# 413 – Neurodevelopmental Disorders

With Anji Gopal and Darren Barnes-Heath

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**Anji**

Let's get going with this evening show. Baby Annabel is joining us here because we're going to be discussing primitive reflexes and the developing brain, so it's going to be great stuff for your clinical work, great revision, and also an opportunity to learn a lot of new stuff too. So to tell us more, I've got Darren Barnes-Heath here with me in the studio. Good evening, Darren.

**Darren** (00:02:24):

Good evening, Anji.

**Anji** (00:02:24):

And it's not your first time here either?

**Darren** (00:02:27):

No, I was here once before, but don't worry, I don't want to sit in that chair

**Anji** (00:02:32):

As it's your second show. But you are familiar being here, but it'd be great if you could tell us who you are and what you are up to these days. Sure.

**Darren** (00:02:41):

So most of my work in clinic is with kids with neurodevelopmental disorders. Autism is probably the most common condition that has been diagnosed that I'm treating, but it'll range from kids with global developmental delay. So very low functioning through to others that are struggling at school with dyslexia, dyspraxia, A DHD, anxiety, those types of things. So quite a range.

**Anji** (00:03:11):

So a whole range of categories and things going on and what ages.

**Darren** (00:03:16):

So occasionally a baby, but I'm not a baby clinic. That's usually a local referral. Most of the time it's probably from about three years of age to 10 or 11. I try and keep it below puberty when possible.

**Anji** (00:03:32):

Okay, and one of the things that you mentioned, so I can put a baby Annabelle down now come to later, but maybe we'll come back to her in a moment. So working with these different conditions and children with these conditions. So that comes under the subject of functional neurology, is that right?

**Darren** (00:03:49):

Yeah, it's functional neurology because we're, I'm looking at how the brain is working, is there a difference side to side? Are there areas that seem to be below where they should be for a child of that age? And then I'm trying to change it functionally. So using the receptors in the body that are going to send signals up to the brain, hopefully stimulate those areas of the brain to make them work a bit quicker, begin to build plasticity there so that the child then is moving forward in their development.

**Anji** (00:04:22):

So working from in terms of a process from those primitive reflexes using neurology and an understanding of neurology and then an application of that.

**Darren** (00:04:33):

Sure,

**Anji** (00:04:34):

Yeah. Can you give us an example?

**Darren** (00:04:46):

So I guess when I'm assessing a child, the areas I'm thinking of first of all are in the brainstem. These are the reasons they're going to develop first. And we're thinking, well, is the child feeling safe? Are they in fight, flight or freeze or are they able to cope with what's in their environment, process it appropriately. Now if they are, then they're likely to be learning and developing reasonably well. So many of the children we see have got partially stuck in the fight, flight or freeze responses. And this means they're getting overwhelmed by different sensory information. They're unable to regulate and feel safe themselves. They might still need co-regulation from parents for instance, but they're not now getting that in the same way because they're so much older and we don't perceive that they need it. So first of all, it's trying to get their autonomic regulation working. Obviously if they're in fight or flight, their sympathetics are going too high. If they're in more the freeze, then you get too much parasympathetic. Both of these are going to be upsetting, often their gut dysfunction leading to other autonomic problems.

**Anji** (00:06:09):

So we'll be seeing children or you'll be seeing children who have those symptoms coming from sympathetic. So as you say, gut, anything else that

**Darren** (00:06:18):

We see that I would say the gut's the main one. When you look at the eyes, you can see changes in how the pupils are responding, but probably the big things,

**Anji** (00:06:31):

But most people might not notice those.

**Darren** (00:06:33):

You see a lot of sensitivity in their mouth with many of them

**Darren** (00:06:38):

Because The area where some of this is being processed in the medulla is also where a lot of the signals are coming through the trigeminal and vaal areas and they haven't developed well. So then when they get sensory input into these areas, they can't cope with it. They're pulling away.

**Anji** (00:06:55):

So the whole of the digestive system right from the top all the way through,

**Darren** (00:06:58):

It's all being well controlled and we see that many children on the autistic spectrum have got gut dysregulation and then they may be allergic to the common things are gluten, dairy, et cetera, which is then causing metabolic problems, which is affecting the brain. So we see that the brain can affect the gut, can affect the brain, and that's part of the conundrum with a lot of these. I don't go into all the nutritional stuff. I work with a couple of different nutritionists and tend to refer to them when it's getting more complex and then we work together with the child, which often brings about the best results.

**Anji** (00:07:41):

So coming back to the brain,

**Darren** (00:07:42):

Yes. So my first thing is trying to get to the brainstem working. Then it's looking at more their sensory systems. Can they cope with touch sounds, light movement? Are they able to process these things and be able to then basically the back half the brain is processing the sensory inputs and then it's feeding forwards to the front areas where it's planning. We have our motor planning areas here and then the actual movements occurring in the motor strip. And as the child begins to move, then they are beginning to predict. So as they're beginning to crawl and they're walking, they kind of know how long it's going to take to get somewhere or what they're going to do when they get there. So they begin to predict more.

**Anji** (00:08:33):

So this is the integration of all the different primitive reflexes in a way. As you go through these areas,

**Darren** (00:08:39):

We see that they have to feel safe and then we get the sensory areas working as the sensory do, then they can begin to control the motor ones. And so there's sort of end primitive reflexes that are ones that are doing more of the complex movements involving both sides of the body. And if a child's developing neurotypically, then they should kind of go through that pattern through general movements, activities, interactions. We begin to get activation of the prefrontal cortex where their learning and emotional regulation Things Going. And so yes, I'm trying to figure out where they're getting stuck and also if they're getting stuck more on one side or the other.

**Anji** (00:09:25):

And before we come to that left/right, for those of us that don't work with children, can you remind us, we will have all learned it at some point in our studies, but can you remind us of some of the primitive reflexes?

**Darren** (00:09:37):

Sure. So I think the first thing to say is that primitive reflexes are normal. They're good to have at an early age. So we get our little baby should have these reflexes when they're born and it's all to do with survival. Some of them help them kind of wiggle through the birth canal. Others are helping be aware when they're distressed or then beginning to grasp and involve with feeding. So they're good things, but they are reflexes that are happening low down in spinal cord and brainstem. And so as the brain then develops, they should override these and you don't want to have these reflexive movements going with you through life or particularly the autonomic reflexive things where you suddenly go into fight flight without even realising what's happening

**Anji** (00:10:32):

And that's the sort of startle reflex, is it?

**Darren** (00:10:35):

Yes, the startle reflex there. That's right. And with that, so the Moro we're talking about there, the children can very easily get upset. Now They're getting upset in a subconscious way and then that's triggering their behaviour, so then they're either flying off the handle and being aggressive or they're overwhelmed and running away and they don't really know why they're doing it at a time. It's something that they might consider a little bit afterwards, but it's still a reflex.

**Anji** (00:11:09):

And so that example would be where that primitive Moro reflex hasn't been subsumed or overridden?

**Darren** (00:11:17):

That's correct,

**Anji** (00:11:18):

Yes.

**Darren** (00:11:18):

We need areas of the cortex to begin to inhibit As our brain develops then it can inhibit a lot of these subcortical more subconscious areas and sadly, most of the children I see haven't done that. So they might be at school and they're trying to do cognitive learning, but they're unable to inhibit these, Which Is then impacting a lot on their learning and emotional state.

