



Calgary Neuropathy Association  
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# Neuropathy - New Frontiers

A talk to members of the Calgary Neuropathy Association

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*Calgary Spine and Sport*





**Introduction by Sylvia Donley, President of the Calgary Neuropathy Association.**

Thanks Sylvia for that introduction. *{Volume check}*

I'm very excited to chat about Neuropathy today. It is, unfortunately, way too common of a condition and I feel that not enough is being done for this condition. I'm not happy with current treatments out there. And there are a lot of people who feel like they don't have any hope because they have been told to live with this. I think we can do better than that. Thank you for braving the snowy, icy conditions today. You're going to hear a lot of great information. So, I'm going to keep this pretty informal you can ask any quick questions that you have. I'm going to have time at the end for any questions that you want to ask. So let's get started.

**01:01 – Where We're Headed**

This is just a quick road map of where we are headed. We'll be chatting, a quick introduction about neuropathy, there are a lot of myths out there about what it actually is. Going to go over a little bit of anatomy and physiology, I don't want to bring you back to your high school science and biology days, all those high school nightmares, I don't want you to relive that. I just want to make sure we are on the same page. We are going to talk about some stats on neuropathy and how these are impacting our country, and the burden it is having on our citizens. It's pretty large. And we're going to be talking about some mechanisms of damage. There's tons of different factors that goes into neuropathy. It's not usually just one thing that's causing the damage to the nerves, it's a bunch of different things adding up.

Of course why you're all here, there's a bunch of new research. There's some exciting stuff out there that not a lot of people are paying attention to. In the last 5-10 years there've been huge advances in what we're actually learning about neuropathy. There's too many people that are stuck in the past, doing the same thing from 20 years ago. We can do a lot more for people. The last is what can we do to actually help people, and there is a lot of cool techniques out there as well.

## 02:18 – Definition of Neuropathy and Intro

So, if you break down the word neuropathy, you get neuro = nerve and pathy = problem. Put that together and you get “nerve problem”. It’s a pretty general term it can describe any problem with any nerve in your body. But how people generally use it is a problem in the peripheral nervous system. So a problem in your limbs, your arms and your legs. Speaking of that peripheral nervous system, this is a breakdown of all the different areas of your nervous system. It’s divided into your central nervous system, your brain and your spinal cord, and your peripheral nervous system, which we’re going to be talking about a lot today. But I bring up the central nervous system because we are going to dive into a little bit of new research about how peripheral neuropathy is changing the brain as well. They are definitely related.

The peripheral nervous system is divided into your motor nerves and your sensory nerves. You can divide your motor nerves further into nerves that you can control and nerves that you can’t. The nerves that you can’t control, that’s your autonomic nervous system. It’s your parasympathetic system, so your rest and digest, which is actually very important. We’ll be talking more about that today with neuropathy. And your sympathetic nervous system, your fight or flight. You need both systems, but there’s unfortunately, too much of our fight or flight system activated at different times in our lives and it is causing a lot of damage to our nerves. We will be going more into that as we go along.

## 03:51 – Definition of Neuropathy and Intro (Clinical Manifestations)

Alright, I’m sure some of you have experienced some of these symptoms or all of these symptoms. These are the typical signs that people experience with neuropathy. I want to talk more about this autonomic symptom right here because that’s your fight or flight system that is running out of control and is causing this sweating, this redness, cold feet, the feet are turning different colors, the hands are turning different colors, as well as these skin changes. I find people who aren’t complaining about neuropathy, even if they have dry, cold feet, that is a form of neuropathy and they weren’t even aware that they were getting less blood flow to their nerves and that’s causing some damage over time if we don’t address that. Because your nerves, your arteries, and your veins they all run together in your body, you can’t separate them. So, anytime you have cold hands or feet guaranteed those nerves aren’t getting as much blood flow as they should.

This is why neuropathy is so tough to treat, because you could just have a mild form of just one of these symptoms. Maybe just a little bit of pain in a certain finger, or even just a reflex change that you notice in your normal checkup with your doctor. There are some subtle things that can present that are actually more important in the bigger process of how your nerves are working.

#### 05:12 – Definition of Neuropathy and Intro (How to Classify Neuropathy)

This is how we usually classify neuropathy. We break it down into a radiculopathy, that's a problem with the nerve root as it exits the spinal cord and goes say, into your arm. You can have a plexopathy, and that's basically a problem with nerve plexus. A plexus just means it's a network of nerves, just a bunch of nerves in one spot. You have two different plexuses in your body. You have a brachial plexus, all the nerves going into your arms; and, you have a lumbar plexus, all the nerves going into your legs. Those can actually damage a bunch of nerves at the same time. Then we can further divide this, there's a lot of different terms we can use for neuropathy and people get confused all the time: Polyneuropathy, Mononeuropathy. or other things going on.

Mononeuropathy is simply damage to one nerve. We see that a lot with physical compression of one nerve. Polyneuropathy is two or more nerves affecting two or more limbs. You see that a lot with diabetes and a bunch of other system wide conditions.

#### 06:27 – Definition of Neuropathy and Intro (Hypersensitivity and Allodynia)

You can get very hypersensitive whenever you have pressure on a nerve or damage on a nerve. The term for that is allodynia. It basically means that you're feeling pain for a normal stimulus that shouldn't cause any pain. This is very, very common in neuropathy, I see it with a lot of my patients. What that means is your pain nerves are actually firing too much and they are getting too efficient. The more you actually fire a nerve, the more efficient it becomes, any nerve in your body.

#### *Audience Question*

This is fresh off the press, current research. It's called nociceptive sensitization, this is what is happening when your pain nerves become too efficient at firing. This is a very bad thing, you don't want to get into this stage, because it is much harder to treat people that are actually are way more effective at firing their pain nerves.

