Academy of PHYSICAL MEDICINE

Transcript

Electro-Physical Agents: Contraindications With Tim Watson

Cast List

Steven Bruce	SB
Tim Watson	TW

SB: We've had tonight's guest on a number of occasions in the past. He's been brought back by popular request. He is the UK's expert on electrotherapy. He's probably the world, one of the world experts certainly, on electrotherapy. He is Professor Tim Watson, professor of physiotherapy at the University of Hertfordshire. He is actually retired, but he hasn't stopped work. He's still at the university doing at least a day a week there, monitoring research students carrying out research on behalf of various agencies and he also has a consultancy with an electrotherapy company, which we'll hear more about in a little while. I say he's retired, I mean he's been at the university I think since the dinosaurs were small. Tim, I must say-

TW: Yeah, 20 years at Hertfordshire and then 20 years before that at Brunel.

SB: It's great to have you back with us though because you're a very popular speaker and we always enjoy your take on things because you've made it very clear in the past, you take no money for what you do so people can't buy your opinion. When they ask you to do research at the university, you do it

thoroughly and rigorously and they have to take the results as they are because you're going to publish them like it or not.

TW: Absolutely.

SB: So how have things changed since you retired?

TW: I'm only working six days a week instead of seven. So that's the life of luxury.

SB: This is relevant to this evening's discussion because you are a world expert in electrotherapy, which we now have to call electro-physical agents-

TW: Electro-physical agents or electro-physical modalities, but electro-physical agents, EPA you see, electro-physical agents. And that's really because electrotherapy technically means I am putting an electric current into you. So if I do TENS to you or muscle stim, I'm really putting an electric current into you. That's fine. If I'm doing ultrasound or laser or shockwave, there's no electricity going into you at all. So in the UK, historically everything that involves a machine has been called electrotherapy. Worldwide, we're trying to move away from the term and to use the term electrophysical agents. Ultrasound is not electrotherapy. Ultrasound is an electrophysical agent. So anything which is electrical or physical or any combination thereof therefore fits. That's why.

SB: And this is a very timely broadcast, isn't it? Because you are about to, you have rewritten the book on electrotherapy, which is now called Electro-physical Agents: Evidence-Based Practice. That comes out early next year. You are the editor of the whole book. You've written several chapters in it and in particular we're going to talk about contraindications, which has been completely revised, you tell me, and which we aren't allowed to show any copies of because it's still under wraps with the publishers-

TW: It's still under wraps but it's not going to stop me. I'm just going to get shouted out afterwards.

SB: So what we can't do is we can't put something up on screen for you to read about this at the moment, but it will all come out in the wash, and we'll make sure that you get copies. So what's changed? I mean-

TW: What, on the contraindications? The problem with the contraindications is that historically if you go back, and I've got a collection of old textbooks going back to the 1940s, 1920s, they all list contraindications because every modality, whether it's shortwave or ultrasound or laser, technically there's going to be a number of times when you really don't want to do that. And that's really what the contraindication list is. And then it got expanded and they have the contraindications, "Do not do it here". And then they had the precautions, "Well you know, probably best if you don't do it here". And over the years loads of these things have just been passed down. It goes from

textbook 1920 to textbook 1928 and you're thinking, where on earth did this come from? I probably get more emails and queries a week about contraindications than anything else. Probably 80% of my email electrotherapy thing, workload, is to do with contraindication. I've got a patient with a hip replacement, is it okay to do ultrasound at their knee or I've got a patient with a pacemaker, is it okay to do TENS to their shoulder. So that's the standard stuff.

SB: So hang on, if I may interrupt, your previous book was Electrotherapy: Evidence-Based Practice, so you wouldn't have written that on the basis of old wives tales and handed down notes, would you?

TW: No, but that was in 2008 and therefore between 2008 and now, which is effectively in a writing gap is like 12, 13 years writing gap, things have changed and we've tried to, again go back myself and my co-editor Ethne Nussbaum who's over in Canada. We've gone back through every modality. We've gone back through every published contraindication list which has got evidence behind it. And we've checked with all the authors on every individual chapter on the new text. And we've just tried to work out which ones really are contraindications and which ones are precautions, be thoughtful but it's not a contraindication and which ones it's perfectly safe and when we're trying to be as least restrictive as possible. We're not being prescriptive anyway, but the smaller the contraindication list the better. But there's no way on earth I want to put, none of us would want to put a patient at risk.

So if it really is risky to do TENS to a patient who's got a pacemaker, let's just make it really clear. If it's perfectly all right to do ultrasound to somebody who's got a pin, plate, nail, wire, screw in their arm, let's get that news out there. So we went back through, it took us two years I guess, we went back through everything we could find and when we weren't sure, we went back to the original literature and when the original literature was not sure, we tried to find out where the old wives' tale... I'm sure I'm not allowed to say that, it's probably ageist and sexist and whatever, but you know what I mean, the old wives tale, where did it come from? You know? We digging, we were digging deep.

SB: It's a good job you're not in this for the money isn't it?

TW: If I was in this for the money I-

SB: Are we allowed to tell people how much you get paid per copy of the book?

TW: No, no you're not. But it's not very much. I might get a pint of beer a year, if I'm good.

SB: Well, the world of physical therapy generally is grateful for you for doing it and maybe they don't know but it's quite clear for having spoken to you on a

number of occasions in our discussions before this that actually you'd be happy to put all of this research up free of charge if you were allowed to, because-

TW: Yeah, and I do. The website at the moment which is still open access and is still free, has got everything, nearly everything that I can come up with and distribute for free. Because my view is, if the knowledge is out there, why wouldn't I share it? And I don't think it's right that people should have to pay for that knowledge. I appreciate that's a fairly liberal view, and let's leave the politics to one side, but my view has always been, if I know it, I've found it out, why wouldn't I share it? And my view is I'll share it for free with as many people who want it.

SB: So I was going to suggest to people that they put on their Christmas list a copy of Electrophysical Agents: Evidence-Based Practice, but actually you'd be better off sending you enough money for a pint of beer, wouldn't you?

TW: Yeah, send me the pint of beer in a sealed envelope.

SB: So let's talk about the specifics of contraindications then, because you've mentioned several modalities that-

TW: Yeah, we can look at some examples but the point is that there are, effectively what we ended up with was a division into, let's say the contraindicat... The contraindications are, "Absolutely do not. Whatever happens, do not." So for example, if somebody's got a pacemaker and you want to use shortwave, which is radio waves, you shouldn't do that anywhere in their body because wherever you turn the shortwave on in their body, it could make the pacemaker go wrong. We know that is true. Do not do it. All right? So that's a generic, a global contraindication. And there's actually very few of those. I know you're not going to see it properly, and the whole point is you can't so don't take a picture of the screen now, but that grid is the grid we have worked up and that's the grid I'm working to. The red dots on there, and there's relatively few of them, the red dots on there are the absolutely do nots, and we can pick on a few of those in a minute as examples. So shortwave pacemaker, good example.

SB: And presumably that would apply to internal defibrillators as well?

TW: Yep, anything which is inside the body with a battery, it's a no, don't do it. So an internal defibrillator, even a cochlear implant, anything that's internal and powered, that would be an example of a complete contraindication. There are things which are local contraindications. So a local contraindication, there's quite a lot of those, but the local contraindication says, okay, you've got... It sounds bad, like I'm wishing it on you, you've got prostate cancer or you've had... No, you've got prostate cancer, but I want to do ultrasound to your knee because you've got a knee problem. It's nothing to do with the

prostate cancer. There's no reason why your knee problem is linked to your prostate cancer. The local contraindication would say things like ultrasound, things like laser would be crazy to do in the immediate vicinity of your cancer, your tumor. But it's perfectly all right at the knee. Because if I do ultrasound to your knee, the energy I'm putting in is never going to reach the tumor. So local contraindication really means, does the energy reach the problem part?

SB: Are people worried about undiagnosed metastases?

TW: Yep, undiagnosed metastases. So if you had somebody with a history of CA breast, had a mastectomy or a partial mastectomy or lumpectomy, and they had that six months ago, and they're now presenting with thoracic spine pain, your clinical red bells, ding-a-ling-a-ling-a-ling or the red flags, whatever you call them, they're already up there aren't they? So your instinct says whatever Tim's grid says, just don't go there. Why would you put ultrasound into the spine for that patient? It could be metastatic. And that's a clinical decision and that's fine. But the local contraindication simply says, "Don't put the energy into the immediate area of..."

And we could pick on, so for example, okay, infection. So thermal ultrasound, ultrasound at high dose with a deliberate intention of producing heat would be locally contraindicated where there's an infection. If you've got an infected leg ulcer and I want to do ultrasound to your wrist for a wristy problem, then there's no way the ultrasound is going to reach the leg ulcer, it's really not an issue. Now previously, they've been listed as contraindications, but that's crazy because it's not a contraindication global, it's local. So we've got contraindications, just don't do it. We've got local contraindications, steer clear of that area and then we've got the precautions.