**Anji** (00:11:45):

If we were to just mention the other key reflexes,

**Darren** (00:11:49):

Yes, we've got plantar and Babinski in the feet, so we've a plantar one along here in the Babinski up here, and they're kind of helping baby propel themselves forward. So being able to feel forwards and back Of The feet and also then the Babinski more on the inside and outside. So they're using these for stability and propulsion, getting the control. So as they begin to wait there, they've kind of still got some of the reflexes, but then they get more proprioception and movement through them stimulates the brain more and that then begins to inhibit them so they've got more control, they can decide exactly how they want to move spring run land rather than be compelled by the reflexes in the hands. We've got the grasp, So that's putting pressure here, then you go to grasp, and again, that's useful at first, but then you want to begin to be able to inhibit that and use little bits of it, so handwriting And the fine motor control there and then we've got the rooting and the suck reflex around the face which are helping the feeding and swallowing. But again, if they stay there, we tend to see a lot of hypersensitivity. Well, in all of these you get hypersensitivity or lack of sensory awareness, so the reflex won't tell you, oh, you're definitely going to get this problem or that. But we see if the reflex is persistent retained, then the processing up here isn't quite right and that tends to go one of two ways and they're either kind of hypersensitive or unaware. Then we get more onto the postural ones, which are involved in balance. Being able to realise when your head's going forwards and backwards, the tonic labyrinthine will put the baby into full flexion or extension and they have ones where on all fours we can test as they turn their head and bring their head back and forth, more of the postural reflexes

**Anji** (00:13:57):

And we're going to look at some of those aren't we in a moment with We'll Do some the testing there.

**Darren** (00:14:00):

So These ones are getting a little bit higher up the brain now the cerebellum is more involved and with all of these we can look, see if there's asymmetry. So very often see that children

have got these sort of diversion of functions. So there's some areas which they are really struggling with and others that they've got pretty good skills with or maybe are above expected level. You think, well how can this be happening if they've got this delay? But what we see is that one side of the brain not often less active, the other side can be overactive. So you get this imbalance, then the child tends to realise what they're good at or doing what they're good at, and so they naturally build more plasticity in areas that are working well and this can lead to greater imbalances

**Anji** (00:14:55):

And then you get more of a feedback loop.

**Darren** (00:14:57):

Yes.

**Anji** (00:14:58):

Before we go on to the right and left, we've got a couple of questions that have come in already. So Laura's asking, is the startle reflex the same as Moro?

**Darren** (00:15:06):

Not quite. So the startle is part of it and we still have a startle reflex and that's a good thing. The Moro is the full part of the reflex where, so when the baby's born, they'll have a deep breath in going back and then they'll go into flexion as well. So we don't see that very often. How I tend to assess it is how much autonomic change the child has. So do they have palette? Do they look scared? Are they angry that this has been set off because I clap my hands or nudge them a bit and if they're old enough to then can put the pulse oximeter on and see how the autonomics are changing.

**Anji** (00:15:53):

Fabulous. Number two, Sarah says, do you find that one primitive reflex is retained more than others?

**Darren** (00:16:04):

I think not quite. You tend to see them in clusters. So most of the time if I saw a child and they just had one reflex, I wouldn't be too concerned if that was the only thing I found. When you see that there's a group of them that's telling us more about them, what is not functioning in the brain, the areas that aren't developing, which one is most common? Probably the asymmetric tonic neck reflex in some guys, because this is so related to how each side of the brain Is Inhibiting opposite sides of the body. So for that to be fully integrated and have good motor function, the child's able to kind of lift opposite arm and leg

**Darren** (00:16:55):

And Turn one side and the other and they're getting a lot of cortical activity going across.

**Anji** (00:17:00):

Perhaps that's something we can look at again over there as well just to go through that would Be great.

**Darren** (00:17:04):

But those reflexes I may see frequently, but I'm probably not going to work on them straight away because there are others lower down in the brain that I want them to feel safer and process first. So although you might see those more commonly, they're not necessarily the area of go-to straight away.

**Anji** (00:17:24):

Okay, so you are working on this sort of develop in terms of a ladder of progress in that way too?

**Darren** (00:17:30):

Yes. On the pyramid slide - at the bottom of the pyramid we've got the sensory system. Now this is actually from about 1996 Williams and someone with S came up with this and they didn't realise at the time that interception was really a thing. Another that came a few years later that would be one of them on the lower end here that the child has to have good sort of tactile awareness, the auditory visual vestibular and critically, particularly when we look at a lot of the kids on the autistic spectrum, the interception understanding what signals they're getting from inside. Do they know when they're hot, cold, hungry

**Anji** (00:18:23):

In pain

**Darren** (00:18:24):

And then yes, do they appreciate pain? A mum was telling me a little while ago about she started getting worried about a child when she put her hand on something really hot and just kind of peered at it and thought that's a bit strange. And mum was sort of trying to get off. So the cortex realises it's feeling it, but it goes into the insula where we have interoception which then gives us those emotional awareness and that then leads to pain behaviour and how we're going to avoid it or not go through it

**Anji** (00:18:58):

Again. So this is the base building block of the central nervous system, these system building blocks.

**Darren** (00:19:03):

I think a lot of the time in education when you see kids at school, the teachers or the parents are complaining about things at the top here they're sort of saying, look, my child can't regulate their emotions or they keep doing this thing and if we try and fix it by going there, it doesn't really work. We need to be working from the bottom up assuming that there are some problems down here. And usually that seems to be the case.

So we work on the senses and the primitive reflexes we can see as we get those reflex maturity, then you get sensory motor development. So this is where we're getting the sensory areas and the motor beginning to be working and then we apply attention to it and get more of the coordination, the ability to adapt, make fine changes, and with that then we get the frontal areas and the intellect coming. So I find this a good thing to show parents just to get the idea of, well these are the building blocks and these are the things that we need to really focus on. First of all, once they can cope with these things, then yes we can go up. I can't just fix this bit at the frontal lobe and

**Anji** (00:20:22):

Not help with without understanding what's happening there at the base of the pyramid. And then you mentioned right and left and the two hemispheres of the brain. Talk to us about those.

**Darren** (00:20:31):

So where do we start with that? I guess what we see is that there's lateralization of the brain, so there's some areas where we pick up sensory information. So I see things over this side, they go to left side of the brain from the right they go to the right and the same with the feeling and the hearing. Those primary areas will pick up information from one side of the body and they're not really lateralized doing the same thing on both sides of the brain. But then we start to process that information more specifically and then as it goes to these secondary and association areas where we process this more, then it gets lateralized. So an example of that on the visual system could be that we process vision and we've got the left cortex here first of all in the centre part there as it comes round to the left side here we are looking at more like colours and patterns and then we've got an area on the bottom here of the temporal lobe sort of feeding round, which is all about symbols. So it's looking at the details of symbols. This area just here is looking at faces. So we've got the whole area devised for recognising someone's face and putting the name to it. When we look on the other side, the right is, so the left is doing high contrast, it's looking at detail.

(00:22:05):

The right side is going to be looking more at lower contrast, quick changing things. So it's doing motion, it's kind of doing shapes and how things move around here. Then in that area for faces, it's not looking at the detail of the face, it's looking at the whole face and how it changes. So it's understanding the emotion that's being conveyed in the face rather than categorising who it is we get around there. It's then doing how we use things rather than what they are. So we see that the right side of the brain is all about where things are and it's getting the big picture, whereas the left side is processing a lot more of what things are. We see the same in the auditory system, the motor system, the right has a bias for gross motor control, whereas the left has got a bias for fine motor, so that's doing handwriting and speech. So we can see how all the language processing is going on the left side.

