Academy of PHYSICAL MEDICINE

Transcript

Rehab and Technology With Jon Graham

Cast

Academy of Physical Medicine
Jon Graham
Ollie (model)
Len (model)

APM: welcome back into the studio a chap called Jon Graham. Jon was with us, I don't know, a year, 18 months ago when he brought in rex the Exoskeleton, which we've demonstrated on set. This was the robot legs designed to assist people who are paralyzed from the waist down or higher and we demonstrated what that could do. I believe he's now got somebody who's been out in the Sahara on one of the endurance events there using rex and someone who's currently training to use rex for the London marathon or a version of rex. If you want to see about rex, look at the previous broadcast. It was fascinating as was everything else that Jon covered this evening, However we're going to be looking at some different aspects of technology and rehabilitation, but Jon, Jon Graham It's a great pleasure to have you back in the studio. Jon is a senior physiotherapists working at the Chris Moody centre in Northamptonshire and uh, he's a wealth of experience in the world of Rehab. So crikey Jon, where are we going to start this evening? We're gonna talk about technology rehab in particular that's your Forte

Jon: So as chiropractors and osteopaths appreciate so much of your work is hands on and that's where we kind of have a

lot of overlap. Physiotherapists back in the eighties and nineties, use an awful lot of equipment in their departments with some very dubious clinical research behind it and they all went out and I've always felt it was a bit baby out with the bathwater. So I've been keen to look at

APM: You saying physiotherapists, were doing things without an evidenced based to back it up.

Jon: Who'd a thought, who'd have thought? Um, but then it was a baby baby out the bathwater they threw everything. Everything out. And I've always been a belief is not technology per se, it's about applying the right technology. Technology has got research background.

APM: When you say they threw everything out, what did they throw out?

Jon: physically literally.

APM: But ultrasound is still in.

Jon: Ultrasound is still in, in a lot of the micro microwave short wave diathermy a lot of places don't use interferential any anymore

APM: One of your senior colleagues, Tim Watson says there's absolutely no evidence. In fact, there's good evidence that interferential is a load of rubbish.

Jon: Yeah. So it all, it all went out

APM: That's not to say There are numerous people who swear by interferential and it gets results one way or another, then it gets result

Jon: 30 percent better than placebo.

APM: Yes.

Jon: So what we've looked at as a concept as what I've turned the rehabilitation triad, which is trying to have a patient on that journey with the correct combination of hands on therapy when required with technology and with exercise and the exercise can be the sort of run the gamut of uh, wanting to do 10 of these exercises every half an hour to review core stability. It might be as part of an exercise class, specifically addressing neurological strengths and weaknesses. We run neuro classes or it might actually be

optimizing someone's functioning. They can actually get out and do exercise. Do you know, do activities. So in this, in this slide you can see we've got our, an exercise group and the people in that a picture have all had strokes. And then in the bottom right-hand corner, you got a fellow who was able to get back to hill walking using our foot drop technology. And we'll be looking at that a little bit more.

APM: Have we got this slide showing it because it's, um, difficult for us to know. The triad is the hands-on work, the technology and the exercise therapy itself.

Jon: It's looking at with the patient at different points in their journey. What is the most appropriate sort of balance of those, of those components. And the tech can be low tech or it can be high tech, it can be for Parkinson's patient, it might be electrical tape the blue one on one shoe, red on the other to get them to coordinate left and left and right. Or it might be all the way up at the high tech with our, with our exos. So what I'm planning to run through a powerpoint presentation to put the foot drop in the middle of that. And then we've got a model who we're going to explore.

APM: Do you hear the, you hear the sharp intake of breath from my team then because we say we do not do powerpoint in here, but we'll let you get away with this short presentation you've got videos. That's important.

Jon: We've got videos. Yeah. So the first technology we're going to look at is FES. So that's applying a low level current to motor nerve.

APM: And FES stands for?

Jon: functional electrical stimulation. Yep. So low level, you're hitting a nerve just where it's a superficially the skins and he's very little current and what you're doing is your depolarise the nerve which will then activate the muscle. So here's an example, a stroke. This chaps, this is without FES, so we're trying to walk up hill. He's looking down. You can see is catching his catching his foot that you think the traditional way of managing for foot drop might be semi rigid splint, which then create problems when you're walking up hill. So here is the next video with wireless fes. It's got a trigger under his heel, so it tells the device when he's lifting his heel and gives him stimulations peroneal nerve. And you can see he's walking fast, he's looking ahead. No, stick required.

APM: So the problem with this character is the loss of control from the central nervous system to the muscle, but by artificially firing that in peripherally.

Jon: Yes. Yeah. Well how I then. The analogy I use is we've got. Is that in any house we've, we've got our rings ring mains so that's our brain and spinal cord into which we plug our peripherals. So a brain or ms or spine or spinal injury affects that ring mains. So that means potentially we can find another power source. We can plug in our perfectly functioning peripheral bit, hairdryer a lawn mower or whatever. But sticking with a lawn mower idea. If I run over my lawn mower in the garden, I'm holding two, two ends of it, no matter what to plug that into. It's kind of game over and where it's going to get interested in later with our model is whether, because it is potentially peripheral nerve injury but have we got complete severance or have we got a few strands and wires still in contact the we can we can we can access. So this is the difference it makes on speed. So the one on the left is without one of the right is with, and this is the first application in an ms support group and you can see almost two, two and a half times as fast. So why is speed important and they crossing roads and that's that,

APM: that but also quality of life generally.

Jon: quality of life.

APM: I didn't mention to the audience that we almost had to cancel this this morning because you'd been struck down by man flu and I'm, I'm so pleased you have manfully struggled in to do this. Don't lose your voice for the next 90 minutes

Jon: the power of paracetamol and here's here's example, incomplete spinal cord injuries and she's got a little bit like a model tonight. Lumber spine pathology because it's bilatoral for her, she's got very catchy feet. Now at the end of the day, if you think about traditional ways of managing that with the splint, that's not really an aesthetic option for a free young lady. Here she is with with FES.

APM: My word. That is a difference, isn't it?

Jon: And yeah, she can still wear her normal shoes. the big splint in normal shoes

APM: but she's got some bulky devices round her knees. She's happy when she's.

Jon: She's either wear long skirts or that the technology can be delivered in different in different ways. So this is a chap with a brain injury. Now you'll see as he's walking down the room and there's two things to notice, one, how much he's catching his foot and two the position of his arm. So here we are with the fes.

APM: What's the brain injuries? Is this traumatic?

Jon: Traumatic brain injury, car crash. So as he walks back down you can see two things going on. One is now getting heel strike and also because he's not having to concentrate on his arm, which is now down by his side more, more functional. It's not a perfect walk is still a little bit of a swagger in it, but he is from Manchester. I've seen them walk up there. So his big thing was could I run. So this is 18 months later answer his own question.

APM: He's still got his arm arched up. Quite a lot.

