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Chapter One
Why Nerves Cause Pain

“It is okay to
lose your nerve.”

Pain Solutions

Pain Solutions is a book to help you understand there is hope that your pain can be greatly relieved, and, sometimes, completely eliminated by the appropriate peripheral nerve surgery. Surgery, of course, is the last resort. If you are reading this book, then most likely you have already had all the usual non-surgical treatments for your pain. By describing how individuals, like you, have been helped, I hope to make this book personally important to you or someone you know.

In this chapter, I outline the basic mechanisms of pain related to conditions for which I have developed pain solutions. In the chapters that follow specific solutions are discussed for your pain.

If you have pain, then impulses are traveling along a nerve into your spine. From your spine those impulses continue to your brain. Pain is a message that there is a problem somewhere in your body to which you need to pay attention. You may not like the pain message, but it calls your attention to a problem. *Pain Solutions* will help you find the answers that perhaps your own caring physician(s) have not been able to find for you.

The central nervous system consists of the brain and spinal cord. Problems in the brain are usually related to tumors, bleeding, or lack of blood supply (stroke). These usually cause headache and loss of some function, but they do not usually cause pain in your arms or legs, or your body. Problems in the spinal cord can cause pain in these areas of your body by having some part of the boney or ligamentous spine cause pressure on the spinal cord or nerve roots. It is usually pretty clear that this pain is coming from your neck or back. Traditional x-rays, the newer MRIs (special imaging studies), or traditional electrodiagnostic studies usually can identify this problem. An example of nerve root compression and imaging for the spine in the neck, the cervical spine is given in Figure 3-1. These symptoms can be treated often without surgery, but sometimes portions of the vertebral column must be removed, like a disc, or the bone alongside the nerve (a laminectomy). If the bone is not stable, the spine may have to be fused at some level. These operations are done by Neurosurgeons or Orthopedic

Surgeons. This type of pain usually has a special pattern to it. A well known one for the lower extremity "sciatica," where the pain goes from the back, into the buttocks, and thighs, and can extend all the way to the toes. An example in the upper extremity might be the compression of the nerve root between the 5TH and 6TH cervical vertebra, which causes pain from the neck, into the shoulder, and down towards the index finger. Certain muscles, like the biceps for elbow flexion, might be weak. A reflex might be lost. In this situation, pressure applied to the top of the head down into the neck can cause the symptoms, and this is called a positive Spurling sign (see Figure 1-2). When the pain is caused by problems in the central nervous system, the peripheral nerves are not tender.

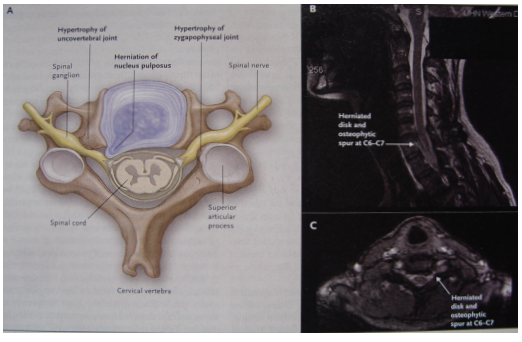

Figure 1-1. Left: Illustration of a cervical vertebra in which examples of the intervertebral disc is compressing the nerve root on the left side and bone is compressing it on the right. The spinal cord is noted in the center. Right: Examples of magnetic resonance imaging (MRI) of the cervical spine showing the problem that exists at (left). (With permission from the New England Journal of Medicine article Cervical Radiculopathy, Volume 353, pages 392-399, 2005, by S. Carette, and M.G., Fehlings.

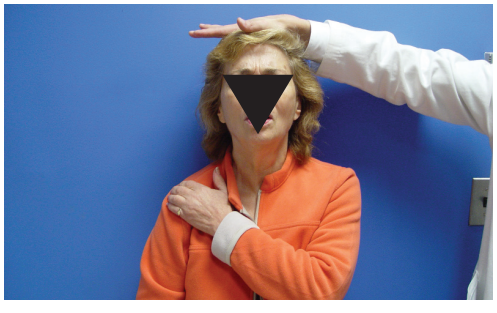

Figure 1-2. A positive Spurling sign occurs when pressure applied to the top of the head results in pain going into the shoulder or fingers, such as illustrated here. This is a sign of cervical nerve root compression.

The Peripheral Nervous System consists of all the nerves that are outside of the brain and the spinal cord: the nerves in your arms and legs, and in your face and in your chest and abdomen. In general, there are three main problems or events that happen to peripheral nerves that cause them to send a pain message to your brain. These three categories are neuroma, nerve compression, and neuropathy. Let us first define what these are and give you some common examples so that you may see that there is hope to stop the pain message by correcting directly the problem with the nerve itself at the point at which the pain message starts. When the pain is coming from the peripheral nerves, there is usually a spot along the path of a nerve that you can touch which causes that pain (see Figure 1-3).

The Peripheral Nerve surgeons of the Dellon Institutes for Peripheral Nerve Surgery® are especially trained to identify these sources of pain. (Visit us at Dellon.com). Let us understand each pain source better.

Figure 1-3. The brownish region is where this upper arm and elbow were injured at work. The * on the skin is where pain occurs when that spot is touched. The dotted area is where the pain travels when the painful spot is touched. There is also less feeling in this region. This indicates injury to a peripheral nerve. The painful spot has a neuroma. This patient can be helped by removing the neuroma (see Figure 1-4.).

