fact, it is possible that it may be equal or superior to the retina, which has thus far been considered the richest human sensory organ.(Mitchell and Schmidt 1977)

This makes your fascia a system of proprioception- i.e. of knowing where your body is in space, but also of graceful full body orchestration of movement. Pause and take a moment to think about what your life would be like if you couldn't locate and orient your body in space. You probably wouldn't be tons of fun at parties. You would more likely spend your life lying on the floor in a small room- but still in misery because the floor wouldn't feel like there was a "there" there. Super good times. So while we take it for granted, our ability to know where we are in space is pretty crucial to any kind of functional life. Put another way, fascia is "our most important perceptual organ." (Schleip 2003)

That perception- or input- creates a feedback loop to our cells (fibroblasts and osteoblasts) to adjust their activities in maintaining our tissues according to our movements and the loads we experience. Remember the

example I gave in chapter 8 about the casted leg vs. the uncasted leg? One leg got input via loading and moving the tissue, while the other leg got no input. Every movement of the body generates electric fields (primarily attributed to the piezoelectric effect) and those fields spread through the tissues along your original information superhighway, providing the input that either leads to a normal, healthily maintained leg, or a wasting leg. That's a pretty important communication feature courtesy of our largest sensory organ!

10: taking care of your fascia

So now what? If your mind is at all like mine and you are new-ish to the wonderful world of fascia, reading a micro-book like this will lead to inevitable questions like, “Well what can I do to keep my fascia healthy?” and, “Am I being paranoid, or are my footsteps abnormally loud?” and, “Will I perish in a catastrophic tensegrity related mishap while out for my daily run!?” Fear not. This PDF is not at all intended to induce fear and suspicion of one’s fascia.

But I get it that since it has been an overlooked tissue system that we don’t exactly talk a ton about how to keep it healthy in our culture. Which, ahem, might explain the wildly out of control upwards trajectory of chronic pain, narcotics prescriptions, and joint replacements in our culture as well. (cough) Maybe just a little bit (cough).

The good news is that attending to your fascia isn’t complex, so here’s a short list (only 3 things!) of how to give it some love:

1) Move frequently: Please don’t take this as yet another public service announcement to hit the gym after a day of sitting in your office chair. I have no problem with any affection you might have for your workout, but that’s not what I’m talking about. Working out intensely for an hour at the end of a sedentary day is meaningless when we’re talking about frequency. (Bowman 2013) I want to be clear that intensity and frequency are totally different things.

Working out really hard for a blip in your day does not magically erase sitting still all day. Yes, most of us have work lives that are tied to screens, so you are going to need to get creative and take walks on your lunch break, spend portions of your day at a standing desk, and/or hold walking meetings. Find ways to get movement in, but get it in. Again, I'm not talking about getting your workout in. I'm talking about getting movement in. You don't need to break a sweat all the time, that would be exhausting. Instead, move like humans move. Which brings me to point #2:

2) Move in ways that humans are supposed to move: I like riding my bike. It's super fun. But humans have not been riding bikes since the early days of our species. We can argue about what makes us human all day long, but we know we're bipedal and we ambulate by walking (and occasionally running). Walk, skitter through the woods, jump from rock to rock, stand upright, lift stuff, carry stuff, and even occasionally hang from things and climb things. If you want to give your cells nourishing input, get back to being human. These are the loads (as talked about it in chapter 8) that we are designed to thrive with. You don't need to become a hunter-gatherer to get this movement in. Put your favorite cooking pot on a high shelf, then move it to a low shelf. Get creative!

3) Work with a manual or movement therapist (or why not both!): I do occasionally get blank stares when I say "manual and movement therapist", so I will begin with a brief definition of what I'm talking about:

A manual therapist is someone who manually- usually with their hands or elbows but occasionally with a tool- manipulates your body's tissues to "unkink the hoses", "unsnarl the sweater", and restore integrity, spring, and balance to the "cables of your tensegrity bridge".

Examples of manual therapists are: Rolfers, Structural Integrators (same/same by different names…), Myofascial Release, massage therapists, Physical Therapists/Physiotherapists, Active Release Techniques, Osteopaths, Cranial Sacral Therapists, Bowen Practitioners, Rosen Method Bodyworkers, Visceral Manipulation… the list goes on.