Jon: For a run, but not on the. Not on walking. So.

APM: I think we saw it. I think we saw that video last time, you talked about the fes.

Jon: the really interesting thing about this guys, he was 12 years post injury at the first application where people are told they're long past any, um, any recovery. So this is the other end. This is a complete, a peripheral nerve injury, um, and it just kind of goes to show the alerts, the drop foot as a consequence of this. This person dropped out of medical school and had a number of psychological issues because the impact that made on his life and he got to the point where, because it's, his foot was so troublesome. He was gonna op for below knee amputation. So this was last chance saloon for him. So here he is walking. He's tried 14 different AFOs and you see it's quite a Flacid foot.

APM: AFOs?

Jon: 14 different carbon fiber plastic, the whole nine yards.

APM: Is this foot orhoses?

Jon: Yes. Ankle foot orthoses. So here is barefoot on the stairs.

APM: Struggling

Jon: Here's the other one. And then this is where the carbon afo, this is one of the problems with, with solid solid splints that they present. They stop the shin going over the foot. So you can't get normal stair dissent. It's very one foot at a time because he can't. bend the higher left foot. So here is with this split we're going to be looking at in a moment, which is called the FS 3000.

APM: Well, that could be normal couldn't it.

Jon: So, this chap, this is. He was in tears of joy with this. Yeah, no longer considering lower leg amputation because this ticks all the boxes causing widespread community ambulation with um, with, with this speed is speed as well. So we're gonna be looking with our, with our model as to how this device device works. Um, second a case study, uh, so with the stroke patient. So you did say it was the recks and the Sahara,

APM: I beg your pardon

Jon: So this chap had a for the stroke, tried numerous braces for foot drop used fes, but uh, still wasn't enough to compete over a troubling challenging terrain. And his big thing was the entry into marathon de sables and for those who don't know, built as the toughest endurance race on earth. Six marathons in seven days in the Sahara with temperatures ranging from minus 10 to plus 50 and you have to carry all your own equipment and all you're own, um, food, so no mean feat.

APM: Um, so he trained for 18 months to do this and there he is out in the desert and you just see above that sand boot on his lap, on his right leg at the very top of this, of the splint. And just picture on the right you can see the kind of terrain, um, that he was faced with. Um, so what I thought we'd go look at with our model that, that device just right on cue, our models decided to bugger off and I'll have to make sure the team bring our model back in.

Jon: So we have some other technology we can spin it spin through on this.

APM: OK, so let's, let's talk about the, the device.

Jon: The story behind this is it's invented by a Canadian engineer whose friend had charcot-marie tooth. So in muscle pathology, the fes isn't going to work for. He had tried numerous solutions, not unsuccessfully, chafing, rubbings, etc. So his engineering pal said well, I'll get my

		engineers to look at this. So rather than revisit what every orthoses has been doing for many years, they said let's just fresh piece of paper, what are we trying to achieve? Um, and they've come up with this, uh, this device, it's called a turbo med. So
APM:		A turbo med.
Jon:		turbo med, so it attaches to the, to the foot via a clip,
APM:		and we can't see that terribly well, the clip is here at the bottom of the, um,
Jon:		one of the laces. And then we set that to the, to the correct height. That's what, that's what we do in, in a minute with our, with our model. It's very bendy so they can slip their foot right in there is set at the ankle angle. So you've got that automatic, um, spring because it's external to the foot. You don't get any interface issues with skin inside the shoe. You can use whatever footwear you want. All you have to do is attach attached to the clip to your required footwear. So what we're going to do with our model is to explore how we would treat his right foot drop, test It with a electrical muscle tester to see what response we get with that, and then look at using this, this device.
APM:		Ok, let's do that then. So while Jon moves into position with the model. Let me just introduce the model if I can. Um, our model is an eighty six year old gentleman named Len and he has undergone lumbar fusion L45 fusion back in 2003 due to chronic and severe back pain. Um, and sciatic pain, um, that's returned somewhat more recently but also it's now accompanied with a degree of foot drop. So I think better now we get the patient's view of what's happening to him. So I'll hand you over to Jon and Len to see what's, what's going on over there. Okay over to you guys.
Jon:		So, so Len how can you explain how you're finding this foot drop is interfering with every day, every day life.
Len:	00:14:18	It slows me down I can't walk very rapidly I walk slowly because if I tried to go too fast, I trip over everything. The, my toe doesn't lift in time. I kept even the slightest lump and I'll trip over my foot doesn't lift as it should do.
Jon:		and have you had some near misses.
Len:		Yes

Jon: actual falls or just near misses?

Len: No, falls.

Jon: Falls as well. So if we can have a little look at the I'm going to take your shoe off Len. So if you can lift your foot up at the ankle and show us what movement, you've got. Ok. So we've got limited dorsi flection, so I'm just going to see how tight so if you let go.and see how tight your ankle is lovely and relax. Good. Lift up so I can get an extra probably 5 degrees with a passive stretch, but I probably would You might find just doing some calf stretches. will give you some help with that. What I could do with is have we got a tissue. So what I'm doing here, because we're oops spilling the water, so Lens got slightly dry skin. So you've got to ignore that sensible advice but don't mix water and electricity this is one of those scenarios where you do want to mix it. So if you think what I'm trying to do here, we've got the head of the fibular and I got the peroneal nerve just underneath it, splitting into the deep and superficial branches I'm just going to see if there was enough, because we have, we have got some activity, we just haven't got enough. So interesting to see if we'd give that just a little bit of a boost.

APM: How does it compare side to side,

Jon: if we do we do the other one lift that foot as high as you can and this one.So yes the toes come up but the ankle barely moves, but there is some stiffness in that, in that calf. Please pass that box. So this is a, um, a muscle stimulator that allows me both to do, um, to stimulate a nerve as we talked about with the fes. But if I don't get a syllable contraction from the nerve, I.e, there is. There's a pathology up here and the nerves completely burnt out. I can actually go straight on the muscle and do direct a direct muscle stimulation. I can use that as a, as a diagnostic. So if I don't get a lift on the fes type settings, but I get one, I get some activities on the direct muscle stimulation. I've proved it both ways because if I put direct muscle stimulation on, normally unabated individual muscle accommodates to it and won't be activated. So just going to set a frequency about 40 hertz, 40 pulses per second and postulation of 300 milliseconds. Ok. So you will feel some pins and needles type sensation.

Len: Ok No problem

Jon: Can you just tell me when you feel that?

Len: Just beginning to feel up here. ah now I can feel it all. Trying to force my foot upwards.

Jon: how does it feel? Does that, does that feel like it's bringing your foot up further than it would normally?

Len: Try it again and I'll tell you. About the same. Maybe a bit more.