So, how does that happen? Say you damage a certain nerve in your arm that starts to fire the pain nerves over and over again. If you don't address that, it's going to become very efficient. Then that moves into firing the pain nerves in your spinal cord and further up. So now it's not just a problem here in the arm, now it's affecting the spinal cord and even up to the brain as well. And it that whole feedback loop that becomes more efficient and that can cause a vicious cycle over and over and over again if you don't actually break it up.

#### *Audience Question*

That's why it's so important after any injury that you get rid of the inflammation right away, otherwise it takes much longer to treat. If you sprain your ankle and just hop on your foot for a few months, that's very bad, because you're firing that pain nerve over and over and over again

and you're telling your body that this is normal. So it's going to do it more and more and more and then it's going to be a year-long event to actually heal that ankle. We don't want to do that. So you need to get off that foot to make sure you're not firing that pain nerve.

There's a term here neuralgia. That means you can assign a term, or any nerve to that term, brachial neuralgia means a problem with nerves in your arms. Trigeminal neuralgia is a problem with the nerves in your face. Neuralgia is basically, we can't find anything wrong with you, yet you're feeling a lot of pain. This is pretty common as well, and this where people think, I don't have anywhere else to go. They're saying you're normal, but you don't feel normal. You definitely need to dive deeper and figure out what's going on with that.

#### 09:22 – Definition of Neuropathy and Intro (Timing is Everything)

So, timing is very, very important with neuropathy. You can't let this go on too long because we really have to work to get you back to where you were compared to if this has been happening for a few weeks or a few months.... Who here has had neuropathy for a year, what about 5 years? 10 years? 15 years? Wow, so that's a long time and that literally changes what's happening inside the body and how your systems are normally functioning because everything has to work around that. So, we'll be talking more about that in the research about what that's actually doing over the years.

If we just see something happening over a few weeks, and someone is coming in saying-complaining of this, then it usually means there is something inflammatory going on. It's the body's natural response to any damage is inflammation. You can even form inflammation inside your body for even something that you eat. That what they are actually finding in new research too is that any time you eat something that you are sensitive to you can become inflamed in your intestines. That actually affects even how your nerves are functioning too. The resolution to inflammation is scar tissue. That can even happen with something you are eating, it can form scar tissue inside your body.

Weeks to months, that's more of a nutritional type of thing. Years, more hereditary. If it's been happening over the last few years, we can see some things you get from your parents. As well as we need to ask them when they first come in, how much pressure have you had on these nerves and for how long? Someone is going to respond a lot quicker if they have only had this for a couple of weeks compared to 15 years. We have to basically take time into account in how we are actually going to treat this.

#### 11:27 – Definition of Neuropathy and Intro (Nerve Regeneration Rates)

Everyone knows that you can't really heal the nerves in your brain or spinal cord, your central nervous system. It's a very, very, very limited capacity but in your peripheral nervous system

you can actually start to repair some of the damage, which is a good thing for neuropathy. They're finding that the rates differ quite a bit, from ½ a mm a day to 9 mm a day depending on many different factors, and your nutritional status. Even genetics as well can take part in that. Your oxygen levels, any medications you're on, stuff like that. The average value is about 2 cm a month that a peripheral nerve can actually start to grow back and heal itself.

#### 12:11 - Anatomy and Physiology (Basic Nerve Structure and Function)

This is the basic structure of your nerves, your peripheral nerves, you've got the cell body there, that's where all the nutrients live and that's how it becomes nourished. It sends an impulse all the way down that axon, there. And you see it has that myelin sheath, that's the covering that actually allows your nerves to send impulses really, really quick. It's the superhighway. You can't have any damage to that, otherwise you're going to be in bad shape for neuropathy. Then it connects to the other nerves from right there.

*Audience question* – There is hope because you actually need to start to get different nutrients in your body to start to repair the myelin sheath. And go from there. It's much harder to regenerate the nerve if the myelin sheath has been damaged. We're going to talk a bit about as I go over what happens with diabetes.

You can separate the nerves into the ones that go from the skin all the way towards the spinal cord and the brain; then you have nerves coming from the brain and spinal cord all the way out to all the muscles and organs. The afferent and the efferent nerves, you need that feedback loop to be constantly firing.

#### 13:42 – Anatomy and Physiology (Basic Nerve Requirements)

Alright, this is what we basically focus on when we are getting people better. The three main things your nerves need to be healthy at all times. Unfortunately, a lot of other healthcare practitioners forget this and they don't focus on all three. You need oxygen, you need stimulation, or activation of your nerves, and you need good food, fuel or nutrition. You can't get away from this fact, this is basic nerve theory, and you need to address all of these equally.

#### 14:12 – Anatomy and Physiology (Nerve Fibres)

So here is a chart. You don't need to worry about the numbers. Look at the top, it is classifying your nerves from thickest and fastest to thinnest and slowest. This is how all your nerves are laid out in your peripheral nervous system. The thickest and fastest ones, they're actually

finding in the research that those are the first ones to start to get damaged with any neuropathy. That's usually something you can't feel. So with any changes in temperature, given our cold climate here, there is actually more neuropathy here than in a warm climate, like say in Arizona. That is why people actually go there, because their nerves literally function better in those climates. As you go down your nerves start to get thinner and thinner, and you don't actually have any myelin, that fast conduction chemical, you don't have any of that myelin in your C fibers, right there.

