Transcription of Interview:

# Neuroanatomy, Pain & Behaviour Change

With Dr Matthew Williams

Recorded 2nd January 2014

This **FREE** 9 Page Transcript Discusses:

1. The ‘take home nuggets’ from Matthew’s 1-day course
2. The interconnections between neuroanatomy, pain pathways, the perception of pain and nociception
3. Drug Effects vs. Placebo Effects
4. The stigma surrounding mental illness
5. The Psychology of habit forming behaviours, change and motivation AND MORE!
Transcription of interview between:

C: Chris Murphy (Director of PhysioUK)
MW: Dr Matthew Williams (Neuroscientist)

C: Hello. Welcome to this interview with Dr Matthew Williams. Matthew is a neuroscientist and lecturer at King’s College and Imperial College and a number of other institutions – he lectures medics and health professionals in a variety of topics, including neuroanatomy, pathology and behavioural sciences. Essentially, with some of the conversations Matthew was having with a number of physios, he found that many said: “we don’t cover a lot of that in our training and that’s really interesting!” So Matthew contacted me to meet up and talk this through and there’s some certain topics that we’ve come up with that we think are really interesting. So today is really an opportunity to add a little more flesh to these topics and to give you a bit more to see whether it is of interest to you, how they can help clinically and how they can help you in your practice. So first things first, hello Matt.

MW: Hello, Chris.

C: Thanks for taking the time out to talk today. I know that with our chats we often go off at a tangent, so we have identified the 7 main topics we’d like to cover today which include:

1. Neuroanatomy
2. Pain Pathways
3. Perception of Pain
4. Nociception
5. Drug Effects and Placebo
6. Mental illness
7. Psychology of habit forming behaviours, behaviour change and motivation

There’s a range of topics there but they do all flow through, so if we took the first of those with respect to neuroanatomy – what I would be interested in, from your perspective Matthew, is why do you think people need to know about this more and for people that may be coming along to your day course, how would you want them to be at the end of that session, what would you want them to take away with respect to neuroanatomy?

MW: Well, neuroanatomy itself is of course an incredibly complex subject and someone can become a professor of just studying neuroanatomy in one species let alone all the different brains there are in the world. However, I would say to physiotherapists and occupational therapists and people in that line of work, you don’t need to know a lot, you know, it’s not like the brain physically is part of the treatments that occur normally but whenever you talk about the other issues that we are discussing, you know, the pain pathways and drug effects, it’s always worth knowing a little and that little is essentially derived from embryology and how the brain develops. So you can show just a few
images and a few nice pathological samples of human brains dissected and mounted in the museum we’ll be teaching in, you can see very clearly how right from the embryo you get the first few cells and at that point the final structure of the brain is actually already planned and programmed into the system and that relates to how all these different systems function and interact. So it is always good to start these types of talks with just a 20/30 minute introduction so that people can understand the terminology and learn just where two or three systems are because it really does help visualise something rather than it being an abstract drawing on a board, if you can actually see it, it helps you recall it.

C: I think, as you said, one of the things I hadn’t mentioned that you brought up there is where we are going to be teaching the day first of all. I don’t know if you just want to fill people in on that a little bit with regards to what they’ve got there at the venue and how that adds value, especially with respect to neuroanatomy.

MW: Yes, so we are running these courses in the Gordon Museum at King’s College London (see page 11 for some photos), at London Bridge, which is a Victorian purpose built pathology museum and it has got a large wing for neuroanatomy and the best way to visualise it is like the Natural History Museum but for pathology, human pathology, and it is quite a stunning place but the samples are very good and they allow us to examine actual real brains rather than just plastic replicas or diagrams on a board. Always a good way to help you remember it.

C: Yes, definitely. So from the anatomy, if we have that understanding then, it’s different systems and I’m guessing within that, how they interrelate?