The precautions are the third level down and the precaution says, it's not contraindicated. There is no known risk to the patient. We are simply suggesting that you think carefully, is this the smartest thing to do? Have I got an option? All right? So for example, and again it's the orange blobs on the chart, which I appreciate people can't see but let's say nonthermo, I know we've done the infection, let's do ultrasound, metal implant, all right? Metal implant, is it okay to do ultrasound over a metal implant? It's not a contraindication. It's not a local contraindication, it's not a global contraindication, much as it's been in the textbooks in the past. All we're saying on there, because it gets a precaution is, "It's not wrong, it's not dangerous. If you've got a clinical reason to do it, do it." I would. If you had a Colles' fracture or a distal radial fracture and you add a screw or a nail or a wire or plate in there and you had a soft tissue problem and I clinically reasoned that your ultrasound would be of benefit to you and your soft tissue problem, I would do it because the ultrasound is not going to heat the metal up, that was the old story. There's no way on earth ultrasound is going to heat the metal up-

SB: Wasn't the theory that the ultrasound would bounce off the metal and that the combined interference pattern would then-

TW: Yeah, so you've got ultrasound going in and then ultrasound bouncing back out. But then the ultrasound hitting the metal is almost guaranteed to bounce off in a direction which is different to the direction you've put it in.

SB: You'd have to be holding the head perfectly stationary at just the right angle-

TW: Yeah, you'd have to hold it absolutely at right angles, absolutely stationary for about three or four hours. Then you might actually start to run a risk of damaging the tissue. Clinical reality, no problem. So that's why we put that down at precaution. So there's a whole lot of therapists out there, physios, osteos, chiros, sports therapists who have been told at some point in the dim and distant past, "You must not do ultrasound over metal." We are saying, "It is not a problem." So that's a precaution. A precaution in that we're reminding you to think logically, think clinically, but actually we're saying there's nothing out there that says it's a problem. And there's people who've done research doing ultrasound over the temporomandibular joint and there was a query about, "Oh, you mustn't do that in case it heats up the metal amalgam in people's fillings and you burn the inside of their teeth. With all due respect where the Doodoos does that come from? You know? Anyway, so somebody very kindly do some experiments and they measured the temperature of the amalgam fillings and proved categorically it's perfectly all right. So we've got absolute contraindications, just don't do it. Local contraindications, steer clear of that area with that modality for that problem. And then the precautions, think clinically but actually there's no known problems.

SB: Okay. Well, I would like to think that people are thinking clinically before they decide on a modality anyway so really that last one is irrelevant, isn't it.

TW: It's irrelevant for the smart, thinking clinician and we all hope we are one of those and we will hope we're teaching people like that and we all hope, if we're a patient, we're going to go and see one like that. There are lots of people out there using electrotherapy modalities who have not had three, four, five years training. They've not got their masters, their BSE or their whatever, their PhD, whatever they've got and they're delivering these modalities. Maybe, with some of the things we're talking about later, are things that people are using at home, buying over the counter. And that's becoming ultra popular in the electro world. Just buy it, you don't need to go to the clinic, go to Boots and buy one in Boots. So we're trying to accommodate everybody from the, I haven't got a clue through to the ultra clever PhD.

SB: Yeah, sure. And of course that's a role for practitioners advising patients who bought things over the counter, not necessarily practitioners who bought things over the counter.

TW: No, absolutely. And the patient may well say, "Look, I bought this ultrasound at Boots or I bought this TENS machine at Lloyds pharmacy, is it okay for me to use?" And they will effectively go buy the machine cheap somewhere but then they will use the therapist, the practitioner as the, can you please guide me. Now personally, I don't have a problem with that and I will happily do so. Some people take a different opinion and say, "Well look, if you want to go buy the machine that's your lookout. I'm not advising you."

I think that's wrong. Because if the patient has got the machine and wants to know whether to use it or not, then if you know the answer it behoves our clinical practice to tell them, you know? Or, "I've got a TENS machine, where's the best place to put the electrodes?" Or, "I've got a TENS machine. The instruction book says I mustn't do it if I've had a heart attack in the last 350 years. Is that true?" You know?

SB: Is the general rule that you don't do anything on a woman in the first trimester of pregnancy true or have you managed to get away from any of that?

TW: I think we probably got away from that. So on the pregnancy run across the grid, there's certainly a lot less contraindications on there than there ever used to be and I can't even find the pregnancy run, it must be on there somewhere. Pregnancy, right, so things like ultrasound, laser would be don't put it in the area at any point during pregnancy. Don't aim it at the fetus. Yeah? The baby's in there, in the warm, in the dark, in the wet, it's in there to grow. Leave the little darling alone. Why would you want to hit it with ultrasound? Why do you want to hit it with electrical stim or laser or anything else? The chance of me doing ultrasound, let's say to the low back of a patient who's pregnant, the chance of that ultrasound reaching the fetus is just about zero but if it all went wrong, if it all went Pete Tong and the patient lost their baby, it's the way I tend to look at it. If the patient lost their baby and it all ended up in court and the judge said to me, he's only going to ask me two questions, could the ultrasound have a detrimental effect on the fetus, when this lady is pregnant? My answer must be yes because we know it can.

SB: We do? Okay.

TW: We do know that's true. All right? Question number two, could the ultrasound have reached the fetus? I have to say yes because it could. What I want to say is the amount of ultrasound I've got to put in to do harm is way bigger than what I've just delivered and the ultrasound I've just delivered

almost certainly hasn't reached the fetus. He's not going to let me say that he's only going to let me answer two questions-

SB: Is there a possibility? Yeah.

TW: Yep.

SB: What does the research show on damage that can happen to the fetus?

TW: Most of it's animal research, fairly predictably because no one's going to give you ethics permission to deliberately try and blow babies up in the fetus, in the sac, but there's two levels. If you go in with enough energy, you can actually have a detrimental effect on the growth and the development of the fetus. If you really crank the energy up, you just couldn't do this with a therapy machine, but if you really crank the energy up you can actually induce an abortion. It'd be a miscarriage. But if you did therapy ultrasound at therapy ultrasound doses, which are in our normal range, even if you got close to the fetus by doing directly over the abdominal wall, which would be stupid but you could, or the low back or the sacroiliac the most you're ever going to do is have a detrimental effect on fetal development. Our argument is why would you do that? Why would you run that risk? And none of us want to. But if the patient is pregnant and you want to do ultrasound to the knee or to the ankle or to the shoulder or to the thoracic spine, it's not a problem because the ultrasound is not going to reach the fetus and therefore it's not an issue.

So in the past, what have been treated as global contraindications, we've effectively, not backtrack that wouldn't be fair, we downgraded them. So we've made the contraindications list as minimal as we can. All right? And there's a whole lot of things on the sheet, again you can't read it but it's there, a whole lot of things on there which are green and the green simply says, "It's just fine." So things in the past that have been considered to be a problem, so ultrasound was listed as a problem after acute injury, well that's when we want to use it. Why was it ever listed as a problem after acute injury? Well, because the ultrasound used to be delivered at high dose, it used to generate heat and heat is detrimental if you've got an acute injury, but now we're saying low dose ultrasound, no heat perfectly all right, so we've just applied evidence and logic and we tried to dispel as many myths as possible.

It's not going to work in that somehow I'm going to find a way of putting that up onto the website. At the moment, there's a chapter in the book about contraindications. That's part of the chapter of the book. The publisher of course wants you to buy the book. I'm saying that should be freely available, but that's the difference between my philosophy and the publisher who's got to make five bob at the end of the week.

SB: I'm guessing that's not the only thing in the book, of course.

TW: No, there are 20 something other chapters. And again, I'm not selling the book because I really don't mind whether people buy it or not, so it's not a sales pitch but the point of the book is the last one came out in 2008 so this has got a whole lot of new chapters in there for modalities that never appeared in the last one. So things like shockwave wasn't used in 2008, vibration therapy, both of which we've talked about on previous... Here. Ultraviolet therapy, some of the electrical stimulation, so we're looking at functional electrical stimulation, that's been expanded. A whole lot of other electrical stimulations that weren't out before, weren't being used before are in.

And our criteria, my criteria as editor was trying to decide the chapters, is there enough evidence to justify including that modality in the book? If it's just a fashion thing, there's no way stuff's going to get in the book just because it's in fashion because by next year it'd be out of fashion and I'm going to look like a complete plonker, plus the fact philosophically I'm not up for that. So the only things that have made it into the book are the modalities for which we have got enough evidence to justify inclusion. And I guess from my point of view, every chapter has a structure which is supposed to help the reader.

