

Airing Pain Programme 47: The power of the mind

Investigating ancient and futuristic techniques to reduce pain using the power of the mind: from mindfulness to neuro-engineering.

In this edition of Airing Pain Paul Evans explores the possibility of controlling pain through techniques that focus on the brain and the mind.

Paul meets Aleksandra Vuckovic, a rehabilitation engineer at the Southern General Hospital in Glasgow, who is conducting research into the use of neuro-engineering techniques to control chronic pain in those with injuries to the central nervous system. She explains that neuro-engineering works through patients training themselves to identify the part of their brain that controls their pain and then reducing it using brain waves. One of her patients, Andy Nisbet, shares his own experience of the technique and discusses the potential for future advancements in this method.

Paul also speaks to Vidyamala Burch, founder and director of Manchester-based organisation Breathworks, which offers training for healthcare professionals and individuals in mindfulness-based approaches to chronic pain. She introduces us to the mindfulness technique, which fuses modern medicine with age-old Eastern practices, and talks about the advantages of becoming aware of emotional and physical states as they occur. Burch explains that mindfulness allows people to identify the behaviour patterns related to their suffering and to make a conscious choice about that behaviour. This technique impacts on all areas of a person's life: allowing them to reduce stress, maintain good relationships with those around them and increase their self-esteem.

Paul Evans: Hello, I'm Paul Evans and welcome to **Airing Pain**, a programme brought to you by Pain Concern – the UK charity providing information and support for those of us living with pain. This edition is being funded by a grant from the Scottish Government and in it I will be looking at two approaches to pain management that span nearly 3000 years of civilisation.

Vidyamala Burch: Wouldn't it be amazing if we could combine Western healthcare with these techniques from Eastern religions effectively, but to bring it in in a secular setting.

Evans: Now fast-forward from 600 years BC right up to the frontiers of science.

Aleksandra Vuckovic: I just tell them, 'Look this is green, these are these three bars. They are either green or red – just try to make them all green.'

Andy Nisbet: The idea of being able to control something using brainwaves was like science fiction to me.

Evans: Well, science fiction or ancient religion, what these two techniques have in common is that they both aim to tap into the power of the mind to help manage pain. Mindfulness has its roots in Buddhist meditation although it's not inherently religious and is often taught independent of religion. Since the 1970s its principles have been embraced by clinical psychologists for the management of stress, anxiety, depression, eating disorders, addiction and chronic pain. Vidyamala Burch sustained a severe spinal injury when she was 16. She's founder and director of Breathworks, an organisation which offers training for health professionals and individuals in mindfulness-based approaches for chronic pain and chronic illness. So what is mindfulness?

Burch: The pat answer that's widely used within research is moment-by-moment non-judgemental awareness but I don't find that very evocative myself.

Evans: I don't understand it either.

Burch: Yes, yes. So really it's about being present, being awake to what you're experiencing right now physically, mentally and emotionally. And on the basis of being awake and aware you can make choices as to how you respond to that experience.

Evans: I don't know what you mean by being aware. Of course I'm aware; I'm awake, my eyes are open, I'm talking to you and we're smiling at each other. I'm aware. Isn't that what you mean?

Burch: It's what I mean broadly, but you would be surprised at how unaware we are a lot of the time. We're in what's called 'auto pilot'. We're going through the day with all our habits about how we do things, and if you've got, say, back pain you might have all kinds of habits in terms of the way you respond mentally and emotionally in particular to that back pain. Well, also physically it might be you've got back pain and you think, 'Oh my back hurts I'll stay in bed' and you don't really realise that you can step back from being completely identified from the experience of back pain. Step back and be a person who's aware they have back pain and that they can choose what they do with that back pain. That's obviously on the physical level, but mentally and emotionally mindfulness means that you're aware of your thoughts and your emotional states as they happen. You're not completely identified with your thoughts and your emotional states. And you would be surprised at how difficult

that is for most of us. If I said to you, 'What are you thinking?' you'd probably have to pause and think, 'Well, I'm not really sure what I'm thinking.'

Evans: My immediate answer would be, 'Well I'm thinking about what I'm thinking. And what am I thinking? Well, I'm thinking about how to answer this question. Well, I'm not thinking.'