MW: Well, yes. I mean, the brain develops in a very strange way. There’s no central plan, if you like. I mean, I don’t want to get into too much detail but very roughly, where you have the embryo you have like a top and a bottom, you get a line of cells that go across it which eventually turn into a nervous system and this segregates out the five sections, and these five sections ultimately become five distinct areas of your central nervous system as an adult. Then each one of these develops largely independently into the structures in the adult but then they have to cross connect and it’s thought incidentally that a lot of illnesses, particularly mental illnesses, are caused by problems in this cross connection either in the embryo stage or as a young child.

There are some things we will come to in more detail with the pain but there are some things we know very well and then the systems take one more step and you’re into the realm of no idea and that tends to link around the anatomy. So hopefully we show this very clearly on the course as it’s quite hard to describe it verbally.

C: Okay. So just going into the pain then, which is our next section to discuss. From your perspective, from the conversations that you have had with other health professionals, where are the gaps in the knowledge that would help people both from a clinical perspective with regards to current management of pain?
MW: Roughly speaking, pain has two components as a sense. It is one of the senses. I think there are nine confirmed... it’s still argued as to whether there is up to 14, but nociception is a clear one of our nine senses in itself and the bit that we sort of understand quite well is how it is transmitted along the nerves in your body, in the peripheral nervous system, how it goes into your spine, up your spinal column and then goes into a pair of structures right in almost the dead centre of your brain, called the thalamus, and the thalamus is essentially the Clapham Junction of your brain, it’s just where loads of connections come in and are rerouted out to other parts of the spine and brain. And that bit we sort of understand quite well and all the drugs we are used to taking act on various parts of the system but what pain is conceptually, and what happens to this pathway once you go past the thalamus is largely unknown as a perception, as an understanding of where the feeling originates. It’s the old ‘write everything we know on the back of a postcard’ actually. So all the pain killing treatments we have are to do with blocking the signal at one stage or another. But we know from behavioural studies that there are lots of things that affect your perception of pain. So your sensitivity to pain changes throughout the day with your circadian rhythm for instance and you are much more sensitive to pain early in the morning and much less sensitive to it later in the afternoon.

We also know that social effects can increase or decrease someone’s sensitivity to pain. We know that someone’s mood can. If you are very scared or very angry then people have lowered pain sensitivity. So there is clearly a complex set of interactions going on past this purely mechanistic pathway and obviously in a one day course there’s not enough time to review the whole field but if you just look at some of the ideas as to why this happens, mixing psychology and neuroscience at this interface.

C: I mean, certainly within physiotherapy over the last, I’d say, at least ten years now there’s been an explosion in the literature with respect to pain and the main area of change has been taking it away from a René Descartes, this happens in the periphery therefore that will signal something in the brain, and it’s the literature on explaining pain to patients that’s clarifying their understanding of it. You know, graded exposure to things, pacing, especially with regards to the chronic pain field. They would be the sort of key areas where things have changed. From the people that you taught, how does what they would pick up from the day impact them from a clinical perspective? From their perspective, what would they do differently as a result, or how has that changed their practice?

MW: Well, I think that depends very much on how the individual runs their practice and interacts with their patients in the first place. I mean, there is such variation in the way the clinical practitioners’ work. It is a very individual sort of skill. So I can’t sort of say oh everyone will do this and will help, but if you have got some sort of understanding of these things – for instance, if you have someone who was finding a series of therapies they have got to do and they are too painful, you can advise them not to do them in the morning when you are more sensitive to pain and suggest they do them in the afternoon when they are less sensitive to pain. Which incidentally, as a side thing, dental pain is the most prominent on this, so if you have ever got to have dental work, do it in the late afternoon, it makes a huge difference!
C:  

[Laughs] The reason why I have to chuckle about that—

MW:  If people only take one thing from the course…

C:  

[Laughs] Then go to the dentist in the afternoon!  It’s those things when we have spoken
before that I love and you’ve got to think, “I’ll make a note of that one and that will
change my life now!”