Jon: I think it's fractionally a bit more, but I think that's a lot to do with tension in your, uh, in your calf. I'm going to leave those on because we're going to really potentially really revisit that. But if that was completely denervated, if there was no part of that nerve that was still functional, we wouldn't have gotten that result. So that's, that's a nice little. A nice little sign. So

APM: Are you done with the water.

Jon: Yes. So we'll do the splint. on the camera you can just see the little clip clip there It's the bit from the Henry Ford department of design any colour you want as long as you want a black clip. So they will, they will work on a, on a, on a business type shoe. Um, but you have to attach the clip lower down than the laces you'd attach the clip there so you'd just use a leather leather punch. While I'm just assessing. I'll do it on a pair of trainers because there's no sense in doing a leather punch on someone's lovely business shoes. You'd find one like that. Ok. Now if we tuck this foot, just underneath there. So this is. So once it's set up to the correct, the correct height, length sorry, so then it's, it's, it stays that we'd put the screws up and then you're not doing this every time you just pot it on in a oner.

APM: How widespread is the use of this particular splint?

Jon: well this is really quite new. You know, new device.

APM: This is still in beta testing.

Jon: No I mean, it's, it's, I mean we, it's, it's, they're very few NHS facilities that offer them mostly in private, a private practice. But no no it's a fully fledged product and they've got as well as our NDS runner, they've got a couple of, um, iron men sponsored athletes and there's one guy does the boston boston marathon with the device. Ok, How does that feel?

APM: so dare I ask then the NHS isn't using this because it's presumably it costs money. So how much does it cost?

Jon: So the seven hundred and 50 pounds,

APM: That's a lot of money, a very small device, effectively

Jon: once they're, once they're measured you then trim it it's custom custom length too Lens Foot. So bring that forward again, I'm just going to do that a little bit. But also if you think if this were

APM: some fiddly work goes on here, isn't there yet?

Jon: But the other, the other issue is if you can get the true cost of a fall. If Len was to fall and break his hip from the ambulance, scooping up in the high street to him coming back for living on his own and doing everything he needs to be done. You're probably looking at about 25,000 pounds.

APM: Obviously the NHS just wouldn't see it that way because they won't attribute that cost to um, the foot drop.

Jon: No. Well when they do it's too late, what's quite nice about it as well as it's all for its quite worn under a pair of trousers it is relatively discreet. Ok so if I pop that down there Len, there we go.

APM: So in terms of the mechanism, this is effectively providing an upward force on your foot so your heel strike will drop it down, but when he tries to lift his foot, the splint will bring it in to dorsiflexion. Yeah.

Jon: Yup. And then you can offset this latch or needle laterally to give it a bit of control that way as well. Ok stand up have a feel. I will say we, we've got two different shoes on so that might.

Len: I can feel a difference from the shoes but that doesn't matter.

Jon: So you just have a little walk to that. It's interesting because I'm actually seeing more of the underside of that shoe than I am of the other.

Len: I can feel it there's no doubt about it. I'm not doing that all the time.

APM: I think we're okay with the, with the walking because to get a proper assessment we're going to have to get you outside and walking which we can't do at the moment, but

it's a good illustration of a very useful piece of kit to make people's lives that much better.

Len: I can feel it in the walking

Jon: even on those few steps you can feel.

Len: yes I do have to shuffle my feet a lot.

Jon: Yeah.

Len: So I don't slip over things

APM Some question for you is do you want to have a seat again so it's more comfortable for you. with this device. Would you be comfortable wearing a device like that? given that there's all that bulk under your foot? You wouldn't feel self conscious?

Len: Well, yes I would, but what it reminded me of was ski boots.

APM: Yes.

Len: You could produce something like that in the ski boot fashion but what didn't Look like that. for the cross country skis that on the downhill.

Jon: What we're aiming for Is that your your everyday shoes when they're trainers or wellington boots or business shoes or whatever. The device will fit to those. Whereas if you're going down one ski line you're down to one. Yeah. One shoe. Yes. Once that's down.

APM: But also in terms of your quality of life, if you're instead of having to stumble over every raised, paving stone, actually able to walk fairly normally, you might be prepared to put up with it. Just that little bit of framework around your shoe,

Len: Well yes I'd need to use it for a bit and see how we get on. But it certainly worked. It's amazing. In fact You're trying to lift it now.

Jon: Yeah, it was pretty. It's pretty sprung. So what we're gonna do now is just take that off. Then we'll then we'll see just how much of that peripheral nerve is still in contact to see if we can use the fes because then you're potentially into no. no bulk around the shoe.

APM: Would you expect there to be a difference now with what you did a moment ago?

Jon: with this?

APM Yes. Your FEs.

Jon: No I thought it was a slightly stronger lift, but it's just a matter of whether it's because it's only two or three the footdrop isn't so dramatic, but it's down here, but it's enough just to catch the odd bit. So actually one or two degrees of extra functional dorsiflexion could just be enough to make a, make a difference. The advantage of doing it with the FES is the fact that every step that you take your strengthening that major major loop. Whereas with splint, um, you know, you're not, you're not improving the root problem, but you are working on other things because if you can walk further using it and do more, um, that's, that's no bad thing.

Len: Coming through now

APM: Lateral deviation. This is a new piece of kit. You've got here in your hand. Same thing as the?

Jon: This is without the trigger. So this is just delivering the muscle stimulation. Whereas with this, with this device, I've got a wireless trigger. So if we can find, if we can find a setting that we're happy with, then we can trigger that with, uh, with a heel switch. How's it feel? Len? That all right?

Len: You're fine

Jon: when you're testing it. Um, I'm putting, I'm putting that stimulation on for a relatively long period of time. whereas when you walking you're just getting a brief pulse of it so often. people will go ooh I really don't like that well you gotta think that you're only going to get that happening for point five of a second. So it then becomes much more.

APM: Do you become immune to that after a while? Cease to notice.

Jon: There's two things I think one people become immune to it, um, and then also because as you get the strengthening occurring, you then don't need the same current. So that little dongle I've just put on the edge , that's a wireless heel switch.

APM: Now tell us what's happening with the wireless switch and the foot. Will switch on the power as the heel lifts, which will then cause dorsiflexion which should achieve the same as the splint. Right? Here we go then. Just don't go anywhere just yet because you're on the end of a string. Shall we just get Len to Hold that.

Jon: And then have a little walk.

Len: Ok.

Jon: You can sort of hear a little.

APM: Yeah, I can still hear the foot drop that. And back again

Jon: Can you feel it kicking in?

Len: I can feel the tingle all the time, but I can feel my foot strip. Oops.

Jon: Yeah See that

APM: sliding

Jon: That's really you can is. You can actually see in a way the whole. They were the difference between the two. So you've probably got. We're probably not surprised for all these years. You probably have got only one of very few fiber's still with connection and not enough in with a bit of help to get a foot lift that said I'd still be kind of interested in if we had that calf stretch and the ankle because it is a stiff ankle um, if we had that stretched and rather than using that as a functional device, you're using that to stimulate just to strengthen it and see whether actually in six, six to eight weeks when we retried that, whether actually we've got a different, different results. But what was interesting though is you could see how it affected the other one was without it you were catching on

APM: yeah there were two quite significant strikes on the carpet weren't there.

