Fascia - The Latest Research – Ref 306

with Gary Carter

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TRANSCRIPT

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Steven Bruce
Good evening, and welcome to the second of this week's broadcast. This is another one of those perennially fascinating subjects, we're going to be looking at fascia. And like many aspects of health and medicine, our understanding of fascia has evolved over the years. And even now more is emerging about this amazing connective tissue. To help us make sense of it all or not just to make sense of it, but also to make use of it in our work, I have Gary Carter in the studio with me. Gary is a real expert in this field. He learned and studied and taught about fascial slings with Tom Meyers. He's worked with Gunther von Hagens. He of the body world's fame on a project to display the world's first plastinated fascial human. And he's of course up to date with all the latest evidence and research in this area. Gary, very warm welcome to you. Thank you for making the trip.

Gary Carter
Thank you for inviting me, it's great to be here.

Steven Bruce
Let's start off here, I said a little bit about you there. And there's two very famous names there, Tom Meyers, Gunther van Hagens, I suspect everybody watching knows about both of those, what's your own route into fascia?

Gary Carter
Well, I'm from a background of athletics and sport and bodybuilding, funnily enough, which is a strange way to come into it. In fact, before that, I was a graphic designer, and as well as working with 3d graphics as well. So modelmaking, before the days of computers, that makes me sound quite old. And I was always able to see the body in 3d. So when it came to the bodybuilding world, and I was trained by very interesting people, that taught me to get a sense of the body and movement in a particular way, but I could see how the body was connecting up when they were moving, especially the guys that are going into competition. So, say if they were training their biceps, for example, I could see exactly how their calves were responding to that. And also because these people were in good condition, the bodies were well defined, you could see the movement transfer from one place to the other. And that always fascinated me. So I left that world, got involved in becoming a personal trainer, I did some natural bodybuilding competitions, which is non steroid based. And somehow the visual of the anatomy just made sense to me. And it was a subject that I was always interested in. And my father just brought down to Brighton a book that he bought me when I was about 10 which is a pop up anatomy book which I was fascinated by, still have that book.

Steven Bruce
I learned something already; I didn't realise there were competitions were steroids were allowed.

Gary Carter
But in the world of bodybuilding there's a huge, I mean, it's a level playing field to a degree which we had certain cyclists talk about. But it was a world that I never really wanted to get involved in. And the guy that trained me, he just looked at me and said, listen, you're never going to become a top professional bodybuilder. So don't kid yourself. And don't do that to yourself. And I was more interested in the longevity of the body. My interest is can we keep changing it and it can keep adapting all the way through my life,

not to the point that I can only do that up until I'm about 30 or 40. And that fascinated me. So this sort of constant changing element of the body is that something that we have control over? Anyway, through that I then trained to become a personal trainer but use the bodybuilding techniques to help people improve their structure, their form and how they moved. But I also want it to be more hands on as well. So I also come from a background of martial arts and really in theory, came up in that so I was interested in the energetics of it. So I studied shiatsu as my manual therapy to start with, but I was always feeling something under my hands that I couldn't describe. Even when I went back to my original shiatsu teachers and would describe it to them, they said well, we're not too sure what that is you're feeling until I met someone that you know called John Stirk.

Steven Bruce
John Stirk was one of my tutors when I was at college for the benefit of anybody watching.

Gary Carter
That's right, and John had studied his yoga practices with a woman Vanda Scaravelli who had a huge influence on my work. And he, as a teacher at that time, coming from his osteopathic and cranial osteopathic work, was talking about fascia, and this was probably for me in the late 90s, I'm sorry, the late 80s, early 90s. And I just thought, oh, that's I've not heard that word before. I've heard of connective tissue but, what's this fascia stuff. And our understanding of it from that perspective of bodywork and movement was more of a fluid base. So what I did was then studied in cranial sacral therapy. And that made a lot of sense to me and what I realised what I was feeling under my hands, was that rhythm when I was giving my shiatsu treatments. Through that world, and the various works that I was doing, I ended up teaching a lot of anatomy to various yoga schools and so on. But we came across Tom Meyers. And Tom, at that time, was running some lectures in London, and he was over from the States. And this was mid to late 90s. And we brought him down to Brighton to do a two-hour lecture on this idea that he had, which was becoming the Anatomy Trains, but it was before the book came out. And he was showing these particular connections through the back of the body, which we now know is called the superficial back line. And my colleague who I mentioned to you before, Peter Blackaby is another osteopath and yoga teacher. We used to literally almost staple down the bands to the back of our clothing, to get a feel for movement through the entire back of the body. But we didn't assign any anatomy to it. We just knew that it was feel there. So when Tom came along and described that, we thought, well, he's actually put the anatomy into something that we're feeling.

Steven Bruce
I remember you were saying before we came on air that actually, for many people over the years anatomy is all about getting to the muscle and the bone and the ligaments and in most prepared anatomy, dissection of specimens, the fascia has all disappeared. And I don't know what stage, maybe Tom Meyers was the sort of the leader in this field, when people started to really take fascia seriously as part of the dynamics of the body.

Gary Carter
Well, there's an image that we have as a slide, if that could come up right now, it'd be fantastic to see it. Because the image that we see on the far side of the screen closest to you is from a book from the 1850s. And what we see are fascial compartments in that. Here we've got a dissection that we had done on our

plastination projects. But I'll leave that one for the moment. But what we see there is this beautiful illustration of all the fascial compartments of the thigh, and the book has compartments of the low leg, and then it's got longitudinal cuts as well. So it's got all of the channels of every single muscular structure. We know that Andrew Taylor Still in the 1800s was also talking about fascia. And I now just recently understood that there was another individual which I've completely forgotten the name, but he's talking about the interstitial tissues. I.e. the interstitium, which has now been named again, by a man called Neil Theise. He's a liver pathologist and written a paper a few years ago on this. And this was all happening around about the 1800s. But somewhere along the line after that, all of a sudden, these images started to disappear from the books and we started to see the kind of anatomy that we are used to seeing in anatomy books that I grew up with, which is muscles, tendons, ligaments, origin, insertions, bones, and so on. I understand why that's happened so that we're trying to simplify something. But from, and we were talking about this earlier, from Andrew Taylor Still's initial understandings and his proposals about what fascia could be, suggesting that it could be neurological, suggesting that it could be a mediator for fluid flow, suggesting that disease begins and ends within the fascia. A lot of what he was suggesting, has since been proven to be correct. And I think it's probably because they didn't have the equipment to study it. And Andrew Taylor Still had said something along the lines of, there will be more future study in the mind's eye of fascia. So he knew that at some point, we would understand it but outside of his lifetime. And we're finding that now so then there's been this renaissance in that tissue and that's been going on, really since the time of Ida Rolf, so the 1950s and into the 60s with her work of Rolfing. And how the origins of osteopathy have continued as well.

Steven Bruce
One of the things we were taught when I went through training and has pretty much been disproved since then, is this idea that we can stretch fascia. Is that still something that you find is common amongst various practitioners? Not just osteopaths, chiropractors.

Gary Carter
Yeah, there is sort of, there's conversations now around strain and stretch, then having to look into physics when we do that. So I was also, as an aside, as a hobby, I used to build race cars with a friend of mine whom used to race cars and a lot of physics came into that and we're looking at stretch and strain. If some sort of material is under a lot of stretch, it can start to lose integrity. So structural integrity of an object or the human is something that compromises its stability. So strain is something that we start to feel when people think they're stretching their hamstrings. So there's a level of strain. And those tissues are resisting, and they're resisting for a reason, not to be taken too far. However, we do know in terms of extreme martial arts and ballet, for instance, there's going to be a lot of force to the system to get as much range out of the body as possible. And if I'm working with someone that needs to do that, we will look at the whole system to find that the range works in a balanced way, rather than just one region of the body, because then the integrity is gone. But in terms of stretching it, I know this is in cadaver labs. So there's a big element missing, the living body. But as a manual therapist’s instructor and integration practitioner as well, I apply some of those techniques directly to the tissue that we see. And all I see it do is return once again. So what is it that causes the change? Is it the nervous system?

Steven Bruce
Indeed, just going back a stage there, you kind of implied that we could be damaging the structure by trying to stretch the fascia. We presumably have to work quite hard to do that?

Gary Carter
We can do.

Steven Bruce
That's fascia, I suppose there's a lot of practitioners who treat ballet dancers, I'd say yes, and these buggers have damaged their system, because they don't have the, what's the word, integrity that they might have?

Gary Carter
Recoil gets lost. And that's something that is of interest to me, as I'm getting older, got to a certain stage now I'm being asked to, from workshops over a certain age. Recoil in the system, I think, is something that's really important because bounce reduces and as people move on in their years, we start to see the juiciness of the tissue disappear. Commonly, what we know is that as people start to get to my age, I've just turned 60, is that the muscular tissue starts to atrophy a little so that there are certain degradations of muscular tissue through the ages. And somewhere through the mid-60s, it happens again, in the 70s, it occurs and in the 80s, it speeds up a bit. And what's understood is that the more muscular tissue that we're losing, the body's replacing that with more collagen, which is stiffening the system. So if we can maintain muscle density, then we can maintain the juiciness within the connective tissue as well. So we're not laying down too much collagen.