MW:  That’s an important one.  I’ve told everyone I’ve ever met that and believe it really makes
a difference.  But anyway if you know these little variations.  I mean, you know from your
own experience that sometimes the dread of pain can be far worse, you can put
something off and you can actually make it worse.  You know, if you absolutely fear –
you’ve got an injury and you’ve got to do something and you know it’s going to hurt, you
can fear it so much at the moment you get the slightest hint of pain you stop
immediately, even though the pain you’ve experienced is actually quite low.  So your
emotional state can make quite a substantial difference to how you interpret these
things and if a practitioner has some small understanding from this course as to how that
might work, I’m hoping if they can just tweak what they do maybe and become a little
more efficient.

C:  And I guess then, where we’ve previously spoken about the placebo effect, there is an
element of maximising that and utilising that as best as possible.

MW:  Absolutely.  Well, you know, with this idea of pain and how pain is actually felt is quite an
abstract concept in the brain.  Clearly that overlaps with the idea of a placebo.  You know,
placebos are a known and well characterised effect.  It is well measured in large scale
clinical studies, they actually have to take it into account and there is often a separate
control group because you have to make sure.  If you just had a treated and not treated,
you’d have no way of knowing that any beneficial effects weren’t placebo.  We know
certain things like the more dramatic the placebo, the greater the effect it has.  So an
injection of salt water has a greater effect than the sugar pill, even though they both
have absolutely no direct effect on the system.  And we don’t really know what the
placebo effect is, even though it’s been very, very well characterised behaviourally and
just put forward, go through a few of the ideas and the evidence supporting or against
them and essentially for people, not a specific goal to give the people on the course, but
just to increase other understanding of it, which in turn they can tell their patients.

C:  Yes, and as you said there, the awareness of all the subtleties and the different factors
that can influence and how you can then, if you’re not aware of them, you can’t actively
or knowingly tweak them and adjust them and use influence as best as possible as
therapeutically as possible and I guess being aware of that then that gives you other
choices with regards to helping them as best you can.

MW:  Absolutely.  Ultimately, you have got to trust the clinical practitioner to do their best.
You know, no-one goes into these types of job for the money, you know, people are
there because they want to help patients, that’s why they went through all that training.
Ultimately, you have got to trust people to do the best job they can and in the past I’ve found that clinical practitioners are generally very, very good at doing that but everyone has got their own way of doing it, so all I can do is give them a new way of looking at something, a little bit more information that’s in line with all the current research and hopefully that will trickle down and help them interact with their patients better.

C: And just to wrap up the pain section, we will be looking at drugs as well and an overview of the sort of common drugs and how they work.

MW: Yes. Well, that comes in to this sort of multiple level pathway of how a signal is transmitted from your finger to your spine to your brain and different drugs work at different steps of this. We will just look briefly at why they work like that which incidentally overlaps a little with why some drugs are addictive and others aren’t.

C: Which again I think, relating back to that conversation you had with the physio that started this whole journey, there’s bits probably mentioned in training and unless people then do further study that knowledge is lost to a degree and I think understanding, as you said, that understanding anatomy, understanding how things work, understanding why one drug might be more appropriate than another, it just gives you more choice within your clinical management and a more informed choice.

MW: Absolutely. Knowing more about a subject can never be bad!

C: [Laughs]

MW: Well, it’s always the old phrase about not drinking deep enough from the Pierian spring because a little knowledge is a dangerous thing, but I suspect people who have come in and done a three or four year degree and then plenty of on the job training and then running their own practices can’t be said to have a little knowledge. So I think we’re all right on that one.

C: I think we’re safe on that one. Just to draw us on, because time is ticking away, I’m going to lump the last two together a little bit and then we can see how we go discussion wise. But the one that fascinated me from when we have spoken before is the whole area of mental illness which I know is quite close to your heart from the work that you have done. What would be your take on that, what would you want to explore in that section that has relevance to people within an outpatient and within a physiotherapy practice or physio or OT’s?