**Anji** (00:23:08):

So the same broad functions on both sides, but then with very specific differences as well in terms of how they're Applied

**Darren** (00:23:16):

and we tend to see that kids on the autistic spectrum are having lower functioning on the right side of the brain, so they struggle to pick up their Interoception. Their sensory processing is often more of an issue and then their ability to pick up things like faces, tone of voice, body language are all lower

**Anji** (00:23:43):

So these are right sided, all right sided and this is autism you said, and the other…

**Darren** (00:23:50):

You tend to see ADHD with bias more for the right side, obsessive compulsive disorder and tourettes tend to be all right side under functioning. So depending on which parts it is and there's a bias for sensory processing, it depends which senses and quite what because you could argue that some of dyslexia is sensory processing with visual and auditory issues that they get, whereas dyslexia is a left-sided brain issue that's then struggling to recognise the letters or pick up the phonics or put the phonics to the letters. So you've got these auditory and visual processes of what things are on the left side that aren't working that make it harder to then process the language and read and spell, et cetera.

**Anji** (00:24:38):

So as we've understood the functional neurology of the brain a lot more we can map their maps essentially for each of the different conditions as to which sides Are working well and which sides perhaps are inhibited. Is that Fair?

**Darren** (00:24:56):

Yeah, definitely a fair statement and it's not always like it's completely all parts of one side and the other, but there's pretty strong bias and there's been research looking at EEGs, MRIs, PET Scans,

**Darren** (00:25:13):

Cognitive assessments, behavioural checks, and then we can do sensory motor assessments as well and you tend to see the same patterns of left right coming up with the kids with these issues.

**Anji** (00:25:28):

Okay, so that feeds into a couple of the questions that have come through. Sam says, do you have any thoughts or theories why the reflexes might be retained in the ways that they are? And Christina, what is it that inhibits the progression of these reflexes? So why do these things happen?

**Darren** (00:25:47):

So there's lots of different theories and reasons. There isn't one thing that, oh, well it's because of this, but if we break those down a bit, I guess one we can look at is the environment. So is the environment in the body conducive to the nervous system developing? Now the reflexes are one way of assessing if the cortex is kind of developing at

the rate it should be. So if it isn't, then we'll see that reflex is delayed. If the child has got too many, too much inflammation going on, there's too many toxins or not enough nutrients, then that's going to make it likely that the reflexes aren't going to develop so well. However, if it's purely nutritional or metabolic, we would tend to see an equality of the delay. You wouldn't see more on the left or more on the right.

(00:26:53):

The whole brain would be underdeveloped at a similar level and you tend to see that more I would say in the genetic disorders and that's one of the other causes. When there's a particular genetic deletion, mutation, et cetera, then that's going to slow down the development and you'll see the reflexes delayed When we see that there's more one side than the other then get into, well is that more lifestyle things you can say, well nowadays perhaps we are living in more of a left brain culture, we are not running around and using our bodies so much. We are in front of screens and doing more left brain activities like the typing and things. So there's arguments there and then I think when you see with trauma at birth, this is, and trauma in general tends to affect each side of the brain differently. So we tend to see that the right side is becoming more hypervigilant, more aware of everything around but unable to process it so well it's like looking for danger more and the left side is more well in my little bit everything's fine.

**Darren** (00:28:20):

I asked a patient who's an artist who did these beautiful trees to do a left right side brain tree for me and she came up with this and we can see that the left side is more, it refers to itself more, it's got more connections to itself, whereas the right side has got more connections going down into the subcortical areas and this is then picking up things like we're saying about empathy and the person's emotions and others and it's thinking more about the consequences of our actions to society rather than the left, which is more kind of goal directed.

**Anji** (00:29:04):

Okay, so the right is more out in the world, would you say that and the left is more about me?

**Darren** (00:29:09):

Yeah, broadly speaking, I think that's a reasonable generalisation to Make

**Darren** (00:29:15):

And so I've got parents that I think are quite right brain dominant. I'll explain it with the picture in the clinic. If they're more left brain dominant, then we get the brain out then start to say, well what the little bits are doing, try and help them understand as best they can.

**Anji** (00:29:35):

Just if we can we go back to the pyramid for a moment? A couple of people have asked if you could just run through it again. So this is a pyramid of the central nervous system, is that right? And then this is how it develops?

**Darren** (00:29:52):

Yes. It's looking at the levels of development. So the base is the first area to develop, which is the sensory system. So the child needs to be getting information in first of all. Then it begins to process that information where we go up into the second area. So we get the information coming in. The brain stem is kind of telling them, is this safe? Do I need to go into fight, flight, freeze? If they don't, then they can begin to process and understand it more. The thing is when they go into fight, flight, freeze, it kind of turns everything else off and they've just got to deal With that.

**Anji** (00:30:30):

And then you're stuck at that Level.

**Darren** (00:30:31):

Exactly. They get stuck. Then the back half of the brain broadly is processing that sensory awareness. It's giving us our sensory motor development. So we have the vestibular parts, the postural security, the awareness of where our body is in space. We have the awareness of left and right side of the bodies and we can use them differently. The reflexes are maturing here and we've got things like ability to screen sensory input. This is really important because the right brain's taking everything in all the time. Now we don't want to be bothered by every bit of information in the right brain's doing. And so as that develops, the frontal areas can filter out the irrelevant material. This is where kids with A DHD really struggle because all of it's coming in and It's like,

**Darren** (00:31:26):

Oh, that's really important. Someone rustles, I've got to attend to this. And it comes really loud into their consciousness.

**Anji** (00:31:37):

Then we move up,

**Darren** (00:31:37):

Then we go up to more attention based, so perceptual motor where they've got to focus on something and now we're getting frontal areas involved in the movement and the cerebellum constantly adapting, realising if we're making errors as we're doing these fine motor things or the gross motors we're trying to throw or hit or whatever it Might Be. So higher levels, we've got the eyes involved, the awareness of where we are in space, our attention, our intention, and beginning to process language and things here as well. And then we get to the peak, the frontal areas where we are expressing language with speech and handwriting. We are controlling our behaviour and we are doing higher level the academic stuff.

**Anji** (00:32:23):

Yeah, higher level sort of processing and intellect at that point. Great. And we'll send out this slide to all the viewers as well today. So before we go over there, a couple of very quick

questions, Hopefully. Does the way the side of the brain function alter with handedness from Tilly? Thanks,

**Darren** (00:32:50):

So most of the time it stays the same, but there are some with when they're left-handed, left foot left eye, left Ear dominant. When they've got all of those, then they tend to, and it's in the history, then sometimes they swap some or all and I don't quite know why. Luckily we can assess their sensory motor system and kind of figure out are they're weaker on this side. So we're going to get that working so we know which areas are underactive, but it's a little bit murkier.

**Anji** (00:33:27):

Okay. Sorry, Tilly not a clear answer then. So the assessment of the sensory motor system, should we pop over there? So we've got Nieve here joining us. Thanks Nieve.

**Darren** (00:33:43):

Hello ne. Thank you. If we can assume Nieve  is a autistic child. The majority of the children I see have got quite a lot of vestibular insecurity. So I realised some years ago that actually moving my bench into the corner of the room was really helpful for a lot of these children because trying to get them to clamber on it immediately was putting them in a state of fight flight. They weren't feeling safe up there so spending more time on the floor, getting mats out worked a lot better. So if you'd be kind enough to lie down on your back and we're going to Put all these to the test.

**Darren** (00:34:25):

Some of the assessments that I do now, very often the child is quite a bit more active than Nieve . They're wriggling around or trying to get up and do things. So it might be that they're sat on the balance plate, the vibration plate that I've got, or it may be that they like to be on bean bags or they're on the big ball, whatever seems to get them all settled, it might be on mum and so often the assessment is fairly chaotic. It's not the case of going through one at a time.