Any time you get that burning, that deep burning aching pain, that's when you have a lot of pressure on your thin, thin fibers of your nerves. Your C fibers, right in there. That's why we have to listen to what people are telling us: "I feel burning" or, "I just don't feel like I have any feeling or sense where my body parts are." That tells us what's happening with that actual nerve and how we can help that neuropathy.

These largest fibers, right here, the fastest ones, they let your brain know where your body part is in your environment. So, I'm not even looking at my finger and I know that I'm bending it because of these really large fibers and those are the first ones to get damaged. So, this is where people start to get a little bit clumsy, they are starting to drop keys when they are trying to get in the door. As well, I see people in random postures. They don't even know they are holding their arm over here like this. That's because they have damage to their nerve telling your brain this is what your arm is doing right now. I see this a lot in my patients, with abnormal postures their shoulder is down like this and they think they are standing up straight. I'll put them in front of a mirror and they're like, "Oh, I need to stand up straight like that." That nerve is actually damaged telling them, where their body is.

#### 16:32 – Statistics

Some stats here. There are around 3 million Canadians affected by diabetes with an increase by 200,000 in every single year. Which is actually such a huge percentage. There are 35 million people in Canada now, or just a little bit more than that. That is quite a bit of people with diabetes. I bring that up because that's the number one cause of neuropathy in a system sense. So, 1 in 5 people are living with chronic pain related to neuropathy. That's a pretty big stat. We need to be doing more to take care of this. Eight percent of people are affected by this, it is actually a little bit more now. It is costing six billion dollars a year. It's a pretty big impact. It's more than heart disease, cancer and HIV combined. That's the cost of neuropathy.



### 17:25 – Mechanisms of Damage

So, like I said before, that is why neuropathy is so tough to treat; there are so many different causes. You have to take into account the status of your central nervous system. Like I was explaining before, if you have that sensitivity going on where your pain nerves are becoming too efficient that's going to affect how things are playing out with neuropathy. You have to look at your immune system. If you're not getting enough sleep or nutrients, your immune system is going to be squashed. If you're under a lot of stress that's going to make your chances of getting neuropathy, or fighting neuropathy, even worse. You've got to look at your metabolic system and see how your metabolism is, how your hormones are functioning. Once again, stress is related to that too. Even your digestive system, we touched on that as well. There is tons of new research showing the connection between the brain and your digestive system. A healthy digestive system, they are finding, means a healthy brain. They are very well connected and this has a big influence on neuropathy too because if you are all inflamed inside, in your digestive system, those inflammatory chemicals are going to go right to your nerves in your arms and your legs. With all of these you have to take into account your genetics and what you are experiencing in your environment on a daily basis.

### 18:53 – Mechanisms of Damage

So, these are all different ways that you can actually damage your nerves. You can have literally physical pressure on the nerve itself even with just with what you are doing at work, how you are sitting, even watching TV in weird postures. You can actually damage your nerve that way. Or even how you're exercising too. You can see that there is a vascular component. So, the health of your arteries. This is a big one with heart disease, high cholesterol and all that. That plays a part in neuropathy. You can be exposed to chemicals and not even be aware of it. Even cleaning chemicals, different things on your food, and even different things you're being exposed to at work too. Or things you're using to, say, using pesticides on plants and things like that. Stuff you're using in the garden too. You can have infections, I just put one condition in there, but there are tons of others for neuropathy conditions caused by infection. You may have something passed on by your parents, so you may be born with neuropathy. We will go over that in a second. And, systemic as you can see diabetes is actually in a few of these categories because it plays a role in a few different categories.

### 20:04 – Mechanisms of Damage (Mechanical Pressure)

I want to talk about mechanical pressure. People think you have to have like a saw cutting into the arm to get neuropathy physically. But you can actually have pressure on your nerve by doing something repetitively. Say if you are just using a screwdriver over and over and over again. You're starting to tighten those screws. Over time you're going to affect this muscle

right in here and there are some sensitive nerves that go right through that muscle, that can actually be damaged. I've seen that a lot there have been too many carpal tunnel syndrome surgeries have been performed when the problem is actually up here in this muscle causing damage to the nerve. The problem wasn't actually at the wrist. Even in your posture, if you're a hair stylist. I've seen a lot of hair stylist patients who are doing this all day. You have a lot of sensitive nerves going right through here that can get compressed when you have your arm up here, you don't even have as much oxygen going into the arm because the blood flow isn't the same as the other arm. They suddenly come to me and they say they have numbness and tingling in these fingers, what's going on? Well I can see what you do for a job and what you're doing all day and you're on your feet all day in weird postures like this. It plays a part in it, for sure. You can even see check-out counter. I see a lot of these people who are leaning up against a counter all day and they are putting pressure right here near the groin. You have a lot of nerves that go right through there, right through this ligament here. It can actually start to compress that nerve as you put more and more pressure on it. Or you could have a big tool belt on, I've seen this in a lot of police officers, their tool belt is actually around 20 lbs. Hang 20 lbs right off your waist and see what happens for 5, 10 years. This definitely plays a part.

#### 21:53 – Mechanisms of Damage – Diabetes Damage

This is a typical scenario with diabetes and how it kind of starts. Say you have a lady who has a bowl of ice cream before bed every single night. She feels fine until, over time, her body can't really handle that sugar load. What happens is she has that bowl of ice cream. That sugar is circulating around in her body as she starts to sleep and your nerves automatically suck that sugar into the actual nerve. Your muscles need insulin to actually have sugar go inside. But, your nerves don't need insulin, they just take any sugar that is going around inside your body and they just suck it right up. All that sugar needs to go somewhere, it needs to get converted into something. That's where you have this chemical here, not really that important for our use, but its call sorbitol. What that does is attracts tons of water into the nerve and it starts to swell up causing damage to the nerve itself. As well as damage to the blood vessels around that nerve. Remember that I said your nerves, your arteries, and your veins all are right beside each other. Any swelling of that nerve is going to damage the blood vessels. You can have a multiple angle attack from this actual sugar going into the nerve.