Steven Bruce
So what then can we do about it?

Gary Carter
Well, load bearing work, you know, the classic, progressive resistance training is always useful, put load through the body, this is a structure that's built to take load, it can do it through its lifetime. But, you know, here we are sitting on chairs. And this is the world that we now live in. And we've kind of developed an environment around us that the body is actually suffering for.

Steven Bruce
One of the challenges, isn't it, though, load bearing work requires doing some exercise. And given that many people's day is spent in front of a computer before they get into their car, before they sit on their sofa, finding the opportunity for that load bearing work is quite difficult, isn't it?

Gary Carter
Absolutely.

Steven Bruce
I know, we're just sort of stating the obvious here. So I'm hoping you're going to come up with some magic wand and say with five minutes a day we can show our patients how to improve the structure.

Gary Carter
Five to 10 minutes a day, you know, it is possible. But it requires an amount of exercise to be done. So I still am personal training some people as well. And I also still train myself and some of my clients, because I travel with my teaching and work as well. So especially with our project in Germany, I was away for almost five years. So I had to give my students and clients a lot of work to do on their own. And that's something I called thirty-fives, which they do 35 reps of a particular exercise. And we work that out relative to their needs. So each person is slightly different. And they send me a text when it's done. And it's thirty-fives and they're done in 15 minutes, pretty much.

Steven Bruce
Right. So how many exercises, about 10 exercises?

Gary Carter
No, about six or seven, because that's all it needs to be really, not too many. And then of course, by then if they're interested in doing more work with themselves, they'll start to seek out those kinds of practices as well. I also come from a yoga background. So multiple directions in movement is really useful because our fascial structure different to the musculature is sort of omni directional. So you know, we might see the covering of a bicep, and of course we'll see the basic grain of the bicep muscle but what we'll see is the wrappings around it and the more superficial fascial covering around it moving in every direction, that the bicep is connected to the tricep through those fascial coverings as well. So creating multiple movements is really useful.

Steven Bruce
At some point presumably that structure within the fascia is laid down in response to the stresses it's undergoing rather like trabeculae in bone, can that be adapted later in life? Or is it kind of fixed after you reach 80, 90 years?

Gary Carter
It's a constantly adaptable thing, I just see that people have certain ages. And I can't even say older, because older could be 25, just depends on how people are behaving with their body and their attitude. It's still got the ability to remodel. However, when there's a restriction that happens in the tissues and maybe that's an age type stiffening that starts to occur, it becomes more uncomfortable for that individual to move. So that's for the general public will say that they would rather not move, it's too painful. So they limit their potential to move into their environment. But gradually, if we can educate them and help them to find different movement patterns for themselves, they start finding that these tissues soften up and that can be a combination of movement work and manual therapy, because the two really go well together.

Steven Bruce
Interesting, I should get you to spend half an hour with a 92 year old patient of mine who shares my surname, is my father. Because after he broke his hip recently, he's doing an awful lot of sitting and he can't move because it hurts, but I keep trying to say to him, well, I've got new muscle in my legs, you won't get them unless you do some exercise. Chicken and egg, isn't it?

Gary Carter
I've got a slide I'll show you later, hopefully in a while of my father because...

Steven Bruce
Your father is a sprinter?

Gary Carter
He's a master's athlete. He's 86 now. And he's a hurdler and 500 metre sprinter still. Yeah, at 81 he was running a 16 second 100 metre sprint. So my brother and I can just about keep neck and neck with him. And when we're behind him, when we're running on the track, I can't get past him, I just stay behind. But there's an incredible run, he has a an athletic run. It's not an old person running around the track. It's quite incredible. But he does the work on himself. He's interested in this, he's been to a few of the fascia symposiums as well out of interest and doesn't understand it all. But he's got a good engineering brain, so he can relate it to the body that way. And he just applies five to 10 minutes of that work into his training, and it's enough for the bounce that he needs.

Steven Bruce
Yeah, we're gonna come on to that, I hope because you talked about elastic recoil when we were discussing this before the show. And if there's a way of encouraging more of that into the system, I'm sure it's going to be really, really helpful for our patients. Talk to us a bit about the basics of the structure of fascia, then.

Gary Carter
Well, the fascia is created by a cell called a fibroblast. So I guess similar to an osteoblast, where we see trabeculae being laid down, that's also happening in the fascial medium. The fascial structure is being created by the fibroblasts. And the fibroblast is, it's a cell with many tentacles simply put and quite fuzzy, bit like my head. So it's got cilia all over it, and has something called a primary cilia, which is more of a stiffen structure and their direction sensitive. So the more we start to put regular movements through the body in particular directions, the fibroblasts will organise themselves along those particular directions. And then the fibroblasts are producing collagen, elastin, and reticulin. And they're also producing a fluid base for them to live in called ground substance, so glyco amino glycans, and it has to borrow Tom Meyers' words, it's basically snot, it's got a kind of gooey mucousy kind of quality to it. And that material, that wet stuff can either have a lot of glide to it, or sometimes it can thicken and becomes a bit too sticky. What's recently understood now is that fibroblasts are interconnected, every fibroblast connects to another, one way or the other. So what we have from head to foot and skin to depth is almost a unicellular web. So we could say that within the fascial network is another connected network of cells. And they are all feeling stresses and strains and so on. So the primary ingredients are the collagen, elastin and reticulin within that fluidy network and our primary protein for the human and animal kingdom as a vertebrate is collagen.

Steven Bruce
Right. We had a question that relates to this coming just a second ago from Keith, who was asked about how hydration affects fascia, and does it need to change with age? So I suppose there's two parts to that out there. Hydration is probably important, but the other question is, how do we hydrate the fascia? Or is

it simply enough to drink whatever the current multiple litres of water per day that are recommended by the government?

Gary Carter
While you're drinking that amount of water, then you're probably going to end up spending more time in the toilet. So it's a lot of good hydration coming into the system's coming through nutrition. So what sort of foodstuffs are we going to get deeper into the system. So it gets carried into the structure better than just drinking water. But also the glyco amino glycans have got a, the nature of their structure to simplify it, it's more like moss. So it holds a lot of fluid. So think of a loofa, we have a dried loofa. And then you put that into a bowl of water, that's going to soak the water up. And that can kind of dry a little bit, the tissue becomes less hydrated, so it makes it more vulnerable. Movement is the thing that really helps the fluid to be taken up by those tissues. But also, again, manual therapies. And there are various foam rolling type practices out there. If I can mention it, my colleague and friend Sue Hitzmann, she has created something called the melt method. And she's specifically organised sort of rubber balls of different sizes. And she's created a foam roller by sourcing the right sort of foam and doing the research on the fascia to generate the right amount of hydration into the tissue, so it juices up. But we find that we can generate that in how we palpate someone's tissues without having to go too deep. I Qigong as well. And a lot of my students at the end of those sessions find that they feel quite juicy. And the movements are quite soft and flowing.

Steven Bruce
What is Qigong?

Gary Carter
It's an ancient practice similar to Tai Chi. So it's got roots in Tai Chi in a way just to simplify, so they're very soft, but repetitive movements as well.

Steven Bruce
Okay, so using the foam rollers, using movement, we can cause the fascia to hydrate itself.

Gary Carter
Yeah.

Steven Bruce
What's the best nutrition in order to provide the necessary fluid? I'm glad you said what you did, because I've always been really suspicious that just drinking water isn't enough.

Gary Carter
It's not just enough. I mean, it's useful to be hydrated, I don't drink loads amounts of water. I mean, when I'm teaching and giving lectures, I don't have lots of water at all, because I'm going to be running out to the loo a lot of the time. But you know, the foods that carry water, and so the water base foods, which are, you know, you've got good vegetation, vegetables, but a lot of the vegetable proteins that we get around as well, they will carry a lot of water, short grain brown rice draws up a lot of water if it is well cut, but not dried, but it needs to come in and be quite fluffy. This is a lot of stuff that was going on for me in

my bodybuilding world and water content foods were really important. Because we noticed it in the tissues. It wasn't just about having loads of protein. It was bringing fluid into the system that way. There's now a lot of talk on Robert Schleip, you've mentioned has been on your show, he's good to keep researching because he is right at the cutting edge of the fascial research and how we get gelatin into the system as well. And that has an effect on the collagen and then it brings a juiciness to the collagen and makes the collagen much richer.

Steven Bruce
How do we get gelatin into the system?

Gary Carter
I'm not too sure how we do that. So we need to look into get Robert back on the show for that one.

Steven Bruce
Okay, 005.6. The system gives them these names, or they give themselves I'm not sure. Anyway, 005.6 says, I've heard that the ballet dancer selection process acts like evolutionary natural selection. That it's they're selected for training because they're already hypermobile and thus can already assume the desired hyperextending joint positions. Stretching doesn't get them to that point. They're already there. Have you got any thoughts on that? Might not be something you looked into.

