



More About Fascia - Ref170

with Robert Schleip

15th June 2021

TRANSCRIPT

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Steven Bruce

This evening, I'm joined once again by Dr. Robert Schleip. Now, if you watched our last broadcast with Robert, you'll realize that he is a very, very engaging, and enthusiastic speaker on the topic of fascia. He is a PhD in human biology, but he's also a psychologist, he's a Rolfer, he's a Feldenkrais practitioner. And he's joining us virtually from Germany. Robert, great to have you with us again.

Dr. Robert Schleip

Thank you. I'm really looking forward to continuing where we stopped last time.

Steven Bruce

Excellent. Well, we talked about a lot of things last time, didn't we, we talked about shearing forces, we talked about hyaluronan, we talked about cannabis, we talked about all sorts of ways in which we might influence fascia. But actually, I was reminded by somebody afterwards that for many of us, perhaps we should go back to first principles. And I wonder if maybe you'd just take us through the basics of anatomy, physiology, where fascia is concerned. What's it made of? What does it do? How does it differ around the body?

Dr. Robert Schleip

Well, it's not new, of course, it's what we have been calling connective tissue before or soft connective tissue. It's everywhere. It's hard not to see if you do any anatomy dissection. But people have been giving it a similar low level of importance, as we do with the wrapping of Christmas presents and other things.

Steven Bruce

I like to think that, and I can only speak for osteopaths but imagine chiropractors, I think, for a long time, we've recognised the importance of fascia, but I suspect that one of the problems that we have, or the misconceptions we have is how we influence it, which I know we'll come on to a bit later on, because we talked a bit about it last time, and I know you've got more to say on that topic. But does it differ? I mean, yes, it's connective tissue, but is it different in the palms of their hands from around the heart or around the meninges or?

Dr. Robert Schleip

Oh, sure, yeah, just on the hand, the connective tissue on the back of the hand is quite free, so you can take the skin and slide it one centimeter in both directions, almost as you can do on the lower arm. But if you do that on the inside of the palm, you will realize that it is much more adherent, similar like if you have scar tissue. And most people have such adherence, where they have pathology or where they had a scar, an injury, but on the hands it is not because of pathology or emotional tension or whatever, it is that we have a better grip. So we have gotten this increased adherence on only a few places of the human body. And the hand palm surface is one of them and that is for functional genetic reasons.

Steven Bruce

Okay. So in terms of genetics then, what's the embryological process in creation of fascia? When does it start? Where does it arise?

Dr. Robert Schleip

It's in the first couple of weeks. It comes from what most people call mesoderm, but more and more people say it's not a derm, it's the in between layer called meso from which then the mesenchyme develops. Which is basically what later differentiates into bones for example, as one type of connective tissue, but that is more specialized by compressional loading. And if you happen to be a connective tissue, not in the middle of a joint, but on the surface of the joint and the joint grows of a limb, and the limb grows larger and larger every week, then you are more exposed to tensional loading than to compressional loading and then you develop more collagen type one fibers and less minerals and then you become part of the fascial net. So those connective tissues that are specialized for a dominance of tensional loading, we call the bodywide fascial net, and that is similar but not the same as the bones which are more compressional connective tissue.

Steven Bruce

Rather quick administrative note here, Robert, we didn't have Claire on the shot earlier on to do our camera shots for us. You are gradually creeping out to the left-hand side of your camera shot Yeah, that's it, now you're centr of screen. When you get excited, your head disappeared off the side of the screen. And I know you get excited quite a lot about fascia.

Dr. Robert Schleip

Okay, so I stay sober. So ask me a boring question and we can continue.

Steven Bruce

Well, I'll ask you one that we did touch on last time because you are a leading light in the current knowledge around fascia. So how has our knowledge changed over recent years, what's new?

Dr. Robert Schleip

We have better measurement instruments. Just three days ago, I was sitting, and I had goosebumps all over with one of the leading radiologists who is focusing on fascia research with MRI, not with ultrasound. And in the past five years, most of the high-quality research was done with high resolution ultrasound, but now we have MRI and I could see where that is leading. So maybe with his assistance and these very expensive machines, but they use them anyway if somebody has low back pain, and if he or she has private insurance, so then they will use the same machine but with a slightly different software to see whether this client needs fascia therapy or whether he or she needs muscular therapy or psychotherapy or surgery.

Steven Bruce

I think you were saying last time weren't you, that there is particular evidence, I think, of adhesions, I say adhesions, less mobility or motility in the fascia in people with low back pain and I think cervicogenic pain as well.

Dr. Robert Schleip

Yeah, yeah, it's most clearly shown in chronic low back pain. That there are layers that are adjacent to each other and normally, they move horizontally to each other, a centimeter or more. In chronic low back pain, they seem to be stuck to each other. So if you do the same forward bending movement with your

skeleton, they almost move only one millimeter or two millimeters. So they are more glued together, you can say, at least they have an increased adherence. And that has been shown for the thoracolumbar fascia and we have indications also in chronic neck pain, but they are not as good yet. But we have it for the fascia surrounding bigger nerve bundles, like the sciatic nerve or the brachial plexus. These nerve bundles have their own fascial sheath. And apparently that's where a lot of the evil inflammation starts. And then when you do an arm movement, these nerve bundles are also more adherently connected with the environment.

Steven Bruce

Well, I'll tell you what, I mean, anyone who knows me will tell you that I have an absolutely dreadful memory, but one of the things that stuck in my mind from what we were discussing when you were with us last time, which was one of our shorter broadcasts, was actually the layers of fascia are not independent, are they? You say that there's a matrix between them, hence the shearing motion that you were talking about?

Dr. Robert Schleip

I think I showed you last time or at least I tried to. We think that they are very distinct layers. So you have one white layer, and then you have a second and in between only you have air or water or some homogenous cream. And if you then have a horizontal motion, people think this is sliding, and we have the illusion of having separate layers, because we separate them with our knife. But before we separate them, they are adherently connected with each other. So here I have a better example, I hope I can show it, yes here. So you have a dense layer on the top, you have a dense layer between, but in between you have a fibrous mesh. And depending which of the diagonal fibers is a little bit softer, you can slide the upper one more in one direction than to the other, and how far you can move them in relationship does not depend so much on the consistency and the viscosity of the cream in between, but on the geometry and arrangement and stiffness of the fibrous elements, and that you wouldn't call sliding you would call that shearing motion. And that seems to be the main way how fascia moves.

Steven Bruce

I've got a couple of questions; Franco has asked what determines that fascial elasticity and he asks which nerves supply it. So how elastic is fascia?