Burch: Yeah, so being aware of one's thoughts would be: you're washing up, your back's hurting and it's as if you can kind of come to, wake up to being in the middle of that experience – washing up with your back hurting – and you can be aware 'my back is hurting, I'm holding my breath [exaggerated breath], I can relax my breath, and I'm having thoughts that are very fear based – thoughts about, oh my God how am I going to get through the evening? How am I going to cope with my kids coming home? How am I going to do the housework? I won't be able to sleep, I'm going to get totally stressed out, my life is ruined'. And those are the thought processes that many of us have on a very unconscious, habitual level and they start to drive our behaviour. So you become a person that becomes more and more wound up, perhaps very irritable, argumentative and so on. And with mindfulness what's really wonderful about it is you can just think 'Oh, I'm irritable'. That's very different from being an irritable person. You're a person who's having some irritable thoughts and irritable emotions and this is where the non-judgemental component comes in because you don't think, 'I'm irritable. Oh that means I'm a really bad person. I shouldn't be irritable'. You just think, 'Oh that's interesting – I'm irritable'.

Evans: Put it away?

Burch: Put it away, yeah. And 'How can I respond right now to help that irritation reduce as opposed to just getting more and more irritable in a blind and unaware way?' I'm sure any of us know what it's like to be completely caught up with our mental and emotional states, and not have any ability to have perspective and balance around those states.

Evans: Something I do – that I've learnt to do – is...I have pain and it changes my personality sometimes, and I can recognise now how its changing my mood and how it's affecting other people, and I try to visualise myself by stepping outside my body and looking back at myself.

Burch: And what happens when you step outside your body and look back at yourself?

Evans: I see my grumpiness, my mood and I can identify with what the other person is seeing.

Burch: Yeah I would say that the outcome is very, very similar because what you are doing there is, if you like, stopping. Instead of just being Mr Grumpy, you're stopping, you're thinking, 'Ah I'm grumpy. It's having an effect on me. It's having an effect on other people.' You're recognising you have a choice and you only recognise you have a choice by stopping and identifying what's going on. When I say wake up, that's what I mean – coming to from an auto pilot habitual unaware state and being able to think, 'Here I am, I'm grumpy. Wow, I'm grumpy and I can do something about that.' So it's very similar but I would personally be careful of encouraging someone to step outside their body, because the tricky thing when you've got pain is it's in your body. Mindfulness helps us to become whole, so we're not splitting up from a part of ourselves. Obviously it works for you, which is great but, for some people the idea of stepping outside the body would be a way of splitting off from the pain.

Evans: I actually mean stepping out of my mind from the body.

Burch: Yes, so stepping out of your mind – I think that's very accurate and sometimes called decentring in fact. Within mindfulness based cognitive therapy they talk about that as decentering which means decoupling ones identity from the mental states that you're having. So you have just described mindfulness in your own experience.

Evans: Well there you are.

Burch: And do you find it empowering when you think, 'Oh I'm grumpy. I've got a choice here – it's affecting other people'?

Evans: I find it stops me getting into a spiral of grumpiness and getting into an argument at home.

Burch: Yeah.

Evans: My wife might say to me, 'Paul that's unreasonable' and I can look at myself and say, 'This is why this is happening'. In the old days I would carry on and we would just spiral into an argument and now I can stop and say, 'She's right. I can see it. It's affecting her and its affecting me.'

Burch: Yeah, so that's brilliant. Essentially those are the kind of skills we are teaching with mindfulness and again you've described very well the non-judgemental aspect, in that you're able to say, 'I'm grumpy and its affecting myself and other people' without saying, 'I'm a really bad person because I'm grumpy and because I'm a really bad person I'm going to get more grumpy'. I think people with chronic pain and illness...we quite naturally have poor self-esteem or lose our confidence. We think that perhaps we're useless – perhaps if we have

lost our job. Or say if you didn't have this awareness you are describing and you were arguing with your wife day after day after day – that's deeply undermining, isn't it?

Evans: It's exhausting.

Burch: Yeah, it's a horrible way to live. But the fact is you can say, 'Oh yes, I'm grumpy. It's affecting her, it's affecting me, and I don't have to keep doing this'.

Evans: You run Breathworks and you train people to do this?

Burch: Yes. One of the things I quite often say on our courses – and we train health professionals to run our courses and these are very highly educated people, very skilled, with quite complex methodologies and so on. They can find mindfulness very effective, very powerful. But I often say to people this is not rocket science and in a way the shocking thing is that we need training to learn how to do what is actually innate. When we get out of our own way and we begin to let go of all the unhelpful habits that we have learned through a lifetime of experience – we protect ourselves in all sorts of ways. But that's what I love about mindfulness; in a way it's innate. We have just learned to come back to something that we recognise and something we take as true and we can do for ourselves.