Gary Carter
I mean, I've worked with a lot of dancers, and I have worked with some ballet dancers that actually have suffered the price really of trying to make their body be the classical ballet dancer body and their structure is not set up for it, I can understand, I think knowing, seeing how the structure is now. And I guess in this amount of time in my life, I can understand why the selection process is what it is. Because it's not only about the person being able to perform the way that they perform, it's so that they can sustain it. But if you've got a lot of people that try to force their bodies into something that it's just not willing to go to, they might be able to have a career for a while. But the breakdown is that the fall off from that is really quick. And an osteopath colleague of mine and myself within the same year, we're both working with ballet dancers and they both had the same degree of low back pain. And when they were laying on their back and they could take hold of their big toe and bring the foot to the floor next to their head and they let it go, naturally, and the viewers will understand this, you can know what that would feel like, if you let it go, you would see that the leg would spring back again. But when they let their leg go, it stayed there. So they had taken it to such an elastic degree, that there was no more recoil. So, the low back was taking all the load to stabilise them. So we had to do very different work to bring more density into the hamstring structures. And we couldn't shorten the fascia, we had to actually, well to try to shorten it, we had to develop the musculature more.

Steven Bruce
So you, presumably, you must have an opinion about stretching advice, which is given to people and I think back to a book that I saw, must have been when I was in training sort of early 2000s, late 1990s, where the book argue that anybody could learn how to do the splits, if that's what you particularly wanted to do. I never bothered to pursue that, because I didn't really see the need to do the splits. But it sounds as though there's a point whereby at which stretching becomes detrimental?

Gary Carter
Yes, we lose some integrity, so that the musculature doesn't quite have the same power if we stretch too far. There is now some research looking into stretching before any events isn't that useful, because it can actually weaken the amplification of the muscular structure. But I think it's down to the individual. And that takes a lot of practice and learning. So it's tricky to put that as blanket ideas. If I come back to my father, just for an instance, there's a book that's just been written about master's athletes, and he's been included in one of the chapters in that. And the thing that was outstanding, Richard Asquith is the author can't remember the name of the book, just gone from my head. But the thing that he pointed out about my father is that my father's training time, over half the training time is spent in preparation and warming up, preparing the body.

Steven Bruce
Big difference in warming up and stretching, though, isn't it?

Gary Carter
Yeah, he does some stretches, but stuff that I've given him to do. So what we look at is, if I use say something like the bina band is that we will take those tissues to a point where we can just about feel it want to return and then go there and then let it return. Rather than I'm going to stay here and keep holding on to that. And just wait. So can we find where the elastic edge is and play within that edge. And for my father, in his lifetime of athletics, he's had three injuries. And he started getting into masters in his 50s. And that blew me away when I found that out, because I was expecting that he's a few injuries a year, but barely any, barely any.

Steven Bruce
It's a hard philosophy to sell, though, isn't it? Most athletes have been brought up thinking that they've got to stretch before they train. In fact, I've even come across athletes who think they stretch before they warm up, which seems even more likely to cause damage. And there must be a psychological component to doing what you believe to be good.

Gary Carter
Yes, exactly. Again, I'm sorry, I'm going to keep coming back to my father on this because at 81, he became world champion, again at 200 metres. And we were at one of these huge running tracks in Malaga. And they've got an underground indoor track as well. And this is where everyone's warming up and preparing. And I was down there with his prep, helping him with that, and then leaving him to do the rest of it. And it was the groups that were from 50 years up to 100. And it's all in five-year categories. And they were doing all the kind of warm up work that I would know to do. And after those events, he said to me go downstairs now and see what you notice. And it was the 35s to 50s group, and you could smell the testosterone. And everything that we saw was everything that we now see in terms of functional training techniques, foam rolling, using bands and stuff like that. And that was the warmup. And you could see, it was a bit like the eye of the tiger movie in their eyes. And I spoke to one of the coaches later on that evening and I said, do you think that all this new functional training, as I understand it, I'm in that world, has made any difference to the performance of those athletes compared to what has happened in the past? And he said it's negligible. On the times. He said, it's a more psychological thing. And what is the current trend at the moment? What I was told, and I don't know, I might be corrected by someone out

there in the world right now. But the biggest changes happened when they changed the track surface, and the running spike length. And that's when they started to notice sizable changes in times in running. But all of the stuff that we see going on, if it works for you, stick with it. If the mind can stick with it as well. There's a connection of the mind and body with a lot of athletes and their body already gets in tune the moment they start visualising what they're about to do, there's evidence on that already.

Steven Bruce
But of course, I mean athletics running, it's a very measurable, objective performance. And if the only thing that's changing is the psychology, you could say, well, you could stop doing it provided you can change the psychology and maybe make them last longer in their careers. I don't know. Some more questions. Cornell has said the recent research mentioned that fascia has some contractility.

Gary Carter
Yeah, so where we have fibroblasts, what's understood as well is that we have cells that are called myofibroblasts. So they don't produce the collagen, but they've got contractile qualities to them. So they are within the net of fibroblasts, but some of them have got contractile qualities to them. So their behaviour has been noted to behave like smooth muscle cells. And so they get called smooth muscle cells, but they're not, they've got a smooth muscle cell type manner to them. And that can cause a contractility to the fascia. They're responsive to hormones, so our regular muscular structures have got nerve connections to them. So I can, you know, they've got motor units and so on. But my fibroblasts are more responsive to hormonal changes in the system. And what's considered is only about 30% of the myofibroblast in the body are active, the rest are dormant so that they get quite active in wound healing. So you think about burn scars, with quite extreme burn scars, we see how the skin is quite wrapped up and wrinkles, the myofibroblasts are active so that the ones that are probably dormant have come online to bring that tissue back down. But they don't stop contracting. So they keep the skin in that pattern that we understand. So again, Robert Schleip at one point with his research team was looking at how we could go about manoeuvring the skin, influencing the myofibroblast to prevent him from contracting so much. Sorry, to carry on here, in low back pain, it's been understood that in some instances, some individuals have a higher percentage of myofibroblasts in the thoracolumbar fascia, and in the plantar fascia as well. Different to some others. So it could well be that that's the issue and so that the treatment modality will be a bit different. Problem is though we can't take a tissue sample from the body and stain it to see whether they've got them. So we need to start looking at possible characteristics that they might display and how quickly they keep having that issue.

Steven Bruce
Yeah, you said myofibroblasts are particularly susceptible to hormonal change, is that a good thing or a bad thing?

Gary Carter
That's a good thing. I mean, we're not hormonal all the time. So we've got hormones running through the system all the time. For me coming in here, the hormones are up for a bit because there's that anxious moment. So there's a different quality of hormones that are coming into the system. And then you're great at making someone feel really easy and relaxed, and the hormones are going to change in that moment.

So they're responsive to oxytocin, serotonin, and about nine other hormones that have been researched so far.

Steven Bruce
I suppose we all think though, when we start talking about hormonal changes, we think that women throughout most of their life are more susceptible to dramatic changes in hormone levels. Does that mean that women athletes, or women generally are more vulnerable to injury or?

Gary Carter
There is that. That has been looked at now. So Professor Carla Stecco as part of our fascia research group, she has been doing a lot of research into that. So fascia and hormones, and then the effect on female sports people. So at certain times, say through their cycle, then the hormones are different. And that can affect whether they get ACL tears and so on, so that they might need to temper their training differently, and the way they compete. So it's a very different dynamic to it to how it might be for the male.

Steven Bruce
Yeah, I always think about an ACL tear as being a tear of the ligaments. But clearly, there's got to be some fascia involved, which is the bigger problem, or is it that you can't separate or practically can't separate them?

Gary Carter
Can't really separate them. I mean, that's the strong connective tissue structure, I would say, connective tissue proper, however, is still got the components. It's got collagen, elastin, reticulin. And it's just got high intensities. And we now understand also that the ACL is neurological. So it's got proprioceptive qualities to it as well.

Steven Bruce
On the subject of collagen, which of course, you've mentioned numerous times, Rebecca says, you know, there are lots of collagen supplements out there at the moment, such as she specifies marine collagen, is that something that would be recommended? Are you aware of any benefits in terms of fascia?

Gary Carter
I'm not too sure, no, I mean, it's still a whole field that's being looked into. It's nothing that I really suggest to anyone at the moment. So Rebecca, I can't help you on that one.

Steven Bruce
Personally, I find the whole field of nutrition is one which is riddled with bias, and particularly commercial biases, and a lot of standard nutritional advice is based on very little evidence whatsoever. So, I'm sorry, we can't help Rebecca on that one.

Gary Carter
Yeah, sorry Rebecca. I mean, my only thing with this is that If you are going to explore stuff like that, you need to give that kind of process at least six months, and you need to chart it. I had to do that. And it was a year to two years' worth of dieting, bodybuilding training and to get that right, and that took a lot of fine

tuning. But what I did for me wouldn't have worked for my training partner. So we had to do it differently. Yeah.

Steven Bruce
And I guess with all these things, there are so many factors changing at the same time, it's quite hard to nail down, which is the one that made the main difference.

Gary Carter
Yeah, and age comes into it as well. So as we start to get to a certain age, the body doesn't respond the same way. So we then adapt to our training, but then you're dealing with athletes that way that can become quite finely tuned like a race car. And that can happen to people that aren't at top level, they still feel it.