Jon: So we definitely know the other one is, is, uh, is a scenario.

APM: Ok, I'll let you direct Len And uh, I'll get back to the Studio

Len: every time I lift my foot it tingles. it switches it on

Jon: There are some, um, NHS centres which is a Birmingham, Solsbury, Leeds and Sheffield. You can have access to that technology we've tried with.

APM: Is that part of a trial or

Jon: No no it's a clinical service and if there is a nice guideline for it. so nice they've looked at the FES technology and deemed it effective for foot drop.

APM: Robin says, what's the cost difference with the fes? I'm not quite sure what robin means about that because um, the difference between FES and what? So the difference in the splints and the FES

Jon: Splints are £750, the non wireless version of the fes is pretty much the same price, but you'd have to have a cable to your foot to the box. Whereas we wanT the wireless bit it's about £1200 yeah.

APM: That surprises me because that sort of technology is so commonplace I would've thought now. Fes is easily available, isn't it? And the wireless switches

Jon: you wouldn't have yeah you wouldn't have thought.

APM: But someones obviously seen done something

Jon: but I think it's, if ironically the company make it is an NHS foundation business, but they are any business they're recruiting, they're recruiting that cost development cost through sales

APM: well martin says gobsmacking results and it'd be interesting to see later on how Len our patient feels about that as well. Um, faith has asked question. She. So she has a 30 year old male patient with an incomplete spinal cord injury an injury that was at c56 currently wheelchair bound and following an accident two years ago. Would this have any effect as part of a rehab program?

Jon: So two answers to that it depends on the degree of incomplete of completeness. So if the patient is at the nearly complete part of incomplete, then I would be looking at some different technology if they are able to walk a few steps but are troubled with with foot drop or a weak cords weak hamstrings. Then a combination of that because you can have that's a single channeled device. So I'm just picking up one muscle. So with the complex ones I can put three or four of those stimulators on with two channels and

stimulate a lots of muscles where you've got an individual who's got a very high level of near completing complete, so they have very little active unit move, especially at that level. Then the technology that works well for that is where they combine the fes with a cyclic ergometer, so the individuals would pull a wheelchair up to the ergometer pop their, have their feet positioned on the pedals, and then their legs are driven by FES. So they'll have the FES pads, generally on the quads, hamstrings, and glutes, and a fine interplay between the system motor assistance, the pedals will give you, um, and the, and the fes, and that allows the muscles to work quite strongly to then get the metabolic benefit.

APM: but it doesn't get them out of the wheelchair.

Jon: Um, if it's, if it's, uh, near the high end, no. But one of the things when we all learnt, our anatomy, we pretty much focus on muscles is being organs of mobility, of motion. This muscle attaches here to there. It's what it does is it moves those two points neareer together and together and lengthens under control. Now increasingly we're seeing that some of the bigger muscles, the thighs and the glutes have, have got a role within, um, the metabolic system. So it's thought that there is an issue in spinal cord injury that the absence of activity in the glutes quads explain to the higher than normal rates of diabetes in that population. So by using an fes cycle, you could maintain your muscle bulk, so reduce your risk of pressure sores and improve the metabolic function in the muscle and reduce the risk of diabetes. And what's Interesting is that the levels of diabetes in paraplegics is not particularly different to the level of diabetes in tetraplegics. once you've lost those big metabolic groups of muscles. The damage is the damage is done, whereas you might affect expect if it was just mobility issues where they're not walking around, of course they're going to get diabetes. You'd expect there still to be, expect the difference.

APM: I'm going back to what we could actually achieve in our own clinics. Most, most of us are not going to have 1200 quids worth of wireless switch technology and fes. But what would we have to invest if we wanted to just do the analysis part of that, which was a functional stim machine, wasn't it And a couple of electrodes.

Jon: you can get a functional step stimulation device for 30 pounds sorry you can get a muscle stimulators for 30 pounds.

APM: So we could do the first part of that, which is the two electrodes on the peroneal or superficial deep peroneal and test the nerves. So we would have an idea ourselves, whether it's worth finding someone who does what you do and say, look, this guy's a prime candidate for this particular technology.

Jon: and also someone like Len where it kind of gives a little bit of a lift, not a massive lift, actually then saying, well before they see us, fes specialists spend six weeks just using that half an hour in the morning, half an hour evening as a, as a training, as a training device. Are we able to just go to one slide here? This, uh, if we look at this part of the powerpoint. So this is kind of showing the power, if you like, of home muscle stimulators. So this, this gentleman here has had a stroke and he's got recovery to set in his flexors so he can even close his hand, but what he hasn't got, is the ability to stabilize the wrist to use the activity he's got. So that's his best attempt to try to pick up a foam ball. So what I've done in the picture below is I've used just the cheap and cheerful electrical stimulators on his, a finger extensors and some abductors and this is the same session straight away, just stabilizing the wrist has made a massive, massive difference. And then this is, this next video is the same guy, month later, he's done it 20 minutes a day every day for a month and he's not got the stimulator on this last one. So this is the kind of the treatment effect of using that.

APM: So we're going to an enormous amount of control from that.

Jon: We've not, we've not changed any pathways, neural pathways anywhere. So. So what, so what you've, what you've done is your, because you're attaching the and stimulating the nerve you will be getting some, um, some afferent information. And getting some sensory information and then the fact that he can't pick up a single,

APM: I'm not sure, I'm not sure what I'm going to be glad you came tomorrow when I've got this.

Jon: So, um, he can't, he can't do a single repetition so he can't really exercise. So by giving him the means to do exercise, you've then got the, the, the repetition.

APM: and is this commonly available now in stroke rehab units?

Jon: becoming moreso.

APM: And no doubt proving particularly cost effective as well.

Jon: Yes. Because it's at the. Well the nice thing about this is where again, one of my things about the technology side is somebody wants to, once the physio, has trained family and the user, how to use this. They can be putting this on and off their wrist all day at the bedside so they can actually get many, many hours effective therapy without requiring additional person personnel.

APM: Um, just before we move on, do I remember last time when we were talking about stroke rehab, some of the patients, you were rehabbing were a long way into the stroke weren't they and conventional wisdom in the nhs was something like 18 months and you're not to get any improvement, which actually simply reflects what has been NHS policy, which is don't treat them after 18 months.

Jon: It becomes a self self self fulfilling prophecy. The way I look at it is in the early, if you have a stroke, it's like any other injury, you will get inflammation and you will get swelling. So you will get areas of the brain that are have been wiped out and around those areas you have swelling and inflammation it will then depress, all those other functioning neurons and that normally takes a three to six months to resolve. So any change you get. so if you say best three months, so any change you get in the early stages is just, it's very often resolution of swelling. Anything beyond that is new learning. And you're only ever training into that brain, right? So if, if, if our model tonight decided he wanted to take up a new hobby, he's got an active brain, he could learn to do something and bridge or whatever or something physical. So, you know, with stroke only ever training good, good brain.