Anji (00:35:02):

So where would you start?

**Darren** (00:35:04):

Quite often the feet because it's furthest away and I sort of say we're going to just run along the feet and see and so I've kind of seen, right, can they cope with this stimulation? Then I do the same along the side for the Babinski and the plantar and we'd see that the toes are going down like this or up and out a bit for the Babinski. So we do both sides and see if there's a change. The hands would go along through here and look to see do the fingers begin to curl on any of these as well. They might have the withdrawal reflex. So when baby's in the womb before they develop all these sensory reflexes, they've got the protective withdrawal, which is even more primitive than the primitive reflexes.

**Anji** (00:35:54):

What would that look like?

**Darren** (00:35:54):

And so then if I do this and it's not painful, it's not nociception

**Darren** (00:36:01):

But it's a withdrawal, then they're going to go into flexion of the limb. So the whole limb will go up like this,

**Anji** (00:36:08):

Withdraw itself.

**Darren** (00:36:09):

So sometimes you'll see that just as working here there's a little bit of a retraction And

**Darren** (00:36:15):

That's then maybe different from the other side. You're thinking, yeah, the brain can't cope with this so well

**Anji** (00:36:20):

And by what point would that in a typical neural development would that have disappeared by

**Darren** (00:36:26):

So by two, all of these apart from the posterior part of the TLR when they're standing to put their head back should have gone and they

**Anji** (00:36:37):

By age two,

**Darren** (00:36:38):

Yes, some of them quite a bit sooner. Then we look at the face. So going to, and again I show them what we're going to do in terms of the rooting reflex here and we are looking to see does the mouth start to move? Are they looking to turn towards it? And then the sucking reflex are going just on the roof there. For the younger ones I often have a glove on and get finger into the roof of the mouth if I don't think it's going to be bitten too much and see if that's activating it.

**Anji** (00:37:12):

So what would you be looking for

**Darren** (00:37:14):

When a pushing onto the palette? The sucking reflex starts so the tongue pushes up to it. Little babies will suck away. It's the bottle or nipple and very young ones under three or four months will keep going. And you think surely they're going to realise there's no milk there soon, but the reflex kind of keeps going for 'em, and it's good at this stage if I can to see how the gag reflex and the tongue movements are because telling me more about how the medulla's doing. So it you look at the primitive reflexes and then think, well which parts of the brain are they also going to? So let's test those with more of the functional neurology tests of like, well what's the tongue strength? Let's look at the palette. Can they say R if they're able to do that, can I prod it and see if they're setting a gag off? Is it different one side to the vOther?

**Anji** (00:38:13):

Okay, so you've assessed some of the reflexes, hands, feet, and in the face and Head

**Darren** (00:38:16

Those tend to be ones on the back. I would at this stage if we then check the jaw and the neck and the cranial system, we kind of know about that. So we won't go into that here I then put them on to all fours. So if you can go like a that it and then here you can test several of the other reflexes. So the spinal gallant would be normally on the skin rubbing up and down and seeing if this causes lateral flexion or if they are disliking it. So there was a little boy not long ago I did this to and he just kind of bent like this and bent and bent and rolled over To come Completely away. The level of stimulus just couldn't cope with and he was a bit, not angry, but disgruntled at it. You could see there was an emotional reaction for it. The symmetrical tonic neck reflex is looking at how the posture is able to cut the body in half. So roundabout seven, eight months as the child's going from sitting to crawling like this, as the head goes into flexion, the arms flex and the legs extend. So

**Anji** (00:39:36):

The head goes into flexion, the arms flex and the legs extend.

**Darren** (00:39:39):

Yes. And then as the head extends the arms, they get into this type of Position

**Darren** (00:39:43):

So it helps them kind of get into the crawling and it's to do with some of the reticular tracts and the brainstem beginning to get developed and having the control on the postural system. So we move the head into flexion and extension here and we're looking to see how the spine moves, but particularly do the arm bend as the head goes down. If the reflex is there, the arms will flex and they might even be face planting. So you've got to make sure they don't bump their head as they go.

**Anji** (00:40:13):

So if the reflex is still retained, then there'd be the flexion of the elbows.

**Darren** (00:40:19):

Sometimes you see that, sometimes as it goes down the legs extend and they're kind of in downward dog almost with the bum in the air without again really realising that they're doing it. There's then the extension version where as you go back like this, they'll tend to go bum onto heels and then the asymmetric tonic neck reflex. So as they're going through the birth canal and turn, they're going to extend one side. So as you turn here, one side extends the other side would begin to flex.

**Anji** (00:40:56):

Okay, so that elbow

**Darren** (00:40:57):

Would, what we see is the elbow goes out here can move or movement of the leg and sometimes it can be enough to pretty much make them roll over.

**Darren** (00:41:09):

These reflexes when they're still retained are powerful. The parents might be no, no, keep that straight or so and they can't do it because the cortex isn't able to inhibit it. So we go through those. Then if you'd lie on your back again now. Thank you Nieve . And I guess typically then if we have, I dunno what a typical autistic child is, but if we assume that we've got a child with some right brain delay, we're going to be trying to stimulate the right side of the brain. Now manual therapy of the grade five manipulation adjustments is a really powerful way of stimulating.

**Darren** (00:41:53):

For a lot of these kids at first it's too much. They haven't got good awareness of where they are in space and if they get a lot of proprioceptive input straight away, it's likely to overwhelm them. So it goes up to the cerebellum, it's going to give more information than it can cope with. Then they might feel a bit dizzy or a bit nauseous with the autonomic changes.

**Anji** (00:42:17):

So we need something a little Lighter.

**Darren** (00:42:18):

Yes, it could easily set off their fight flight responses. So it's a very useful thing when they can cope with it. But the majority of kids that I see can't cope with it first of all. So I'm doing much gentler things.

**Anji** (00:42:32):

So we're sort of creeping up on the nervous system essentially.

**Darren** (00:42:35):

If we are doing gentle kind of tactile things, first of all, then we are maybe working on the hands, giving deep pressure through the palm on each finger, Helping The cortex realise it's got these different fingers seems really mundane. We go and do all these courses and get very skilled in manual therapy and then we end up doing very basic.

**Anji** (00:43:02):

So You're squeezing there essentially

**Darren** (00:43:05):

Deep proprioceptive input, feeling where the body is, more awareness of where I am. So I know I'm not going to fall over because laid down and then I can feel these Inputs

**Anji** (00:43:17):

and so you are working on the other side.

**Darren** (00:43:20):

That's it. I'm working on the left side of the body here and then I might start going through the movements of the reflexes. So they get proprioceptive input For How those primitive reflexes should be working. So I'm doing the babinski and the plantar here and as doing that, seeing the coping with it, then you can begin to increase it a bit. So maybe a bit of joint compression, so not full on adjustments but just getting some compression through

**Anji** (00:43:57):

That. So you're compressing, compressing rather than tractioning there

**Darren** (00:44:00):

A bit more, quicker proprioceptive Input now. The sensory things, I've got various sensory toys here, so this little gizmo is just vibrating at a low amplitude, so might be going through the primitive reflex movement At the same time.

**Anji** (00:44:19):

So you're layering things on top of each other.

**Darren** (00:44:22):

That's it.If we do more complex movements like this, we're getting more cerebellar activity going on.

**Darren** (00:44:29):

We might do both sides,

**Anji** (00:44:32):

Arm and leg at the same Time.