So every chapter has got a bit at the beginning about brief bit of background. Every chapter has got a bit about the biophysical effect. When I put ultrasound energy into the tissue, it does this. Every chapter has then got a chunk of evidence, which is the clinical evidence. Biggest bit of every chapter, the biggest bit is what does the evidence say about ultrasound and soft tissue injury? What does the evidence say about laser and OA knee? What does the evidence say about TENS and low back pain? And then there's some application stuff. It's not a how to do it textbook. It does what it says on the front. It looks at the evidence for the modality, but every chapter has got the same basic structure, even if they're written by a different author, so that if you, the user want to look up the clinical evidence on shockwave, you know it's going to be in the shockwave chapter, you know it's going to be section four and you know it's going to be in there and you know it's going to be the biggest part of the chapter and all the references that support that evidence are in the references. That's the whole point of the book.

So all the existing chapters, which are still in there have been completely revised. All the new chapters are in there because the modality they're talking about has sufficient evidence to justify inclusion. If it's fashion, it's not in there.

SB: Okay. For which we're all very grateful because what you're doing of course is you're looking at the research and saving us having to do it and what's more, you're able to look at the research and say, this is good or bad research.

TW: That's what I'm hoping to do. Yeah, that's what I hope to have achieved. And I'm trying to have been, myself and the other authors, we're trying to have been as objective as we can and not swayed by either fashion or advertising hype or anything else.

SB: Can the manufacturer still bugger about with the evidence and get a result that isn't actually reflective of what they do?

TW: Yeah, quite simple really. I mean, there's lots of ways. If you look at websites, and I've had two or three emails this week about product X, I'm not going to say what it was, but product X, they're saying on their website, nah, nah, nah, nah. So I go on the website and have a look and it says, "Oh, after 20 years of extensive medical research" and I'm thinking, "Oh crikey, I've missed all this then." And you go rummaging. And actually there's nothing on there. So you ping them an email or you ring them up and they say, "Oh well we haven't published any of it, which is why you can't find it." And then I'm saying, "Well can you tell me what it says?" And then they're saying, "Well no because it's confidential." Come on. If it's research and you're claiming that research support your modality, your machine, publish it, tell us what it is.

SB: There's only one reason not to, isn't there?

TW: That's what one is led to believe. But what they are hoping is, or sometimes they put references on the website or references on their advertising, blurby colorful thing and they're hoping that by putting the references on there, you're actually not going to go and look. You're just going to be convinced that they've got research because on a number of these, and I just love doing this because I'm a pain in the botty, on a number of these things you go down their reference list and none of the references on their list actually say what the advert is claiming.

They could just reference these for a different... Or not even a different topic but just not the same thing as what they claim. You know our machines stimulates an increase in blood flow and they give you five references and none of those are about that modality, with that machine stimulating blood flow, they're just five references they hope you're not going to look at.

SB: But a systematic review we can rely on, can't we?

TW: I wouldn't rely on a systematic review, partly because most people when you get a systematic review only read the abstract, which is fatal. I appreciate why because if I'm reading a systematic review of course I read the abstract and if it wasn't my job, maybe I wouldn't go digging but the systematic review can come up with some really skewed answers. They're supposed to be the top of the evidence hierarchy. They're supposed to be the most believable with systematic review, meta-analyses, supposed to be up at the top there.

I'm not suggesting this is done deliberately, but it's possible that you can change the outcome of a systematic review by changing your inclusion exclusion criteria. So let's just say, we did one recently on the effect of manual therapy in... What did we do? Chronic tendinopathy. So is there any evidence that manual therapy has benefit in chronic tendinopathy? Right? And that was a genuine review we've done and that's not the topic for this evening, but I'm just using it as an example. Before I do the review, I am supposed to decide a priori, before I've even looked at the literature, I'm supposed to decide on my inclusion criteria and my exclusion.

So let's say for example, I make an inclusion only randomized control trials. All right? Okay. Tick. Only articles published in peer review journals. Tick. Only articles published in English or whatever your criteria are going to be. And therefore then when you do the search and you apply your criteria, always read these things, it says, "Oh, we started off with 1,743 articles and we came down to five which met our inclusion criteria." If you change one of the inclusion criteria, you can change which articles you end up with on your review and therefore the conclusion you reach is based genuinely on the articles you've reviewed systematically, but the articles you've put on the table for review are massively influenced by your inclusion exclusion criteria.

SB: And you're suggesting that potentially somebody could adjust their inclusion or exclusion criteria after they've seen what the results might have been?

TW: Yeah, I mean I did the teaching session with a group of research students and we did it as an exercise just to see what would happen and by changing the criteria it changed the number of the number and the papers that were on the table and therefore we changed the outcome of the review. And review one was entirely supportive of the intervention and review two, same title, everything else is the same, fiddled with the criteria was not supportive and therefore the assumption that a systematic review is independent and objective should be true and I would just love to believe that that was true of every systematic review, but if I was a dirty little critter and you were a rich person with a company trying to sell product X, if you put enough-

SB: I wish one of those two things was true.

TW: Well, I'm glad I'm not a dirty critter, I wish you were rich for your sake, but if you put enough money on the table, it's possible that somebody could construct a review to give you the answer that you would really love to get into journal X and it would appear pukka. It would appear absolutely straight. Because most people are not going to sit there and evaluate the inclusion exclusion criteria, they're going to assume that the author has done it straight. And I'd love to believe that that was true. All I'm saying is it's got to be possible to skew the outcome.

SB: So when you look as a systematic review, can you spot when those things have been manipulated?

TW: Yes because I do that morning, noon and night and that's not showing off, it's just because that's my job. That's what I do. And therefore, I probably miss some but I think I would pick up the obvious manipulations. Yeah.

SB: Yeah. You said earlier on, I think, you look at something like, you download something like 50,000 papers a year or-

TW: It's 10. I probably download 10,000 a year. I don't know how many I scan.

SB: Sorry, it's 50 bucks of paper if you don't have access.

TW: Yeah. $50 a paper if you don't have access at the university, which gets really quite expensive. So I probably download, read in terms of PDF files, probably the best part of 10,000 a year. This is not very retiree, my retirement, is it?

SB: Well, we are very grateful, as I said.

TW: And on the Twitter feed then ... and again I think we talked about this on some previous occasion, but on the Twitter feed I try and put out every day, it doesn't happen every day but most days, I will put out two new papers. Not mine, but two new papers that I've found. They're always from this year. One of which will be a review and one of which will be an original piece of research. So today's original research was using shockwave in chronic low back pain.

All right. It goes out there. It's got the title, it's got my ... because you've only got 200 characters so you have to write a really tight summary of the paper, give the reference bit link so you hit the link, you go straight to the paper. And people say, "Oh well there's no evidence for these electro physical modalities." How can I put a review up every day and a new piece of research up every day if there's no evidence? It's not all brilliant. Some of it's pants and I don't cherry pick the evidence. If there's evidence out there, it says we tried TENS in plantar fasciitis and it didn't work. I'll put the paper out there. So I'm not cherry picking to make electro look brilliant. I'm trying to let people know what the evidence is.

SB: Just a quick aside here-

TW: Sorry, that was way off track.

SB: No, no, no not at all. People are already saying how much they're enjoying your delivery as much as the content, but has the evidence for interferential changed at all?

TW: It has, but not in the kind of way that we're typically using it.

SB: I ought to perhaps remind people, I asked you about the evidence for interferential on one of our previous shows and you just said there's bugger all.

TW: Well, it's pretty low. Of all of the modalities that we've got out there, it's probably one of the lowest ranks in terms of how much evidence we've got. In the last two years, there has been some new material coming through. People are re-evaluating it because they're saying the way we used to do it, 10 minutes once a week, was just a complete waste of time, which is true. If you do enough of it at appropriate settings, it does have an effect and I think the research in the last couple of years reflects that change in practice and therefore the change in research, but it's still weekly evidence compared with other intervention compared with TENS or compared with muscle stim or compared with almost any other kind of electrical stim, it's the weakest evidence? I wouldn't write it off but it's not good.

SB: Just to clarify, weak evidence doesn't mean it doesn't work. It just means you haven't got any evidence.

TW: No, it just means there's a lack of it.

SB: Yeah, okay.

TW: So evidence of absence, absence of evidence. We've got an absence of evidence. We just haven't got the stuff rather than we have got the stuff and it says it's pants. That's not the position we're in. We just haven't got very much on interferential. Historically what we've had has not been good research and it's effectively said that interferential's a waste of space. The stuff in the last two, maybe three years is beginning to say, if you do it and you do it enough, probably got some benefits, but I still-

SB: But you said that about ultrasound as well, didn't you?

TW: Yeah.

SB: Because you said that the trend towards domiciliary ultrasounds, so people buy them and take them away has improved outcomes-

TW: It has improved the outcomes, yeah.