APM: Evelyn sent in a question a little while ago, saying would the splint that you demonstrated with be suitable for a teenager with transverse myelitis. She says that she's made good progress, but um, they've reached a plateau and he breaks his orthoses every time, um, because he's regularly driving tractors apparently. But

Jon: so transverse myelitis is does everyone know what that is?

APM: Well, in case.

Jon: ok, so it's an inflammatory condition effecting the spinal cord. So you think MS tends to be cordal. Transverse Myelitis often tends to be a particular, a particular level. If it's a lower level, because in the lumbar spine you can get

a very flacid footdrop. The higher up the level, you can often get spasticity. Now, if, if you're using a conventional splint, they don't cope very well with steps and stairs because if they're not powerful enough to lift your foot, they often can't cope with the compressive force. So very often you see, them being fractured on people using steps and stairs. So the material technology that's gone into that splint means that it can cope with thousands and thousands of thousands of crushes, open-crush, crush-open. Which is why it's being used for people doing marathons.

APM: Evelyn says this guy, fractures his orthoses driving tractors. I'm not quite sure why that would be.

Jon: Um, uh, it's probably not the driving. It's the, as you get up into the tractor, your shin is going over your, over your foot. Yeah, it's, it, it, if you think about climbing a normal normal steps and stairs you've got a certain angulation, of tibia over foot well the higher the step The more that angle is. Yeah. And also they're not off and on a tractor they're not deep steps. So the, uh, they're often on a tip, the front end of their foot, which puts a lot of force through it. And on all those carbon- on all the standard stock carbon fiber devices. They actually have a little do not: and that include squatting and climbing ascending stairs with a, uh, with their foot on the end. So I suspect the damage is done getting into the tractor and then an initial fracture and then he does the a few presses. And then that's. Then that's it.

APM: I said we were going to move on and I've got a couple more questions that's just come in, um, this one is would the brace or fes help 10 years after a stroke with result in weakness in one lower extremity in other words, how long after stroke would you expect to see an improvement on? We did touch on that, but just to be specific

Jon: Well with the video we saw earlier, he was 12 years after his ABI, which and effectively he's had a very dominant right sided brain. Yeah. Right-sided brain injury. Uh, so he's, he's had a stroke for want of a better word caused by external trauma rather than internal trauma when he was 12 years, 12 years post. The only difference when it's longer is there maybe more tightness in the calf like we saw with our model, so may need more preparation before it works and also he made a little bit of disuse atrophy, so again you might need a sort of six to eight weeks lead-in to, um, to strengthen. But I've had a nice results with fes, with people 15, 20 years based post-stroke.

APM: Jason has sent in a comment here with a question, I think. Says he's worked in an ms center in Rotherham for 14 years and has often suggested that patients with drop foot ask about this technology from the doctors. Some patients got a trial but some refused without any investigations by the NHS what's the best way to try and get patients a chance of the trial?

Jon: in Rotherham because you're so close to sheffield there is a service in sheffield. Yeah. So they can have it on their, on their doorstep. So I would, I would go armed um, with the, uh, go onto the. google nice fes recommendations and plunk it on a, on a doctor's desk and said, look, I want one of that.

APM: And then say that it's also available in sheffield. So you don't actually have to do too much work to make this happen.

Jon: No, all you gotta do is send it. It's probably Rotherham and Sheffield are the easiest places to get and birmingham that they've got. They've got an NHS service on the, on the doorstep. But yeah, you have touched on an issue that I have. And that is for. Because this was. Jay does jason. Jason obviously thinking really positively, right? Here's a situation I think FES will help and getting a knock back, my bugbear is the number of people out there with, with unmanaged foot drop, be it from peripheral cause like our model or in an area where they haven't got a. Jason going oh Well we could try. You could try it FES. So we are um, as a, as a sort of a passion of mine, I've kind of set up a, um, a social enterprise called the national foot drop society and we're going to try and have the first national foot drop awareness on september the 21st this year with the B2 raising public awareness. That actually is, it's not something you have to live with there are solutions

APM: after we finished the broadcast I'll get some more details about that from you and I will put those up on the website because it sounds like something which will be really useful to a lot of our patients and of interest to all our practitioners, but I know we, we need to move on. So I think this is jason again. I'll finish with this question. I actually tried some stimulation muscles 14 to 13 years ago, but the physios there at the time said not to use it because it doesn't work. Quick question, why do medical people seem to say no to all things they don't know about. This is bugging me for years. I don't know if that is jason or not, but that's a question that's beyond the scope of our discussion this evening

Jon: It is, it is the

APM: Nobody likes to admit ignorance I guess. Uhm,

Jon: yeah. Well on that note, but smart people do because they go, I don't know. Let me find out.

APM: Ok, let's move on. Yeah. Did you want to do some more powerpoint? I see you've got another lined up. Or are we going to do?

Jon: No I think we'll go on to do.

APM: So tell us what we're about to do and we'll get the next model lineup.

Jon: lovely. Ok. So one of the clinical developments in terms of, well come from, research into potential clinical practice is the use of virtual reality. So when we were all getting, um, connects and the Nintendo Wiis, 5-10 years ago for christmas and could see as clinicians that this could have value for our patients. That was kind of the starting the starting point. The difficulty with those devices is that, for example, on the Wii if I moved my nunchucks up and down in a running game it thinks I'm running it can't tell that I'm not running. Um, and also if I've got a very small movement, then the machine might not even detect it. So there's increasing use of, of, of virtual reality software to be very specific and only allow you to engage in the activity if you're doing it correctly, to give you the feedback of how you're doing. But also it can detect very small movements, so you may have a very small movement, but detects that and allows you to exercise. then you get the motor motor learning and motor loop, the reward sensation, and there's two types. There's the stuff that you interact with and the one we're going to look at it has got to connect. As your input. So you're still very much in the studio here at the time.

APM: Am I alone do you think? Not really knowing quite what a connect is?

Jon: So the connect is the. Is this a microsoft device that sits on top of the tv than it has a camera and infrared sensor that picks up limb segments. Ok. So allows It

APM: So this is how the Wii technology works?

Jon: It's how they. It's how the microsoft version works and it's nice because it picks up limb segments.

APM: I only asked that because I'm sure that all of you out there had no idea what it was. I of course did know what a connect was.

Jon: So the nice part of so with the Wii, because it's their inertial movement sensors, you can cheat, with the connects, it looks at your body, you'll see a little stick man and we'll see what we get software out later. There will be a little stick man. And then the next level is what we call the immersive VR. Where you'd actually put a headset on and so all you see is the world that's been created in that.