*Audience Question* - The sugar surges in our blood and is what causes the damage. Not the actual sugar, just a lot of sugar all at once, and if you keep doing that over and over and over again. There is a genetic component to this. If you have the best genetics ever where you can actually handle a ton of sugar inside your nerves and not cause any damage you're not going to have any symptoms. But, unfortunately, if you don't have the best genetics on the planet to handle that sugar, it will take less sugar for you to be eating, compared to somebody else to start to cause the damage.

Not only is there damage from swelling now you actually have different chemicals that are starting to do damage inside that nerve that deal with your myelin. Remember that really fast conducting substance that causes your nerves to transmit impulses quick. Now you're not forming as much myelin. You have a multi-angle attack here of lack of blood flow, you're not getting as much myelin in that nerve and all that swelling. So, now she wakes up in the morning after having ice cream for 6 months and she starts to get pain in her feet as she walks around for 15, 20 minutes. Then it starts to go away. Then over time it starts to last 30 minutes, 40 minutes and after a while the pain in her feet starts to stay around all day. This is kind of the typical scenario that happens. They realize, 'Oh, now there's actually a problem here. I need to get this looked at. It's been happening for a very, very long time.

#### 24:57 – Mechanisms of Damage – Chemical and Toxic

Chemical and Toxic, alcohol is a big one. It doesn't allow your absorption of vitamin B1 which is Thiamine. This is what we actually give to a lot of alcoholics right in the hospital is Thiamine because they are very deficient in that. Your nerves need vitamins and they need B1 especially as well. I've also seen unfortunately a lot of medications out there that do have a lot of serious side effects. The FDA came out with this in 2013 that there are a bunch of antibiotics that a lot of people are using, I've seen a lot of my patients on these that can cause neuropathy. They are linked directly to neuropathy. You have your Cipro, your Factive, Levaquin, Noroxin, Avelox, Floxin. A bunch of random words there but you definitely have to take into account what you're taking, what you're putting into your body that could have an impact on your nerves.

#### 25:53 – Mechanisms of Damage – Infections

Like I said, you get neuropathy from even infections. I definitely understand the need for vaccines. It's just that some of them have been more linked more to certain syndromes more than others. The Guillain Barre Syndrome here causes weakness that starts in your feet, starts to rise all the way up into the hips, to the hands, all the way up until you almost need to be on a ventilator in a few weeks to about a month because it progresses very quickly. It's a very severe form of neuropathy. I've seen a lot of my patients, they had an epidural when they were pregnant and they unfortunately nicked one of the nerves in the lumbar area. Now they have a lot of numbness and tingling in their legs. Different surgical procedures have actually caused neuropathy.

*Audience Question* - Once you have neuropathy, the blood flow isn't really working 100% to those nerves. Medications get distributed through the blood. That medication isn't working 100% as intended if you have neuropathy because it is not being distributed evenly in your body. It's going to have a little bit of a different effect compared to somebody who doesn't have neuropathy or the blood flow issues. You are more susceptible (to these medications) in

the nerves that are already damaged. Diabetes is more of a system wide event. It is tough to say, I think there needs to be more research done on what certain medications are doing to the body and how susceptible we are. Maybe it needs to be a contraindication to give somebody this drug. If they have this condition, we can't give them this drug. Maybe we need to do more research into that.

#### 28:42 – Mechanisms of Damage (Hereditary)

I talked about the hereditary causes of neuropathy. You can actually be born with something like this. This is a typical profile. This is called Charcot Marie Tooth. This is one hereditary condition, there are many, many, many others out there. I've even had people come in who didn't even know they had something like this. This is the typical feet and legs of what they actually look like when they come in with something like this. They have the really high arches in their feet, the toes start to curl back a little bit, that's what they call hammer toes. Then you have, these which are called champagne bottle legs, so they are a little bit skinnier in here and they have a typical shape like that. So we have to be aware of certain things like that going on too.

#### 29:22 – New Research (Years Before)

Let's get into some research here. There are some pretty heavy concepts that I want to break down so if you don't understand anything, just let me know. They are finding actually that neuropathy, and I kind of touched on this before, neuropathy starts about 3 to 5 years before there is even a diagnosis of neuropathy. You have pressure on those really thick, fast fibers in your nerves. You don't even feel that there is anything wrong, but that is sending information to the brain about where your body parts are in space, and so it's (the brain) not getting that anymore. This is starting to happen 3 to 5 years before you feel anything at all. They're even noticing people have altered balance, they have different cognitive issues, they're not thinking as clearly. They're finding this is happening 3 to 5 years before there is any diagnosis.

#### 30:15 – New Research (Spine Motion)

Now, the normal motion of your spine is: you bend your head to the right side, all the bones in your neck should rotate to the opposite side. You bend your head to the left, all the bones in your neck should move to the opposite side again. When you bend your body to the side like this, it's a little bit different. All the bones in your mid back, your low back should actually bend into that and the same on the other side. We see a lot of problems with people that don't have this normally working for them. They bend their head to the side, you actually see this on an x-ray, and things like that. They bend their head to the side and there are certain bones just stay

right there. They don't do any movement at all, or they even rotate to the improper side. That can put too much pressure on your joints. That causes a lot of pressure on your nerves. This is very, very common there is actually a physical reason for a lot of numbness and tingling going on in your arms and your legs. It's because your spine isn't moving properly and that's because of a lot of poor postures that we're in, car accidents are very, very common, falls, things like that. Does that make sense?