Dr. Robert Schleip

Depends on what you mean with elastic. If you mean reversible stretchability, so if you take a bubble gum- Don't I have something here? Yes, I'm very good equipped. Let me see, this is not bubblegum, but this is a jelly bear snake and that is gelatin. Gelatin is cooked collagen, but without the fibrous geometry but all the elements are there. Now this is very elastic in the meaning of chewing gum, stretchability. So you can stretch it, stretch it 50% and it doesn't care. But fascia also is like a stainless steel. So if it's a rubber band, you can stretch it and it bounces many minutes afterwards, because it has an elastic recoil capacity. And stainless steel like a guitar spring, that you want to vibrate for a long time, you don't do it out of gelatin and out of bubblegum, you do it out of stainless steel, for example, or of collagen from our animals, because they have the same quality. And we humans have almost like kangaroos or stainless steel, like kinetic storage capacity, not chewing gum stretchability. Probably an octopus would have more stretchability, but it cannot bounce very much. So what the person probably asking is not how can you

become more like an octopus, but how can you bounce based on your fashion like a kangaroo. And the nervous system, very interesting that is related to that is proprioception, but more the pacini and the muscle spindles apparently. And they work a lot with feed forward calculation. And that is a very interesting subject because it's based on, so if you're shaking a tree and you find the right rhythm, where you can shake it forever without much effort, you're doing the same if you're dancing, if you're hopping, with your fascia and looking for that effortless rhythm. So, we do have a nervous system linked with proprioception and with high velocity mechanoreceptors like the pacinis and like the muscle spindles, and we use them to find the right rhythm. So, children need to hop, they need to dance and then they are training some parts of the brain to detect the rhythm detectors in their fascia, in their whole body.

Steven Bruce

Okay, but if we accept that fascia will stretch and recoil the way a steel string would on a guitar, what determines the degree to which it will do that? Which is what I think Franco was asking and is it the same between different fascial components in the body?

Dr. Robert Schleip

No, so that depends not only on the nervous system, but on the geometry and architecture of fascia. So, that has been shown, if you overload fascia, that you have repetitive strain injury, or if you under stimulate fascia by lack of appropriate movement. So, for example, if you put a joint in a stiff cast, which many people are doing with their shoes, then the geometry changes into a chaotic multi directional arrangement like I have in this piece of felt. And this one, if I stretch it 10%, it will tear. But if you have a fascia in a joint where you have lots of weekly movements, and where you have the muscle fibers contracting and bulging, very often healthy fascia is like pantyhose in a bi-directional arrangement and see how much I can stretch my muscle here and it will come back to the original shape. So that is one example. That healthy fascia is not like matted felt tissue that goes in any direction, this you have in injury and in lack of movement. But it has a very regular geometry, it's either bidirectional or it is parallel fibered, with a lot of crimp in between. So here you have curly tissue in a three-dimensional arrangement. That's not what you'll find in the Achilles tendon. But in the Achilles tendon of humans who know how to dance and to hop and to run, you have a crimp formation and the more crimp, the more waves you have, you only see them in the microscope, the more healthy the tendon is and that makes us like kangaroos. So the chimpanzees, the gorillas, you will not find much crimp in their Achilles tendon and that's why they are not very good hoppers and dancers and runners. And if you are couch potato and your own watch your wonderful entertainment all day and you don't go out hopping and dancing, you will lose the crimp. So the crimp is part of the secret of fascia.

Steven Bruce

So I'm guessing from what you said there when you started that, you hinted there that you don't approve of shoes. Are you a barefoot person?

Dr. Robert Schleip

Of course, you need shoes once in a while, but we were not designed to be born with shoes. So shoes are crutches. And if you have broken your foot, or if you're taking the first steps, crutches can be quite useful. Also, if you are injured, or if you're walking on very dangerous ground with huge stones or if you live in a society where people will think you're weird if you enter the opera without shoes and you don't

want to have trouble, so I think that's good. But basically, it's more natural to walk and to run without shoes. Of course, not if you are not used to it. So if somebody who has not been walking around barefoot all day, suddenly shifts within one month or two months to barefoot running, they will most likely overload it. So it has to be done very, very gradually and then it will be healthy.

Steven Bruce

And presumably that felt style mesh in the fascia will change in response to the stress?

Dr. Robert Schleip

So that's what we would speculate based on what we have studied elsewhere. But nobody has shown that you have more crimp in the plantar fascia in barefoot runners, that has not been shown. I believe so but believing and measuring are two different things.

Steven Bruce

Right. Okay, Robin, if you're watching, I know, what you're thinking "I told you so" because Robin's one of our regular attendees on these and his solution to everything is barefoot shoes.

Dr. Robert Schleip

We have to go running together.

Steven Bruce

I've got a question here from someone who describes himself as 005.6, which apparently is James Bond on furlough. He wants to know if there's anything special about the fascia in palmaris brevis. That sounds as though he knows something specific himself about your thoughts?

Dr. Robert Schleip

I would have to look it up. Yeah, I think it's one of these muscles that does not move bones, but basically is a fascia tightener. And so that's what I have in mind here. And these are very important, and we have much more of them in the human body. Big example would be the whole serratus transverse abdominus. It probably has been discussed on your show many times because of the good research around it, but it's not a bone mover, it's basically a fascia membrane tightener. So that would be my suspicion, but I would have to look more into detail.

Steven Bruce

Okay, I forgot to follow up on Franco's question because he did ask about nerve supply to the fascia. Now, presumably it's good at nociception?

Dr. Robert Schleip

Yeah, fascia has much more nerve endings than Ida Rolf knew, or Moshe Feldenkrais knew or the founders of connective tissue massage. Maybe Andrew Taylor Still knew about the rich innervation of fascia. But I think we are all shocked how rich it is. So, Carla Stecco and I, maybe I shared that last time, we did the calculation last year on how many nerve endings in the whole fascial net we have and we came to the incredible number of 250 million. So that is by far our richest sensory organ. And a lot of the nerve endings are free nerve endings. And not all free nerve endings are nociceptors, but many of them

can be nociceptors. So that means soft tissue pain, most likely has a very strong fascial component in many cases. And that has also been shown at the University of Heidelberg, if you irritate free nerve endings in the muscle tissue itself, it doesn't cause as much pain as if you do the same electrical or chemical irritation to the fascial envelope of a muscle, and then people scream, and they have long lasting adaptation. So that's another indication that probably majority or at least a high proportion of soft tissue pain, think low back pain, neck pain, etc, originates from the fascial envelopes.

Steven Bruce

Franco is quite active this evening on the questions and moving on from what you've said, he's asked whether we can permanently change the extensibility of fascia, by stretching or by other manual therapy techniques.

Dr. Robert Schleip

Permanently? If you stretch your IT band once, it is hard to believe that it will stay longer for the rest of your life. But if you do that, if you are a child and you grow up in a circus dynasty, where you stretch several hours a day, nobody questions that this can shape how your joint mobility is in adult life, if you continue to do that for several hours for several years. So there is no question that fascia can adapt to long term stretching. But the question is, it's most likely not that we change the collagen fibers, maybe collagen type three, we can change with manual forces, but we talk to the fibroblasts, to the architects, that constantly remodel the collagen fibers. And that is something new we learned, five years ago I was preaching and believing that the remodeling time, the half-life of fascial tissues is one year. So then you would need to stretch for one year until 50% of your collagen fibers are a little bit longer. But now they showed it is much more rapid, at least in intramuscular connective tissue. So already after seven months, most of the collagen fibers are newly created by the fibroblasts. And the fibroblasts in the way how they create new collagen fibers, they listen to the way how you stimulate and move your body. So that means if you do stretching for three, four months, you have a very good likelihood that you can have larger range of motion, but probably not only passive stretching, but also active loading in large range of motion situations.

Steven Bruce

Presumably that greater extensibility, range of motion is only going to stay if you continue the stretching though?