Steven Bruce
Yeah. So on the subject of supplements, and again, please feel free to say it's not your area of expertise. And what about vitamin C and glucosamine. Lorenz wants to know about that.

Gary Carter
Vitamin C has been understood to help in collagen synthesis. So I find that that has worked for quite a lot of people, it's been quite helpful. But that was difficult to measure it exactly. But it's always a useful thing. We know that that vitamin is passing through the body on a regular basis. And we can use it, you know, if you've taken too much it gets you on the loo.

Steven Bruce
Well, yes, and that's your measure, isn't it. And actually, we've had a speaker on the programme before talking about general health saying that, you know, if you are suffering from a cold or a virus, or whatever it might be, actually you take it to overload because that is part of the process of getting rid of the bugs in the system.

Gary Carter
Our system is under a lot of stress. And you know, there's work stresses, business, same thing, business stresses, physical stress, training stress, as well, relationship stress, and so on. And right now our country's in a financial stress, so all of those things are adding stresses to the system. And then if we get some kind of element coming along with it, then whatever we're taking is never really going to cover it. So we might need to bolster the system but supplements just to caveat that, supplements are exactly what they mean, is that they supplement the diet that you have. They're not the magic bullet, food first and supplements on top.

Steven Bruce
Just one final word on that, I was very struck by a number of speakers we've had that say that the recommended daily intake of almost all vitamins is way below what it should be for any beneficial effect. We won't go into detail here. Sarah wants to know if you've got any opinions about fascia and hypermobility, the thing we did on Monday, it was about a 15 year old girl who has a nasty scoliosis, but she's also hyper mobile and is getting lots of pain. So I think that prompts the question to a certain degree.

Gary Carter
Yeah, we're dealing with collagen types. And I find this with various, I teach a lot of yoga as well, so I'll have people come along and say I'm hyper mobile. We might see the classic example of the knee hyperextends or the elbow hyperextends. They give themselves the title that they're hyper mobile, or someone's told them. But they haven't really been tested for hypermobility around the entire body. So sometimes what we'll see is that where there's extra movement at the elbow and the knee, for example, somewhere else in the system is not moving as much. So that compensated so then there's kind of investigation that starts to go on. And that can't really be done in a big class setting, that has to be done in a private one to one setting. But with the classic hypermobility, and you've got Ehlers Danlos Syndrome, and so on, then they've got different situations to deal with. And we then need to turn to the muscle. Because the myofascial element of it, the fascia is enveloping the muscle completely running right the way down to the individual muscle cells to the tufts around the muscle as well. So where we can have the musculature expanding, and if we're more into the fascial tissues, just enough, we've got an opportunity to show a few things up. But that takes a lot of work because we then need to bring in say the model of tensegrity to that where we're looking at balance, tensional forces around the entire system, so that we need to work around everything rather than just an area that we think we should because you can throw it further out of balance.

Steven Bruce
I first came across the word tensegrity probably 20 years ago, I didn't understand what it meant. What does it mean?

Gary Carter
It's a term that's coined by Buckminster Fuller, the architect, and it's basically a collaboration of two forces, tension and integrity. So tension and compression. There are some installation artists one called Kanneth Snelson, another one called Tom Flemons. And they created this fantastic set of structures that you see standing in parks and so on, which is aluminum rods with cables suspending them and they will call them floating compression. So they're basically the same thing and it's a balance of forces. That the classic toys that we see are the rods with the elastic and making the icosahedron structure, and everyone uses that saying, well, the wooden rods are the bones, and the elastic is the muscle and connective tissue. It's a model, it's a nice idea. And it does show us what's going on. I've got a similar one here, which is a vertebral structure so that we've got the, I take those out, we've got the wooden structures of the vertebra suspended with the red and the blue elastic. So they're not really touching. So you know, I can press that together, but it's springs apart once again, this is probably a nicer version of it, because we're showing some of the intrinsic muscles of the spine and so on. For the other ones, the icosahedrons are well balanced forces. And if we shorten one structure, then another structure is going to have to lengthen to deal with it. They're the classic models that are used for tensegrity. And it's a great example for a body wide balance, because our skeleton cannot stand on its own. Whenever we find a skeleton, in an archaeological dig, it's always independent bones, we don't really see any muscle or soft tissues there. So the only way it's going to stand up is to add the soft tissues to it. So it could be that if we disappeared the bones from the body, it still got an opportunity to stand because of fluid pressure. That takes me back to Andrew Taylor Still, because he was talking about abnormal pressures in one part of the body will create abnormal pressures in another. So muscle is a pressurised unit. It's a fluid structure in a tough connective tissue bagging like sausages in their skin, but multiple all around the body. And their

adherence towards the skin of the bone, the periosteum, as you know, and they've got certain points where they connect well, and then we can actually have the skeleton suspended. So bones don't really touch each other in general, and they've got space between them.

Steven Bruce
It's a great model.

Gary Carter
This is fantastic.

Steven Bruce
There are new discs holding the vertebra apart in that one. And yet they stay apart.

Gary Carter
They stay apart. You can play around with that. There is another one that's a full size one. And I've tried pushing it together. And what happens under certain force, it resists it, and it can't get them to do that. But I've got some bits of foam that I put in there. Because once we do this, it's me playing as a kid, and I put this around it, put some netting around it, we start to see something very different occur. And I use this when I'm running my courses, is that if I can put, just very quickly, hopefully this will work because I know we live.

Steven Bruce
So the netting is the fascia.

Gary Carter
Yeah, so the netting is just an element of the fascial sheath because the spine itself is actually in a sheath of multiple planes. I'll only take it down that far. But what's happened immediately is now that structure's become more stable, it's less floppy than it is down there in that. But if I put more and more of these nets, I've got loads of these, they come from wine bottles, but it makes for a more stable structure. So we have the anterior ligament of the spine. But in the anatomy books, you will always see the anterior ligament as an independent structure, but someone's stuck masking tape along the front of the skeleton. And there it is, but that's not what you find when you come to dissect it. It's just basically a bumpy thing in the middle of the body, covered in strong connective tissue. So it's a robust structure. And when we see it in that situation, we wonder how it ever moves.

Steven Bruce
I'm really glad that we've now got an answer to the question about whether drinking wine is good for your structure.

Gary Carter
Well, absolutely. It gives you good connective tissue.

Steven Bruce
Marcus has said, is there any benefit in giving patients isometric stretches? Or should we prescribe a more dynamic fluid movement to the recoil edge he calls it.

Gary Carter
I would suggest what Marcus said. However, there might be a certain circumstance where someone needs to spend a little bit of time in one area for a while, it really depends on the level of resistance that's come up into that area. There's a term that's used in fascial anatomy called densification. So it's where the tissue ends up more like Velcro. So we've got this gliding surfaces, every muscular surface glides against the next one between them, if I just use the webbing again, got another one. So one muscle and other muscle between them is what's known as a loose area of fascia. So it's a loose webbing. So where the muscular structure moves against the next one, the softer connective tissue between the two enables some glide, but in that space is a lot of fluid. And what's now understood from Carla Stecco's work is that she's found a whole group of cells that now exist in the fascia, and they're called fasciacytes. And that first came to light in the 2018 World Fascia Congress. And they wanted to call them Stecco cells. She was up for a Nobel award for this and she said, no, they're fascia structures. Let's call them fasciacytes. We'll leave them like that. So they're smoother looking cells.

Steven Bruce
That's unheard of in academia for somebody not to want their name on there.

Gary Carter
I mean, Carla's fantastic and similar to Robert, she's got such a quality to her. And what she's understood now is that they produce hyaluronan so that they create a fluid that enables them to glide. And that's quite an incredible quality, we've understood that, they don't slide on each other, they kind of glide on each other with this fluid between them. But if this tissue was to thicken, now those two surfaces aren't going to glide so well. And then the fasciacytes don't get to function so well. So as manual therapists, we will know that if we can find the interfaces between some tissues and then ask the person to add some movement to it, they start to get some motion once again.

Steven Bruce
So we can unthicken them.

Gary Carter
We can undensify it, break down the Velcro. So in some cases, just maintaining a slightly static stretch for a while if we use the word stretch, can be useful, but not taking it to a point where that person is fighting for it. I always check for the breathing, can they maintain a steady rhythm to the breath, even though they're moving towards an end range. We could consider and it's being looked into that if I was to keep going into an extreme quality of stretch, I'm sending the body towards sympathetic tuning. So it's taking it towards fight or flight? Because that's your emergency measure. So I'm going to suggest this now and maybe the audience can do this is that if you all bring your arms up as high as you can, so if you don't mind doing that, if you take your arms up as high as you can, okay, right. Now take them higher. So I asked you at the beginning, bring your arms down, I asked you to take your arms up as high as you could. And then I asked you to take them higher, and you had that little extra in you. So we've all got the

extra range. But that's only in an emergency measure. And what I see in a lot of extreme stretching, people go to that place. Yeah. And then the nervous system is being tuned up towards sympathetic tuning. So can we stay within our safe range, make sure that you've got as much room in it as possible to quote, Robert Schleip, once again, is that we have all the length in the body that we need, we just need to take away the resistance to it. That's it and it's available to us.