#### 31:24 – New Research (Brain Blood Flow)

Alright, there was a research article done in 2014 and it found that blood flow in the brain is literally different in people with a disc herniation in their low back. They have a lot of pain in their low back, they have numbness and tingling in their legs, and the blood flow in the brain is different. So, you have to ask yourself, why is that happening? Those nerves aren't sending as much information up to a part of the brain called the frontal lobe. It's the prefrontal cortex. That's the area in the brain that gives you all your human qualities. Your personality, your decision making, your social aspects, all that stuff. So it's very important that the frontal lobe is working as well as it can. And neuropathy is unfortunately affecting that. There are a blood flow changes in that area. Even just from something happening farther away from the brain.

#### 32:12 – New Research (HCN)

This is kind of a next step into this. They found that peripheral neuropathy actually affects what are called the HCN cells. Don't worry about that too much, it's just that these cells located in your frontal lobe and they actually give your frontal lobe more rhythm qualities. It's the pacemaker of your frontal lobe. Peripheral neuropathy is affecting those cells, now your frontal lobe isn't working as well. This is a big area in your brain that assigns importance of pain. How much pain you actually receive and are aware of is in the frontal lobe area. They're finding that there is starting to be some damage from peripheral neuropathy in this area of the brain. You can't separate the two. The nerves in here are directly connected to the nerves in your brain and your brain can tell you how much pain you are actually experiencing. So it is important that these areas are working very well.

I have over here, "Mind over matter. If you don't mind, it doesn't matter." It's kind of a silly saying, but it's so true. A lot of patients in my office, they've been dealing with this pain for so many years, that's all they can think about. That's going to make their pain and suffering worse and worse and worse. Even though nothing has really changed inside of them. The more attention you pay to pain, the worse off you're going to be. I like to hear what people are experiencing. They should tell me what's happening. But we don't want to assign too much importance to what's going on because it's going to only interfere with what we're doing with them. If they keep thinking about it over and over and over again. Remember the more you

fire your nerves the more efficient they become. Same thing even with your thoughts too. It will definitely go against what we are trying to do with people if they constantly are just thinking about their one pain over and over and over again.

#### 34:00 – New Research (Crossmodal shaping)

OK, another research article here, in 2014. They found that pain was actually related to how different systems, all the different nerve systems in your body are working. They are finding that even your visual system, your immune system has a big influence on how much pain you're actually experiencing. All the sensation in your body goes to one part in your brain first, and it's called the thalamus here. They used to think that this was more of a relay station. All of the sensation goes there when it's fired right up to the brain. But, what they are actually finding is this is more of a gate keeper now, where it can modify certain signals that are going on in there. All the sensations coming in right to that one area, and now they can be changed into something else. So, if there is a problem in here, you can actually be experiencing way more pain than you should be even though there really not a lot going on in say your arm that might be causing that.

So there are new therapies here, and I'm going to be talking more about this in a few slides. What I'm using with people is Sound Integrated Tactile Stimulation, Visually Integrated Tactile Stimulation. What we need to do is make this area, where all your sensation goes, if we can make it start to work properly. If you have too many cross-wires going in different directions right in this thalamus area here, we need to basically start to make it work properly and get rid of that neuropathic pain. We can do that with these two therapies here. I'll go over that in just a little bit more detail.

#### 35:33 – New Research (Chronic Pain)

Alright, chronic neuropathic pain actually ages the brain. They're finding that pain fibers actually start to shrink the brain over time which is very, very bad. It can actually age you a decade or two they are finding. So, they have found 5 to 11 % less volume inside the brain with chronic pain. We definitely need to get this taken care of right away otherwise it's just going to get worse and worse because now your ability to handle the pain is even worse then you start to shrink the brain a little bit more, it's just a vicious feedback cycle.

#### 36:07 – New Research (Imaging)

They found the very first signs, even though we could tell you this a long time ago, there is now research proving it. That there is inflammation inside the brain with chronic pain due to neuropathic pain. What do you know, the inflammation is right in the area I was talking about,

that thalamus, that gatekeeper the relay station where all your sensation is going in. There's inflammation there and of course causing some crossed wires, then you're feeling more pain than you should be.

#### 36:38 – Activation of Human Vagus Nerve

Here is a cool treatment I've been doing with people. There's tons of uses of this. Its vagus nerve stimulation. The vagus nerve is a nerve in your lower brain stem that actually causes you to have a lower heart rate, lower blood pressure. It keeps your intestines healthy. It's actually been used for a lot of depression and seizures, and stuff like that, as well as chronic pain. How well this nerve is firing depends on how much pain people are actually experiencing. Years ago you actually had to cut somebody open and electrically stimulate that nerve in your brain stem. Now they have actually found, that is what this graph is showing, we can actually stimulate that part of the brain stem with the little electrode inside the ear. That goes right to that vagus nerve. We can do a lot of cool things for a lot of different conditions if we stimulate that vagus nerve.

#### 37:34 – What Can Be Done to Help?

What do we usually do with people? Where do we start? Like I said before, neuropathy has tons of different causes. We need to do a proper history with somebody to figure out to figure out what's exactly happening. So, what they've experienced in their life. Work our way backwards a little bit to figure out what's actually going on. It could be a combination of many different things causing their neuropathy. Even though they just think its diabetes, or it's just one car accident or something like that. It's usually a combination of many different things. Then we do our actual neurological exam. I do a little more detailed exam than a lot of people. I look at every reflex in the body, I compare it side to side. I do all your sensation testing to figure out exactly what's happening. We do a lot of balance testing. Remember I talked about your autonomic system so, your fight or flight system, or your rest and digest system. How well are those systems actually working? That influences how much pain you're experiencing and even the neuropathy too.