A movement therapist uses a system of awareness instruction and/or a fitness therapy system to reeducate your ability to accurately propriocept and understand how you operate in space so that you can function better via getting in tune with how you initiate and carry out your movements, know what proper biomechanics are, and come to see with more clarity (and resolve) your own body blind spots.

Examples of movement therapists are: Rolf Movement Educators, Feldenkrais teachers, strength trainers, Alexander Technique teachers, yoga teachers, Rosen Method Movement Educators, Nutritious Movement teachers, Physical Therapists/Physiotherapists… the list goes on.

Both manual and movement therapies work towards the common goal of people more happily inhabiting their bodies. Both will restore health to your fascia and body-wide integrity to unravel your compensatory patterns, resolve pain, heal from injuries and surgeries, and- importantly- avoid aging into a downward spiral. Add to this the fact that there is often significant overlap between the two kinds of therapy groups I've listed here, and sometimes it seems strange to tease them apart.

Need extra help in how to find someone to work with? As a general rule of thumb, if you are seeking out a practitioner it is best to look for someone who is going to work with you as a whole. It's all connected remember? Attending to the whole is the only way to stop the boomerang effect of one's compensatory pattern. So while it's normal and understandable that if you have a shoulder issue your practitioner would spend plenty of time there through your course of work, they should also be attending to the larger pattern of how to get that shoulder into a happier place long term. Which may also involve your neck, your pelvis, your spine, your feet, etc.

for my fellow practitioners

Are you a manual and/or movement therapist? Nice to kind of meet you!

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references

Bowman, K., 2013. In: http://www.fasciafreedomfighters.com/katy-bowmaninterview/

Dalton, E., 2011. Asymmetrical hips and uneven legs: walking silly putty.

Findley, T.W., Schleip, R., 2007. Fascia research: basic science and implications for conventional and complementary health care. Elsevier Urban & Fischer, Munich.

Grinnell, F. 2008. Fibroblast mechanics in three-dimensional collagen matrices. Trends in Cell Biology, 12 (3), 191-93.

Guimberteau, J.C., 2005. The sliding mechanics of the subcutaneous structures in man: Illustration of a functional unit: the microvacuoles. Studies of the Académie Nationale de Chirurgie, 4 (4), 35-42.

Ingber, D.H., January 1998. The architecture of life. Scientific American.

Langevin, H., 2006. Connective tissue: A body-wide signaling network? Med. Hypotheses 66 (6), 1074-1077. Levin, S.M., 1981. 34th Annual Conference Alliance for Engineering in Medicine and biology. The icosahedron as a biologic support system. Alliance for Engineering in Medicine and Biology, Bethesda, Houston, p. 404.

references

Levin, S.M., 1981. 34th Annual Conference Alliance for Engineering in Medicine and biology. The icosahedron as a biologic support system. Alliance for Engineering in Medicine and Biology, Bethesda, Houston, p. 404.

Meert, G.F., 2006. Das venöse und lymphatische system aus osteopathischer Sicht. Elsevier, Munich.

Mitchell, J.H., Schmidt, R.F., 1977. Cardiovascular reflex control by afferent fibers from skeletal muscle receptors. In: Shepherd, J.T. et al., (Eds.), Handbook of physiology, Section 2, Vol. III, Part 2, pp. 623-767.

Myers, T., Wellcast Academy, In: http://www.youtube.com/ watch?v=wL1ZVarr1R8

Myers, T., Spatial medicine. Anatomy Trains, http://oldsite.anatomytrains.com/ explore/spatialmedicine/expanded

Oschman, J.L, 2012. Fascia as a body-wide communication system In: Fascia: The Tensional Network of the Human Body, Schleip et al., Elsevier, Munich, p. 104.

Pope, R., 2003. The common compensatory pattern: Its origin and relationship to the postural model. American Academy of Osteopathy. 13 (4): 19-40.

references

Schleip, R., 2003. Fascial mechanoreceptors and their potential role in deep tissue manipulation. In: Fascial plasticity- a new neurobiological explanation. Journal of Bodywork and Movement Therapies 7 (1): 11-19 and 7 (2): 104- 116.

Van der Wal, J., 2009. The architecture of the connective tissue in the musculoskeletal system: An often overlooked functional parameter as to proprioception in the locomotor apparatus. Elsevier, Munich.

thanks!

Thanks again for reading Why Fascia Matters.

At the time of writing this, I am accepting new clients in my practice: Emerald City Rolfing.

-Brooke Thomas

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