Steven Bruce
Difficult question, just how far to push, push your stretch, because, you know, I know so many people that you're not stretching your hamstring, unless you can get your forehead on your knee, even if most of the bend is coming from your thoracic spine or whatever. And to accept that it's a useful stretch at a lesser range than that must be very challenging to educate them that way.

Gary Carter
Yeah. I mean, you know, the question for me is, why would we just need to stretch our hamstrings. And it's interesting, isn't it when you ask someone to show me your muscles, they show the bicep. And when you ask someone how flexible they are, it's always a sit and reach test. And yet, they can cheat on that, you know, what about, there's my level of flexibility and have a look at the tricep or something like that if we're going to measure the body that way, we've got knees, so when we bend down to pick something up, we don't usually do it with straight legs, we'll bend the knees to get down there. So one of the biggest issues is that we sit and when we sit and I'm doing it right now, so sorry, guys, is that my pelvis is dropping under just a little bit. So my sitting bone is closer to the back of the knee. So the hamstring length is already shortened. And my weight of the back of especially this leg is against the chair, so that the fascial wrapping around the hamstring and between them and where the hamstrings meet the adductor magnus which they sit in a channel, all of that can densify. And the moment that densifies, if I then try to sit up or sort of stand up and go towards a forward bend, all of that tissue is stopping me from moving, and then I blame the hamstrings for it. But keeping myself in this position is shortening the structure. So then I'm creating, I'm imbalancing its tension or arrangement. So I might need to bring movement back to that.

Steven Bruce
So what's your answer then? Desks mounted in front of a treadmill, sit to stand desks or just get up and...?

Gary Carter
Stand desks. But you know, also can people get on the floor? Are they able to get on the floor, sit cross legged? Sometimes if they're at home, can they sit at home with their legs crossed on the sofa rather than sitting? I mean, not many people sit the usual way on the sofa anyway, or sit on the floor with the back against the sofa. But have the legs crossed learn to find that movement. Good friend and colleague of mine is a Pilates teacher since the 1960s. She's called Hannah Jones and she's on, aside from her Pilates teaching, she studied with an American tracker, who's now in his 80s, Tom Brown Jr. and he learned from the First Nations individuals or what we would have called North American Indians. She spent some time with the elders on the reservations and they had noticed, the elders that the youngsters can't keep up with the elders when the elders are running in the forests. And she said, well, why do you think that is? And they just said chairs. And she said, why? She said they don't squat. And they don't sit cross legged. We sit cross legged, there's no load on the hamstring. It doesn't compress it.

Steven Bruce
They're like me though, I can only do it with one leg. I can't cross the other leg.

Gary Carter
I can cross both legs or sit on the floor, that's because I want to teach yoga, I spend a lot of time doing that I'm not necessarily a lotus person, I get to half lotus, but lotus requires a quality of movement at the hip. But that movement, you can get into sitting, standing and forward bending really quite quickly. And you haven't had to do a pre stretch for any of that, it's already available to the system.

Steven Bruce
Yeah. Okay. Our audience will want to have something that they can actually use in practice. And maybe see you working through this on a real model. Should we go have a look at a real person?

Gary Carter
Yeah, there's two things I just mentioned on that then, because what I'd like to explain here is that we have the Anatomy Trains model, which is a model from Tom Meyers, where we can understand strain transmission through the system, so the body can be considered a strain distribution network. So Tom's mapped out a series of myofascial continuities that run from head to foot, I've found a few shorter continuities that are more sling based. And where we make a change in one area, we can see possible effect into the other. So I'm hoping that that will make sense on the model. But also, what's now understood from Carla Stecco's research as well and her brother Antonio Stecco, is that the retinacular, so the wrappings that exist around the wrist, especially at the ankle, they are not separate structures. Because we see them in anatomy books as white strapping around the wrist and ankle, they're not, they're part of a continuity that we show on Freia, our form. So maybe we'll talk about that shortly.

Steven Bruce
Yeah we will, I mean, the Freia thing is a very interesting thing.

Gary Carter
But so we show that on her, but basically, they are thickenings of the deep fascia. But they are now understood to be highly proprioceptive. And that makes a lot of difference to how the system is informed for motion, especially in the lower leg. And that makes a lot of difference that people that are athletes, people that are older, because they lose motion at the ankle joint. So just a couple of things that I do, they're very simple things that we can do with them.

Steven Bruce
Should we go and do it?

Gary Carter
Yeah. I'm going to bring this along with me.

Steven Bruce
So allow me to introduce Jack who's one of our regular models here.

Gary Carter
Hi Jack.

Steven Bruce
Used to being pushed and pulled around, aren't you, Jack?

Gary Carter
So what I'm going to start with Jack is to go down to Jack's left foot, and just a little bit of work on the plantar surface of the foot as well just to suggest a quality of length. A foot, as a lot of you probably know you got 26 bones in the foot, up to 33 joints, there's a lot of connective tissues in the foot as well. And of course, there's the plantar fascia. The plantar fascia itself is not an independent structure. So at Body Worlds, the exhibits, they always show the plantar fascia curled away as an independent tab of connective tissue. But it's got a muscular structure connecting to it that also contracts it as well. So that's a whole other story. However, the plantar fascia we know blends to the periosteum of the calcaneus, that is continuous to the Achilles tendon, but also it's continuous to the retinacular around the ankle as well. So they all blend into each other. So the soft tissues of the foot, the connective tissues of the foot, and the ligaments are feeling the movement of the bone and the bone is then communicating back to that and soft tissues are responding. So it's an interesting kind of give and take kind of relationship. So I'm just going to put this over here. So if you could straighten your feet, square your feet up a little bit more, please so your heels come more through the midline. This is something that we might look at in someone standing, specially in our yoga practices as well. But organising the feet in line for a while is something that can be quite useful to understand what's going to happen with the femur too. So sometimes with some people when the feet turn out and the patella is facing forwards with the femur facing forwards. When the feet come in, you might see that the knees draw inwards, but we use this as a sort of simple starting point. And as an aside to that there's more of a spiralic arrangement through the leg as well that travels up into the pelvis and towards the sacrum that is actually quite key in gait, so that the spiralic action in the gait starts to throw the sacrum forwards when they walk, but what I'm gonna do here...

Steven Bruce
Just develop that spirallic action again?

Gary Carter
Yeah, so from the departure of the foot, there's two elements to the foot that we could consider is the fourth and fifth toe, they come back to the cuboid and then relate to the calcaneus. And that's called the heel foot. And then the first, second, third toe, I've got stronger connections towards the tibia. So that's called the leg foot. So there's a divide like a gliding joint between the two, so that this side of the foot has got more of a chance to come back behind him, where the front of the foot can go forwards. And what that generates is a slight rotation in the foot. And that little rotation in the foot is then picked up through the fibula. Also the fibula is the bone which has got the strongest rotation in it, it's got a spiral in it. And that then communicates up through to the lateral hamstring, also to the iliotibial structure, which is not a separate band, because it's part of a sheath. And that whole rotation travels upwards, and you can see where Jack is going, if I just give him a little bit of motion, a bit of lift, well, and what I'm gonna ask Jack to do is just soften his knee slightly. So that's it, once he loosens his knee, I've got more communication into his pelvis. What Jack's doing there is quite common for a lot of people is that they will end up

becoming quadricep dominant, locking at the back of the knee, and I can just feel a lot of force in the system. But Jack, I don't know if you notice that if you soften your knee again, and I've got more access to your leg, your foot probably has more contact with the ground. Does that make sense?

Jack
Yes.

Gary Carter
You feel that. So just by taking that pressure off, he's got more access to the ground, so you can feel the ground differently. But people lose touch with the ground. And they put the ground in the knee or at the hip, which is why we see so much compression going on. So what I'm going to do now is ask Jack to bend his knee slightly at the front of the foot, rest heavily so that the board or the big toe board or the little toe stay down, keep your foot just there for the moment. I'm going to bring my hand under the plantar surface so that my fingertips or finger pads are coming up into the plantar surface. Some people are going to find this quite uncomfortable. Jack might grimace and I'm going to drag that back slightly. And Jack, you can probably feel it's a bit bubble wrappy. Does that make sense? And then I'm going to grab the heel and ease that back and you just follow me, don't push it. Let me lead it, all you do is follow. We're going to drag that heel back as far as it can possibly go. Good. Then you wait there just for a moment. And notice where you're landing in yourself. Notice that maybe there it goes, drift it back a little bit.

Jack
Yeah, I got myself drifting.

Gary Carter
Yeah. Now, can you bring the arms above the head just for a moment. Sometimes, it hasn't actually happened with Jack, here, but sometimes we'll notice that the arm will go up higher. In fact, what's happened is this arm's going up higher. I don't know if you've noticed that in yourself. So what can happen with this is that from where we have the superficial back line, so again, some of the viewers will know this, you've got plantar surface at the foot, Achilles tendon, gastrocnemius to hamstrings, takes us to the sacrotuberous ligament to the pelvis, goes to the sacral fascia and then up along the erector spinae. But at the sacral fascia it can switch and, in some cases, can take us to the other side.

Steven Bruce
Only some?