#### 38:38 – What Can Be Done to Help?

Obviously I am a chiropractor so I do adjust the spine as well. I can't get away from the fact that a lot of neuropathy is helped quite a bit by adjusting the spine. There is tons of research out there showing that the better we get the joints moving the less pressure you have on the nerves. There is a PhD Fellow by the name of Dr. Sperry, who actually found out a few years ago, he actually won a Nobel Prize for this, he found that 90% of the information going up to your brain comes from the muscles and joints in your spine. It's very, very important that your spine is healthy and moving properly. Otherwise your brain's not getting 100% of the

information that it should. That means that it can handle pain better if all your joints are moving better as well. Just something as simple as that. We see that joint motion equals joint and muscle activation which equals brain activation. A lot of people are saying, no I have back pain right here. It actually has a big consequence to your brain.

#### 39:40 - What Can Be Done to Help? (Three Treatments)

Basically what you need to do to handle neuropathy, you need to handle these three things. Some people are only using one of these factors to treat neuropathy. Some people maybe a maximum of two. Or, maybe even none of these at all. But, you need all three of these to help with neuropathy. You need what is called volitional treatment, you need to use voluntary firing of that nerve. So, as simple as if you have a bicep nerve that is cut, you need to work that bicep. Start fire that nerve over and over and over again. So, it's voluntary. Then use reflexogenic treatment, you need to use reflexes. Something that you can't control. So, say we start to use the bicep reflex to start to rehab that nerve. You can use other reflexes that start to send direct nerve impulses direct to that area. So, you need to use that as well, it's very effective. Then, artificial treatment which is something we add to the body. Some electrical stimulation is very effective as well, ice, and heat and there are a lot of artificial methods we can use too. You need to use all three of these to get the best results possible.

#### 40:50 - What Can Be Done to Help? (Cross Cord Reflex)

Does anyone know what this is here? I am not the biggest football fan on the planet, I know enough to get by. This is the Heisman Trophy. This is awarded to the most outstanding US college football player each year. The reason why I have this here, the position he's in, that's actually how your body moves around in this world and how your nerves are activated in different patterns. You can see that he has his right leg flexed forward and his left arm flexed forward. This is actually how we walk. You put your right leg forward and your left arm forward and then you alternate. You do this over and over and over again. It's this reflex that we can actually use to treat neuropathy to get it working properly again. Because when say you contract your bicep, now your tricep has to relax. Otherwise your arm wouldn't move. That's how your muscles work all over your body. It's problem in neuropathy, that's when this doesn't work properly. When you extend your arm, you have to contract your triceps and you have to relax you biceps. We can use that to our advantage. We are actually doing fast stretches to certain joints that are actually compressing that nerve. There's too much muscle tone in say your bicep here. There's too much muscle tone in all these muscles in your arm here and we need to do a quick stretch to get this to relax. So that you can have more muscle tone in the back of your arm here. It's this is cross cord reflex that we can actually use to our advantage. Any time that you actually contract your biceps you're actually starting to activate the nerves in the back of this arm because this is how we actually walk and we can use this to our advantage.



#### 42:35 - What Can Be Done to Help? (Nerve Glides)

Very effective treatment is Active Nerve Glides. Anybody ever heard of these before? What they do is, remember I said any time you have inflammation of a nerve you form scar tissue, that's the one end result of any inflammation in your body. Scar tissue is actually going to hang up your nerves and allow them to basically just be stuck in place. We need to start to break up that scar tissue and allow that nerve to glide back and forth normally.

This picture on the left up here. She's doing an exercise basically to free up the median nerve. That's the nerve going right through the carpal tunnel area. Its gets caught a lot. It can even come out of the neck and not be moving properly as it goes down to your wrist. You extend your arm over, you bend the neck, you look and then you start to move the hand around. That physically stretches the nerve, around two or three cm as it exits the spinal canal and it moves it in and out as you start to move the wrist around. This is very, very effective stuff because you are, at the very least, starting to break up that scar tissue. The better that nerve can move, the less pressure it's going to have on it.

I've had somebody who had sciatica for about 20 years. In the very first visit we did some of these for the lower leg where you actually get on your back, the leg is extended and I start to flex the foot back and forth. That actually moves that nerve in and out of the spinal cord about 3 or 4 cm. They were able to walk around with no pain after 20 years of just doing this for a few minutes. Pretty cool stuff.

We can also use two other things, like I said, heat or ice. Heat will increase the firing of a nerve and ice will decrease the firing of a nerve. If your nerves are becoming too efficient, if they are inflamed, we don't want that, we want to use ice to start decreasing the firing of that nerve. What they are finding is that anytime you inflammation you have pain, anytime you pain you have inflammation. You can't separate the two. Some people think you just, you're in the acute stage for a week, so you ice for a week and then you're fine, even though you have pain after that. Anytime you have pain, you have inflammation, so we need to use ice for that at all times.

#### 44:54 - What Can Be Done to Help? (TVNS)

I've covered this just a little bit. This is the Vagal Nerve Stimulation. This is just a picture of what I actually do in the office. That's the ear clip in there. We can actually stimulate, it's called the Tragus of the ear. We put that electrode in there. It's painless, it's subthreshold therapy. You can't even feel what is going on, you might be able to hear just a little bit, but we use this for about 10, 15 minutes and it has huge effects on neuropathy on neuropathic pain, and digestive health, even depression, things like that.

