Presenter: Today, we're going to be taking a look at the ARC Neuropathy Workshop. This is part one, we're going to talk about what it is and who does it affect. And then in some of the subsequent ones, we're going to talk about what some of the treatments are out there and then some of the research behind it.

So, neuropathy is quickly becoming one of the most common chronic diseases in the United States. In fact, 8% of the U.S. population has neuropathy and 30% of diagnoses are linked to diabetes. Now, does anybody know what's a serious complication of neuropathy and diabetes? It is amputations. So according to the American Coalition of Amputees, half of all amputees are due to neuropathy and its complications. And throughout the world, it's estimated that every 30 seconds a leg is amputated and 85% of those amputations were a result of a diabetic foot ulcer. So neuropathy and diabetes are both huge factors for any amputations across the world, and especially here in the United States.

Now, diabetes.org Has some statistics, 27% of Americans 65 and older have diabetes and 27% of all Americans over 18 are pre-diabetic. Now, these numbers are always going up. I did a talk like this about a year and a half ago, and some of the most recent data that I was working with at the time, it was talking about 25%. And it just keeps going up and up. Now diabetes, when you look back at 2017, was the seventh leading cause of death in the United States. So it's a really big problem that a lot of people just don't talk about, don't think about, and don't hear about.

So let's talk a little bit about how neuropathy develops. So think about a tree. A tree has a root system that goes down and that's kind of like how our nerves are. You notice in these branching roots, they get smaller and smaller as they go down, you see that? Our nerves are similar to that because they go out and they get smaller and smaller. So the nerve that's your sciatic nerve, most people have heard of that, that's the one that comes down the back of the butt, down the leg. That's about as thick as your thumb, but once they get down all the way into the bottom of the feet, those nerves are microscopic. You couldn't even see them without using a microscope. And let's say like this tree, if you didn't give this tree any water or air or sunlight, what would happen to it? It would start to die, right?

But then as it's withering away, if you were to give it some of that water, air, give it some sunlight back, what would happen to it? It comes back, right? So if you give what they need back, that's when they start to come back. So that's going to come into play when we start talking about treatments in the next module. Today, we're going to look at the nerves and how they actually get damaged. So here's a nerve here, this outer ring, that's the very outside of the nerve, so we're blowing up one of those tiny little microscopic nerves. So this outer portion here is called the myelin sheath, it's a fatty tissue that protects those nerves, keeps it insulated, keeps it healthy. What do you think these tubes right here might be? Those are the blood vessels, right? So those blood vessels bring oxygen and nutrients to those nerves, keep it healthy.

Now, let me ask you a question. What percent of nerves actually feel pain? You think you know? Well, it's actually only 10% of nerves. So that begs the question, what do the

rest of those nerves actually do? So the rest of those nerves control our eyes, our heart, lungs, liver, kidneys, stomach. And if you look down here in the lower back and sacrum, these control our bladder, kidneys, urinary tract, sexual organs, which is why you'll notice if you have a patient who comes in and he has neuropathy. And it's a man, he's probably also going to have erectile dysfunction. That's a very common thing that we see with these patients who are in a late stage of neuropathy.

So these nerves, it's important to keep in mind that they're not just for feeling pain, the numbness, the tingling, burning, that's the tip of the iceberg. Just like the tip of the iceberg is 10% of the iceberg, only 10% of those nerves actually feel pain, the rest of the 90% are all controlling what you're seeing right here. So what are some of the most common causes of neuropathy? Well, there's actually quite a few. So diabetes and pre-diabetic, we already talked about that. Poor circulation, now that can go along with the diabetes, but you can get neuropathy independent of diabetes just because of poor circulation as well. Toxic exposure like chemotherapy. Now chemotherapy, did you know that actually 50% of people who go through chemotherapy end up with neuropathy? So that's a really important statistic because we get all sorts of patients with chemotherapy-induced neuropathy in our clinics all the time.

Back, neck, herniated disks, so you can actually get pain that radiates down the legs or arms, and that's a type of neuropathy as well. Post-surgical, these nerves can get cut and that happens quite a lot unfortunately, it's a hard one to treat. Auto-immune diseases, that's another one that's hard to treat. But most commonly the top four here are the ones we see the most common. Infections, viral or bacterial, alcohol abuse, liver or kidney disease, thyroid conditions, as well as being on multiple medications, those can have some interactions. These top four are the ones that we see the most in our clinics, we do see some post-surgical.

Now decreased blood flow, I want you to see this here. Here's a good, healthy nerve, and here's those blood vessels supplying that myelin sheath like we were just talking about. What do you notice is different about this one here and then this one here? Now this one, there's something missing completely, what is that? The blood vessels, right? Now but you see here, what's already starting to get damaged? That myelin sheath that's insulating and protecting it. So as you're getting damaged, you see this mild to moderate damage and then severe damage. When patients start to have their nerves look like this, that's when they're going to get all these symptoms. And what are some of those symptoms? Well, we have numbness and cramping, we're going to get... People talk about tingling, sharp, electrical pain sensations that they actually get in their feet, and it also affects their sleeping.

A lot of patients say either they can't get to sleep because of the burning pain, or it wakes them up. Sometimes they'll get a jolt of pain that really wakes them up and then it's hard for them to get back to sleep. They walk around because a circulation helps them, so they walk around. So it's a big problem for people at night when they put their feet up to relax, then all of a sudden their feet get restless. Now balance disorders is another one. Of course, if you're going to have numb feet, your brain's not getting

signals from your feet saying where the ground is, where your floor is, and you start to lose your balance.

What's the number one cause of death for senior citizens, does anybody know? It is falls. Falls are the number one cause of death for senior citizens and that's a really important thing. If you ask any senior citizen this question, they all know the answer. They all know it because it's very, very important to them. So this is something, if balance is an issue, talk to your patient about this because they're going to know that this is very, very important. Now, burning pain and loss of balance, that comes from the brain. When the brain not getting normal sensation signals, it starts to get numbness, tingling, burning sensations. So our brain is constantly being told that everything is normal by our healthy nerves and as soon as they stop sending that normal signal, our brain just immediately will start translating that as a burning pain. And that's why a lot of our patients, as they start to get numbness and those nerves are not working properly, they'll get burning pain as well.

So in the next module, we'll start talking about some of the different treatments and until then, I hope this was helpful for you. And you can put in any questions, comments, and emails, and I would like to address them in the next one.