**Anji** (00:44:38):

So loads of questions coming in. So let's pick a couple of those.

**Anji** (00:44:58):

Bob says, just to interject, I may be jumping the gun here, but I know a couple of adults with retained startle reflex. Is it possible to change this?

**Darren** (00:45:09):

It is. It's more complex in adults. Has it been there all along from development or has the startle reappeared because of some sort of trauma Changes?

**Darren** (00:45:23):

So in most people that I have seen have had concussions and they're still struggling with a concussion that's often reemerged. So when the primitive reflexes have been integrated, they still exist in our nervous system. And then if we have a head injury or we get cognitive decline, you see them coming out. There's actually a bit of research showing that the degree of cognitive decline is reasonably well associated with the degree of the reemergence of a couple of the reflexes. So it shows that as the brain can't control things well then they reemerge. So it's possible, but it depends on the individual.

**Anji** (00:46:08):

And then at the other end, do primitive reflex retentions have anything to do with why some babies crawl and others bums shuffle, from Lawrence?

**Darren** (00:46:17):

Yes, yes. So when they've got, if they don't get the symmetrical tonic knee reflex working, then they struggle to get into this position and be able to start going. So they need that one and they need the asymmetric tonic neck reflex to then be able to do the opposite. Opposite limbs, leg movements.

**Anji** (00:46:44):

Yeah. Okay, so I interrupted you there. What are we doing, Sensory?

**Darren** (00:46:49):

So it may be that we use some of a light brush, a soft one that's not very coarse and begin to brush in here. And I'm often doing these in the clinic to then teach parents to do them at home so they can do a little session of exercises, a quarter one now to be building plasticity in the nervous system. If you've got a 6-year-old, it's going to take a little while to begin to change what's happening. And so if the parents are kind of efficacious, if they can do the right things, then that can be really helpful and I don't need to see them too often.

**Anji** (00:47:29):

And is there an age at which these things become more difficult to change? I mean the diagnoses of Disorders are becoming for many people are quite late In the day.

**Darren** (00:47:42):

Yes. I think the older they get the harder because things have got more hardwired and they've adapted or maladapted, whichever way it may be. So it takes longer to make those Changes,

**Darren** (00:47:58):

The changes, but then in other ways there's more frontal ability to be aware of yourself and the fact that you've got these particular issues as well. So the adaptability in that way is a bit easier. But definitely I think early Intervention – as Early as possible as we do a lot with the mouth. So that may be cranial work if you can do that or extraorally, these little things called Z vibes vibrate very finely. And if I put that around here, And what I often do is ask child to take it. If you hold there and very often they'll pop it in the mouth and if you can chew that, then getting lots of proprioceptive input through the teeth, the tongue. So that's all going into the medulla and the number of children I've seen who are a lot calmer. Once we get that in to the point that you can redo a primitive reflex straight after and has changed because they've got that input going in as well.

**Darren** (00:49:10):

So you get going into the medulla, putting them more into a parasympathetic state and beginning to activate parts of the cortex. So then we begin to layer things up.

**Anji** (00:49:30):

Just as a complete tangent, would that work for adults to stimulate that area as well?

**Darren** (00:49:36):

If they’ve got Delay Or sensitivity there, It can be useful. There's a lot going on about vagal nerve stimulation. If you get the vibration particularly towards the back of the palate that's going directly at vagal nerves. There's other ways we can do that by use this device, which will come to in a moment.

**Anji** (00:49:54):

So in the yoga world we'd be Ohming or chanting to get that Back of the throat

**Darren** (00:49:59):

Chanting, gargling. It's all using the control of the medulla in different ways and with the younger kids we can't get them to do those things. So we've got to put in The stimulus inwards.

**Anji** (00:50:12):

A couple more questions if that's all right. So just again on the all fours reflex, Lucy: what was the name of the reflex demonstrated before A TNR where the head flexed and the downward dog

**Darren** (00:50:27):

That was the STNR - the symmetrical tonic neck reflex,

**Anji** (00:50:30):

Symmetrical tonic neck reflex. And then the next one while we are here is, oh, Simon says, what about babies who like me were bum crawlers, not all four limb crawlers.

**Darren** (00:50:48):

So they will have delays in those reflexes as well and often it's not just there. You see that earlier on, they are only rolling to one side, so they may really dislike tummy time, which is the tonic labyrinthine neck reflex. We didn't demonstrate that. I did the vestibular work when I was here last time On the cerebellum. But there is get the child to stand and bring their head back and forwards and often as the head goes back, they feel like they're going to fall Backwards,

**Anji** (00:51:20):

fall backwards.

**Darren** (00:51:22):

As the TLR begins to become active, the cerebellum is working better and that allows all the vestibular spinal tracts, the muscles that are in the spinal extensors to bring us up to work.

**Anji** (00:51:34):

So the postural muscles then

**Darren** (00:51:36):

postural Muscles

**Darren** (00:51:37):

So they feel unable to, they don't feel safe on their tummy because they can't do postural muscles or they've got an imbalance in them so they're only rolling to one side. And if they're only rolling to one side, then it becomes much harder to crawl. You've only developed kind of one side, so they get to the sitting and then adapt with the bun shuffling and that's about, I think it was about four and a half percent in a couple of studies were showing that the kids that don't crawl.

**Anji** (00:52:07):

So those are the reflexes related to rolling then as well, so that you've just run through there. Yeah. Okay. Sorry, I interrupt. Interrupted. Thank you. Thanks. At home for all these great questions. We're going to come back to some of them as well or pick up them in a moment

**Darren** (00:52:24):

And try and use the principle of summation. So if we're sending signals to one part of the brain that's got potential to make some changes. However, if we are sending signals from different areas to that, then we're getting 2, 3, 4 signals coming in that's got more potential to change and that's easier to cope with than doing lots of stimulation from one area.

**Anji** (00:52:51):

Give us an example of how that would work. So which area are we trying to target And why?

**Darren** (00:52:55):

Let's assume we're still working with an autistic child that's got delays in the right side of the brain and we're going to try and activate more cortical areas as we do the sensory work.

**Darren** (00:53:09):

This could be that. Now I don't think the sound will go brilliantly here, so we'll just assume it is. But I have a little wireless pod and play nature sounds for instance. So we could have sounds of waves rolling, something like that. There's no detail there. You've got that kind of awareness of space and things moving. The right brain is processing that considerably more than the left side, put it on the left side of the child and then it's going through into the right side of the brain. If they've got vision, when I test the how they cope with light as I shine a light in their eyes, if they've got any withdrawal or dislike from it, then often reducing the amounts of light going in allows their nervous system to work a bit better. So some simple lenses like these, as we wear these, the blue is allowing a bit more light coming from the left to the right side of the brain than the red is. So if I can put those on you for a moment there. So we can put those on and then we're activating the right visual sensor and the right auditory sensor a little more as then doing our physical Sensory manual work. Often I've got mum working on the foot with one of the devices, maybe she's using this and I'm doing work on the hand or doing some cranial if I want to get a lot of interoceptive work doing, then we'll do more vagal activity.

So this is a more expensive, another little toy that vibrates. Unfortunately recently as I was travelling back from the seminar, one of these set off in a suitcase which caused alarm from the customs offices, but they always find it interesting when they open those up. So this does little bits of vibration If we were to do it on the ear, I'll go onto this side. So you can see just around here we are getting into one of the sensory vagal nerves so we can get vagal stimulation there. We can also, it has a nice funny shape prong, which is quite good for getting, you can try it there. Sensation through the head is quite kind of calming, quite good for headaches. And then if you put it on, I'll just take,

**Anji** (00:55:50):

It's got a little buzz going on there.