APM: And you're using both levels.

Jon: So we're just using the, the non immersive

APM: you see a role for the immersive?

the immersive. I, I see a role for it but it's, there's two problems with. One is just the pure expense of it. It is cost prohibitive. The other thing as well is even for you or I putting it on just to play a game, a car racing game, whatever we can actually have quite a few, labyrinth it, it's not. Um, the brain wasn't designed necessarily to cope with it. So people, ordinary, ordinary users can have issues and it's the kind of issue's that would be exaggerated in someone who's already had a stroke. Not that they couldn't learn, but it would mean is difficult in starting, um, a treatment protocol where the first experience is I feel sick and that's not easy to sell to encourage the second, a second session. Whereas with this One, when be looking at

APM: well I'm still trying to work through whether there's any advantage to that immersive technology over what you're about to demonstrate.

Jon: I suppose the, the, the advantage of it is say for example, in my imersive technology, it was presenting me with my, um, my toast and my marmalade and my jam and I only had very small movement so I can't practice buttering my toast yet. But when it's calibrated, then as you make the movement intention to do the buttering what you see on the screen is as if it's your arm doing just so you get this very important

APM: Feedback

Jon: review points for rewards the right cycle. Um, and a lot of these rewards are really quite, subtle and one of them little

anecdotes I like from back in the day, was Tomorrows World with Michael burke wasn't it. So they had a chap on

APM: they're all too young to remember

Jon: Oh of course well it was a science program. It was called tomorrows world. And interestingly enough, a lot of this stuff is, is come, come to fruition, but there's, there's no tele transportation which is particularly disappointed. So they had this chap, on the stage and they were saying to him right, had a counter and they said we want you to do is really um, think about your, about your blinking and Just to see if you can increase the rate, you know your rate of blinking and no, sorry, I said this wrong. So they showed him the counter and he didn't know what he was doing. apologies didn't know what he was doing. And they said see if, see if you can work out what it is that's going on here.

APM: The aim being to make the counter tick over

Jon: And they. And then they, then they distracted him talking to him about other things, and then the counter was going up, well done you've got it to five. The guys completely confused, hasn't got a clue. Six, seven, and they were building up and its marvellous, just a genius and the poor guy is getting a little bit confused as to what's going, what's going on. But the rate at which the numbers were going up, we're starting to increase. So whatever he was doing was increasing, but he didn't know what it was. But his internal nervous system did, hence it was generating that behaviour and what it was a guy in the front row, every time he blinked he was just doing the clicker. So completely unintended, you know, without any conscious thought. The nervous system had picked up on the well done. Fantastic. Brilliant. The verbal stuff, the numbers going up and then kind of internally calibrated what was going up, what was going off. So it's a two edge sword because it means that we have, when we re-training, moving could always be aware of, there can be some other effects going on that we can't, we can't control for everything.

APM: So do you want to demonstrate this stick technology on Ollie our new patient

Jon: So this has been developed by a technology company in Switzerland. They have a, um, they had their own high end, um, immersive version of this. We've got a number of games so that the, um, and we can look at a shoulder

abduction. We can look at reaching, trunk flection, prelim activities hand opening and closing, stepping. So you're really kind of picking your. I'm picking the activity that you're wanting, your, your, your wanting to work on. So what we'll do with Ollie, so if we just get you to stand up, so if you stand back by the chair, so it needs to know your current range of range of movement so it can then calibrate it and then challenge you at the level you currently are at so if you be you for the moment. So if you put your arms right out in front of you and then can you see the connects feedback?

Ollie: Yeah.

Jon: So this is the nice thing. This is the kind of feedback you don't really get on a lot of traditional games. So we can see, you can see as a user, I can see as a therapist what you're, what you're doing. So halfway in front, little bend. Ok. So hold yourself level and straight. So again, let we see. See that, that's where, going back to Steven's question, what the connect does that connect is picking up all those, all those limb segments. Lean your trunk to the left. Straighten again. So this is, we can have people standing people sitting, lean to the right. We're we can have people on exercise on physio gym ball type of things and also potentially can use this at home. All it does is plug into a smart TV So we're gonna give you a challenge. What you need to do is your, so you're going to do that pumping movement. The faster you do it, the faster you'll move. Reach out to grab coins but now you gotta work hard to get up a hill. yep and reach yep you're going very slow so you need to get the needs to get the momentum going. Crack on and use those arms. Keep going. Harder harder harder harder. And reach, reach out and get that momentum going. You missed those. Arms forwards and back. Now I can combine that with theraband to make some one work. If you think of these winter months by picking these stepping works someone like our model can be doing this at home rather than necessarily exercising down the gym with. The environment may not be.

APM: and at the moment this is just picking up his upper body. So you said earlier on that he could cheat if he wanted to pretend that he was running.

Jon: With the, uh, with the connects devices, you can't cheat this one, this one, this one because it's because it's actually looking at your um, so if you bend your knees, so it's now looking at his knees doesn't matter what he does

with his arm. Shift the pelvis to the left. Shift your pelvis to the right. Ok. So now on this one

APM: And he’s controlling this just by leaning is he?

Jon: Move side to side. I think by the end of Januaruy I’d have problems with the theme tune.

APM: I think by the end of the session we’re going to have problems of it.

Jon: Now what it’s not picking up is that Ollie isn’t bending enough. So you need to bend more.

APM: How is the game going to encourage him to do that?

Jon: because when he wasn't bending the legs were going red. So he’s not bending enough on either leg. So bend.

APM: But he's actually still getting the reward or picking up these little icon things.

Jon: Yeah. But the ability to be able to visual

APM: yeah.

Jon: this visual feedback so you’ll know if you’re performing incorrectly. And that’s what you don’t get with traditional gaming systems. And what's nice is with this is that we can, um, we can do shoulders, hands do any, any particular body part as they improve, we can calibrate it. Um, so we can do stepping and crossing roads forwards and backwards steps we calibrate it to what that person's able to do. So it matches the matches their abilities. Then they can be a challenged within the game for speed and then next time you go, right, let's see if I can walk and move it bit further. Um, and we have, so we, we found that people with although the games lack the, um, the high graphic drive of call of duty and stuff like complex games. Actually, if your issue is I want to work on balance, a lot of the stuff is very distracting so people will actually want simple, simple graphics.

APM: Jason's come in again and said, has this technology have any use for familial spastic Paraplegia?

Jon: Yep so familiar, familiar, but spastic paraparesis again is an upper motor neuron condition. So a kind of a worsening, deteriorating nervous condition that very much

presents as increasing degrees of spasticity in the, um, in the lower limbs. And I've had some really, really nice results with it. A number of the clinical centers, again, it's one of the standard, um, conditions where that was recognized as being helpful. interestingly one chap I treated um, he could, he could actually get a change if you stimulated thighs and back or bottom and hamstrings you'd like to do all of them, but his nervous system couldn't cope. Yeah. So you had to kind of choose the best, the best mix. So there are some people you can't completely wire up because actually the nervous system will shut down and say no I'm not happy about this, but it's a very nice um, um, use in FSP.