MW: This is actually the key point that I noticed when I spoke to the original physio who gave me the idea for this course. Because we were talking about patients that used to drive him up the wall, who had come in and they wouldn’t do their exercises or they were recovering but they still kept coming and seeing him every single week. So there’s clearly something there driving them to come and see a health professional, even walking there if it was painful or difficult to do but then in the same sort of manner this person then wouldn’t go through their exercises to actually recover and that’s a strange duality of thought.
One of things that has been done in the NHS to considerable success in the last 15 years is in GPs and A&Es’ is the recognition amongst frontline clinical staff of just some of the very basic signs that someone is showing some form of mental illness. The thing they is so much stigma around these illnesses that people will often refuse to recognise they have them, they will not even tell the doctor, “I am feeling very sad, I am feeling self-destructive”. They will come into a GPs every two weeks for a year with, “I've got a mild chest infection. I've got a cough that won’t go away” and actually they haven’t. What it is, is they are either too ashamed to actually outright ask or they don’t even understand, they just feel a compulsion that they need some help but have no idea how to go about obtaining it.

So there have been these techniques that have been introduced and they are quite simple, it’s just a handful of small symptoms and with a few follow-up questions that doctors can ask and gauge the response of that can be a really good giveaway to this and I think the rule of thumb is that about 1 in 8 people who turn up at GP surgeries have some form of an underlying mental illness. So this is not a rare thing at all. So we go through a few of those... you know, not some huge long list and of course there are many types of mental illness but most of them, thankfully, are very rare but some of the most common symptoms that can be spotted in like a 5 or 10 minute discussion, we will just go over them and why they are symptoms of certain illness. And if that gives an extra string to the bow of whoever is treating you then that can only be a good thing.

C: And again, that can influence their practice and what they do and I guess with what you have just said there it could influence that but also it then might be more appropriate referral onto another practitioner or back to the GP or further discussions because, you know, for that person to get the best result.

MW: Absolutely. You may have someone who... I mean, it’s particularly common, for instance, in younger men that they are a very high risk group for depression. In fact they are, men 18 to 34 are the main group for suicide and yet they are the group of course who society puts on this idea that you’ve got to be strong and vital and outgoing and master of your own fate and it can be extremely isolating for people within this and if they’ve come to a physio, they’ve got an injury or they have been referred by a GP or something, and they come to a physio and they like that physio, they get on with them, and they know something’s wrong, they feel it, so they keep making this overture, this repeated meeting to try and work out how to get some form of help or treatment when they don’t understand what they’re going through themselves. But of course from the outside it can just look like, “Why is this guy continually hassling my surgery?” And a referral to a psychiatrist or a psychologist or even just a counsellor could make or break the difference between treating that person in the appropriate way.

C: And it’s not avert mental illness it’s just those subtle signs, it’s picking those up early on.

MW: Well, yes it is. I mean, to be honest humans are pretty good innately at spotting the really extreme stuff anyway. If someone comes in and they are having a full-on paranoid psychotic attack, you don’t need any training to spot that’s not normal because their
behaviour will be so extreme, you know, you’d be calling an ambulance and maybe the police! But the most common mental illnesses are depression and anxiety disorders and these can have quite devastating effects, even at a low level on someone’s life but very often with these people they have had them for years and they have learnt to put on just enough of a front that people can’t spot them. But outside the theatre, outside the GP’s office, outside the physiotherapist’s office, their lives are falling to bits and of course if you are desperately miserable every single day and if you only sleep three hours a night and your weight shuttles from one extreme to the other, that is going to have a severe knock-on effect on all the other issues in your life, including any treatment you are undergoing in therapy.

C: See, I find it fascinating. These areas I just know I’d be so fascinated to hear the discussions that people bring of patient stories. If you go back and explored that a little bit further where there’s behaviours you couldn’t quite put your finger on at the time and now it’s like, “Ah, yeah” and “Gosh, I’d missed that”.