**Darren** (00:55:52):

Yeah, a buzz there. You put it on like this and it's on the carotid bodies. So a bit like the baro reflex but a lot gentler. You're just tingling those stretch receptors and moving them a little bit more into parasympathetic. So it can be putting that over there.

**Anji** (00:56:09):

And with all these tools and techniques so the parents are able to do this with their children at home, how many sessions might an autistic child need or how long might this take?

**Darren** (00:56:20):

Really good Question. I mean I think the biggest what if is probably the diet, what's going on inside their body because we know that autism is a kind of neuroendocrine gut immune problem.

So how much can we change just doing these things? Usually some.

And these are the only things that can really change the balance of left and right. So it's important. Occasionally I'll see a child who seems just so toxic that I think go and see the nutritional side first and begin to change those and then come back and see me in a few months when I'm working with them. The thing I'll say is, well let's give it four treatments, which is often three or four months. And if I'm seeing changes in the reflexes, in the tests over those three, four months and you are beginning to see changes in their behaviour at the bottom of that pyramid, then that's good. We begin to move forward with it. And so some I'm working with, I think next week I've got one boy who's very low functioning, it's about eight and he's coming to see me for the third time for three days.

**Darren** (00:57:42):

I work with him morning and afternoon for three days and we do that every couple of months. When I saw him last time, he was less sensitive to food, he was beginning to eat more and his bowel habits were improving more. So how much of that was dietary changes recommended? How much of it was the inputs we were doing into the Vegus? Hard to say, but we see some changes and think well we'll Carry on.

**Anji** (00:58:07):

So you sometimes have these sort of intensive of sessions?

**Darren** (00:58:11):

Well, depends How far away. Depends where the parents are and what kind of works for them. I try and fit around their needs and their ability to get to see me and how much they can do at home

**Anji** (00:58:22):

On that. And the sensitivity of the mouth. Rebecca says, would retention of some of the primitive reflexes be why some children put lots of things in their mouths to chew even when they're five, six or seven?

**Darren** (00:58:33):

Yes. It's like it hasn't fully got through. So I guess what I will see quite commonly is to start working on the sensory areas and then mum or dad bring them back and they're looking even more exhausted because the child's putting everything they find in the mouth. So it's like the flex of the kettle or the remote control or whatever it is, is going in there and it's suddenly woken up that sensory system and then they're going through those phases that you'd expect babies to when they're picking things up and everything's going in

And I then talk to the parents and they say, well they never really did that. So it's beginning to wake that up and you need those areas to wake up so they can then begin to deal with different textures and things.

**Anji** (00:59:16):

And so then they would from five, six or seven doing this, then they would move through the next stages of the pyramid.

**Darren** (00:59:22):

Yes, you may start to see them then experimenting with more foods. Smell might come in more and they may begin to have more facial expression. You see quite a lot of looking in the mirror and doing all these different faces. So they're not quite sure what their face is doing, but they know it's important and speech as well.

**Anji** (00:59:44):

Yeah, it all starts to blossom.

**Darren** (00:59:46):

Yes.

**Darren** (00:59:48):

All those nonverbal kids that I work with, they've all got very high sensitivity there and as that comes down they can begin to start babbling and making preverbal or pre speech sounds.

**Anji** (00:59:59):

Yeah. Okay. Sorry, Nieve’s lying here still.

**Darren** (01:00:03):

Yes.

**Anji** (01:00:04):

What else have we got to show?

**Darren** (01:00:06):

So I guess some of the higher tech things. So low level laser is a nice addition. The class two lasers you can use safely on the brain. So only about 2% of the photons actually get through the skull in adults, it's a little bit more in children, but there's studies with these or a decent randomised controlled study with this showing them improvements in social and emotional regulation when autistic kids have had the laser compared to an LED. So the laser's often on the stand and that might be somewhere over here doing little beams onto right side of the brain.

**Anji** (01:00:58):

So the side you want to stimulate in this case?

**Darren** (01:01:00):

Yes. So you're getting through. And then if we want to do more with the interoception

**Anji** (01:01:03):

Where are they all coming from? Some of them from the states?

**Darren** (01:01:09):

Yeah, that one's American,

**Anji** (01:01:13):

But otherwise widely available. So some of these things are just brushes that you could get anywhere.

**Darren** (01:01:19):

So most of the things I've got in my clinic are either under about £50 or over about £5,000. There's not much in between, but yes, all these are low. This is one of the ones in between the Remax and it's really nice to work within the clinic. A lot of parents will say, oh, should I buy this? I say, well actually this little buzzy thing's like £20 and the chewy sticks £35 or something. So go for those rather than $500

**Darren** (01:01:47):

Then the shipping fee, et cetera.

Somewhere, I dunno quite where they are now, I've got little essential oils. So they're often then getting smells going in on the right side as well. So

**Anji** (01:02:00):

Really picking all of the multi multisensory

**Darren** (01:02:03):

More from the brain rather than the body. And then as I'm working on the child, particularly when I get to the postural reflexes, then I might be doing some gentle mobilisation and manipulation while they're moving around, and Get proprioception going

**Anji** (01:02:22):

Anything else to show us

**Darren** (01:02:26):

So for the asymmetric, If I can put a little ankle weight around here. So now we're going to increase the proprioception on one side and

**Anji** (01:02:48):

You're going to put the weight on the other arm as well.

**Darren** (01:02:53):

So now when Nieve moves her arm…If children can cope with lights, then these gizmos are good, the eye lights. So you can set the LEDs to flash on one side or the other. These are going to be on the left side of both eyes, so put that in and then every eight seconds - it just did it - You get little blue LEDs flashing and so that's activating right side of the brain. And then we could do an exercise, where I bend this knee, you lift your arm up as well and we go down. And then as you do this one, you lift the opposite arm up. So this is beginning to pattern the asymmetric tonic neck reflex. And I may do it completely passively at first. And then as it gets more complex, we do opposite hand and leg. So now one side of the brain has got to do one part, one side to the other. So if you lift up here and there, that's it, and then there and there, and then you try and do it yourself. So lift these, that's it. And then

**Anji** (01:04:05):

So we can really see the progression here and the layering and the multi stimulation and the putting everything into one area working. And again, it comes from the anatomy, doesn't it?

**Darren** (01:04:17):

It does, yes. If we understand the areas of brain we're working on, then …

**Anji** (01:04:23):

A question's come in about hyper-mobility and some of the conditions. There seems to be some correlation between hypermobility. So how does that alter the reflex integration?

**Darren** (01:04:37):

Well, it slows it down because the hypermobility, we have less proprioceptive inputs. So with the weaker collagen, those muscle spindles are going to be slacker.

**Darren** (01:04:53):

You have more movements before proprioception reaches the cerebellum and they realise where they are in space. So the whole proprioceptive thing is lower, which then means all the postural control and much of the other motor control is reduced, so they're less aware of where they are in space, and so they can't plan to move so well. And the ligaments are looser, which means there's less stability.

**Anji** (01:05:20):

So there's a lot more to get through in a way to get to the next level.

**Darren** (01:05:25):

There is, and it seems that when proprioception is lower, the other senses get more skewed, so they might then pay more attention to the sensory and they're more likely to be hypersensitive there. One thing I see very commonly with the hypermobility and low proprioception is that they're hypersensitive to interoceptive input. So they're, you get the pattern of, I guess what used to be called kind of a hypochondriac because they feel everything in their body Changing. And they don't know where their body is so well in space. So it's harder for the brain to realise what's normal and what isn't.