So we do two different sorts of training; we run courses for people in pain or people with chronic health problems of any sort, as well as people who are suffering from stress – which is more like the busy, stressed person who is still in work, that kind of thing but they are finding work difficult because of stress. Mindfulness can be really helpful. So we work at that end of the spectrum right through to people who are very disabled through their health. This is usually an 8-week programme. So you would go for a 2-hour class and then you'll have home practice, so we give people CDs of guided mindfulness practices and you'll do those every day, come back to class, report how you're getting on. Then we also do training of health professionals. So they can take either the 8-week programme into their clinical setting or they can just learn about mindfulness to bring into their clinical practice in a more informal way.

Evans: I think that's a good point that this isn't some airy fairy thing that's come out of the blue; it is a recognised pain management and stress management technique.

Burch: Definitely and there is more and more research about mindfulness. Really it came into the West in about the 1970s in a clinic in Massachusetts with a chap called Jon Kabat Zinn, who was a highly trained scientist and a meditator. He thought, 'Wouldn't it be amazing if we could combine Western healthcare with these proven techniques from Eastern religion effectively, but to bring it in on a secular setting?' So he started doing that in the 70s. Then

it's been the last 10 years when it's really started to take off both here in the UK and also in other countries. There's mindfulness based cognitive therapy sometimes called MBCT particularly for preventing relapse into depression, so there are big clinical trials showing that that's effective. And there is acceptance and commitment therapy, which includes mindfulness as part of its methodology, and that's being used more and more within pain management. So there is more and more research being done – it's still in its infancy I'd say, but there's an explosion of interest. It's sometimes called third wave psychological therapies which are more acceptance-based and that's the very interesting paradox with mindfulness; that mindfulness won't make your pain go away. It's a recognition with chronic pain that we probably can't make it go away. So how can one live with the unpleasant experience of pain? That's effectively what it is: an unpleasant sensation in the body. How can you live with that with peace of mind, with high functioning, quality of life, positive emotional states and so on? I think what's being recognised is mindfulness and acceptance-based approaches may enable you to do that better than fighting your pain, being caught up in a battle with it, thinking you can get rid of it some way or other, because you are always going to fail.

Evans: That's Vidyamala Burch. Breathworks offers mindfulness based training in many different forms – for those of us living with chronic pain, and to train health professionals and organisations. Courses can be accessed face to face, through distance learning, online, or online with mentoring. Check out their website which is breathworks-mindfulness.org.uk. That's breathworks-mindfulness.org.uk.

The small print in every edition of *Airing Pain* is that whilst Pain Concern believes the opinions and information on *Airing Pain* are accurate and sound, based on the best judgments available, you should always consult your health professional on any matter relating to your health and wellbeing. He or she is the only person who knows you and your circumstances and therefore the appropriate action to take on your behalf. Now, from ancient to modern... The Scottish Centre for Innovation in Spinal Cord Injury brings together a multi-disciplinary team of engineers, scientists and clinicians. One of their research projects is being carried out at the Southern General Hospital in Glasgow where I met, lecturer in rehabilitation engineering at the University of Glasgow, Aleksandra Vuckovic. She was with one of her research subjects, retired teacher Andy Nisbet.

Vuckovic: What we are doing here for rehabilitation engineering, we are applying different techniques to aid recovery of people after spinal cord injury, or it's applicable also in general for people after injuries to the central nervous system.

Evans: So what sort of injuries are we talking about? How do they affect people?

Vuckovic: After spinal cord injury you have some effects that you see immediately and some things that develop after time. So what you immediately see is complete or partial loss of motor function movement, sensation, control of bladder and bowel, in some cases breathing, body temperature control. And then there are some other things which are called secondary effects that develop some time after injury as a consequence basically, like osteoporosis, muscle weakness... And one of the consequences is this chronic central neuropathic pain.

Evans: Could you explain what that is?

Vuckovic: It's a chronic pain that typically develops sometime after an injury and it goes by the injury through the somatosensory system. It's generated in the brain rather than the body but it's perceived as coming from the body.

Evans: So let me get this right, the injury may have healed but the pain persists.

Vuckovic: Yes.

Evans: Now Andy, you're one of Alex's research subjects. Explain your injury to me first.

Nisbet: Six years ago I had a spinal cord injury at T4 level. I don't remember exactly when after or at what stage of recovery the pain sort of kicked in or when I noticed the pain, but since then it's been a constant neuropathic pain in my legs and in my left arm. And when I heard Alex was doing the research into it I thought I'd give it a go just to see what came of it.