SB: ... because you're doing it once a week in a clinic for 10 minutes-

TW: Well, it is a waste of time. You might as well just look at the tissues and blow it a kiss. It's a waste of time. Ultrasound once a week or ultrasound once every three weeks. It's just never going to work but if the patient takes the ultrasound machine home ... I didn't bring one with me, but we've waved them around before, domiciliary ultrasounds, the patient is doing the ultrasound at home every day.

The therapist is working out what the dose is, tells the patient what buttons to push to make sure the dose is right, but the patient is doing the delivery at home. We do that with TENS. We've done that with TENS for the last 30 years. We do that with muscle stim and it's now expanding to other modalities because you don't need the therapist and the clinic in order to deliver a safe and an effective ultrasound treatment.

You need to know what to deliver and the therapies can spend five minutes max teaching the patient how to do this. Patient takes it away, patient does it at home. Then they will get the right amount of the whatever the modality is. Then it's got a fighting chance of working. I think that's brilliant. People are saying, "Oh you're taking away our trade." Your trade is not rubbing an ultrasound. "Oh if that's my trade, then I'm going to quit. I'm out of here."

SB: Your trade is making people better, isn't it?

TW: Yeah. So when they come in to see me in the clinic, I'm doing the things that can only be achieved in the clinic, whatever that might be. Manual therapy, stretching, PNF, whatever your penchant ... acupuncture stuff. If they can do the TENS at home, if they could do the interferential at home, if they can do the ultrasound at home, enable them to do that. Lend them a machine, lease them a machine, sell them a machine. I don't care which way you do it, teach them how to use it. The patient goes home, do that at home, save the clinic time for the clever things that happen in clinic.

SB: Tim, predictably, we're getting lots of questions early given that it's you on the show. Can I ask a couple now? Well, one of them is an observation really, and whoever it is hasn't given their name, but they say-

TW: That's a clue.

SB: They say, did Tim really just say, "Where the doo doo's?"

TW: Yes. I probably did.

SB: Hubby and this lady are pissing themselves laughing and we're told to get you back again.

TW: No I've retired, this is the last one.

SB: Yeah, you said that last time.

TW: I know.

SB: And apparently we've had several people ask about ultrasound scanning of fetuses because clearly there must be a difference with that.

TW: There is a difference. The ultrasound energy is the same ... And again, it's a popular question. The ultrasound energy is the same. When I'm doing therapy ultrasound, I'm sending the energy in at relatively, compared with ultrasound scanning, it's a higher dose and I want the energy to go in and stay in to have a therapy effect. In an ultrasound scanner in sonography, number one, the dose is lower, so the amount of energy being pumped in is way lower. Number two, it's very, very pulse. You send in a tiny little pulse of energy, then you wait for the reflection before you send in another one. So the amount of energy going in is smaller and you deliberately scatter the beam into the tissue to get lots of reflection. I don't want scattering, I want it to go in and stay in.

So the energy ultrasound is the same. How it's delivered and the level at which it's delivered is different. My level is therapeutic, relatively higher level of energy to achieve physiological change. Your sonographer or your person using an ultrasound scanner is going in low level, very pulsed, big gaps, scattering it in and there is no direct evidence that says an ultrasound scan has a detrimental effect on the developing fetus.

It certainly reaches the fetus. Of course it does, that's how you get the picture, but there's not enough of it to have a detrimental effect. There are people out there who are saying it could and there are people out there looking to see if there's any link between having lots of scans and abnormalities of development, abnormalities of birth or occurrence of Asperger's or whatever. People are looking at those kinds of things just in case we've missed it, but at the moment there's nothing that links ultrasound scanning with detrimental effect on the fetus.

SB: How long has ultrasound scanning been around?

TW: Probably 40 something years. 50 years.

SB: As long as that? Wow, okay. So there should be a good body of evidence for-

TW: There should be a body of evidence.

SB: Correlation of-

TW: Yeah, if there was a correlation, one would hope that it's been picked up by now. And again, there's been little murmurings every now and then, but every time people have taken a serious look ... unless I've missed it and it's not directly my field, but unless I've missed it, there's really nothing concrete that says you're putting the fetus at risk by having a scan. Nothing.

SB: And I guess the only reason I pursued that a little bit there is because what we don't want is anyone watching this to go away and say, "Well the only thing is they haven't actually proved a link between any of those things you

mentioned," but actually the evidence really is biased towards there being no potential for damage.

TW: There's no correlation in that there's no link that people have recognized and furthermore, people have deliberately looked. So it's not like they said, "Oh well if it was going to have a detrimental effect, it'd be obvious. We'd see it." They've actually gone to look, so they've gone out of their way to look for detrimental effect and not found them.

SB: Fiona has asked a question about cancer and ultrasound, and she says ultrasound is used to start detection for cancerous growths, but surely from what you said, that's a contraindication.

TW: No, because the ultrasound ... you're looking for a cancerous growth is just like ultrasounding a baby in that it's low dose, it's scattered and it's designed to reflect to give you a picture-

SB: Just looking for a picture rather than to do anything to it.

TW: Yeah. So I would not put ultrasound deliberately ... at therapy level with a therapy machine, I would not put ultrasound into cancerous tissue, tumorous tissue or questionable tissue because it could just have a detrimental effect because ultrasound stimulates cell activity. It stimulates cell growth. Therefore in theory, if you put it into a tumor, it will simply make the tumor grow bigger and faster. Fairly not smart but what Fiona is talking about there, it using an ultrasound scanner, so just like a fetus, perfectly safe. Not enough energy to stimulate growth in the cancer.

SB: You just talked about ultrasound stimulating cell growth. I remember some years ago, where people used to say that the whole benefit of ultrasound was down to heat generation, the thermoelectric, thermo-

TW: Yeah, physical thermo, yeah.

SB: Is that no longer ...

TW: Well, it varies around the world. Ironically, I find this really incredible ... it shouldn't vary round the world because the people in America and the people in Sweden and the people in Australia, in the UK, we've all got access to the same evidence, so therefore why would there be a difference? But there is, so the PTs, the physical therapists in America will very commonly use ultrasound with the deliberate intention of heating the tissue. Whereas in the UK that's almost never, I just use them as polar examples ... almost never use ultrasound to heat the tissue.

SB: I thought the evidence said that it didn't heat the tissue.

TW: It heats the tissue, but not enough to make it worth doing. I've got some slides, but they're not here, are they? If I apply ultrasound to you, your tissue temperature, if I put enough energy in, your tissue temperature will go up, you will feel warmth. The amount of tissue temperature change I've got is probably, based on all the evidence we've got because we've measured it a lot, is between about one, 1.5 degrees C, enough for you to feel it, not enough to reach a therapeutic effect.

So the therapeutic effect of heat and it was the research I was talking about last time I was here I think, you probably need three degrees, four degrees C change. Whatever your tissue temperature reads now, I need to raise your tissue temperature three degrees, four degrees to make that therapy effect worthwhile. So the ultrasound warmth you will feel but it's not reaching a therapy effect. So in the UK-

SB: It's like walking into a warm room or something.

TW: Yeah, you might as well stick a hot water bottle ... in fact, a hot water bottle wrapped in a towel will actually do more thermal good than ultrasound. We published that study in 2000, I don't know when we studied that, 2008, 2007, we published that one. Yeah, purely because people were using ultrasound as a heating mechanism. We said a hot water bottle is better. 50p down at the market is better than an ultrasound machine, not 50p down at the market. And we just did the trial to prove it and categorically that's true.

If I want to heat the tissue ... and I love heat. I've just done a whole section on heat in the book. I've just done a trial on heat. Heat is great but you've got to do enough of it to make it worth doing. If you only fid ... I nearly said fiddle fart but I can't say that, can I? If you fiddle around at the bottom end you feel a little bit of heat but it's not going to get you a therapy effect.

SB: So people have asked about the book and when it's coming out. It's coming out early next year where all this stuff is in. And it’s called Electro-Physical Agents: Evidence Based Practice.

TW: That's the title of the book, yeah.

SB: And they'll look for it sometime in January.

TW: Certainly when it's out, I'm going to ... I don't self advertise very much, but I'm going to put it on the website.

SB: Yeah, we will too.

TW: And I'll let you know, and you can let people know. And it's not because I'm trying to promote sales because I genuinely don't care, but if we've made the effort to write the book and people are interested, it's there.

SB: Well, you wouldn't have written the book if it wasn't decent information in the book.

TW: We've culled anything which is spurious, anything which is hearsay, anything which is not concrete and we can't prove it, we've taken out. Or we've made an explicit statement, this is widely claimed, but we can't find any evidence, it's a goner. The publisher wouldn't let me actually say that, but that's what we've said.

SB: And as you said earlier on, you're only going to make a pint of beer out of it anyway per year, given how many thousand sales. So it doesn't make any difference to you.

TW: Absolutely.