MW: Yes. I was actually put onto this line of thinking several years ago just speaking to my GP when she found out what I did for a living and she spontaneously had a bunch of anecdotes about exactly this thing of patients coming in and having nothing really wrong with them but something clearly very serious is afoot.

C: With regards to the last bit about habits and motivation, which potentially from the outpatient therapy point of view has more relevance but ties in with that last section, is what are the key areas that we would be exploring here within that section?

MW: Right, it’s split equally really between why people do, why do some people do their therapy very regularly and reliably and other people want to get well, not like being in pain or immobile, and yet don’t do a series of very simple movements every day which would relieve their suffering? It’s easy to say, “Oh well people are this, just laziness” – I mean, it’s true in some cases of course! But we would look at some of the psychological habits and psychological traps that people get themselves caught into because maybe you can help them break a destructive cycle. I mean, I wish we could go into it a bit more but time is pressing.

C: But I think that is going to be a problem that everyone that works in an outpatients setting will have, where you have this gambit of patients from one extreme to the other where you can’t get someone motivated to do anything whereas someone else will be like, “Well, can I do this, can do this, can I do this. I did exactly what you said to the letter” and I find it outstanding, you know, the difference between those people. And the difficulty then is one end of the scale where people either aren’t engaging at all or they’re mildly engaging and it’s what’s the different people would suggest different things but it’s drawing that altogether and having an informed discussion with respect to that I think has great relevance for people. Again, it would be interesting to hear peoples’ experiences as to what has worked and be able to pin them and say, “Ah, maybe that worked because of this or because of that” but to give people a plan at least and some other tools and skills to try to engage people.
MW: Absolutely. There’s quite a considerable body of research on this, on what methods work or at least have a success rate, it’s never going to be 100 percent, but have a good positive success rate across the group and others that don’t. And unfortunately what works and what doesn’t in our everyday lives where we hear something and we forget where we heard it or we do something because it’s always been done that way, unfortunately they are very blurred and hopefully I can put a little bit of actual factual research to separate out the things that do work from the things that don’t, or indeed the few things that actually seem to make stuff worse.

C: Just to draw this section to a close, because something you said to me and I think it was like between 35 and 50 percent, is it; patients with chronic conditions fail to follow medical advice, which actually sounds like... that’s just astounding.

MW: It’s astonishing. I mean, it’s been told to me by some of the most senior doctors in the country over the years, the one thing I keep hearing is that the biggest single problem in medicine is that people don’t follow their treatments, be it exercise, be it healthy living and avoiding certain foods or drinks, or just taking their medication. I mean, it does strike you rationally as astonishing, does it not, that someone could have had a heart attack and been close to death and been given a single pill they have to take a day and said, “This will stop you having another heart attack” and then they don’t take it. I mean, it does seem irrational but there are psychological reasons for it in many cases.

C: Matthew, time has got the better of us. As always, I’ve really, really enjoyed talking to you and I know that you have hundreds of other stories and anecdotes and research knowledge that you could bring into this subject and I hope that some of the things that we have gone through there just spark the excitement in people’s minds. It’s an absolute delight to have these conversations and I very much look forward to the day of your course. So I just want to say thanks so much and I don’t know if there was any sort of last sentence you wanted to say just to draw things together with regards to what you would want people to take from the day?

MW: Well, I think we’ve covered everything as much as we can in 20 minutes. I mean, I would say come along, even if you come out the end of it feeling you haven’t learned anything, it’s a hell of a place to see! There are some wonderful samples and some of the research we go over is genuinely fascinating. If I can get my friends and family to be interested in this when they’ve got no reason, I’m sure I can get a bunch of clinical experts to be interested.

C: [Laughs] Thanks for your time Matt and I look forward to seeing you soon.

MW: Thank you very much.

[End of Interview]