Vuckovic: This is a study that has been funded by the Medical Research Council. So we are trying to see if people can be trained to voluntarily modulate their brain waves, and if this modulation will result in reduction of pain. So I think it was quite a risky project because first of all we didn't know if we would be able to find the area in the brain that this is related to this sort of pain. Then we didn't know if people would be able to train themselves to modulate brain waves and the third thing that we didn't know was even if they managed to modulate brainwaves would it affect pain at all. So there were three things that had to be fulfilled.

Evans: So how were you training people to modulate their brainwaves?

Vuckovic: I just tell them, 'Look this is green, these are these three bars. They're either green or red so just try to make them all green'. I mean, it sounds silly but that is how it works. And this is normally how neuro-feedback works – in general, not only with this one – this is how we train people with neuro-feedback.

Evans: Okay, Andy, how do you make a spot on a computer screen turn green? I mean, is it just thought processes?

Nisbet: Before I started all this, the idea of being able to control something using brainwaves was like science fiction to me. But when we started one of the first things we did was to be able to control the volume of a piece of music, which I found amazing to begin with. Just the fact that I could drop the volume and control it and hold it there. After that I was looking at the screen and making the bars go from red to green. At the beginning it was a kind of random thinking in different areas of your brain, if you like.

Evans: Let me go back on this, this sounds a bit like Doctor Who. Obviously you're connected to some sort of machine.

Nisbet: Oh yeah, there's a cap on my head with electrodes attached to it and, as I say, by trying to think of parts of the brain to try to make the bars go from red to green. Then once I had hit on an area that seemed to work quite well I was to try and focus on that all the time and try to make the bars stay green. That worked quite a lot of the time. There were quite a few sessions when it worked really well; the pain would go down. I think the times it didn't work was not anything to do with the science of it – it was more me not being able to concentrate or having had to rush here or something that didn't let me be able to focus as well as I could have. To me the focussing part of it was probably similar to something like yoga where you're trying to take your brain to a different place, if you like. I've never done yoga so I don't know exactly, but it was trying to get to somewhere in your brain where you could almost control the pain and just bring the pain down. And as I say, it did work in many sessions. One of the side effects of it was it lasted for two or three hours after we'd stopped the training. Another side effect was a sensation of heat that came with it, which was really strange to me. My feet almost felt like they were on fire sometimes but the pain had gone and that lasted two or three hours afterwards as well.

Evans: So let me get this straight – when you're sitting in front of the computer screen and you have the electrodes attached to your head, did you have to consciously think, 'Pain go away' and the pain did go away or were you thinking about other things?

Nisbet: I tried to think of somewhere in the brain where there wasn't any pain. It's almost a place where you could go in your brain where the pain wouldn't be there. And the result of that was the bars would go green and the pain would go down. It's a hard thing to describe. I suppose it's different for everyone; different individuals concentrate in a different way and have a different technique. That worked for me. The only problem I found was at home it wasn't so easy to concentrate for any length of time because there are distractions – you

think of something different and you're away, your brain's gone, it's off on a different tangent. So it's hard to use in a practical way but it did work while I was here, there is no doubt about that.

Evans: So it is akin to what many of us are told in pain management programmes is visualisation? I mean, I use visualisation when I'm having my blood pressure done; I take myself to an island, I think green thoughts and that should bring my blood pressure down. That to me is visualisation. Is this the same sort of thing?

Nisbet: No. I tried thinking of being on a beach on a sunny day, all these kinds of things. That didn't work in this case. It was more a case of finding somewhere to concentrate within the brain, which ignored everything else and just kept the pain at bay. It was a different technique – it wasn't the sunny beach, lovely day kind of thing.

Evans: Did you develop the technique yourself or were you taught how to do it?

Nisbet: No, Alex at the beginning said nothing. She wouldn't guide me at all. She said, 'You have to find what suits you'. So it's a case of experimenting at the beginning to find somewhere that works and see if the pain reduces. It was interesting at first to see what worked and what didn't work and the relaxing part of it didn't seem to work for me. It was more focussing on a place and getting the pain to go away.

Evans: So Alex, what do you tell people at the start of this programme?

Vuckovic: Well I explain what it is all about; then I explain that probably they know the pain is in their brain and we are trying to change basically how the brain works. But I don't give them many strategies. Maybe sometimes I will say, 'Try to relax because if you are very nervous nothing will work'. What people see on the screen is actually their brain activity from certain brain regions in real time; so this is a single blinded study in the sense they don't know which areas I am choosing. And sometimes on purpose I would go to the wrong side and wrong frequency just to check if it's a placebo or if it's really that area. So I was amazed – Andy was here only two times when he said at the end of the session, 'Listen, I think I was regulating these bars with this part of the brain' and the electrode was right there where he pointed and it was really amazing for me. Okay, this is my study but sometimes I get surprised that he was able to find where he thinks this control comes from.