I mentioned this earlier, the SITS and the VITS. You can see what I'm actually doing right here, this is more the sound integrated tactile stimulation. She has these bone conduction headphones on, these things right here. They just go right in front of your ears. You can actually stimulate different parts of your balance system to decrease your pain. They found a certain frequency that you can do that at is very, very effective. So, we pair that, that sound with, I'm going to be stroking a painful part on her back with a non-painful part. We're going to combine all of that to basically get all of your sensations working properly again. Instead of just feeling pain over and over and over again, we need to break that cycle up. This is actually pretty effective stuff, that no-one else is doing, that can help with that too. So, I talked about the SITS there.

The Visually Integrated Tactile Stimulation, that's where someone is looking at the neuropathy, the part that's really hurting and I'm going to be starting to stimulate that part along with a different part that is not hurting. We can have them looking at that. That's more using the frontal lobe to start to change some certain things there. The frontal lobe is very, very, very powerful. They actually did a test one time, somebody needed a knee operation, had really bad knee pain, could hardly walk. They didn't do anything to him, they actually just gave him some anesthetic. He woke up. He thought he had the operation done on his knee. He started walking around as if nothing had happened. It's actually his frontal lobe, the placebo effect is almost, is way greater than we can even realize with certain people. He thought he had the operation done and his knee was normal again and he was fine, but it's his brain telling him that something happened, something was done to that area and we're fine again. So, the brain's very, very powerful.

#### 47:21 - What Can Be Done to Help? (High Volt Galvanic Stimulation)

I talk about some more artificial stimulation. We use what's called, High Volt Galvanic Stimulation. It sounds scary with the high volt, but this is sub threshold stuff, so you can't actually really feel what's going on. This uses the exact same current that your nerves use to send impulses to the brain. This is the most effective. A lot of people use tens units or micro current or many other different devices out there, but this is the most effective because it uses the same current that your nerves use to get healthier.

*Audience Question* – No, we have to do something a little different about that (if there is a pacemaker). A different form of treatment for someone with a pacemaker. Same thing (if they have a metal plate). We have to be careful of that stuff, we definitely can't do it over the area, it depends on what's going on.

#### 48:49 - What Can Be Done to Help? (Diet and Supplements)

I have not been mentioning diet in all this but it is also very, very important. Remember the three things that nerves need: oxygen, stimulation, and diet. They need nutrition. What they are finding here is, if you are in a lot of pain, you need to eat less. The less you eat, I'm not saying starve yourself, but if you eat a little bit less calories you're going to be experiencing less pain. Your body has less of the fuel to start fueling this fire over and over and over again.

They are finding that certain things that you are eating are actually starting to break down into all these inflammatory chemicals here. So things like the red meats, the egg yolks, yes they are healthy, but they also break down into these inflammatory pain causing chemicals. If you eat less of these, you're going to have literally less of these inflammatory pain causing chemicals. This is what Aspirin and Tylenol and all those things do, they actually inhibit these chemicals listed up here. The COX-2, the COX-1, prostaglandins all that stuff, they actually inhibit all these from forming. You can do a lot of this, not taking the drugs, by changing your diet a bit.

#### 50:00 - What Can Be Done to Help? (Salt)

Ok, Salt. This is a big one with your nerves because you, anyone heard of the sodium potassium pumps, I know it's been a while since the science days, all that stuff, this is how your nerves fire. As you start to fire a nerve, all that sodium rushes in to the nerve, and once it's done firing it needs to pump it back out. The more salt you have floating around in your blood, the higher this spike is going to be, the action potential. So, you fire that nerve, you have a ton of salt in your blood. Now that spike is going to be way larger than before, it's literally going to take more time for this spike to come back down, for that nerve to go to rest again and you to be able to fire that nerve. You're physically not able to fire your nerves as quickly if you have a lot of salt in your blood. They hide a lot of salt in everything these days and so you have to be a little cautious of that.

#### 50:56 – Food & Chemical Effects on Acid / Alkaline Body Chemical Balance

Your body works way better in a more basic environment, a more alkaline environment. So, anything above a pH of 7. Our blood is normally about 7.35, 7.45 on the pH scale, it's a little bit more basic but a lot of us are starting to do things that cause this to shift more toward the acidic part of the this spectrum. All your cell machinery works way more efficiently in a more basic environment. The foods that we eat can actually impact that. The more basic foods are, as you know, are healthy: the asparagus, the kales, certain nuts and things like that. So we need to steer clear of different things going on that may cause more acidity in our blood, making that neuropathy worse.

## 51:48 - What Can Be Done to Help? (Breathing Exercises)

This is pretty simple stuff that a lot of you even do, that can have a huge, huge impact. I've had somebody who had numbness and tingling in these fingers here, the ring and pinkie for five years. All I did was this breathing exercise right off the bat. Get more oxygen into the system, with these breathing exercises and it was gone in less than ½ a day. Like I said, your nerves need oxygen, stimulation, good food. Oxygen is a big part. You think you're getting enough oxygen and you're breathing normally throughout the day but a lot of us are just breathing shallowly. We are just getting oxygen into the top part of our lungs. We are not actually getting oxygen into the deep parts of our lungs where most of the transfer takes place from oxygen to carbon dioxide. I usually tell people, breathing through their nose for three seconds, out through their mouth for five seconds. If you do that for about five minutes every hour, you're going to notice the pain is going to be much worse, er, much better. We don't want that. Much better, as well you're going to have clearer thinking and you're going to have better movement of your limbs as well. It's really big.

Also, here's this Hering Breuer Reflex. Anytime that you take a deep breath in you literally fire the nerves in your lungs to tell the brain to decrease your pulse and blood pressure, decrease that stress response. So now you are not as stressed, now you're actually getting more oxygen to the distal the really far away parts in the spinal cord that didn't have as much oxygen before. You're also starting to change the size of your blood vessels so that now they are not all puffed up when they are really stressed. Now you're starting to get them to calm down. There is more room for your nerves to sit in place and function properly. It's pretty cool stuff.