SB: Let's have some of the questions, because there's quite a lot here. Again, somebody who's anonymous asked about pacemakers, which you mentioned earlier on. And they've asked, does that mean that laser is also contraindicated for patients-

TW: No, laser's fine. Laser will make absolutely no difference to a pacemaker whatsoever. So therefore, if we took the liberty of looking on their electronic device and laser and it says S for safe, absolutely fine. So I'm not just making it up.

SB: So you could stick it directly into the peacemaker and it would make any difference.

TW: Yeah, it wouldn't make any difference because of the energy you're delivering is light energy. The only thing that is going to put a pacemaker at risk is electromagnetics so radio waves, microwaves, electrical stim, probably not the smartest thing in the world, and things like ultrasound mechanically could make the pacemaker go wrong. Laser will make no difference. So if I had a pacemaker and the pacemaker unit was there, the wire was there, the battery was there, I could shine a laser directly over it forever, it would make no difference whatsoever. Which is a good thing if you want to use laser.

SB: Okay. A couple of people have actually asked about shortwaves because you mentioned those earlier on and you said that they were contraindicated for a pacemaker. What do you mean by shortwaves? What are they used for?

TW: Continuous shortwave was used historically as a modality to produce heat, significant heat, genuine ... it's gone out of fashion, but it worked. Pulse shortwave, which people tend to know by the name of the machine so things like Megapulse, Diapulse, Curapulse, but they're just names of machines. Pulsed shortwave is the same energy, radio frequency energy delivered in low energy pulses, but it's still radio frequency.

But it's good for acute legions. It's good for swelling. It's good for hematoma. It's good for muscle tears, so in those kind of treatments where you've got radio energy being delivered into the tissue, even if they're putting it in at the knee, that radio energy is not confined to the knee. Unlike ultrasound, isn't going to go past the knee, but radio energy put in here could easily reach the pacemaker. If it reaches a pacemaker and the pacemaker then goes wrong, which is what's likely to happen, then fairly serious consequence. There was an experiment-

SB: So is this useful then if you can't target it precisely, if it's just going everywhere?

TW: Oh, you can target it precisely, it just spreads once you hit that tissue, which is what you want to do, you just can't stop it spreading thereafter. There was a study, and I nearly got ethic's permission to do it because the current guidance says, a patient with a pacemaker should not be closer than three meters from a working shortwave machine. That's not logical. That is so not logical.

SB: You're walking around the streets, you must come close-

TW: Precisely. I'm sitting here in outpatients in hospital X. There's a wall behind me and just the other side of the wall is the physiotherapy department where they are using a shortwave on Doris who's got OA knee. All right? I'm sitting here less than a meter away from the shortwave. I've got a pacemaker. The shortwave goes on. I do not die. The shortwave's coming through the wall, no problem. So therefore the three meter rule is pants. It can't be true.

Anyway, so the experiment was you get a shortwave machine in a nice big room, at one end of the room, and you point it into the room and you turn it on. You get people with pacemakers who walk towards the machine and they see how close can you get to the machine before your pacemaker stops. Now you do it in a pacing clinic, so once it stops you just start it up again.

SB: I was going to say, where do you get the ethical clearance for this?

TW: That's what we couldn't get. The ethics committee understood why we wanted to do the research and they nearly gave us permission to do the research, but they blocked it at the last minute. So I don't know the answer. But there are certainly patients with pacemakers who can stand less than a meter away from a shortwave machine that's working. They do not die.

But some pacemakers are more sensitive to interference. Certainly the older ones, and some shortwave machines give out a lot more interference than others. So therefore the safety guideline says if the patient's got a pacemaker, don't hit them with shortwave. You wouldn't put them next to a microwave either. They'll die.

SB: Yeah. Okay, good. So we cleared that one up.

TW: Lots of pain relief. It just not very good on your insurance policy. Don't write that one down.

SB: So what have we got? Right. Robin and one other has said something about Twitter research posts. Could you do what you're currently doing for electrotherapy research for osteopathy and chiropractic when you retire?

TW: Oh sure, yeah, yeah.

SB: When you retire from your retirement.

TW: When I retire properly. Interestingly, I did get asked that because there was a message that came up on the Twitter ... oh no, it wasn't on there, it was on the forums, the electro-physical forum. I think we talked about that before as well, which is an open forum discussion because I just can't answer every email I get. I set up the electro-physical forum as a place where people can ask questions.

It's panel of experts who help to give the answers, myself included, and everybody from the user group, from the community. Fine. And somebody said on there a question about massage and how does massage work to relieve pain or something. And there was some stroppy answers about, "This is an electro-physical forum, stop asking questions about massage." And they said, "Well those forums don't exist for massage and for manual therapy and for exercise therapy. Tim, can you set one up?" Sure. Yeah, I've got nothing else to do.

SB: Where's the electro-physical forum?

TW: It's electrophysicalforum.org. It's open access. It's free, just like everything else I do.

SB: Yeah. Brilliant.

TW: Can I slurp while you read the next one?

SB: Yeah, please do. I've got to pick from quite a number here. Somebody, no name again ... People, give me your names. False references, this is about. So, sorry to get onto a controversial topic, but how do the Advertising Standards Agency allow false references, unpublished research when we can't claim to treat things we actually do treat but only have anecdotal evidence for the-

TW: Well, the Advertising Standards Authority will clamp down on these people if they get caught. But someone's got to complain. And the Advertising Standards Authority have got to then spend time investigating and if they

investigate they will tell them off and they'll say, you're not allowed to put that advert up, or you've got to take that webpage down? So if it's pointed out to them, they will clamp down. I couldn't do it. I couldn't put claims up on ... Well I suppose I could on the website. I don't, but yeah.

But there's plenty of false advertising out there or misleading adverts. But even when you see it on the telly, in the white writing at the bottom of the advert it says, nine out of 10 women prefer X over Y or Nurofen gel relieves pain in 99% of people. And you read the bit that you're not supposed to be able to read at the bottom of the screen that says based on a survey of 37 people in 1902 or whatever it says. That's the bit they don't ... But once they put it on there, they've got themselves in the clear.

SB: You might not be able to express an opinion on this, but last week I was out videoing a craniosacral osteopath because we're not allowed on our websites to advertise that we treat babies for colic or reflux and things like that. And yet, any craniosacral therapist, osteopath or the equivalent chiropractor will say that they can treat those things effectively. Now, the chap concerned is probably one of the leading practitioners in this country. And he carried out a pilot study on 28 patients. They were randomized into two groups. One got no treatment and they knew they were getting no treatment because there's no real way of blinding it.

TW: It'd be difficult to blind it.

SB: Yeah, and the other group got craniosacral therapy and it was a pragmatic study. So it wasn't based on, oh I'm tweaking this particular mechanism, I'm just doing something. And every single one of the babies in the treatment group got better.

TW: Right.

SB: To varying degrees and it's-

TW: But there was improvement.

SB: There was improvement, a statistically significant improvement with P values of .0001, .0005 or something. So people who know about those things will say that that and double-ended, two-tailed, whatever it is. So they all got better. And nobody in the other group got better. And two of those in the control group actually had to go to hospital because they got so much worse. And the Advertising Standards Agency won't accept that pilot study. But surely ...

TW: The Advertising Standards Authority, and I've just been in a fairly prolonged legal ding-dong with them-

SB: Oh good.

TW: No, well I wasn't trying to get ... I was being called as an expert witness. Basically they've changed their modus operandi and they've changed the level of which they're prepared to accept evidence. The problem is if you've got a machine ... So I've got machine X and I want to get that into sales in the UK, I have to get through the medical devices agency. It has to be shown to be good enough and safe enough and evidence enough to justify me selling it in the UK to people who are going to buy over the counter.

The Advertising Standards Authority used to say, if it's got medical devices' tick, then up to a limit you can claim it's going to work. They're now changing their rules. So the Advertising Standards Authority now say, if it's not published, then we're probably not going to allow you to use that evidence. Whereas they used to say, if you've done a trial in-house of therapy X against therapy Y and you can show us the results, they used to accept that. And now very rarely are they accepting that. So they've changed their goalposts. So two years ago, that study would have been allowed as part of a claim and now it's not.

SB: Well for the benefit of the craniosacral osteopaths and chiropractors out there, that video that I made last week should be in final post-production in the middle of January and we will be putting it on our website so you can use it to advertise your services by just referring people to us rather than your own site, but we'll come back to that. We're getting around the rules that way. And it's going to be good.

No name again. Shockwave, what's the evidence for shockwave therapy in reducing scar tissue and for soft tissue healing please? Did we cover this last time?

TW: We did cover this last time.

SB: Has it changed at all?

TW: No. There is preliminary evidence. Shockwave have strongest evidence in the tendinopathy world, which is what we talked about and when I last counted up, and I've just done the shockwave chapter in the book so I know what I've just counted up, I think I counted 33 other applications for which shockwave is being evaluated, right through from bone healing to dental, and no one is putting one of them in my gob. Thank you very much.