Evans: I find it absolutely incredible that you can pinpoint a part of your brain that is in use at the moment. I mean I have no idea which part of the brain I'm using. I can read books, possibly written by you Alex, which will tell me which parts of the brain but I couldn't identify them.

Vuckovic: Yeah, it's hard. I tried it on myself, the same thing. Of course I don't feel any relief of pain but I can't exactly say which part of the brain, but I can feel that I'm in the right state of mind – something like almost floating. I feel I can levitate which I obviously can't. I don't know how yoga or relaxation really looks like, but this is my feeling when I'm trying to make the bars green, but from which part of the brain... it's still amazing for me. This is my research, but it still surprises me.

Evans: So Andy, when you could point to which part of the brain your thought was working, can you explain that to me? How did you feel?

Nisbet: It's just focusing on one side of the brain or the top of the brain, imagining what is the right side of your brain or the top of your brain and just seeing what happens on screen. It is the feedback part of it that's important. It's just a case of focusing. It's hard to describe imagining a part of your brain. Even in things like having a conversation, you know recalling a conversation and concentrating on the right hand side of the brain for example, just to see what happened on screen. Then gradually working out what was reducing the pain and trying to hold it there.

Evans: So Alex, the feedback side is that Andy himself is training his brain through the feedback from the screen but you know what area is being involved. And that feedback is going through to Andy and he can therefore identify.

Vuckovic: Yes. So I know exactly what I want to achieve and I know in what direction I want to move his brainwaves, so I'm setting a threshold which is slightly under or above his natural brain activity, and I'm encouraging him to change the direction – either increase or decrease different frequency bands.

Evans: It's all very well Andy saying that he feels better. Do you have any evidence that something is going on?

Vuckovic: Yes, certainly. We record his brain activity during training, before and after each session, and we recorded that over the period of forty sessions. So now we can compare his brain activity from when he came the first time and before his last training. So it's not training, it's just his normal brain activity and we can see that his brain activity has shifted in the direction we wanted when we trained him so this is evidence definitely that something is going on.

Evans: Andy, are you optimistic that you can continue with this in the future?

Nisbet: Well I have been since December when I stopped, when the pain peaks. I use the technique and I think it does take the edge off the pain but, as I said, long term it's difficult to concentrate at home, to sustain that level of effort into the feedback part of it. If a handheld or portable device could be made which you could switch on and do the same things that we've been doing in the hospital here, then that would be a big advance I think. Just something practical like that. But the science part of it has been proved to me: controlling the pain by using the brain does work. Another thing I also got out of the research is just being in charge of the pain. Prior to this the pain came and it was there and I couldn't do much about it. After the research I felt I could control the pain. I was in control and the pain doesn't have to be in charge of you, you can push the pain back. That was a benefit of it as well, just being in charge of the pain.

Evans: I could envisage an application – an app – for a mobile phone being developed for something like this.

Nisbet: I've already suggested it.

Evans: That's Andy Nisbet along with rehabilitation engineer Aleksandra Vuckovic.

Don't forget you can still download all the previous editions of *Airing Pain* from painconcern.org.uk and you can obtain CD copies direct from Pain Concern. If you would like to put a question to our panel of experts or just make a comment about these programmes then please do so via our blog, message board, email, Facebook, Twitter or pen and paper. All the contact details are at Pain Concern's website.

And finally, whilst a smartphone brain modulation app may be some way over the horizon, don't forget that mindfulness has been up and running without any glitches for nearly 3000 years...

Burch: You don't need any equipment, it's free, you don't need to be educated; any of us have got access to these incredibly simple techniques that can transform our lives.

Contributors

- Aleksandra Vuckovic, Rehabilitation Engineer, Southern General Hospital, Glasgow
- Andy Nisbet, patient undergoing neuro-engineering
- Vidyamala Burch, Founder and Director of mindfulness organisation *Breathworks*

Contact

Pain Concern, Unit 1-3, 62-66 Newcraighall Road,
Fort Kinnaird, Edinburgh, EH15 3HS
Telephone: 0131 669 5951 Email: info@painconcern.org.uk

Helpline: 0300 123 0789
Open from 10am-4pm on weekdays.
Email: helpline@painconcern.org.uk

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