Dr. Robert Schleip

For most people, like me, yes. That's unfortunate, because they're remodeling continues. And if you become a couch potato for seven months, you will become a stiff couch potato.

Steven Bruce

Well, I guess you've kind of answered a question which has come in from Phil and from Camillia, who've said, basically, Camilia's said if you've lost that crimp, can you regain it afterwards?

Dr. Robert Schleip

That has been shown. Yeah, at least in animals. In humans, it's difficult to study the crimp because you need to take large biopsies. But in animals, it has been shown. They had couch potato rats who didn't do

any running and then they put put them on a treadmill on a rapid treadmill every day. And after a few months, they had more crimp and more elastic recoil.

Steven Bruce

Okay, which I think answers Phil's question, which was how reversible is the fascial loss of function due to immobility?

Dr. Robert Schleip

Yeah, there is a sad exemption. And that is the Achilles tendon, the Achilles tendon, once you are 18, 19 years old, the inside of the Achilles tendon never changes. Because there is no remodeling happening, or almost no remodeling happening there, and that's probably a price we pay in our evolution for having a very specialized Achilles tendon for elastic recoil.

Steven Bruce

What about if the fascia is actually damaged? And Bob has asked this one, if you go for an operation and they cut the fascia or if from whatever sort of trauma, it's cut, how well does it recover?

Dr. Robert Schleip

Yeah, that's a similar question. Like in the tendons, the recovery is much slower and smaller in the same time unit. And it's much more difficult to repair or even to regenerate it. And the other example is connective tissue in your mouth. You don't repair an injury, you regenerate it. And that's an ability that you had in the first couple of weeks in embryonic development, and that octopuses and very early fish creatures have, if you cut the leg off, they will completely regenerate it. They will not repair it with some stumpy scar tissue, like we do.

Steven Bruce

There's no scar tissue in-

Dr. Robert Schleip

No. So in octopus fascia and intra mouth injuries, we have the ability not to repair only, but to regenerate just like an octopus has. And that's a big secret. And I'm not sure if in my lifetime, they'll crack the code, can we activate the ability that our ancestors half a billion years ago once had to regenerate a broken limb.

Steven Bruce

Okay, now I just want to clarify here, we understand octopuses can do this. Very, very few of the audience this evening are octopuses, I'm told, so are you saying that our fascia does that, wherever you cut the fascia it will regenerate without scar tissue?

Dr. Robert Schleip

No, I'm saying that would be very nice. We only have the ability in the soft connective tissue in our mouth, for whatever reason. There we didn't lose it, and we had it in the first three weeks, I think of embryonic development. And then we lose it, probably we sacrifice that ability for other advantages. But to answer your question, some tissues like the connective tissue in the mouth, they have a very rapid remodeling

rate, and therefore the repair or regeneration is much better. And other tissues, they are more slow in regenerating, and the worst is inside of the Achilles tendon and there the repair is not very good.

Steven Bruce

Okay, well, Marjorie asked how long you have to wait after you've had surgery before you should start stretching fascia again, how long before it's safe to put it under stress?

Dr. Robert Schleip

That is such a big question. Yeah, I'm the worst. I start too early because I inherited impatience from my family. So people like me, you will have to put in jail after I'm injured. Because I have demonstrated many times impatience is not very good. Because if the inflammatory wound healing process is not yet winded down completely, and then you start stretch loading or other mechanical loading too early, that will lead to a chronic inflammation. So normally, in a small wound, you wait five or six days, and you don't see any redding anymore, it's no red color, the pain sensitivity is back to normal, and the temperature is back to normal, then you can say now we can do stretch loading. But what we learned in the last two years is if you want to have an almost octopus-like wound regeneration, it would be good to increase the microcirculation. So if you injured your ankle, it would be good that you go on bicycle spin wheel with a boot on so that you don't stretch load your spring ligaments in your ankle, but you increase your metabolism to two hours cardiovascular exercise per day. And that also increases the microcirculation without stretch loading in your broken ligaments. And then if you increase microcirculation in the local tissue, it will be like the tissue on the inside of your cheek, it will be a tissue that is constantly regenerated very rapidly. And then the wound healing can be three to four times more rapid. So that means if you injured yourself, a very wise consequence would be, Robert take it slower. That's not for a reason that you have injured yourself. Maybe you should do more meditation this week and less bouncing and running and cardiovascular performances. But if you protect the broken joint from mechanical loading and you increase the cardiovascular activity, that would be very wise to do.

Steven Bruce

But two hours cardiovascular exercise a day is a lot to ask of a patient, isn't it? Have you ever had anyone comply with that?

Dr. Robert Schleip

No, but it's good anyway. Because it means they may do half an hour in the evening on the peloton bike or something like that. And if they know it, then they don't go all the way into slowing down, which is a natural philosophical tendency. But for the healing, it's not good.

Steven Bruce

Ok. Salame Olivia has asked a question and I don't think she's meaning to sound critical here. She says, how does a rolfer diagnose fascial dysfunction? I don't think she means to be sceptical that you can, it's that she wants to know what the process you would use is.

Dr. Robert Schleip

Yeah, so I can answer it for myself, as a former rolfer and also part time rolfer now. I would hope to use ultrasound, more often than I already do. So you can look for the adhesiveness or for the stiffness. If you

don't have an ultrasound, you could use your hand. And if one of the trapezius, the trapezius on the left side in a violinist player, feels stiffer to palpation, I would do the palpation again and we have a tool here where we can do it. So I have a digital finger here, let me see if it shows out. So I push the digital finger and of course, I would do it as a rolfar with my own living finger, five millimeters in to the tissue and measure how big is the resistance. And then I do it with 10 millimeters. And if the increase of resistance is in a linear curve, so if it gradually gets stiffer, then I know I have it, there is a homogeneous material just like a homogeneous mattress. But if it's very soft on the first five millimeters, and then suddenly it gets hard, then I think you have two kinds of mattresses, a soft one and a harder underneath. And if that corresponds to the thickness of the subcutaneous connective tissue, the outer layer which is soft, and as soon as you get to the muscle fibers, it gets hard, then a rolfar would need to say this is not my shop. This is the shop for the muscle relaxing experts like the Feldenkrais practitioner, because that would be an indication that the stiffness increase on the left shoulder does not come from the fascial envelope, but it comes from the muscle fiber underneath. And then you may just do a muscular relaxation technique. But if you get the opposite, if the stiffness is increased already on the outside, and if you go further, it does not increase that much, then you have a strong indication that most likely this is a fascial pathology. And then doing Feldenkrais or muscular relaxation may not be the fastest tour to improvement.

Steven Bruce

Well, I think you've answered one of the questions we intended to talk about there, haven't you? In how would you differentiate between muscle stiffness and fascial stiffness and is there any significance in it, would you treat them differently? I imagine that the osteopaths and chiropractors and physios watching would say, well, we can deal with whichever it is, as I imagine you can as a rolfar and Feldenkrais practitioner.

Dr. Robert Schleip

No, no, I think it would be good. Many people say fascia and muscles, they are all together, we cannot separate them and I treat them both. Yeah, yeah, yeah. But I think you can learn to differentiate it, when is the cause more in the fascial envelope and when is it more in the muscle meat, for example? And then you may choose, you treat both, but you treat them with different skills and different emphasis.