Erectile dysfunction. No one's going to put it down my trousers either. But, a growing body, 30 odd, 32, 33 other things. There is some evidence about using shockwave at low dose on soft tissue injury. At the moment I would say that was fairly preliminary. A bit scopy. Does it look like it's going to work? If it looks like it's going to work, let's go full hit and do a big study. It does look like it's going to work and for scar tissue. Certainly for chronic scar tissue, couple of preliminary studies, they're almost at pilot study level in terms of

low numbers, it appears to make the scar tissue more mobile, less adherent. So it's basically stimulating remodeling. That's what it's doing, the same as ultrasound massage, stretching, PNF and all the other things.

But those are examples of studies which are indicative. I certainly wouldn't sit down here and say yes, shockwave works on scar tissue because the amount of evidence we've got and the quality of that evidence is not strong enough yet to defend it. I'm saying there is some preliminary stuff. It looks interesting. My hunch is, when we do some decent research on it, we're going to find it works.

SB: And probably I should refer people back to your previous discussion, your previous broadcast with us. But there are two types of shockwave?

TW: Yeah, there's focused and there's radial. So the focus shockwave, basically the energy gets more concentrated as you pump it into the tissue. So there's a point in the tissue, maybe two centimeters, maybe three centimeters in, where that energy comes to a concentration point. That's where shockwave started doing the kidney stone, blowing up kidney stones and all the rest of it.

The other kind of shockwave, sometimes, well most commonly called radial shockwave, more properly called radial pressure wave, radial something wave, you are putting the energy in, it's at its most concentrated at the skin surface and that energy spreads out in the tissue. So one is coming to a concentration, has a more destructive effect. One is spreading out in the tissue, not destructive, but stimulates cell responses.

So the things like the scar tissue is done on radial. Stuff like the soft tissue injury is nearly all done on radial, there's some lovely work being done on spasticity in adults and kids. So they're putting the shockwave on the spastic muscles. You've got a ... plantar flexor, gastrocs, hypertonicity, central nervous system, post-stroke. You put the shockwave on there, not focused. It's radial. Bang, bang, bang, out into the muscle. The spasticity reduces, you can do that 20 different ways, that's easy. A week later, a month later, three months later, the spasticity still hasn't gone back to its start point.

Now that starts to get really sexy because you could do an intervention, a treatment which lasts for some minutes and as a result of which that patient could have two months, three months of reduced spasticity from their central nervous system. Now that's brilliant. We just need some more research. Well, we need more research on lots of things. The scar tissue, the soft tissue injury and the shockwave, which is what you actually asked me about, yes, we've got preliminary. Yes, it's indicative. Yes, it looks like it's going to work. Yes, we're using radial. No, there's not enough yet for me to sit here and go paper paper, paper, paper, there's the evidence. We haven't got it.

SB: Okay.

TW: Read me another anonymous one. They're more fun.

SB: Well, Stacey Borne says that she's looking forward to the book.

TW: Oh right.

SB: And someone else has asked what the name of the book is and what the website ... The website is still electrotherapy.org?

TW: Website is electrotherapy.org, yeah.

SB: So electrotherapy.org. That's loads and loads of free stuff from Tim on there with loads and loads of background information. The book we've already put up and we'll probably put up again on the site at some point in the near future. On the topic of fractures, says somebody. Do you know whether magnets help heal fractures? I was told, says this person, that hospitals are using them for delayed union these days. Not to worry if you don't know because it's a bit off topic.

TW: No, I do know. And yes, they do work and yes, they are effective. They're not widely used, sorry, my leg's gone to sleep. They're not widely used. A limited number of very specialist areas, specialist clinics. That's probably 1966, chap called Bassett, Bassett and chums. 1966, another one, Brighton, his mate. They were using magnets way back and really good effect. But you've got to put the magnetic energy on for long enough a day to actually make it worth doing. If you just wave a magnet around, get the kids' magnet out the toy box and wave that around over a fracture, no chance.

SB: So magnetic bracelets and stuff like that.

TW: Yeah, magnetic bracelets, not a hope in ... I nearly said doo doo's again.

SB: We're talking monstrous magnets here.

TW: Oh no, we're talking chunky magnets, we're delivering a fair amount of juice. And they're doing that for a long time, prolonged. So most of those specialists units are either leaving it on overnight, that's the common way. You send the patient home, with this magnet and they clamp the magnet on over their plaster overnight. And then in the morning they take it off. So you've got magnetic energy going into that fracture for six, seven, eight, 10 hours a day, every day. And that is capable of stimulating repair.

SB: What's it doing?

TW: It is basically, well it's just the same as an ultrasound, because you can stimulate fracture repair with ultrasound and laser=-

SB: Which I have a question about.

TW: And with all the rest of it. And with the electric sim, there's probably at least eight, ten different ways of delivering energy to stimulate fracture repair. And they're all working the same basic way. They're stimulating the osteoblasts, they're stimulating the fibroblasts. So cellular up-regulation, and you give me some fibroblasts and you give me some energy. If I get the energy level right, I can make the fibroblast get all excited, or the osteoblasts, or the dooby- what's-it-a-blast. I'll just put energy in and I can get them excited. So it's not surprising that magnetic energy is capable of stimulating healing in a fracture, but with all due respect to the stuff you can buy over the counter, or you go to the health fair or you go and just get a magnetic bracelet, it's not delivering enough stuff.

SB: Okay. Joylon's actually asked about ultrasound for fractures. Could you discuss using standard ultrasound equipment for fractures and over replacement joints? As you've mentioned earlier on suitability and contraindications.

TW: In terms of contraindication, there's no contraindication about using ultrasound over a joint replacement. So the history says you've got a hip replacement and you mustn't use ultrasound over a hip replacement. It will make it come loose and fall out. Well, I'll put that one down to the toilet and flush. It's just not true. You can use ultrasound over a joint replacement, a metal implant, a plastic implant, no problem. I wouldn't use it over any electronic implant, pacemaker or whatever pacer, but a passive implant, no problem. Using ultrasound to stimulate fracture healing works. And I've talked about this on some previous edition two, three years ago, but the amount of ultrasound you put into a fracture to stimulate fracture healing is lower. Now we're talking lower levels than your standard therapy ultrasound machine-

SB: I think it's low frequency levels.

TW: Is low, is different, is 1.5 megahertz, so it's a different frequency and low level. So if you take your standard existing therapy ultrasound machine and turn it onto the lowest dose it can deliver, the dose that works on fractures is three times lower than that. So you can't turn your current ultrasound machine down low enough to deliver the ultrasound that works on fracture healing. It works stunningly well.

SB: And the machines that can do that are presumably priced off out of our market.

TW: But they're not outrageous. In orthopedic terms they're not outrageous. Probably about 1200 pound, 1500 pounds. I suspect if I was building ultrasound machines, I would build my next generation of therapy ultrasound

machines that delivered all the standard therapy ultrasound and have these ultra low dose bony thing put in there as an extra.

SB: Roughly how often do you have to get treatment?

TW: Every day, 20 minutes, 20 minutes every day.

SB: It needs to be a domiciliary device and really.

TW: Take it home. And if you happen to play for football club X and you're a professional footballer and you get a fracture, you're sure as hell going to get that treatment. That you will get it because it works. 20 minutes every day and if that takes 40% off your fracture healing time, that's got to be attractive in full time sport. It would work on you if you went to the NHS. But the NHS view, and I completely understand why, the NHS view is 95% of people with a fracture, it's going to mend anyway. Only 5% of them turn out to be problems. If it turns out to be a problem, we'll deal with it. Let's not spend money making your fracture heal faster. It's probably going to mend just fine, which is why it's not done. You've got to do it 20 minutes, you got to do it every day. It costs money to do that. And with all due respect with the pinch on resources in the NHS, it's not going to get delivered. Anyway over a hip replacement, ultrasound is fine.

SB: Right now we-

TW: We haven't covered anything that we said we are going to cover.

SB: No, we're on the downhill slope now, so we need to cover some of the things that we talked about and this one-

TW: Half past 10! Oh my God!

SB: I didn't prime you about this one. Somebody has said InterX. What do you think about InterX or intersex as auto-correct calls it. Have you heard of it?

TW: Yes, I do know something about InterX. InterX is actually, like something we touched on, two maybe three sessions ago when we were looking at scanar, we mentioned the scanar. And there was a degree of... People always are confused about scanar. And scanar and InterX are pretty much the same thing.

SB: Now these are devices which people can buy. Patients can buy over the press. Can't they?

TW: Yeah, you can buy. You can buy lasers, you can buy ultrasounds, you can buy, shortwave if you want to and no one is going to stop you.

SB: When we last talked about it you didn't know an awful lot-

TW: I know a bit about it. I'm still no expert on it, but effectively what the machine claims to do is it claims to read messages from the body and then it claims to know what the body wants and it delivers it.