**Anji** (01:06:10):

It’s a process

**Darren** (01:06:10):

Pain is processed a bit differently as well as, you know, going up the stairs with the heart beating a bit, is it pumping really hard? So it causes a lot of problems.

**Anji** (01:06:21):

So do we need to do anything to Nieve here, given that you've stimulated the right side of her brain an awful lot.

**Darren** (01:06:27):

I think she's got a good plasticity, so she coped with it.

**Anji** (01:06:30):

She should be Okay. So shall we move back over there? Sure, thanks. Thank you very much. Nieve . So we've given some ideas of how you would use, you would test first of all and then you would start to input into different areas of the neurological system. We still have a whole host of questions. Very quick age range as we would move through these in normal development

**Darren** (01:07:12):

So we can see, if we look at perceptual motor development, we've got hand eye coordination, ocular motor control, auditory language skills. So around about the age of two, the child is beginning to get their attention to detail.

**Anji** (01:07:30):

So we're getting here by two.

**Darren** (01:07:31):

Yes. So they're beginning to take things apart more rather than bashing or dropping or things doing gross motor control. They're beginning to, and they're beginning to bring things up and looking at them more so they're focusing in detail and the speech is beginning to come.

**Darren** (01:07:50):

We'd say round about two there and then this is going to be a little bit later, but it's starting, well, it's not there at two because they're having all the temper tantrums,

**Darren** (01:08:02):

They're unable at that age. They've got enough frontal activity to decide what they want and they don't want, but they haven't got enough to inhibit their emotional system when they don't get what they want. And so that's takes a little bit longer to get through.

**Anji** (01:08:20):

Vlad says, how could we use this in practice if we're a general practitioner and we see babies and children would be, a couple of top takeaways

**Darren** (01:08:32):

I think it's really helpful to do a brief assessment of the primitive reflexes to kind of know, okay, are we in the realm of a musculoskeletal issue or is that musculoskeletal issue there because there's underlying neurodevelopmental issues. And then you've got the choice, I guess, of either going down that very extensive rabbit hole and beginning to get into all the neurodevelopmental work or deciding actually this is going to be trickier to treat. Maybe if things don't improve quickly, I need to refer up.

**Anji** (01:09:10):

Okay, so going very much going back to basics and checking the reflexes,

**Darren** (01:09:16):

Because we've known for years in our professions that manual therapy can be really good for these kids, but it's not really good for *all* of them. So it's trying to figure out, well, which ones are going to benefit well from this and are they in the right place or do we need to send them elsewhere? And the primitive reflexes can be quite a good thing there. You can also,

like I mentioned earlier, you can see them change very quickly when there's small bits involved. So if you see them improving, you're on the right track

**Anji** (01:09:52):

Simon says you talk about hearing, so one of those right at the base of the pyramid, what if you're deaf and don't process hearing or what if you're dyslexic and deaf?

**Darren** (01:10:05):

So if you're deaf, the auditory processing areas, so round here where we get the primary auditory and then the secondary bits around here, they are not going to just die off completely. What will happen is that other areas will infiltrate them so they'll begin to get stimulated by other areas. So you may then get slightly better at other senses, be slightly more accurate with those, but there's very little you can do to change that because if they haven't got the end organs working, the receptors, then the brain can't process It. I guess the cochlear implants, if they're done soon enough, can make a difference.

**Darren** (01:10:58):

If completely deaf then auditory processing won't be an issue.

**Anji** (01:11:04):

So Simon, I hope that answers your question, but if not, if we've got time, pop anything else in. What are the functional issues with those diagnosed with both autism and ADHD?

**Darren** (01:11:19):

They tend to have a good deal of the right area of the brain underactive. We see ADHD in its simplest form as really telling us that the right frontal lobe hasn't developed as well as it should do.

And the right side is also involved in inhibition of activity. So when we have an impulse, it's the right areas at the front that are saying, maybe I shouldn't say that because it might offend someone or maybe I should think about what I'm going to say or there's my mates, I won't go to see him because there's a road in between and I need to check. It's giving us that sort of break and we need that break for our movement systems as well. So they tend to be over impulsive and overactive because that area isn't working with autism, we tend to see that the sensory processing areas at the back are overactive and sorry, are underdeveloped, but maybe being overwhelmed and particularly around the right frontal and then the right areas under here called the orbital frontal, which is the socialising areas. And that connects to the insula . And so those areas tend to be underactive with the autistic kids, which is giving them problems with understanding social cues, emotion, empathy, feeling

**Anji** (01:12:52):

So you've got a really broad involvement of lots of different areas Of The neurology at That point.

**Darren** (01:12:58):

Yes, you can't just get the laser and zap that bit and make it all work well.

**Anji** (01:13:02):

So it's not as easy as saying that there's a formula for each diagnosis?

**Darren** (01:13:06):

No

**Anji** (01:13:09):

So coming back to testing and looking at the patient that you've got in front of you and seeing what's going on for them.

**Darren** (01:13:17):

We can't just sort of think, oh, well let's do right brain stimulation and that will be okay.

**Anji** (01:13:21):

Simon says speech comes in at two, so if you're deaf and eventually find out that you're dyslexic, where does your neural development stand?

**Darren** (01:13:36):

Oh, good question. So I mean the dyslexia, so a good proportion of people with dyslexia have auditory processing issues whereby they can hear, but they're not picking up the difference between the sounds too well. So things like “f” or “th” are

**Anji** (01:13:58):

They blend in and are not picked up,

**Darren** (01:14:00):

So then they don't realise there's a difference and they find it hard to work out what the letters are referring to. I imagine then if deaf, and I haven't really worked with many deaf children at all, that area is harder to do. So you've got to then rely more on the visual processing areas. But then if those are underactive because maybe left brain or dyslexia and deaf, then that makes it harder still to do the language processing. I couldn't really say, oh well that's at a particular age, but we see with dyslexia like the others that there's quite a few different things that can lead to not being able to read well. It can be the control, the lines,

**Anji** (01:14:50):

Multifactor input,

**Darren** (01:14:52):

The visual processing, the auditory processing,

**Anji** (01:14:55):

Lots of different things involved. Okay. Joanna: how important is it, and this is one that I think lots of us will see in clinic, how important is it to look at older children and adults who are toe walking in terms of their retained reflexes?

**Darren** (01:15:11):

Yes. So they may have a retained plantar reflex, which we kind of think, oh, that's the obvious one because that's the toe movements. But a lot of the time you see what is more of the issue is that their vestibular system is skewed and they aren't processing the posterior movements at all. So if you bring their heads Back,

**Anji** (01:15:38):

So we'd pop them on all fours?

**Darren** (01:15:40):

This would actually be the standing one

**Anji** (01:15:43):

And the standing examinations. Did you do those in your last Presentation

**Darren** (01:15:47):

Yes

**Anji** (01:15:48):

So if you need to check them, you can. So this is for our toe walking child

**Darren** (01:15:53):

Or adult, they might be toe walking all the time. And the reason they're toe walking is that they feel like they're going to fall backwards. So then if you are suddenly moving back, you can shift your weight by going onto your toes. And so they've adapted to that in order to then be able to maintain them being upright. There are some children to see the toe walking that you can get them to stand on their heels, but as soon as I lift their head up, they're back on their toes again.

**Anji** (01:16:25):

So it would be testing the extension of the neck For the TLR

**Darren** (01:16:31):

Vestibular movements in the up and down plane. And then the therapy for that is very much doing posterior vestibular awareness. So I might be rolling them on the ball backwards, getting them to walk backwards up the stairs and doing manual therapy whilst they're sort of pushing up into extension an extension exercises.