Gary Carter
In some, not every case because sometimes it will transfer right there along the same side. So that might be that we could find that could be some restriction in the low back, there might be an issue in the gluteal. I don't know whether Jack's got any of those things. But if it transfers to the other side, it's also going to go to the opposite latissimus dorsi and affect the arm as well. So we'll see a transference through to the arm. So we get transference and strain transference through the system. But this is an integrated network through here. Now the other thing that we can look at also, Jack, would you mind standing on your left foot, please? Yeah, so just notice how you feel when you're balancing that. Good. And place that foot

down. And now can you stand on your right foot? Right, now, which one did you find was less stable, bring your foot down.

Jack
Standing on my left foot.

Gary Carter
Was less stable.

Jack
Yeah.

Gary Carter
Okay, so what I'm going to do, square your feet up again, is I'm going to stimulate the retinacular around Jack's left ankle. Now this would usually be five minutes worth of stimulation here.

Steven Bruce
Is that fairly forceful?

Gary Carter
It's quite firm. You can see the sort of colour change in the skin, but Jack is probably not too pinchy is it? How does it feel?

Jack
That feels fine.

Gary Carter
Okay. I'm sure Jack would kick me if it's too much. What we can do with it as well and people can do this with themselves, it's actually pinch it, stimulate it, because also the retinacular is actually, it's not too far away from the skin. Under there, you know, this tissue is quite soft and flexible, that the more that I'm stimulating, I'm actually stimulating not only the retinacular, but I'm stimulating all of the proprioceptive nerve endings that exist in there. Retininacular is running from the medial malleolus. Yep, so the inner edge of the ankle, right the way round to the back of the heel structure. So we don't press between the medial malleolus and the calcaneus there, because there's blood vessels and nerves. People don't like that. So just a little bit more, are you ok with that, Jack?

Jack
Yeah.

Gary Carter
It's a bit like an ankle sock of proprioception, because the sole of the foot is also a large proprioceptive structure as well. Okay. So Jack, I want you to stand now, on your left foot. Is that more stable for you?

Jack
Yeah, that feels more stable.

Gary Carter
Yeah.

Steven Bruce
Is that an effect that's going to last?

Gary Carter
It won't, it requires regular work. But gradually, you start to find that it brings some balance to it. And what's happening, once the retinacular is stimulated, there's a communication from retinacular to spinal cord back to the muscles of the lower leg, and it starts telling the musculature, the lower leg in which order to fire, but don't use the word fire. But there's this, you've got 11 muscular structures in the lower leg, all of them reach into the foot, all of them. So everything in the lower leg moves the foot, and they've got a particular firing order to them. What we now know of the musculature of the lower leg, is that a large percentage of them have got their origin from the crural fascia, so they're connected to the crural fascia, and then they connect into the inter muscular sector. So the muscles in the lower leg don't glide in their own compartments, they are connected to the compartment, when they engage, they gather the compartment into themselves and make it much more stable. And that's a particular order in which it fires. And then what Jack was finding, and most people will find that is that the ankle becomes more stable. So it's warming the body up in a way, it's engaging the tissues ready for action. So this is now something that's been considered with athletes, before they do their thing on the sprint line, rather than bouncing up and down and doing all that warming up, to stimulate the retinacular at the ankle, retinacular around the knee, there's retinacular at the groin, and so on. And that starts to inform the underlying tissues as to whether they're ready for something.

Steven Bruce
So starting at the ankle here, is this going to be something that's going to be useful in falls prevention in the aging population?

Gary Carter
So if you think about the position that Jack's now in, is that is a common position for the ankle when people sit and stand and drive. So it's very unusual. I'm just going to do this if the camera's okay with it. For people to come and sit onto their heels and open the front of the ankle joint up. So if people can come towards these positions, whether they need to have themselves sitting onto a cushion, they might need to have a rolled up blanket or towel under the front of the ankle, the touch makes a huge difference to the quality of the tissue and when it's touching, they can relax into it. And when they can relax into it, these tissues start to give. And this is an area that we work a lot through in myofascial techniques, especially the structure integration work that I'm trained in, is to bring lift into these tissues, but to get openness at the ankle, because the moment the ankle has got some range to it, we've got more of a chance to move quicker and respond to our environment.

Steven Bruce
Another question on the foot. Maybe this is a question for your colleague, James L you talked about earlier on. In an ageing body, we get a flatter foot, more of a pes planus, bit more prone over pronation. Yeah. How is that then going to affect the body? And how do we correct it?

Gary Carter
Well, there's a lot of footwork that would need to be done. There's an enormous amount of musculature in the foot that if the foot stays in the shoe, most of its life and it's not moving, then what we see is atrophy. And once it's atrophy, where do we get our support from? We start to put it somewhere else. We are the only species really, that has a small base of support with a centre of gravity quite high up. So creating more space, length, width and muscular activity in the foot can really help for stability, and that can continue to happen as people move on in years.

Steven Bruce
Sounds like you're a fan of barefoot shoes.

Gary Carter
I like barefoot shoes, but I use all sorts of different shoes, so sometimes I run in a really old pair of Timberland boots, and then sometimes I run in the five finger ones and I've got a pair of Nike Air ones. So it's Nike. But I'll use those as well. And I run in those. So it's a combination of, so nowadays, people got all sorts of different shoes in their wardrobe. So we've got different landscapes for the foot all the time, something that does happen as people get older, is, especially if they're not standing and walking around so much is that the superficial fascia of the foot actually lessens, so they haven't got much padding anymore. And that becomes uncomfortable to stand on. So again, what they don't do is walk so much. Or they use padded shoes to walk on and then they're not getting the right support and information back, and the padded shoe causes the body to drop into the structure, rather than what the foot's got the ability to do is to give us uplift, and that's one of its prime jobs is to maintain uplift in the system. The clue's in the word stand up, it's an underneath process. Thank you, Jack.

Steven Bruce
Thank you, Jack. So this is something we could incorporate into our practices.

Gary Carter
Absolutely. And I would suggest that on a regular basis, when we're working with our clients is to add footwork pretty much all the time. Yeah, there are some key areas really, that we need to consider. And I would say the sole of the foot, the movement of the foot, keeping it active, keeping it... It's flexible, it's durable, it's stiff, and it's soft, the foot has all of those abilities to it. So can we maintain its dexterity. With that, from an embryo logical, not from an embryological, but from a developmental movement perspective, within the first year of life, if a baby's crawling, the moment they get the base of the big toe to the ground, the arch of the foot engages, and at the same time, you start to see the curves of the spine engage with it. So they're developing arch of the foot, lumbar curve and survival curve within the same year. So you've got relationships with foot to spine all of the time. So those are useful places to go to and then the cranial base. So we see in dissection, that there can be a lot of thickening that happens around the achilles close to the calcaneus. So there's lack of motion going on there. So something's densifying.

And commonly, we see a restriction in the cranial base, because the head force position is catastrophic to the structure. This maximum weight, as we know, is 14 pounds. So what's that about seven kilos or so, we've weighed the arm in a lab, and on average size wand with the shoulder blade intact, and the tissues is 10 kilos. But that's a heavy object. So if I've got 10 kilos dropping forwards on one side, and this way, dropping forwards, these tissues have to maintain it all of the time. And that's all day long. That's a habit. So we're looking to reintroduce a new habit and help to break down the restriction in those tissues, the suboccipital muscles, as you probably well know, are highly proprioceptive, they have the highest percentage of muscle spindles than anywhere else in the body. So for the baby, when they first stand, they're constantly wobbling the head around. So the wobble is something that's really useful for the system, is to gradually bring that mechanism back because that's where it's learning the most. And then the other place that we notice is the ilio lumbar ligament, from L5 and an L4 across to the iliac crest, we see quite often that that's calcified. So then L4 and L5 might as well be part of the sacrum. And then if they're calcified towards the iliac crest, then the ilium aren't moving with the sacrum when they're walking so then you've just got a fixed unit. And then we see constant compression...

Gary Carter
How reversible is that calcification?

Gary Carter
It depends on the individual. So I will have people on all fours and look at very localised movement at the pelvis. So if they can start to get a rocking of the pelvis by bringing the tail under only, or they think about that region moving only at the hip joint, rather than just going straight up through the spine to make the movement, we start to try to get some localised movement back into the lumbars.

Steven Bruce
Can I take you back to Jack for a moment and that work you were doing on the retinacular. We had a question come in from Bridget. And she wants to know, does he have to be weight bearing while you're doing that work on the retinacular?

Gary Carter
No, you can do that, usually, I work with this with all sorts of students, and I'll go through the same exercise and sometimes it's just to make a point about what's happening neurologically there. So you'd have a group of people, get them stand on one leg, on another and then we sit on the floor and massage the retinacular. Sometimes it works weight bearing. In other cases, we can just sit down and then you've got some relaxed time to massage it. And if I'm in a group, it will be five minutes because I'm talking to them to keep them busy and distract them.

Steven Bruce
So this is something you could suggest to a patient. Do this while you're watching casualty on television or whatever.

Gary Carter
And get the fingers between the toes if they like touching feet. Some people don't like to touch their own feet, but can they start massaging the foot, toe spaces are fantastic. Get toe spaces between the foot

because it just starts to generate the space in the toes that they require. The foot's got the same dexterity as the hand. We just don't use it that way.