APM: special interest here is there any provision for the sort of thing in Scotland. And I guess we're going back to the technology you demonstrated at the start

Jon: one of my colleagues up in scotland, in Glasgow. Scottish Neurophysio I think they're called. They've got, they've got fes facilities, but I think it's one of the things once you know, if you google functional electric stimulation scotland and then put in edinburgh or aberdeen or glasgow, then those websites will be, will be optimized. I don't think there is an NHS provision in scotland, but there is certainly private provision.

APM: This nicholas asks, would he be right to presume fes is contrary indicated with patients with epilepsy?

Jon: Good question. So the official line is that it is contraindicated with people with uncontrolled epilepsy. So if your, if your epilepsy is controlled by medication, that is, that is fine. Now there is no good evidence as to why fes and electrical stimulation in general should bring about a fit and it's more correlation. So if I have a brain injury and I have scarring in my brain, I am likely to suffer from epilepsy. If have a brain injury, I'm also likely to require fes. And it's, it's, so it's kind of, there's no the ones that

APM: I think tim watson said something similar to this and you said that a lot of the contrary indications on various bits of machinery or there just because people are playing safe, not because there's any evidence that there's cause and effect or even dare I say it in epilepsy. I mean, the risk of injury through having a fit might be except.

Jon: Well, I've, I've, I've been using this technology since, um, 2005. So I've set up tens, hundreds of people with foot lower FES upper FES but I've only had one individual in all

that time that was happening FES for the hand lift and said, oh, you know what I feel a little bit like I do when I'm about to have a, have a fit. And we just switched off. So I've had one, and again, I don't know whether that was just, if she not had the fes on and was watching television or reading a kindle, whether the same thing, the same thing would have happened. And again in an uncontrolled epilepsy thinking. Well it's not controlled anyway. So what's, what's, what's, what's the, if, if it helps them with their, with an ability.

APM: A final question before

Jon: Sorry pregnancy is another one. So you can't use FES and pregnancy. Right. But you can use the obstetric tens. No sense.

APM: Final question before we move on, do you have any recommendations for specific home muscle stimulators?

Jon: The one. The one that we use the most is a device called the intelliSTIM. Right. So that's intelliSTIM lengthening that and we can put that up on the website afterwards BE28E and now that's a little bit more than the £25. Normally they're about £75. Very easy for patients to use. And they're relatively sophisticated so you can add a little bit of programming to them. So a lot of, a lot of the cheaper muscle stimulators will either will have two channels, will do two muscles but they tend to be on at the same time. So you might have elbow extensors and wrist extensors, well the times when you want to stimulate reciprocally. So I might want close, open, close, open. So I want a stimulator that can alternate and that's what you get with you intelliSTIM.

APM: Interesting because, um, when we have done these broadcasts with tim watson in the past and it's well worth looking at watson's the recordings of the broadcasts if you're interested in electrotherapy because the reciprocal seems to apply to ultra sound, which is that you can spend a lot of money on an ultrasound machine but actually does nothing more than a fairly simple machines or a TENS machine, for example does, because the output is going to be similar. And his website electrotherapy.org is a very good resource for looking for unbiased reviews of electrotherapy equipment, probably including muscle stimulators as well. But we'll put up what you say because you're using them possibly in a slightly more advanced way than um, his, uh, his clinic. Right? So our final piece of kit that we're going to look at this evening. Well we're

talking about range of motion analysis now I'm in the habit of I believe, feeling that my treatment has increased range of motion, but I'm always concerned that it may be wishful thinking. of course you asked the patients feedback and patients actually, I think sometimes do a bit of wishful thinking there as well. So when you get the particularly difficult conditions, the challenge is to know whether you've got a genuine increase of range of motion and I suppose how long that range of motion stays increased for.

Jon: And so yes, exactly. And also the thing is that you might have a intact range of movement. So say shoulder, the point of which you get the impingement may change. So we're going to look at how you can make a note where that, where that occurs, so you've not only got range of movement, but you can actually within that mark sections of interest. Um, so, uh, so the software, it's based on the commercial measure units you find on any smart phone, uh, with some very smart mathematicians working out how to take that data stream and apply it to range of mu.

APM: So do you need to set some stuff up?

it's all good. It's all good.

APM: Ok, we're going to move over to a model Ollie again. So the software is called BPN pro, body performance measures. So we're going to add Ollie as a patient.

Jon: Yeah.

APM: Oh we're getting all your favourite google sites? That could be dangerous. What's it asking you now?

Jon: You've got, you can do as little as just a name. But you can have a full database. So a quick overview here is the main menu. So we've got our patient information just filled in and then we've got um, test selection. So I can look at different, um, different ranges of movement. So if we look at, um, abduction, now you should all see above sensor one and sensor 2 some spinning balls ok. So I'm going to select, I'm going to say Ollie's got a left, a left shoulder impingement. So I'm going to have the sensor on his arm. Ok, now what we are going to do is lift the arm out to the side. Now we go up. Ouch. Ouch. There. Ok. And down, so have we got the software on the main screen. Ok. So we can see here

APM: We cant see your fingers though.

Jon: So we've got the, on the left active range of movement, um, we've got the range of range of movement. So I've pinpointed those areas where Ollie's told me he's got his impingement. So I've got a the entire range of movement and then within that, so I've got the two things that might change as a consequence of a treatment. So I always find myself, uh, find often measuring neck rotation particularly well neck movements particularly challenging. So, um, for example, we can look at on the neck. So the advantage as well we can just, you can just pop, pop it on, you don't necessarily have to strap it all, so. If you look, turn your head towards me. Good. And then the other way,

APM: so how does this technology rule-out compensating movements such as side bending in the torso when you're doing shoulder abduction or twisting, and

Jon: so the key to that is you're then back as a clinician, thinking, ok, you might show them what you want them to do. You can, you can be very human, very hands on because with the, with these you can actually use the, you can press it and that gives you the keys to the input. So if I wanted to, if I was worried that um, Ollie might be giving me that kind of movement

APM: He looks the sort to cheat to me.

Jon: Hey. Well, yeah, you can tell a cheater can't you. What we can do is we're going to pop it on his if you think about most situations where we're not measuring a whole bunch of things. So if you were to do that and as coalition, I'm going to say no I want you there all I want to do is look at that and look at that. one side and to the other. Lovely okay. So if you get back into the menu. So what you can do is. The other thing is we got on here is like a free-fall module. So if you're looking at say a swimmer and you want it to look at not just the movement in one, one particular zone, you wanted to look as to how, um, how they were,

APM: so true functional activity, crawl or breast stroke movement is affected

Jon: There is a sporting version of this that will actually so if you do it draws, maps out the movement you've got.