Another reflex that you're born with called the oculocardiac Reflex. Ever seen anyone who's really stressed? They're rubbing their eyes like this. They're subconsciously trying to decrease their stress by lowering their own heart rate and blood pressure. Every time you rub your eyes, you actually fire off nerves that go to the brain to tell it that you are too stressed, we need to lower the heart rate and the blood pressure. Therefore you're starting to shrink your blood vessels a little bit more in certain parts, in the far away areas, now they actually have more oxygen. The blood pressure and the heart rate, these are all built in reflexes we can actually use to our advantage. Like I said before, the more you fire certain nerves, or any nerves, the more efficient it becomes. You can actually start to create a longer lasting pattern with all these reflexes.

Mediation they are finding in the research is huge for pain, for depression, for a clear mind. There was a Harvard study done, in, I think about a year ago, that they actually found that people can actually cut their pain in ½ just by doing about 10-15 minutes of mediation every night. That's working more on that frontal lobe again, you're calming that stress response down. So big impacts there.

#### 52:52 - What Can Be Done to Help? (Mirror box therapy)

Alright, Mirror box therapy, I use this a little bit with, more so with stroke patients, but we can have some really big results with neuropathy too. You actually put the bad extremity the arm say, the left arm is bad in this case inside this box here. Now we're going to start move the right arm around and you'll actually have to look in the mirror and they can actually see the left arm moving around. Even though it's not really, it's inside the box. They can see what looks like their left arm moving in the mirror. It's moving pain free, it's moving with a lot of strength. They can actually, they can literally feel the blood start to return back to their hand. It's pretty cool stuff. This is using more of that frontal lobe again, of seeing what's actually going on, and experiencing what's actually happening in that limb. Some cool stuff using that frontal lobe and using some mirrors and things like that.

#### 55:56 - What Can Be Done to Help? (Postural Training)

OK, now posture is kind of a boring topic. A lot of people, just sit up straight, your mother has been telling you that for years. It's actually, it has big consequences. If you try to take a deep breath when you're hunched over like this. You can't. If you stand up straight, and take a deep breath, you can get way more oxygen inside of your body. Like I said, in neuropathy you need more oxygen. Not to mention we were talking about that cross cord reflex. You contract your biceps to relax your triceps. The same thing happens with every muscle in your body. So if you're sitting like this you're constantly contracting all of these muscles right here. They get really tight throughout the day, even the muscles in this arm. They turn off certain muscles in the back and that's when you can start to cause too much damage to those joints and nerves in your back as they start to chronically tighten. So we do, this is called the doorway exercise. There's lots of different stuff that we do with people. They can actually start to open up their core. So, you can get them from this, if you're sitting at a computer all day, and we start to stretch open these really, really tight muscles. They can take a larger breath in, and it really helps with neuropathy.

#### 57:00 - What Can Be Done to Help? (Exercise and Movement)

Exercise, everyone thinks exercise is good, but we don't understand how beneficial exercise really is. Any time that you start to move around a lot, you're starting to fire those really big, those thick fast nerves, all the time, constantly sending great information to the brain. The more of that, that happens, the healthier the brain is going to be. Like I have right here, athletes have a higher pain tolerance, a higher pain threshold than somebody that doesn't exercise. They can actually handle more pain because that frontal lobe is literally healthier and can inhibit more pain that is coming in.

Not to mention exercise helps with sugar control with diabetes and insulin release. It actually regulates all that. Basically, puts it back on track. Not to mention you feel more calm after exercise, you are less stressed and that helps a ton with what's going on with the nerves out to your extremities. What I just read in a recent research article on this, they actually found that walking is as effective as running or jogging. So you just need to walk a little bit longer than an actual run, but the same benefits are found in the heart and the lungs and all that. If anything, try to at least get out for a walk.

58:22 – There is Hope!

The big message that is here is, there is hope. There is too many times that people say, “Oh, this is what you have, there's nothing that we can do about it.” There is always something we can do for people. We may not cure something that has been going on for way too many years but we can improve your quality of life, your function. Give you your life back, that's what a lot of people want. So, there is new research in epigenetics. They are finding that you are actually not a slave to your genes. That's why I have jeans here. What they're finding is your environment is actually very, very important and your genes can actually shape and change as you start to age.

*Audience Question* - (if you have neuropathy in your feet) it (walking) would be (making it worse). So, you need to find something else that would not cause that, that firing of that pain. So you need to do something even with your upper body, and that's sending a lot of good information to your brain. Or, different form of exercise, something for your legs, like riding a bike, that might not be firing the pain as much. Or, even swimming, swimming is huge. It's less impact on the joints, it's great for arthritis. You're basically taking the stress off of your system; you're taking gravity out of the equation a little bit because you're more buoyant. It's giving your brain a chance to relax. It's not firing as much due to (less) gravity.

*Audience Question* - Yes, that's (aquasize) also good too. Like he pointed out, if you're in too much pain, then definitely stop because you don't want to make the pain worse and more cathodic. Judge how you feel with certain activates and go from there.

What they're finding is it's a 60-40% rule. All of us are born with the exact same 60% of all the same nerve pathways in our body. That leaves another 40% that can actually be changed by our experiences and also what we are doing in our environment. It's actually a big, big percentage there. We can make some big changes in our own bodies. You don't have to say, “Oh, my parents had this, so I'm going to have it and that's the end of that.” You can actually take control of what's going on.

1:00:43 – Questions.

1:00:49 – Credits.