**Anji** (01:16:55):

So two simple things we could all test in our patients to see if we need to refer them On.

**Darren** (01:17:01):

So I would say you need to do one of the sensory motor reflexes and

**Anji** (01:17:10):

Which would be the go-to

**Darren** (01:17:12):

Probably, I would say the thing we'd probably test the least and would be doing is the rooting reflex, seeing if there's retention there, then we're thinking, well that really shouldn't be there at this stage in a neurotypical child.

**Anji** (01:17:30):

Again, by when would that have normally disappeared?

**Darren** (01:17:33):

So normally that goes, or it goes down quite considerably, by about three months. So if you've got a 1-year-old, 2-year-old, it really shouldn't be there, even if they're still breast/bottle fed.

**Anji** (01:17:47):

Okay. So that was number one.

**Darren** (01:17:49):

And then I think the

**Anji** (01:17:50):

Moro Reflex

**Darren** (01:17:51):

Would have to be one as well. Instantly I'm thinking maybe there's some others that are more important, but we'll leave it at that.

**Anji** (01:17:58):

You probably want to test all of them, but we can't do that. So we talked about the gut and the gut from the mouth all the way down. Can peristalsis be altered by retention of these reflexes?

**Darren** (01:18:13):

Yes. So when the medulla is delayed, then you tend to see that you've got less control of the peristalsis and the epiglottis. The sphincter up here tends to be oversensitive. So as food is going in, then they might be gagging or coughing more, and then the one at the stomach is underactive and so then they've got more reflux which it's causing. So we see that many of the frequent issues the babies have with colic and things come to issues with the medulla. When you look at it neurologically as that is working better, then definitely you can see improvements in colicky symptoms in the reflux and how the bowel function is going. So are those peristaltic movements? Again, it's not the only thing. There may be others that are there in terms of allergies, so, but it's part of the puzzle.

**Anji** (01:19:18):

And then also on the digestive system, how might inflammatory bowel disease or other autoimmune conditions impact neural development and also the treatment?

**Darren** (01:19:36):

And this is what we see a lot with the autistic kids in that they've got excess immune activation, they tend to have autoimmunity, and some of that is being triggered by foods that may be healthy, maybe not that they're eating, that their body is reacting to. So the food goes through the barrier and then there's the gut associated lymphoid tissue which notices it and starts the inflammatory reactions that sends cytokines up to the brain. And then our astrocytes, like the microglial cells in the brain cause inflammation.

**Anji** (01:20:11):

So then you get your feedback loop. So that's going to make it more difficult with these treatments as you said before.

**Darren** (01:20:18):

And that definitely seems to be one of the things that delays the brain. I think if we've got flu, we've got a more inflamed brain, we don't feel like socialising, we don't feel like getting a spreadsheet out and kind of working stuff out. We feel like curling up in bed or watching something we've seen before on the tv, we go into those kind of illness behaviours where our brain isn't developing and so the immune gut issues are pushing the child towards that and now we have to calm those down to help their brain begin to develop.

**Anji** (01:20:53):

Okay, so as you said, if you feel that that's more of the issue you'd signpost over there. Okay. What about non-autistic adults who still chew fingers and other stimulating things?

**Darren** (01:21:10):

Maybe they've just got that little bit of the nervous system that is hypersensitive or maybe it's become, that's not really an issue now, but it's developed more into a habit. It's something that now gives comfort or masks other things.

**Anji** (01:21:29):

Not sure if the questioner has a habit there that they want to share with us,

**Darren** (01:21:33):

Maybe it's their partner.

**Anji** (01:21:35):

Robin says, is fight flight freeze the amygdala or the brainstem?

**Darren** (01:21:43):

Well, I think it's a bit of both because when you look at the polyvagal theory, Stephen Porges doesn't really talk about the amygdala. He talks about how the different parts of the parasympathetics either inhibit the sympathetics or put us into the freeze response. But then when you look at the neurology of it as well, you see that there are areas, so you kind of have the fight flight in the midbrain or the mesencephalon at the top and then the freeze in the medulla at the bottom and the polyvagal areas. But when you look at the neurology, you see the polyvagal is going all through the brainstem. And there are areas in the brainstem where sensory inputs come in that go straight to the amygdala and they're all subcortical.

**Anji** (01:22:31):

So It depends.

**Darren** (01:22:32):

So I think you can kind of broadly put them, they're working together, I would say is the simple answer.

**Anji** (01:22:37):

Okay. Hope that answers the question, Robin. Thank you. Very last question then. Jolly local Kim. Hi jolly local Kim. If an adult with learning difficulties has learning difficulties and a torticollis rotated left, who never sucked as a baby because of cranial nerve nine damage, and now has choking problems, would stimulating the right side of his neck help him?

**Darren** (01:23:13):

Hard to know with the torticollis exactly what the mechanism is. So I would definitely be thinking if they are my patient that we want to stimulate that cranial nerve nine to try and help the medullary areas. And then I'm thinking, well, why is the torticollis there? It can be because of vestibular imbalances. So you feel like the head righting reflexes can be involved with that. And then eye torsion all more dominant on one side of the brain and taking in information. So there's a lot of different things, it might be leg length and things like that

**Anji** (01:23:48):

So you've got to go back a step or two to see where it's coming from.

**Darren** (01:23:54):

I think with those often you don't really know at first, I kind of try some things and then depending on the result, get more of an idea of, okay, I do need to do more on this side. That's more beneficial with functional neurology, it's more of a discovery rather than right, I've got my treatment plan, this is what I'm going to do. Well, I've got an idea. As I do treatment, I get more of an idea and that helps guide further treatment. It's a bit more fluid.

**Anji** (01:24:20):

And then, so my question now, just if you were to sum in a couple of sentences, what does your typical patient look like? Or do you not have One?

**Darren** (01:24:28):

They're probably between three and 10. And they're either on the autistic spectrum or got global developmental delay or they're at a regular school, but they're not coping because of ADHD dyslexia, dyspraxia or they haven't been diagnosed, but there's a bunch of things that they're struggling with and I'm trying to help 'em through those.

**Anji** (01:25:00):

Yeah, so there's a whole heap of those children out there who need this work,

**Darren** (01:25:05):

Yes, some you can hear coming down the car park, others are hidden behind mum for the first two sessions and then begin to come out the shell.

**Anji** (01:25:13):

So if anyone would like to hear any more about what you are up to or where to learn more about this Work. Where would we go to?

**Darren** (01:25:24):

If you're interested in looking at more interventions, I've done this YouTube site with Shelly and occupational therapist, and we go through a lot of the basic kind of ways of stimulating the reflexes and we try to make it easy. So it is in different playlists you can scan and see there. So if we choose one of the playlists, we've got the Palmer here, then it does tier one first, which is sensory, and then as you go through the tiers, it gets more motor, et cetera.

**Anji** (01:25:57):

Okay. So a little playlist there to help you. And then if anyone's interested in training with you,

**Darren** (01:26:03):

Yes, a bit more detail on those. You can see those slides there.

**Anji** (01:26:08):

And Then you've got some training courses coming Up,

**Darren** (01:26:10):

I'm doing the seminars, which are weekend long ones. So it's like 15 hours. There's a five hour webinar that you can view for about the month beforehand where we go through more of the heavier functional neurology side. And so then these are more practical. We go through sensory, cerebellar, vestibular, then the safety, the polyvagal interception, and then kind of put it all together,