APM: I think he's going to swim around in circles.

Jon: You can obviously do left and right. And so rather than, um, just doing pure what happens here again with the

other sensor you keep going around and at any point he says, ouch then I can then hit a second sensor and start adding points that's the point where we get it and I can look in time as to how that, how that changes.

APM: This might be a bit silly but would you be able to put a sensor on each arm to, to track the movements concurrently? So you can see

Jon: currently with currently with the, with the, with the free form, you've gotta choose the shoulders as to which you want to do. If you're wanting to do the pure round then you can do them both at the same time.

APM: but if you want to do true, crawl activity, you'd have to do one at a time?

Jon: in the sports version, you can do it in the water.

APM: Ok?

Jon: Yeah, yeah, yeah, yeah. And what's really exciting about this is those are the old version of sensors, they're now producing sensors that will go into clothing so. And they're looking at doing some projects with utility companies, so if I'm getting called out, see Mrs. Jones and try to fix her, fix her boiler. It's a tougher job than I thought. My sensors are going to pick up that I've done massive full movements in my knees a hundred times. I've done lots of this and lots of that it can actually measure the stresses and strains of that movement. So it will then say, well, we're going to get you to see Mr. Jones, but we think we already pre rated that job so online it will automatically change the workload so that when they get back into the car they say right. You're not going to miss Jones, you're going to Mrs. Smith. Yeah, because that's actually a quick, a quick job so it can actually in real time pick up the stresses and strain on your body and then change your work in your working strategy

APM: I'm tempted to ask the obvious question, which is who's using this stuff? Is it just you? Is it commonly available? Could it be available in any clinic.

Jon: So this, this is um, for the sensors and the software. It's 300 pounds off the bpm website. and then if you want, I think for 500 it comes with a, with a tablet, but I find it easy enough to have on my laptop.

APM: So that's extraordinarily cheap, actually one sensor and the software or?

Jon: 300, one Sensor, software and set of straps. Once sensor is enough for doing all the single range of movement. Whether it's leg, I mean it does the whole body. And if you only got one sensor, you would just have to be when the patient goes ouch. You'd just manually have to just press the button on the

APM: And the second sensor?

Jon: second sensor is. I think it's another 150.

APM: Ok. So again, it's relatively inexpensive, which I actually would put some real useful patient outcome measures onto our case histories, wouldn't it? Because instead of the patient's feeling, they're a bit better. The think they're moving a little bit further, they're cheating a bit when they're rotating their neck. We could see for ourselves exactly how many degrees it was. Um, I do suspect that we're not very good at measuring degrees by eye.

Jon: No, I mean it, I mean the standard bit of kit. It was, was the goniometer and the studies on those intercorrelates reliability

APM: What are the limitations on this thing because the goniometer you might think, well I'm measuring ankle dorsiflexion, could you, could you do that with this do you think?

Jon: You can do

APM: as long as you stabilize the, the lower leg.

Jon: It's got 20, 20 movement tests which includes dorsiflexion plantar flexion, inversion, a version, knee flexion, extension, hip rotation. But what's nice as well it then automatically logs that to the database. You can click on Ollie and then see over the course of the treatments, it will then pull the graph as to how he's improved

APM: in terms of from an osteopaths points of view. If we're. If we're doing long-term studies and the national council for osteopathic research NCOR might be interested in this. You could actually Just call patients back, say six months later and say, well, have those treatment effects lasted for that length of time? A lot of people are disinclined to do that obviously because it's a faff if you're in treatment and I'm trying to earn a living but it's useful in terms of justifying what we do to the NHS

Jon: if you're seeing someone sort of every day for a week for an acute problem that actually by and large you can. He can. He can remember close-ish, but when you emphasis the last six months gone and then when he was six months ago and it blends itself. Even even better into that

APM: when to some extent, it makes me think too of the medico legal aspect of this. That in the event that you're called into court to justify your treatment. If you've got some facts and figures, you can say, well, there is evidence from what I'd been doing. This was having a beneficial effect. It's not just my imagination or the patient's wishful thinking. There's clear indication that the treatment was having an effect on. That's why I chose to go down this path. Um, and you know, that's just one aspect which may be of benefit here. Where's the technology going now? Where's your lab leading you at the moment?

Jon: So the two things we're working on the project we saw the Rex last time I was in, they have partnered with the engineering consultants as part of mclaren f1. So looking at bringing, um, that sort of technology into exoskeletons. So the idea of, ok, we don't want it going 20 miles an hour, but the control systems need to be working very, very quickly to stop it falling over. So that's quite an interesting project.

APM: Where's rex got to at the moment? Has he moved on since we last saw you quite slow, but it was also very useful if you hadn't been able to walk.

Jon: So that, that model is, is as it is as it is and then currently mclaren are working on the next, uh, the next versions. So potentially two to three years for actually something deliverable in a, in a clinical clinical setting. But there's ongoing prototypes. Im hoping in the middle of this year. I'll get my hands on a, on a prototype version. And the key thing is to try and it's great. I mean we use it not just for our spinal cords use it a lot with our, um, MS patients stroke patients because it is allowing someone to do those activities as standing that, that turning without requiring two other physios, if it's a big individual and also to get the, to get the repetition. But the current design of the REX, um, that the, the train over between patients is, that's five minutes. And one of the things we wanted to do is to, with the new version, had it really, really quick so I can just go from one to one to another. And then as I said, we're looking at the, trying to raise this awareness of foot drop, um, we're developing to try and put our various technologies together to create a sort of upper limb

bootcamp so that people could come post stroke or head injury to come for a couple of hours and try a range of technologies and, and addressing different aspects of their, of their impairments and their movements, but to do it so have different, have different stations. And again, that keeps the costs low for individuals.

APM: See, I've already caught this cough of yours. You fleetingly mentioned ms on a couple of occasions. Um, can you very briefly just sort of talk about the application in MS what So what are you doing

Jon: with MS We've got the range. The range of separate technology a very foot drop is very common. It's very common in MS we use that. Um, and also the exoskeletons can do dynamic stretches in standing, which, and we've got one lady that we treat and no matter how we manipulate, her body position wise and our hands, we can't get the same dynamic stretch we can as we can with a robot. So she'll, you know, she'll say, well, if you treat me, it's lovely because it got the human touch, but I'm probably only going to have my hips will only be easier till this afternoon. I'll feel it again in the evening. when we've had a robot session, if you've got two to three days of reduced pain, which means she's sleeping. And that's a huge, a huge thing for anybody.

APM: Jon, thank you. I'm so pleased you could come in and uh, admire you for putting up with the man flu and bearing with the paracetamal and getting all the way down here. Um, it's been a great challenge getting all this technology. And I'm going to owe my production team a few beers for having ruined their camera shots every so often this evening, but I've learned a lot and I'm sure the audience. So thanks for coming in and I hope we'll see you again.