Steven Bruce
I suppose as evidenced by those people without hands you learn to write with their feet.

Gary Carter
Exactly. For people that don't like touching their feet, a great example is to have them get toe socks because it means they've got to fiddle with the toes to get the toe socks on. So at least that gets them stimulating the foot slightly.

Steven Bruce
Yeah. Okay. Lawrence has asked whether you have any advice we can pass on to Ehlers Danlos sufferers.

Gary Carter
No, but there's a wonderful woman called Jeannie Di Bonn. I can pass information on to you about her because she has that condition. And she's done a lot of research on it and a lot of work on it.

Steven Bruce
Well, that would be helpful.

Gary Carter
She will be best off talking to you about that. And I think it will probably be good maybe to speak to her sometime.

Steven Bruce
Yes. We picked up a couple of potential guests' names from you, as we've been going through this evening. So that's very good. John's asked if there's any effects that you know of from myofascial cupping.

Gary Carter
I don't really look into that work. I do know that some people get great benefit from it. The only cupping I've had is from acupuncture practices, but it does have some effect on some people. This is the thing is that there's so many different practices out there that work for certain people and some that don't. So for some individuals, cupping just hasn't worked. But you know, from what I know, it's been quite useful. But it's, you know, I'm constantly coming from the school of thought is that once we start to work with our own body, you've got all the resources yourself that you need. And that's my specific sort of aim in practice really, is to help the individual find it for themselves. So they don't need me anymore.

Steven Bruce
Yes. You talked about quad dominance earlier on when we were looking at Jack. Vlad says, how do we help people who are quad dominant? Because as he sees it all the time.

Gary Carter
Yeah. Oh God, this is a big, we need a whole other session on that one.

Steven Bruce
We're happy with that.

Gary Carter
Yeah, we could have a whole movement session on that. So what I do with this, specifically, especially when I'm coming from the yoga perspective, I'll use some of the elements on that, which is born out of the work of Vanda Scaravelli. And what I've understood from the martial arts is where, and contact improvisation if you've heard of that, it's a movement form, where we give weight to the ground. So how do you let your bodyweight meet the ground well. So the idea of contact improvisation, which is a movement form, and a dance form, you see two dancers give their body weight to each other and roll with each other. That means total commitment of bodyweight, knowing that the other person isn't going to just fall over and get out of your way you meet each other, and you move with each other. We do that with the ground. Animals give their whole-body weight to the ground when they move, so that they move elegantly with it. Humans, for some unknown reason, hold ourselves away from the ground and our foot doesn't meet the ground very well. So when it comes through certain movements, and I will suggest maybe a squat type movement with the knees on the floor and the toes tucked under, the hands down. So it's like an all fours position, but with the bum on the heels, and then learning to roll up towards something that looks like a downward facing dog. But to give the weight fully through the rolling part of the foot, and the quadricep start to let go. But what a lot of people do is jump into the quadriceps first to brace against the movement. And it takes a lot of practice because there's some unlearning to take place. And from a manual perspective, we might need to go in there and do some work to free up the quadricep region and certain lengthening type arrangements to take out the tone. Because we see high tone. So it's how the the, I'm going to come back to the foot, is how the foot settles on the ground and where they can centralise the load. We noticed on our model, that the moment the sole of the foot open, just with quite a small move really it wasn't a huge treatment is that his body weight started to drift back, just primarily on that side. And commonly what we'll see is that the tone relaxes from the quadriceps so it's not being pulled forwards. And it's a common pattern that we see.

Steven Bruce
We've got a question here from Hannah, who is known to many of my audience as Hannah Dissector because she's brilliant when it comes to dissecting all sorts of mainly horses and dogs that she...

Gary Carter
Come on our dissections.

Steven Bruce
Oh, I'd love to. Yeah. She wants to know how you'd go about rehabbing a fracture when there's metalwork present, which is going to reduce the normal mobility of the bones and fascia.

Gary Carter
Oh, depends on the kind of metal work really, I mean, if we're dealing with someone, say, with a wrist break, and you've got some metal work in there, that's a combination of movement and manual therapy. So we're looking at the interfaces within the muscular structures and how we can generate some movement and glide within those once the scar tissues heal well. Sometimes, with some individuals, I leave them for a while with it so that the scarring happens as it needs to, because we want the stability there, rather than just let's go in there and do the body work straight away, I can compromise them. So let's make it stable first, let it scar up a little bit, let the fascial tissue densify. We know we've got a process. So we then start getting on to the process some few months down the line. And you know, if the person is engaged in that process, then they also do the work. And we start to find that they can get full range once again. I had one client who had quite a nasty fracture of the lower leg and had a rod put into that. And he got himself unfortunately involved at the end of some international football events somewhere in the world, there was something that broke out and he got involved in a fight and that leg got broken again, quite nastily, and it was one of those rotational breaks.

Steven Bruce
With the rods in it?

Gary Carter
With the rods still in it. So there was a fracture around the rod. So that affected the entire lower leg structure. And gradually, the size of that leg started to atrophy. And he used to like boxing. So that's what he did as a sport and a hobby, but he couldn't fight that way anymore, because that leg couldn't come forward. So he used to be southpaw in the lower body, but normal in the upper body. So his coaches said you just can't do this. So he then turned towards martial arts, but he was depressed for a long time, wasn't moving, couldn't run. And we gradually just started to work with all of the fascial sceptre of the lower leg. By palpation, we could feel that most of it had densified, and the musculature had atrophied a lot but gradual work on it meant that he could slowly start to bounce again. So tiny bounces like skipping but without the rope. And that sort of work is really useful for collagen turnover and fibroblast activity. And he slowly started doing more and more of that work. And what we noticed after about a year, there was two little screw head bumps appearing in his shin. So he had two minor surgeries to remove the screws because when we saw the X ray they had broken, the bone was beginning to remodel, the lump in the bone was beginning to reduce, because all of the fascial sets are from the lower leg, like spokes of a wheel going to the bone. We're beginning to change the load on the bone and the bone was remodelling. And eventually, we started to see more of a calf form once again, he has now become a personal trainer, he runs marathons and so on.

Steven Bruce
How's the boxing?

Gary Carter
He does martial arts now, he's got involved in Wing Chun, the same martial art that I do, and he prefers it. And it's all about economy of use of the body. But it's fantastic. But that took him a good two to three years of dedicated practice off his own. To do that he now knows what to do with himself. He doesn't need me anymore. He's got it for himself. Yeah.

Steven Bruce
This is slightly unusual, Vlad having a second bite of the cherry. He says, could you comment on buffalo hump? What are the fascial links there? And what's your opinions on how it can be worked with? He imagines it's a case of working far away from the site of the issue rather than directly with it.

Gary Carter
Buffalo hump? You know, I've not heard that before.

Steven Bruce
I wonder if he meant Dowager's hump or what might be called Dowager's hump.

Gary Carter
Yeah, I mean, if it's Dowager's hump then what we see really is that the habitable structure has totally changed its orientation. So where we see that that lump of skin at the top there basically where the spinous processes taking hold of the fascia has poured it up. And what the body lays down is more adipose into the fascial structure to protect it to stop the spinous process going into the skin because usually the skin up there is quite thin. So we wouldn't want a change in orientation because it's not built to have that. So it's trying to protect itself. So we would look at how we could start to bring the tissues down the back a little more. But a lot of the work is into the depths of the throat as well. So we start working towards the longus colli in places like that to gradually bring that structure back up again, along with movement disciplines as well because manual therapy is not going to cover it all. There needs to be the person engaged in the movement because their body weight under motion, and then doing the work is the thing that goes the furthest.

Steven Bruce
Have you looked into the effect of needling, I'm not saying acupuncture, not Chinese acupuncture necessarily, but...

Gary Carter
Dry needling. I've had some myself and I had a little bit of an injury on the outside of my leg. And I think that can be really useful in some cases. I don't know for the Dowager's hump of course.

Steven Bruce
In the course we ran a couple of weekends ago, one of the muscles that was looked at where as longus colli. But we're dealing with trigger points here, which are tight shortenings in the muscle, and possibly are a way of addressing that flexion in the neck.

Gary Carter
Yeah, I think it's part of a toolkit, you know, so you bring those tools out at various moments. Because we're in there for the long run, in some cases, it's quite a process.

Steven Bruce
And treating trigger points is only any good if there are trigger points to be treated.

Gary Carter
If they are, yeah, Antonio Stecco has got his ideas of what they might be. You know, when we look in dissection, we don't see anything that could be a knot in the muscle, and we don't see anything that could be a trigger point. But his work with how fluids densify between fascial layers and muscular layers is that some of those fluids can end up becoming quite thickened, quite suddenly, bit like corn flour that's gone a bit stiff. But the moment you touch that area, as it relaxes, it releases a whole group of muscle fibres that are close to that fascial structure. It's an idea.

Steven Bruce
And it is quite possible that trigger points don't exist in cadavers. Certainly, we had Professor Gerwin in here, he was saying that there is no good electronic biographical evidence to show the existence of trigger points. And of course, there's a theory on what they are and what causes them. And there's some reasonable evidence on the fact that you can release them with kneeling or with inhibition and other techniques.