Steven Bruce

In terms of treating, somebody a moment ago, Pip has sent in a question asking about a thing called a gua sha, which I've never heard of, apparently this is a good technique for dealing with facial strains, is a Chinese massage tool, which it looks like you've probably got in front of you.

Dr. Robert Schleip

No, it's not, but it looks a little bit similar.

Steven Bruce

She says it's a tool that's dragged along the skin to create a flush reaction, which helps loosen facial tethering, as she understands it, is that your understanding?

Dr. Robert Schleip

Yeah, this has been a larger part of traditional Chinese medicine than acupuncture. Acupuncture was discovered by a Western journalist in the 60s of the last century. And then it became very popular. But in traditional Chinese medicine, acupuncture was a small part of the healing for various soft tissue pains, etc. And the larger part was gua sha, and that continued to exist. But now the West discovered it also. And there are already like 30 or 40, very well-done studies, which is nothing compared with acupuncture. But you already can see that it has almost a similar, maybe even bigger healing potential. And it is done by scrubbing on the skin, even to a level of skin irritation, where you have bruises or almost bruises and increased circulation there, and they look horrible, as if they have been tortured, but it's not very painful when you're treated to that. And we don't know, we have several theories, of course it increases in microcirculation. But it seems to also start a pro inflammatory cascade that would then secondarily lead to an anti-inflammatory phase activation on the third, fourth, fifth days after the treatment. I think it's a very promising treatment, gua sha treatment, and I'm looking forward to much better research and we already got in the last three or four years.

Steven Bruce

Are you aware of research which is going on at the moment into gua sha?

Dr. Robert Schleip

Yeah, yeah. I think Meg Makin is her name. She's somewhere in the New York area.

Steven Bruce

Very interesting, too, because we've actually, must be a couple of years ago now. I had a therapist...

Dr. Robert Schleip

Wrong name Arya Nielsen, I confused them.

Steven Bruce

Yeah, well, we can put the references up after the show. But a couple of years ago, I think it was we had a physiotherapist on the show demonstrating a tool that physios use, which is basically a very shiny piece of metal, which the manufacturers will charge you a large amount of money for. And I wonder if perhaps that's based on this same philosophy or theory?

Dr. Robert Schleip

I'm using, I'm just looking for my fancy tool. Oh, yeah, I have one here. So I have several of them, the stainless steel one. My favourite one is a moustache from Fastic. But that's a similar one here from Germany, where you can put your thumb in a small indentation. And you can do of course, scrubbing as good as you could do with the coins they sometimes use in gua sha. But we now use them to do very slow, slow motion sheer motions. And I train people at my courses that they can do a continuous, not stop and go, but continuous sliding motion, where you move the tool with your hand, one millimeter per second, not one centimeter per second. And that is very difficult to do, you need a cream, you need the right tool. But with the tool it's much easier to do.

Steven Bruce

So given, you know, if we rub the fascia, basically, with a gua sha tool, or one of your shiny pieces of metal, we're going to improve microcirculation, we're going to improve the healing process. How does that contrast with deep tissue massage?

Dr. Robert Schleip

No, it fits together with deep tissue massage. Deep tissue massage on the viscera, I would not use metal tools normally, because my hands are skillful enough. Maybe if you have a cesarean section and you have a very long scar line, with my fingers, it would be very difficult to find a continuous sliding movement of one millimeter per second. But with the tool, I can do that. So in most situations on the viscera, I would not use the tool, except for them scar tissues. But if you work on the heel pad, like we rolfers always did as either rolf told us in the second rolfing session, to mobilise the heel pad in relationship to the calcaneus bone under the knees. And in people, in young people, it can slide four or five millimeters forward, the lower part of the heel pad, which is the fascial plate. And in old people who are not walking barefoot, the heel pad is almost fused with the calcaneus. And then the whole elastic transmission line of the Achilles tendon continuing into the heel pad. And the heel pad being like a patella, hypomochlion, that continues to slide. And then the plantar fascia being something like the patellar tendon to the Achilles, is broken. So that's why either rolf, then ask us to use our knuckles, and I can show you my knuckle that rolfed patients for 30, 40 years. And you see it has already scar tissue on it. It's called knuckle pads. So that is a similar chronic scar like dupuytren contracture, it's driven by the same cells. So it means my hands have become insensitive by working on the heel pad in the second hour. And now most rolfers treat the heel pad with a metal tool like I'm showing it to you. But of course they touch it additionally, with the second thumb, and they feel the tissue and the gliding. So that would be a good example where deep tissue massage like rolfing is embracing tool use at the right moment and at the right time.

Steven Bruce

It's fascinating what you say there, Robert, because I think we've all got experience of treating fascial problems in the foot. But what you've done is to put it into context, you've explained why it would work, which is not just helpful for us understanding what we're doing but also very helpful for us in explaining to the patient, why what we're doing is necessary, which is becoming more and more important, of course. And you mentioned earlier on, you mentioned something about ultrasound, diagnostic ultrasound, is there a role for ultrasound in treatment?

Dr. Robert Schleip

A role for ultrasound, ah, you mean therapeutic ultrasound? So not diagnostic ultrasound, but therapeutic. I haven't studied it. I know shockwave therapy, I questioned it. But now, some very good meta studies have shown, beyond my doubt, it is very helpful in many conditions. Similar, I continue to have my doubts on therapeutic ultrasound, also on most electromagnetic treatments. But I'm waiting for the studies to do the same, to make me humble and show they may be as efficient as shockwave therapy. But I haven't seen the studies, but I haven't really looked deeply into it. I know many therapists use it. And they claim to have huge success. But you and I and we all know the success you experience is based a lot on your charisma and predictions and what a great healer you are, and how plausible the concept is to the client.

Steven Bruce

Well, we've had Professor Tim Watson on the show, I think three or four times in the past and we're getting him back in a little while and he is probably the UK expert on ultrasound. And one of the things that he made clear in broadcasts we've done with him before is, an ultrasound doesn't work on muscles, but it works on scar tissue because it works on collagen. So I see no reason why it shouldn't work to some degree on fascia, but it would be an interesting one to put to him and find out whether there's any specific studies being done into the therapeutic ultrasound on fascia.

Dr. Robert Schleip

Thank you very much. Now I'm the one to learn from this interaction.

Steven Bruce

Don't quote me, I'll let you know when Tim's coming in again, and you could join him with the conversation.

Dr. Robert Schleip

But even then, it's a sufficient lead for me. I can look it up in PubMed. I know how to do that.

Steven Bruce

Okay. Jan has asked about kinesio taping, do you think that helps in any way with treating fascia?

Dr. Robert Schleip

Some studies have shown it. My big suspicion was that it would influence proprioception. And that has been emphasised by the new studies from the Steccos, that proprioceptive nerve density is much higher in the skin and subcutaneous connective tissue than in the joint capsule or deeper tissues. So if you do a slight deviation, how many skin areas are moving together with the knee joint when you're bended. Whether it's only the upper three centimeters above the knee, or whether with a use of kinesio tape, even some skin in the middle of your thigh continues in the same direction as the patella, that should theoretically have a profound impact on proprioception. The studies I showed, they were not as profound. They showed an improvement in proprioception, but not as profound as I had expected. I questioned the impact on lymph. Of course, if you lift the skin a little bit, the lymph should increase. But I think the effect is quite small. Three jumps on the trampoline, or using the stairs instead of the elevators to go to the bathroom would have a much more profound effect, if I'm correct, on your lymph flow than putting sixteen kinesiotapes on your back.