SB: Right.

TW: That's based on some historical Russian... research is probably a strong word for it, Russian concept and they always get labeled by all of this. This was designed by NASA for astronauts so they could treat themselves where on the space station at all kind of stuff. Not entirely convinced by that. It's not actually reading messages from the body and it's not delivering what the body wants in that sense; it is taking readings from the tissue. It's basically measuring resistance in the tissue like we used to do with the old Ohm meters, and it's measuring areas of higher and areas of lower resistance and then it's simply delivering and electrical stimulation into the area where it appears to be most problematic.

So you could get the same thing with a an Ohm meter and TENS machine. InterX will kill me for saying so and I thought they've gone out of business actually, but anyway, never mind the machines are out there, I've got one, and find it does the trick. It does find areas where the resistance it lowers per require. It does sticky electrical stim into that tissue. I don't have a problem with that, but it's not reading messages from the body and then giving the body what is asked for, that's cuckoo-cuckoo, that's out there. They really are, they're very good about the press gang outside waiting for me when I leave.

SB: And what's more their Russians-

TW: Oh, they Russians and they know exactly how they do it. I'm in trouble.

SB: Somebody, we had a case-based discussion some time ago and we were talking about hyperdicrotic, sorry, hyperkyphotic individuals, people who could straighten but actively couldn't do it, and someone raised the question of microcurrent stimulation of the muscles, is that different from-

TW: Yeah, microcurrent is operating at a level below the nerve stim threshold. So if I did it to deliver this much electricity to make your nerve fire, TENS muscle stim interferential are going that level and deliberately going above it and make a nerve fire. Therefore, you can make the muscle twitch.

Microcurrent is coming in, the clue is in the name, is coming in below the level of your nerve threshold so it will not make nerves fire. So you can't strengthen muscle by doing microcurrent because it's not a muscle strengthening current. You can strengthen muscle, again we've talked about this on previous occasions. You can strengthen muscle with electric stim. No problem. Evidence is good, evidence is very good. Probably one of the best evidence bit of electrical stim in the world ever. But microcurrent does some

stuff, it stimulates tissue repair. It stimulates wound healing. It stimulates pain relief, but it doesn't do it by making nerves fire, it plays around at the level below nerve firing, so you're playing around at a cellular level. Probably ATP is what we think anyway with microcurrent, so it stimulates production of ATP, therefore produces more energy in the tissue, therefore enables the tissue to mend but it's not doing it by making nerves fire.

If you were... If you were kyphotic and your extensor muscles were insufficiently... They were capable of pulling you up, and therefore you needed strengthening of your extensor musculature. I can do that with electrical stim. Even better, I do the electrical stim and you do active exercise, the combination of those two, absolutely peachy and it's going to work. But I'm not going to choose microcurrent because microcurrent is not capable of doing that job, it's a tissue healing pain relief job.

SB: We've got, an anonymous question in here but I think I know who asked this question. I think it was Pierre. Pierre has asked about Tecar therapy, which I gather was popular in France-

TW: Popular in France, Spain, Italy. It's normal, it's everyday stuff out there is the one I talked about before when I was here. I think it was last time we were talking about Indiba, big orange machine.

SB: The one that didn't work.

TW: Yeah, that's it, the one that was broken. The one they brought along with broken a bit of a bummer really isn't a great advert that one, yeah, so Tecar, Indiba, again, I've put it into the textbook because there's enough evidence now to justify its inclusion. It's radio-frequency electrical stim. Things like Tecar and Indiba are manufacturers names for their machine, the modality radio frequency, electrical stim, and it's a really weird one. It's a marriage between radio-frequency, that's your short wavy stuff, which we've used to produce heat, and electrical stim, which makes nerves fire, but it is a weird marriage of the two.

So because it's called radio frequency, people expect it to behave like short-wave, but it doesn't, and because it's radio frequency, electric stim, people expect it to behave like electrical stim, like TENS like indifferential, but it doesn't. So you're passing an electric current through the tissue. It's way too fast to make the nerves fire. We're going at about... half a million cycles a second. You've got no nerve in your body that's going to respond to half a million cycles a second. So it does not make your nerves fire, but it does heat your tissue up. So we're using an electric current to heat the tissue, and Tecar in those certainly in that Mediterranean block from Spain, France, Italy, heading over Greece at the moment. It's used for lots of things. We did a clinical trial on it, which is the one that I didn't have the results for when I was here last time.

We did it on OA knee everybody trusts trials on OA knee there's just a lot of it around and that was a good one to do trials on. We did a clinical trial where we had three groups. We had the ones who are really getting this therapy, a placebo group who were pretty convinced they got the therapy but they didn't, and a control group. All three groups got best standard care. So the current best osteoarthritis management, exercise, advice, et cetera, et cetera. And some of them got real therapy on top. Some of them got placebo on top some of them got nothing on top. At the end of the day, the ones who got the real therapy were significantly advantaged. We only did it twice a week, and we only did it twice a week for four weeks on purpose because we were doing it within the NHS. We want to be realistic.

Their pain level dropped by a massive percentage, but I can do that with almost any therapy. Over the four week treatment period, pain drops. We follow them up for three months, three months later, their pain has not returned to the level they had before the treatment.

SB: Which is better than other therapies?

TW: I can't do that with other therapies, right. So, you've got a, you've got a seven out of 10 OA knee pain, and you're complaining like, doodaa, I was and I don't blame you. All right, I do. I do this therapy twice a week for four weeks and you're seven out of 10 pain drops to 2, 2.5 and you can live with a 2.5 you've just been living with seven you can live with 2.5. Three months later, it's gone from, I dropped it to 2.5 it's gone up to four but that's still way off the seven you started at.

Now what I'm interested in doing, and that was the end of that trial, what I'm interested to do is to see that if we topped up that therapy, let's say we give you, give you a couple of weeks of therapy, we leave it for three months and then we give you another two doses next week and then leave it. Is that enough to keep your OA at bay? That, would be really very attractive.

SB: Okay, so the two therapies Tecar T-E-C-A-R.

TW: Tecar is a trade name for a machine that delivers this stuff, and Indiba is the one that we did the research with, but it's the same thing.

SB: Is it in Indiba you have an interest in?

TW: Yep.

SB: You're a consultant for them?

TW: A medical consultant for them, yep.

SB: But that doesn't mean you're going to skew your research-

TW: Nope, my research is absolutely squeaky clean and we were going to publish the results whether their therapy turned out to be brilliant or pants, I was going to publish it anyway. It had to be brilliant, but that's beside the point.

SB: We've had a follow-up from Angela Stevenson about microcurrent. She said that she was part of that case based discussion that we had a few lunchtimes times ago. She said her comments about microcurrent was not for stimulation in muscle but for treatment of the spinal cord.

TW: Yeah, again, there's a few anecdotal stories and a few claims on websites about using it to treat the spinal cord. In terms of if anybody asked me for evidence which I could put on the table and would convince anybody, I am not going to be able to find any of that. I'm not saying it doesn't do it, I'm just saying I can't give you any evidence that it makes any difference to the spinal cord. It could do, alright there's a theoretical model of action whereby the microcurrent could have benefit at spinal cord level.

SB: Through heat generation?

TW: No, no, just basically upregulation of cellular activities that were stimulating the neurogliams and some of the glial cells maybe stimulating the neurocells as well. But in metabolic terms, not like a nerve stim. But that's a hypothetical model and I can make it sound really, really convincing until you asked me to put the evidence on the table in front of you and then it all falls apart because it could work, it could be brilliant.

SB: Right, we're going to turn our attention to bicycles now and Justin is going to put up a picture of bicycle lights so that the audience can see that. This is the Smart Lunar 1/2 Watt Rear Bicycle Light, which at some point, which at some point was, doing the rounds through various therapy groups and I can't remember where, but my wife is one of the people who has asked about this because she's watching this as well, because we are told that this smart lunar half watt light available for a 10 quid or whatever over Amazon is as good as a laser. And Claire, my wife says that she's been using it on her horses' tendon injury as recommended by a member. Is it helping or is it her imagination and hope?

TW: Is she likely to be outside waiting for me? Okay, in that case it is more likely to be imagination and hope. Light is good, light is very good. Laser is... imagine there's a kind of a scale isn't it between the most powerful version of light you can imagine, which is like the big blasty laser, down to the stuff coming out the light bulb, and the research out there historically has said, you've got to use a laser to deliver concentrated light to actually make it worthwhile in therapy terms. They then discovered that you can actually get the same effect with a laser diode, which is nearly but not quite a laser, it's just kind of we'd never say that when I'm treating you with nearly laser therapy, that goes down not very well at the clinic, but that's what we're

doing at your standard therapy machine. I brought one along for another reason. But your standard therapy...

SB: You have to bring it into shot we can't see it.