Gary Carter
I agree with that.

Steven Bruce
Getting back to the questions from our audience here. Robin and this is the Robin who is a great fan of barefoot running and so on. That was one of the reasons I brought it up earlier. How do you rehab an MCP and a hip fracture with significant stiffness, no metalwork, but he's asking for a friend, he says.

Gary Carter
MCP. Can you explain that?

Steven Bruce
Metacarpophalangeal.

Gary Carter
Those are not terms I'm used to instruct integration work. Yeah, no metal work did he say?

Steven Bruce
No metal work.

Gary Carter
Well, it depends on how we start to get around the ankle joint in that particular region. But it's tricky to say really, because without seeing the individual I can't really say anything on that. Because the way that I work with people is so different, I would look at how the foot falls, the movement of the whole leg above that, and look at where the ranges are and aren't, but then go to the tissues further away to see what's happening because you're dealing with guy-wires here. So what's first of all, what's the organisation of the foot. What we see sometimes, there could be an issue to the plantar fascia. And when the arch of the foot drops, the plantar fascia on one side is going to lengthen and the plantar fascia on the lateral side will shorten quite considerably. And we might need to go there, but yet the individual is going to say, well,

why aren't you working locally to the problem, but we need to start to get the structure underneath more functional again, then we go to the next area.

Steven Bruce
One of the questions I always ask when someone like yourself comes on the show is how much of what you're saying here would be accepted or recognised by a conventional medical audience by an orthopaedic consultant or GP? Or because it all makes perfect sense to people involved in osteopathy and chiropractic and the therapies and the disciplines that you're involved in. But is it accepted more widely?

Gary Carter
Yes, and no, we're finding in surgery now, say in your traditional appendectomies is that at one time, they used to say all of the peritoneal tissues together because they just thought it's like wrapping paper. And nowadays they address each layer when they bring that together because we want glide there we don't want adhesion that then travels because that adhesion of an appendectomy can actually wrap into the psoas and we've seen that in dissection. In one of our dissections in the UK, we had a knee surgeon come in, private knee surgeon who got really excited about the work I've been doing the new sling on the leg. And he's designed a tensioning structure to help people that have had total knee joint replacement when he was doing the surgery, he was tensioning the fascial tissues around it, he could measure the tension to give that person back the best fascial structure that he could. And because he knows that taking away the cruciate ligament means they've lost proprioception in the centre of the knee joint. He creates extra sutures in the joint capsule to give it proprioception through the fascia. So in some cases it's happening and they're just not making a noise about it. It seems like the new fascial world is making a big noise about everything, the medical is getting on with it.

Steven Bruce
Sorry, it has been pointed out to me that the metacarpophalangeal joint's in the hand, not in the foot, and I always get them confused. I'm sorry. But the principles are the same I'd imagine.

Gary Carter
Okay, so yes, it would be the same. But I would then keep working into the tissues that are further away, because we know that everything that crosses at the hand, and at the wrist as well, is going to come from the forearm. But we will still look at the amount of space that we've got within the structure, first, go further away from it until we start to get local. But again, without seeing the individual, it's really difficult to be able to say.

Steven Bruce
An interesting question about the foot that came in from Keith here. I'm gonna read it out, as it's written, minus foot to spine with impaired feet, say an obese patient with flat foot or post pregnancy dropped arch. Now we're talking firm base orthotics, is that correct? Or do you think it's possible to get the arches back.

Gary Carter
There's work to be done, depends on the excess of the obesity. Some individuals, they're going to need some firm base orthotics just to be able to deal with the load that's coming down to the foot. What the

foot's trying to do is give back to it, but at some point, those tissues are gonna give, that's where stretch happens, because it's constant load in the direction that is not useful for it. And we see heavy footedness is damaging to where we've weighed an arm and a lab, we've weighed an average leg, and let's say average, I mean, you know, maybe some, that's about five eight, 20 kilos for a leg. Now, we don't notice 20 kilos when we move it around. But the moment the structure is slightly out of balance, we become heavy in the legs, and we hear people talk about that. So once that load starts dropping downwards, the structure underneath is struggling. So in some cases, with orthotics, if I can say the word, it becomes a tool. Now, again, if we're working with someone that's interested in themselves, they get footwork to do. And it's daily, because they're on their feet every day, so the foot work needs to be daily. And in some cases, we'll use the orthotics as a tool along with their footwork until gradually, at some points in the day, they can take it out, but they keep it in their bag, put it back in, and so on until eventually they start to feel more confident with it. Sorry to interrupt, I find quite commonly, again, with the person that's interested, once they start to balance well within gravity, they start to change the amount of mass that they've got on the body, because they become more efficient in the standing position. So that there becomes a redistribution of load around the midpoint. So some people that can be quite heavy if that heaviness is too far forwards, they become compromised in the movement, proprioception has changed. But if it can balance evenly around the frame, someone that's quite heavy can move like a dancer, if it's more balanced.

Steven Bruce
We've got very little time left, so it'll be quick answers on these ones. I had a question came in ages ago from Marie, with the lack of serotonin uptake in adolescent idiopathic scoliosis, does the fascia of an adolescent scoliotic teen have less collagen?

Gary Carter
Not too sure about that. But this has been an area in my structure integration works, I've looked a lot into scoliosis, and you know, the hormonal changes, and that is something that's really been looked at because the hormone dump that goes on in irregular patterns and in teenagers are going to change the tensions of the fascial structure. So you'll find that some elements of the fascial structure have got more collagen, that it's causing more contracture to the muscular tissue within it, but in another part of the spine, on the other side, there'll be too much elastin, so there's an unevenness to it. So we're trying to find by putting work into it, you know, let's use the word energy as in terms of force, then maybe the fibroblasts have got more of an opportunity to lay down more collagen and we just need to make that habit.

Steven Bruce
Gary, we're out of time you've had well over 50 slides in your deck and we've used one of them, they're all beautiful slides. Can I share those as a handout anyways to our audience?

Gary Carter
Yes, you can.

Steven Bruce
There's also information and we didn't talk about Freia. Fascia, research, education, initiative...

Gary Carter
Fascia revealed.

Steven Bruce
Revealed.

Gary Carter
Educating interconnected anatomy, so she's the first ever fascial focused full body plastinate.

Steven Bruce
We'll share the links to all of this after the show. I suspect that you've got courses we can share links to as well.

Gary Carter
Yeah, so we have a dissection course that we run at the plastinerium where we created Freia and I take people to Berlin to see her because she's on a permanent exhibition there. And then we do a week's worth of dissection at one of the best facilities in the world.

Steven Bruce
Wonderful.

Gary Carter
And we're fascialanatomylabs.com.

Steven Bruce
We will share all that with the audience in the email that goes out after the show.

Gary Carter
That's another conversation at some point. She's got 40 elements in her each runs about two hours worth of education. So it's a lot of work that we designed into her.

Steven Bruce
Thanks for your time this evening. It's been great.

Gary Carter
Thank you.

Steven Bruce
Time passes so quickly on these shows, especially when we've got a speaker as fascinating as Gary, stick with me just for a minute, if you will, to hear what we've got lined up for you over the next couple of weeks, next Wednesday lunchtime, another case-based discussion. And we have something really rare to look into. That's benign hereditary chorea. And in this instance, the patient has got shoulder pain on certain movements. So it's a great opportunity, another great opportunity for all of us to pool our thoughts about treatment. That's next Wednesday, the 14th, 10 past one until two o'clock. Then on the following

Tuesday, the 20th. I've got Nikki Scott joining me here in the studio for a session on women's health. She has been on the show before and I have to say I was flabbergasted if that's really a word that we're allowed to use in the modern age. I was gob smacked at what she explained and demonstrated in regards to helping postpartum women particularly, especially by how they're let down by the conventional care system. So looking forward to some more of the same stuff, some more great stuff from Nikki, that's Tuesday the 20th, 730 till nine o'clock. And then of course, on Saturday, the 24th Robin Lansman's with me all day for his face-to-face course on communication and consent. This is going to be quite something, it's not one of those dry days of listening to someone talking about how one word can be misinterpreted. There's practical sessions, there's video sessions planned, it's going to be great fun, as well as addressing that all important practice standard for all of us, you'll go away from the course with much more confidence in your communication skills. So if you're not already on the list, now's the time to grab one of the last five places. I haven't mentioned the dry needling course, which is scheduled for October. That's because we've having to finesse it a little bit before we put the booking page back up on the website. I will get back to that and it'll be up very soon. So keep your eyes peeled for that one. And also, of course, I did mention last time I was on there that we've got another Laurie Hartman show, a show, another Laurie Harmon course coming up. And again, there'll be information going up about that. And this one, he assures me it really is his swan song. This is his final ever course. And I'm delighted that he's running it for us. Anyway. That's it for me for this evening. Thanks again to Gary for being such a great guest, thanks to all my team behind the scenes for their remarkable efforts. And there's been some great stuff going on particularly handling these questions. Thanks to Jack for being a great model. And thanks to you for joining us. I'm not sure how many attendees we've had this evening, but it's been hundreds and I hope you feel as good about being part of this community as I do. Have a great week. Good night.