Steven Bruce

Yeah. And what you said there seems to me from my vague recollection, to reflect what was said about Tubigrip and other forms of sports taping, that the response to that was thought to be proprioceptive rather than anything else.

Dr. Robert Schleip

But I would like to measure that because we can measure proprioception. We have a cream, wherever you anaesthetise the skin and the subcutaneous connective tissue without needles. And then you could do a difference. So you apply the tape with the cream, you apply it without the cream, the collagens should be the same. The proprioception would be altered.

Steven Bruce

Anne's asked us a question about magnets, do you know anything about whether magnetic fields have any impact on microcirculation?

Dr. Robert Schleip

Yeah, that's what I mentioned before. There are lots of companies with magnets and with electromagnetism, and they have some smaller studies that are not yet convincing to me. Now, they came up with some really strong magnets. And they seem to have an effect. I cannot tell you; I cannot tell you.

Steven Bruce

Well, again, it's to some extent it's electrotherapy. And I remember Tim Watson said on a broadcast ages ago that the evidence around magnetic theory was thin. So it doesn't necessarily mean that it doesn't do anything, but nobody's actually done any meaningful research or hadn't at that point.

Dr. Robert Schleip

But in wound research I've shown studies, I used to preach that the fibroblasts, basically, mechanical sensory devices, not biochemical sensory devices, and also not electrical ones. But in wound repair, they have shown it. So if you change the electrical gradient in the other direction, then the repairing fibroblasts migrate away from the wound. And if you reverse it into the natural direction, then they continue to go and repair the wound. So there is an electrical influence on the fibroblasts, but whether you can activate it in a healing direction with these apparatus, I honestly don't know. But it means I don't exclude that they could have an effect.

Steven Bruce

Going back to what you said about fascia in the mouth and the soft tissue around the mouth, Simon has said, is the repair mechanism in the mouth down to the needs to eat to survive, showing that the body knows what is best for survival? And I suppose, actually, whatever we say it's speculation in that regard, isn't it? But it would seem like a logical conclusion.

Dr. Robert Schleip

Yes, that would be reason why selection favoured people who had a much more rapid and much more alive, remodeling in the connective tissue, I know they have more myofibroblasts in the soft connective tissue around your gums, around your teeth. So probably that's because we need to, we are constantly interacting, we may have micro injuries, the teeth are drifting backwards and forwards. So, but maybe then also people like me, if I stopped brushing my teeth, I get paradontosis. And I don't need to do that with my toes that I brush them twice a day in order not to get paradontosis. So maybe the overactive metabolism also has a tradeoff.

Steven Bruce

Yeah. I was just thinking, as you were talking there, that actually natural selection would favour people whose Achilles tendons healed quickly as well when you're running away from saber-toothed tigers.

Dr. Robert Schleip

No, I think if I had 10 children, and I lived 200,000 years ago, those who run more quickly would take my genes and survive, not only when a tiger is running behind them, but then when they are trying to fetch some animals by endurance running. And whether they then need to wait for three days afterwards for regeneration doesn't make a big difference, but whether they survive when they are running. So I think it's a trade off. And apparently running has been a driving force for our survival. Not that our ancestors were running all day, they were walking much more, but their walking speed was not as crucial for the moments of survival.

Steven Bruce

Right. But you can go for a lot longer without eating than you can go without or go for a lot longer without eating than you can being eaten by saber-toothed tigers.

Dr. Robert Schleip

And apparently, it's not so much running away that was important. But it was endurance running in order to catch some animals that would then overheat. And we got the ability, just like dogs who have a big tongue, in order to avoid overheating, we made most of our body, except our hair up here into a tongue surface. And that is the reason why we have sweat glands all over and why we don't have the body hair that chimpanzees have. That is not for better cuddling, or for better swimming, apparently, that is made for avoiding overheating and being a better endurance runner. So people did endurance running a couple of times per month, but that decided whether they had enough food.

Steven Bruce

Yeah. A number of you have sent in comments to tell me that Robert's picture is freezing. Yeah, I know that he's freezing. And frankly, because we're using Microsoft Teams or Zoom if we were, we have no way of controlling that. So I'm afraid we have to put up with those freezes. We will be back in the studio soon. And hopefully, that problem will be overcome. I'm getting some more other questions here. Philip wants to know some more about the Achilles tendon. He says, does what you said mean that the tendon once partially injured or torn cannot heal completely?

Dr. Robert Schleip

Apparently, yeah. That is also the clinical experience that injuries on the Achilles tendon, you will still be able to palpate some kind of scar like thickening 10 years later if there is a serious injury in the Achilles tendon. So unfortunately, I think that's the case that it takes a long time in the Achilles tendon. But they also showed that the repair does not come from the Achilles tendon itself. There are a few fibroblasts or tenocytes in the Achilles tendon. Basically, Achilles' tendon is mostly acellular bundles of straw that have been created by cells who are no longer there. But the cells in the paratenon which is a softer connective tissue about three millimeters thick around the Achilles tendon, that is very alive. So when I treat Achilles tendon tearing injuries, I spend 10% of my treatment time on the Achilles tendon, and 90%, or at least much more, I spend on the fascia cruris surrounding the Achilles tendon. And these cells are very alive. And they migrate apparently into the Achilles tendon and become active heroes who spit out new collagen and repair the old ones. So treat not the broken tissue, treat the neighboring tissue around it, which is much more alive.

Steven Bruce

Interesting, interesting stuff. Let's move away from the mechanical stuff for a little while. What about emotional factors or psychology? Does that have an impact on fascia?

Dr. Robert Schleip

Yeah, now I'm very convinced about that. That triggered me to become a laboratory scientist, after 30,40 years of a rolfing practice, when a German phlebologist published his finding of smooth like contractile cells in the fascia cruris, and a high density of sympathetic nerve endings. And then he said, they must be related to each other, smooth cells we know from the arteries, we know them from the visceral organs. And they are usually regulated not by our voluntary somatic nervous system, but by the less voluntary, autonomic nervous system. So he speculated that for rapid contractions and rapid tensions, we use our muscular contraction. But for long term chronic emotional tensions, not the muscle fibers get stiffer and shorter, but the fascia would get stiffer. And I found that very intriguing. Because it fit to my clinical experience. If somebody is very excited, because they have an exam tomorrow. It is not the fascial envelope that feels stiffer in the palpation that I described, it's usually the muscle fibers underneath. And if I then tell them, you got the job, you can relax. Within a few minutes, everything is soft. But if somebody had a hell of a time in their family, their husband is divorcing them and betraying them. Their two daughters are getting into puberty and saying fuck to the mother 20 times a day, and she is being mobbed at her job. And that happens. Yeah, usually, once shit happens, often triggers the next shit. So if they have this double shit months in their life, or three months or six months, the stiffness feels very different. And that's why I got into the lab under Professor Stauber's direction and looked for these contractile cells. And we found smooth muscle like cells. But we couldn't find a direction to autonomic nervous system transmitters in the beginning, in the first four or five years, but now we found a connection. So the sympathetic nervous system has a strong influence on fascial stiffness regulation. Why are the smooth muscle like fascial contractile cells, which are called myofibroblast. And that is very exciting. So I think you can see fascial stiffness as a potential expression of chronic emotional stress. But you can also use fascial techniques. For example, if you stimulate the ruffini endings to lower the sympathetic charge in the whole body, not just in the region you're working and to activate the parasympathetic charge. So I think there is a very big connection there.