TW: I don't know where it is. I don't know where shot is but-

SB: But it goes beep. So it must be good.

TW: Yeah, it must be good. It really lights up doesn't it, right so your standard therapy laser machine is not delivering true-true laser. But what comes out of here is laser diode, very nearly laser, right? And it works. We know it works. So-

SB: Why is this attractive over laser?

TW: Because it is a blinking lot cheaper, right? I can buy one of these for a few hundred pounds. A true, true, true, true laser is going to be thousands, all right? So if I can save an awful lot of money and still have the clinical effect I want, then it's worth saving the money. If I come down from there, I come down to the LED world and the LED world and this is not a therapy laser, this is a... I think I've waved this one around before, this is an LED is supposed to be good for getting rid of spots. All right? So if you're a spotty little oik, which I appreciate you've gotten past that stage now, but if you were a spotty little oik, the idea is that you wave this round over your spotty bits and you become less oiky, you become less spotty. But that's an LED. An LED is, is not producing laser light. Oops, didn't mean to do that.

SB: And it's the same for this bike light.

TW: The bike light one, now that's a- it's offscreen, right? So your bike light is producing an LED light, which is like this, and the whole reason is, and the reason that they use it on a bike light is because it looks pretty blinking bright and you stick that on your backpack or on your botty or on the back of your bike, and people can see you from a long way away.

It's bright, but it's not laser. If you deliver LED light and again, I'm neither promoting nor knocking it, if you deliver LED light, it's not laser. There is research out there and again I've checked very recently just to make sure, because somebody else was asking me this question. There is evidence that says LED light and laser diode light that we use out of our therapy lasers can produce the same effect, so long as you deliver the same amount of energy, This is more concentrated light than this. Therefore, this will deliver X amount of energy, this will deliver it, but it will take an awful lot longer to deliver the energy-

SB: What sort of scale are we talking about?

TW: We're talking minutes to hours.

SB: Right.

TW: All right, because the laser energy from an LED source is not as concentrated, it's not as strong. So therefore, your therapy laser will have an effect. We know we've got evidence there are thousands of research papers on it. LED lights, I'm not saying that particular one, it's just the one that was in the back of the car. LED lights can produce equivalent effect, but only if you deliver the same amount of energy. And all of these things are different. So yeah, I'm sure someone's going to email me and I'm going to refrain from answering people say, "Oh, I've got a da-da-da laser and I've just seen that but on Amazon for a Doobie Doobie Doobie LED light, can you do the calculation for me please and tell me how my long... I'll be there all day calculating everybody's laser powers, but there's research and I think there's something up on the website which actually illustrates, you can get an equivalent effect with LEDs, but you've got to deliver this same amount of juice.

The effect of laser follows the effect curve, which we've also talked about here before, and therefore what I can achieve with this machine in let's say five minutes might take me 50 minutes, it might take me an hour and a half to deliver with an LED. So I'm not saying they don't work, I'm just saying you've got to deliver the same amount of energy. It's being done on wounds, it's been done on post-op recovery, it's been done on muscle.... it's been done on muscle pre-exercise. So in other words, you, you expose the muscle to a whole lot of this light before exercise. It doesn't make any difference to the exercise performance, it does make a difference to recovery afterwards. And so therefore your recovery time is shortened, which is in sports world is very attractive. So we've got evidence of that level. I really don't believe that putting that onto my tissue that that light cannot penetrate as far as this light. This is laser light, this is not.

SB: Okay.

TW: So it won't go as far in. So I'm not saying it's a waste of time before your wife comes around and tries to beat me brains in. It's not a waste of time,

SB: It's going to take a long time even on a horse from where she is.

TW: Okay, that's fair enough. It will work, but you've got to deliver the same amount of energy and it's difficult with those things to deliver enough energy.

SB: Got a couple of quick questions for you because I really want to show a performance piece of the evening. Evelyn O'Hare has asked about Mojo wristband. She's been asked about performance enhancing wristbands, Mojo as worn by golfers. Apparently there's evidence, heard of them?

TW: No, that's a short one. Most the time, I normally have at least heard of them. I don't think I've heard of those ones.

SB: Alright, quick questions about TENS. Can you remind people of what the best settings for TENS are for lower back pain or does it depend? And does it work for neuropathic pain?

TW: Right, it works, it depends whether it's acute or chronic. It doesn't really matter whether it's neuropathic or not neuropathic. It matters whether the pain is acute or chronic. Ballpark would be if it's chronic, set your TENS machine at a low frequency so you really talking five pulses per second, five Hertz or below, alright for chronic, so if it's chronic low frequency sim fires up the opioid mechanism, best for chronic pain.

If the patient's got acute back pain, whether that's neurogenic or not, it's basically a higher frequency, so up at around the 100 Hertz, a 100 pulses per second, which is a very fast, buzzzzz, whereas the five Hertz, the four Hertz is badum badum badum badum actually the thumpy one high frequency, very fast buzz is good for the acutes and that will reduce the pain. That's the rule of thumb.

SB: You did emphasis last time that people will need to fiddle around with the settings to find what's right for them, not to-

TW: So my five Hertz is a ballpark for the chronics and my 100 Hertz is a ballpark for the acutes. Again, there's loads of stuff on the website about how to fiddle to get the best out of it if you want to.

SB: Last one from the audience. Again, anonymous, is shockwave still accepted for gallstones instead of removing a gallbladder or if they change their minds?

TW: No, there are people playing with it. It started off with kidney stones, that's where the shockwave started. There are people trying to shockwave gallstones. In other words, if you can smash the gallstone up, you can pass the gallstoney fragments easier than passing the gallstone which you can't do, you can't pass. The problem is that a kidney stone is calcific, and therefore shatters when you shockwave it. The gallbladder stones or the gallstones are more fatty and they're not quite as hard as your kidney stone and therefore they don't shatter quite as nicely. So people are trying to find a way of getting shockwave to powder up the gallstone so that you can pass the powder. But they have haven't quite got there yet. Now what are you going to hit me with now?

SB: Now Winnie sent this video in and well send the link to this video in and I just thought, I wanted to finish on an interesting note and we only have time for one question after this, but let's just, let's just see what happens. Assuming this is going to work now. So here we go with the video:

Dr Mark: Today I wanted to share how Vox HPT technology is enhancing our nervous system through brain mapping. And so, Doc and I are both chiropractors, but we also specialize in neurofeedback. So we do QEEG brain maps of our brains. Now we record 19 channels at the same time and we can triangulate that activity and build a 3D image of the brain neurologically. We first mapped ourselves and then we put this Vox human potential technology on us and we mapped ourselves again and what we saw about made us fall out of our chairs. Literally we see the increased in the human potential, literally happening in our brain instantly. So when we brain map people, including ourselves, we can see different colors. Once it builds our 3D image of the brain. Green means balance, that's normal. When it gets too high, it'll turn yellow and red, and that means it's more confusing the nerve, there's too much information going down that nerve and bombarding it with nerve signals.

And then the other side of the spectrum is when it slows down too much and it's just lagging, it's just not getting there. We do all sorts of neurofeedback training to overall enhance that experience, grow new tissue in the brain. Well, we did the comparison maps with just putting this Vox HPT technology on us. It's been amazing. The reporter findings that we have is astonishing. It's allowing us to skip a grade and go right to that next level of healing. And so what we've found is as soon as we do that, whatever areas were too high, maybe too red or too low, maybe too blue, would regulate right to green to homeostasis within just about seven seconds after the tech is on them. And when we're in homeostasis, we have at a better ability to adapt and to pivot when it comes to what we need to do when our health challenges happen.

SB: Winnie, thank you for sending that in. I thought it might get a chuckle at the end of the day, but we've increased the human potential we have. What was the other thing? We've grown tissue, we've increased one's ability to pivot apparently by having something squashy in one's shoe, any mileage in this?

TW: I'm reluctant to stand behind them and endorse their product. We put it on lots of people, including ourselves and got any regular calls. You got any fake did you put it on yourself? You made the bloody product.

SB: And of course they decide what's a red result and what's a blue results goes-

TW: I mean we do 19 channel EG's, I love nineteen channel EG's that's standard stuff, all right, and you can measure what happens in the brain, but whether you make it red or blue or green, depends on what you tell the computer to do. It doesn't actually come out red or green or blue. That's, just prettying up brainwaves.

SB: This is probably an example of adjusting the settings to make your product look good perhaps.

TW: I think that might be the case.

SB: Okay, so I think that's probably everything that we were going to cover and we have just run out of time, so once again Tim it's been great. We will get you back in retired or not at some point so thank you so much for sharing your wisdom, and I'm sure there'll be some followup questions which I might press you with, and I might even try and steal a quick picture of that contraindications map so that when you publish it.

TW: If I turn around and you take a picture of it that's entirely up to you, and rather than you take a picture of it,

SB: That's up to us if we do something that breaches your copyright.