Steven Bruce

Can I just clarify though, what I took from what you just said is that if you have an injury then stress will reduce the healing process. Can it go further than that? Can your emotional stress, all those things you described going on at home, could they actually lead to an injury or to dysfunction in the fascia?

Dr. Robert Schleip

Of course, if I'm stressed, I injure myself much more. But that's more daily life experience. So I run over the street and got hit by a car, not by accident, but just because of my frantic orientation in the world. But I think that is not your question.

Steven Bruce

No, I was thinking more, you know, you're under a lot of stress, you run across the road, and you injure your Achilles tendon, which you wouldn't have done if you hadn't been under stress. Has that been shown to be the case?

Dr. Robert Schleip

Okay. That's a good question, I would have to look it up. My daily plausible thinking would say, of course, because also you don't run as graceful if you're under stress. So if you jump down from a ladder, you will do it not as graceful like a cat, if you are under excitement and stress. But that has been shown also, if you throw a cat out of the second and third floor, they land very elegantly, because they can feet forward the ground and take the tension out, but only if they have their eyes open.

Steven Bruce

How on earth, Robert, did you get this passed the ethics committee to do this experiment?

Dr. Robert Schleip

I haven't done it. I saw some videos being done, I think in the 50s last year, where they threw cats out of buildings. Yeah.

Steven Bruce

I'm not a fan of cats, but I wouldn't. Naomi has asked, whether if a scar tissue is large or deep, is there a possibility that the fascia may have lost its innervation or there may be no innervation in the area?

Dr. Robert Schleip

Let me come back to your first question without forgetting the second one. The first one, if you go jogging, and you're under stress, and you go jogging, on a wooden floor, or even on concrete, which is sometimes ideal in order to get acoustic feedback, you will have a more bumpy sound. And when you are in a good mood, you land intuitively different. So people when they are in a good mood, they do more front landing and their heel doesn't pound as hard. So the softer landing, the more catlike landing, that would definitely influence your injury rate, I'm quite sure about it.

Steven Bruce

So what do you think's going on? Is this simply an unconscious control of the joints a proprioceptive issue, or is there some change in the quality of the fascia?

Dr. Robert Schleip

No, the fascia doesn't change by getting into a happy mood within five minutes. But the muscles pulling on the fascia make it stiffer at the right pre second. So when you catch the medicine ball, you don't wait until it lands in your hands, you already use a transverse abdominus to make your trunk fascia into the right pre stretch so that when the 10 kilogram heavy medicine ball lands in your hands, you only have a few centimeters of yielding and not 50. So I think it's the nervous system directing the muscles in a millisecond pre calculation model, feed forward model, how they adjust the fascial stiffness, then that comes back to the pulmaris longus to the transverse abdominus, that our body is made like a tensegrity model to have constant pre tension. And the pre tension should be ideally suited to the expected interaction. And if you're stressed, you expect a strong interaction. And if you're in a good mood, you expect a dancing interaction, you know, where a force meets you at a level where you can respond.

Steven Bruce

Building on that, Simon has sent in an observation, he says he's noticed in his patients with depression that their fascia feels different and he describes it as sticky. Does that sound plausible to you?

Dr. Robert Schleip

Yeah, but I wasn't sure. So I am a collaborator in a study by Professor Michelak, and it's already submitted. So he did four master theses in psychology, and I was able to support, I think all four of these master theses on links between depression and fascial properties, and only measuring with our tool, the stiffness and the recoil elasticity. In the trapezius muscle and fascia, they actually showed there is a strong stiffness increase and elastic recoil decrease in the trapezius fascia in depressive patient, compared with a normal one. And very interesting. They gave depressive patients foam rolling exercises. And then they did depression test, where you tell them 100 words and you check which ones they recognise, again, five minutes later. And depressive patients, they remember every negative word very well. And they forget about the positive ones. And after foam rolling, their memory is more normal, they will also remember positive words. And that is a very robust measurement for the severity of depression. So that means fascial treatment may have an anti-depressive effect.

Steven Bruce

I suppose the obvious question to that is, well, how long does that effect last? I mean, how many times a day are they going to have to come back for fascial treatment to get over the depression?

Dr. Robert Schleip

Yeah, probably as long as the elastic recall. Because if you walk and you have a bounce that we humans have, bouncing makes you happy. That would be another study. But I've done it on myself in a nonscientific manner. I can go jogging and return grumpy. That is possible. It's difficult, but I have proven it is possible. But it is impossible to go hopping for longer than 60 seconds and to continue taking yourself serious, it is not possible. And we don't know why. So the elastic lightness hopping movement on a trampoline seems to change some very fundamental biochemistry. We don't know whether it activates serotonin or something like that. So if you have fascia that is like you, you will not bounce, whether you go up the stairs or down the stairs, and therefore you don't have that neurological stimulation that people have on the trampoline. So if you then do foam rolling, you have a little bit more elastic recoil, probably for 20 minutes, but not for the rest of the day. And maybe that is a trigger to say you're doing a mini trampoline.

Steven Bruce

I mean, we missed so much by not being in the studio. And if we had you here, we wouldn't have your picture freezing, but we'd also be able to film you hopping across the studio to prove your theory here, Robert.

Dr. Robert Schleip

And then see where the corners of your mouth are going.

Steven Bruce

Yeah. So going back to Naomi's question, which was about scar tissue being large and deep. And does that lead to a lot of innervation and what's the consequence of that?

Dr. Robert Schleip

I think scar tissue is less richly innervated, at least in the beginning. And because you have broken connections, and also because the nerve innervation goes together with blood vessels, and in the scar tissue in the beginning, you have less blood vessels there, unless it's an inflammatory scar repair process. But most scars have less nerves, and also less blood vessels in it, unfortunately. And therefore, I would be not surprised if you can show with a two point discrimination test that the proprioception, it's not proprioception, but the haptics threshold is diminished wherever you have a scar.

Steven Bruce

Right. Okay. So going back to your relationship that you were describing between fascia and depression. Pippa's said, aha, she didn't say the aha, I threw that in. She said, could the relationship be because if you do work on the fascia, it reduces pain levels and reduced pain is likely to reduce depression?

Dr. Robert Schleip

Yeah, that would be an alternate explanation. Yeah. Yeah.

Steven Bruce

I suppose it presupposes that the person with depression also has pain.

Dr. Robert Schleip

Yeah. So you would need to differentiate that and that would be something to look at the studies. If they didn't separate that, then I think that is a very good potential criticism. You know, that you are confusing chicken and egg, you know that the main driver is how much pain they have. That would be a possible factor. But in a good study, you may be able to figure that out, to look at those patients that had depression and pain. And those patients that have only depression, whether there is any difference, at least a tendency of difference between them.

Steven Bruce

Well hopefully within our audience this evening, somebody will be saying, aha, a great study project for me, a great research project.

Dr. Robert Schleip

If they do, they should contact me. If they want to do a high-quality research, not just a little shabby thing to get their PhD.

Steven Bruce

Well, actually, somebody spoke about a patient last time, didn't they and you said then they should get in touch with you is about, eosinophilic reaction in fascia, I can't remember now. But you hadn't any personal experience of it, but you said if they had a patient with it, they should get in touch, I don't know if they did.

Dr. Robert Schleip

Yeah, no, not yet.

Steven Bruce

Right. Okay. What about lymphatic drainage as a treatment modality? Is that going to help fascia?

Dr. Robert Schleip

Oh, sure. Yeah. Lymph is one of the big pathways for the ground substance, water, to not stay stagnant in the area, but actually to go back into the central cardiovascular system. And that is one important pathway. We know the ground substance water makes up the majority of fascia. The collagen fibers are only like 1/3 of the volume. Two thirds is water of some kind. And that is a big attention now, I think since our last talk, Neil Theise published his new examination, that the liquid connective tissues, I always lumped them together with the dense connective tissue and preaching that everything is fascia, but the liquid and loose connective tissue, they have very different functions and properties compared with the plantar fascia and IT band etc. You have cells moving a lot in different directions, you have very different cells there. And they seem to be linked into one ocean. He put in tattoo pigments and studied also some silver colloid pigments, and then saw where else in the body are they disputed. And I had a possible suspicion a year ago that maybe the loose connective tissue under the skin is one ocean. And the loose connective tissue around your visceral organs would be a different ocean that they are almost not connected with each other. Because you have dense membrane separating, but now it's been shown no, all the liquid connective tissues seem to be in one body wide inner ocean connected. And that is now a very big issue. There are little channels in how the cells migrate. There is talk about a microbiome of hundreds of 1000s of bacteria, not only living in our guts, in directing us to become depressive or Alzheimer-like to go to the fridge in the middle of the night. And we think we are the master in the house. But it's these little creatures who direct us. But we also have a microbiome in our liquid connective tissue that has been shown in people who have Lyme disease, that even when they have conquered gut health and got healthy out of it, they are still little nests of Lyme bacteria living in your body in peaceful fight with your immune system. And that is an intriguing new dimension since a couple of months that the liquid connective tissues in fascia are much more alive. And they have a much more mobile migrating cells. And hyaluronan seems to be more important, and that we need to study them and treat them probably different compared with the dense fascia and that's where the lymph comes in. So there is one important moment, one drainage system about this inner liquid ocean.

Steven Bruce

So Robert, who did you say the author of that study was?

Dr. Robert Schleip

Neil Theise. He had a big publication in a nature journal three years ago, where he claimed that he found a new organ called interstitium and everybody before had overlooked that. And then people got really angry about them. But that was a very good strategy to get fascia into discussion. And later, he apologised and said didn't mean that the complimentary medicine hadn't seen it before. But the allopathic anatomist had not seen it before. And now he went further and collaborates now with people, with Jean Claude Guimberteau and osteopaths who were angry with him when he published the first one. And the second

type of publication, he just described it a couple of months ago, that they are all interconnected, the loose connective tissues.

Steven Bruce

Fantastic. Well, we'll pick up that reference and make that available, as well to people after this. Sammy has asked about the effect of aging on the viscera. And I've also been asked by Karen, what's the effect of aging on fascia and the two are obviously connected.

Dr. Robert Schleip

I know good studies on aging and tendons, because that's a subject in sports medicine. And then we say tendons are not liquid fascia, but they are dense fascia. Aponeurosis is a tendon too. So I do, like most fascia people, I take all the tendon research and say that's also true for other dense fascia. And there they have shown that fascia loses the elasticity when you get older. It doesn't get stiffer, surprisingly, compared with young men, so if you compare the stiffness of the Achilles tendon, at the age of five, and then at 20, and then at 60, at the age of 20, it has the highest stiffness. And as you get older, you lose some of that stiffness. But that is not the same as elastic recoil. But what they showed is that as we get older, we have more of these sugar-like crystals crosslinks between the collagen and they are not good. I think we talked about it last time that as you get older, your your connective tissue gets more crispy. And that is a serious side effect of getting older. I don't like it.

Steven Bruce

When Salame Olivia's question was about why viscera drops when you get older? And is that looseness in the fascia? Perhaps the reason behind that?

Dr. Robert Schleip

It could be gravity taking its toll.

Steven Bruce

Gravity has been there all the time, hasn't it?

Dr. Robert Schleip

Yeah, but if you will lower it one millimeter per month, you can calculate. You don't see it at the age of five, but at the age of 70, but I'm not sure about that explanation.

Steven Bruce

Okay, so a more specific, well actually I'll ask one more question, I wanted to get onto some of your recommendations for movement, what we should advise patients to be doing. Camillia asked some time ago about a person say who has a head or neck injury, which is affecting the bone in the muscles and is causing scarring, does that affect the fascia and she's thinking in particular of wryneck.

Dr. Robert Schleip

Well, you're talking to an interesting person right now, because for the first time in my life, last week, I had serious neck pain. And I just came out of the hospital this morning, because I have a disc prolapse. And it's to a level where I'm taking drugs in order to do that, and where the doctors are fighting with each

other, whether I need surgery, but I had an infiltration there. And I can see it's not one of these prolapses that you have without pain when you get older. It's one of these were it really pinches on the nerves. And now I'm thinking why am I getting it? You know, have I been too much kyphotic online teaching? Have I been doing too much sports in my triathlon preparation? I don't know. But one of the thoughts is that disc protrusions are usually an injury like pairing of the anulus fibrosus. So not the nucleus pulposus but the fascial envelope rounded. And that should be in this kind of arrangement in a bi-directional arrangement. And there I've been thinking, not loading your head will lead more to this kind of felt tissue. So I've been thinking, but I should have practiced it more, that somebody like me should carry a suitcase on top of their head once or twice per month, not twice per year as I do. And that would be, probably I could have avoided my disc prolapse by making my anulus fibrosus stronger and more regular by loading, by doing a partial headstand on the ground with 30% of the body rate. You can do that easily. I started to do that but only like three times per year and that is not sufficient. So now we are also thinking, how can we strengthen the fascial envelopes as we get older, that they are not getting as prone to overload injury. And that would be compression. But it would be also shaking your head not everyday in the discotheque for five hours. But maybe once a month, you should be shaking your head for 20 seconds, until you feel a slight discomfort once a month.

Steven Bruce

That doesn't sound very often to me.

Dr. Robert Schleip

Yeah. But then if you do that, or maybe once per week, but not every two days, you create some tiny micro injuries into the forgotten felt like fascial envelope around your disc for example. And then also if you stretch load your neck in different rotations, right now I cannot do it because I, but I should have done more rotations, which we don't have in our desk life. And one good way of doing rotations would be walking in nature instead of staring to a monitor, doing ball games, where you have the ball coming from the right and from the left, but also closing your eyes and doing some moderate dancing motions, and your head will go into different directions. So that is my vague Robert Schleipian speculation how I could have avoided this nasty injury.

Steven Bruce

So, so far, we've got hopping or bouncing, we've got headstands and we've got head shaking. Is that the full range of movement exercises that you prescribe to your patients now?

Dr. Robert Schleip

No, for full range, you need to squat, of course, you need to do little, how do you call it, rolls forward. You need to climb with your children on the ground, between the tables or go to a children playground with children. And I love these, I think you had it in the invitation. Now you don't see the cable there, but I love to go into playgrounds where they have these activity nets. They are like six meters high and you have these cables going into different directions. And there you can hang upside down, which is really nice. And there you get into monkey like stretches.

Steven Bruce

We have to be careful about sort of going into children's playgrounds and playing around on their equipment that we get arrested for that sort of thing these days.

Dr. Robert Schleip

Yeah, yeah. So best do it with a friend, if you're there alone, the police and the parents will get a little bit nervous.

Steven Bruce

Robert, going back to the control of the fascial network, if you like, Franco asked these questions ages and ages ago. First of all, does fascia behave independently from muscle? But in terms of that behavior, he talks about the control of fascia as well. And is that done by the autonomic nervous system? I guess mine is, to what extent is it actually controlled as opposed to causing a response which affects the autonomic nervous system?

Dr. Robert Schleip

The autonomic nervous system has an influence on fascial stiffness, we have shown that, but the response time is very, very slow. So when the sympathetic nervous system influences fascia to contract, it contracts by one centimeter per, not per hour, per months. And that is incredibly slow. But if you do that for several months, you may get frozen shoulder you may get dupuytren contracture and you may get a stiff lower back. So that is possible. But that is not directional. We know other genetic influences can influence fascia. We know infectious diseases can do that. I don't think it's a highly skilled direction, your nervous system tells you, tighten the fascia here, but not there. I think it's a very archaic, slow response. That under stress, you make everything a little bit stiffer.

Steven Bruce

But that's tensioning of the fascia, presumably is being done by muscles. So the muscles are the ones being controlled.

Dr. Robert Schleip

No, frozen shoulder has nothing to do at the moment of dupuytren contracture, it's a facial contracture, not driven by muscles. The muscles in the palm are normal. You have the same in morbus ledderhose. You have it in several other pathologies, fascia can contract independently of muscle fibers.

Steven Bruce

I do understand that, I was just wondering whether that contract, to clarify, whether that contraction was actually directed in some way by the autonomic system, or whether it was happening as a result of a physiological response within the fascia itself?

Dr. Robert Schleip

Yeah, the second one for sure. Dupuytren contracture can happen just by biochemical factors and genetic influence also, yeah.

Steven Bruce

Yeah. Anne sent in an observation earlier on too, we were talking about depression and inflammation, and she's mentioned a publication called The Inflamed Mind by Bullmore, which apparently shows that there is a strong link between depression and inflammation, which presumably will affect the fascia.

Dr. Robert Schleip

That would make sense. Yeah.

Steven Bruce

And Curline has sent in a question about diabetes and how, she's mentioned particularly type two diabetes, if it's poorly controlled, what effect is that going to have on fascia?

Dr. Robert Schleip

Well, type two diabetes has these advanced glycation end products. And they are what you also accumulate in aging, and they make the fascia less elastic and more brittle. And so that is what makes it crispy in the way how you make meat crispy by heating it. And that tastes good if you're a butcher. But it's not good to have that in your meat, and diabetes and aging are doing that together. And if you put both factors together, it's a real problem. And then the question is, can you revert it, the earlier you do something against it, the easier it is. But if you already have too much of these advanced glycation end products, they are in the ground substance. And they make cross links, but very strong cross links between the collagen fibers. And if you have too much, too many of them, it's not impossible, but it's a lot of work to revert it and get it out of your system. So that's a big factor. Yeah.

Steven Bruce

We've actually had a number of speakers recently over the last six months, talking about the effect of diets on obesity and type two diabetes. As I understand it, there is very good evidence that a paleo or keto diet can reverse obesity and do a lot to reverse type two diabetes. So maybe there's a useful, useful role there. And I don't want to get into an argument with the skeptics about keto or paleo diets, but it's worth listening to them. Because, you know, there is at least some evidence behind the suggestion.

Dr. Robert Schleip

And the link to the inflammatory elements is also very strong. So how many of these advanced glycation end products you formed, is influenced by the inflammatory milieu in your ground substance? And whether you can change that with one diet, or another is an interesting debate.

Steven Bruce

Well, here's a good question for you. Phil has just sent this in. And have you got any advice on helping to improve fascial function in people who are hypermobile?

Dr. Robert Schleip

Oh, yeah. Short question. No.

Steven Bruce

I'd say it was a good question. Not short.

Dr. Robert Schleip

Yeah, yeah. So we have a protocol that we want to test, where you make fascia stiffer, but also you reduce the amount of sarcomeres in a muscle. And that would be the old fashioned isometric muscle contractions that they used to do in the 60s to prepare astronauts. But you would do that only at the short range of motion, until exhaustion, just like in bodybuilding. So you would do bodybuilding, by increasing muscle tone, muscle force in the short range of the muscle, and animal research has shown over several months, then the muscle will have less chain elements in series. So it will be a little bit functionally shorter. But nobody has examined that yet in these Ehlers-Danlos, Marfans and other hypermobile patients.

Steven Bruce

Well, Robert, we're just about out of time. And it seems to have gone by just as quickly as the 45 minutes we had on that lunchtime interview that I did with you. So I'm going to leave the last two points to a lady called Monica, who is one of your Teutonic compatriots, Monica, I haven't heard or seen you on the questions for quite some time, so welcome back to the forum. First thing she says is inverted tables. Are they useful in developing fascia?

Dr. Robert Schleip

Inverted tables where you hang down?

Steven Bruce

Well, you can alter the angle to any inversion you like.

Dr. Robert Schleip

Maybe I should try that tonight with my neck. That would be good. For hypermobile people, I'm not so sure. It's definitely good also for the fluid distribution.

Steven Bruce

I think her question is about fascia generally, not about hypermobility, because you talked about hanging upside down on children's playgrounds.

Dr. Robert Schleip

Sure, because you get joint ranges of motion that you don't get in a sedentary day like, yeah, so you stretch some joint capsules beyond what you do by being a couch potato.

Steven Bruce

So it's good.

Dr. Robert Schleip

Yeah.

Steven Bruce

And the final thing then, which was also from Monica, Monica was suggesting for your neck, apparently, I've just been told, so yeah, but there you are, that's Monica's advice for your neck. But the other point from Monica is that she says we need to have you arrested. Apparently, she thinks that we need to hold

you in confinement so that we can get you on the show more often. Because everything you said has been so fascinating this evening.

Dr. Robert Schleip

Thank you.

Steven Bruce

And I think, sorry, I think she just echoes what everybody else is thinking, when we got you back so soon after the last show, because, you know, your knowledge is just so fascinating. And it's so great that you share it with us. So there we are, Robert, I'm so pleased to have had you with us and the time has flown by. But thank you again for joining us.

Dr. Robert Schleip

Thank you again, and I learned a lot, I will try out some of the recommendations for my stiff neck now.

Steven Bruce

And if you've come across any more research that might be of interest and you care to send it through to us, then I'll obviously make it public and make it known to people on our forum as well. So again, thank you very much.

Dr. Robert Schleip

And I'll do my homework about depression and anti-inflammatory factors now.

Steven Bruce

Thank you. Yeah, and that would be interesting to hear.