Neuroma

For the rest of *Pain Solutions,* a peripheral nerve will be called simply a "nerve." A nerve begins in the spinal cord and extends to somewhere in the body, for example the index finger tip. Whenever a nerve is injured, it tries to grow back to where it originally was. This is called nerve regeneration. Peripheral nerves do regenerate. They are wrapped by small cells described

by Theodore Schwann (1810-1882), the father of cellular biology. He did not know what they do. In fact they were thought to be part of the nerve cell itself. Today we know that they are totally different cells. They make myelin, which is the insulation covering the individual nerve fibers that permits them to conduct an impulse quickly to the brain from the point at which the nerve is stimulated.

When a nerve is injured, the part farthest away from the spinal cord, the axon, dies, but the Schwann cell still lives. The Schwann cell is not attached to the spinal cord. The actual origin of the nerve fiber in the spinal cord is still alive, and wants to heal the part of the nerve that was injured. When the nerve fiber degenerates, the Schwann cell makes nerve growth factor, which attracts the nerve fiber to grow back across the site of injury and reconnect to where it used to go (see Figure 1-4).

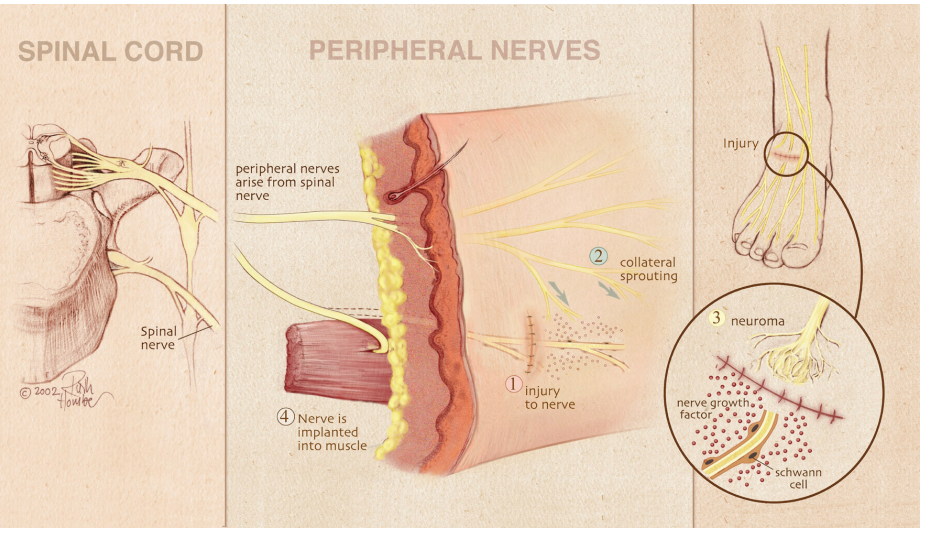

Figure 1-4. Nerve fibers arise in the spinal cord (left panel), leave the vertebral foramen to become peripheral nerves (center panel). When an injury occurs, as in (1), the part of the nerve traveling past the injury site dies. In the right panel, Schwann cells are noted around the nerve fiber, and they begin to produce nerve growth factor to attract or call the nerve to grow back, or regenerate. When the nerve fibers get stuck in the scar while attempting to grow back, they form a neuroma (3). In the center panel, a normal nearby nerve is affected by the nerve growth factor and creates new nerve sprouts which can grow in to the denervated territory, a process called collateral sprouting. In (4) the process of implanting a nerve into muscle is shown. This is the technique used by the Dellon Institutes for Peripheral Nerve Surgery® to prevent a painful neuroma. (With permission from http://www.dellon.com)

The injured nerve can actually grow pretty fast, about one inch per month. When the spinal cord is injured, the nerve fibers within the spinal cord have trouble regenerating because they contain a different form of myelin and they do not have Schwann cells to make nerve growth factor. In fact, there are small cells in the spinal cord that make a substance that prevents nerve regeneration within the spinal cord. This is why a person with a broken neck, as happened falling off a horse to Christopher Reeves (who played the character Superman in the movies), usually remains paralyzed. One day we will know how to reverse this process and permit healing within the spinal cord. Today, however, only the peripheral nerves regenerate.

When a peripheral nerve regenerates back along the same pathway it originally had, sensory and motor function can be restored. It may not be normal sensory and motor function, but useful function can be restored. When a peripheral nerve regenerates into scar, it is blocked. The small nerve fibers become trapped in the fibrous scar tissue and form a painful neuroma. This is illustrated in Figure 1-4.

It is Okay to Lose Your Nerve

"Doctor Dellon," said Carmen, "ever since that door crushed my elbow, I have had pain that shoots into my forearm whenever that spot is touched. It happened at work two years ago. I cannot even let the therapist touch it, because it just hurts too much. Can you help me?"

Carmen's arm is shown in Figure 1-3. The door had cut the skin when it crushed her arm, leaving a thick brown scar where the emergency room doctor had sewn the skin closed. She had an area of skin that felt unusual when touched (the dotted area) and a trigger point that sent the pain downwards towards that unhappy (dysesthetic) skin. This meant Carmen had a neuroma of a nerve to the skin.

"Yes, Carmen, I can fix that. I need to make a new incision along the length of the nerve that is injured, find the neuroma, which is the damaged end of the nerve, and implant that nerve into a muscle to prevent it from growing back again," I explained.

I showed her the illustration in Figure 1-4, which is one prepared especially for the Dellon Institutes for Peripheral Nerve Surgery®.

"Doctor Dellon, I want you to do the surgery," Carmen replied. "How long will it be until I can use my hand again? When will I know I am better?"

"You can use your hand right after surgery. When you wake up from surgery, you will know your pain from the neuroma is gone. There will just be the pain from the surgery itself."

"My pain is gone, Doctor Dellon. I can touch my elbow again. You were right. It was okay to lose my nerve."

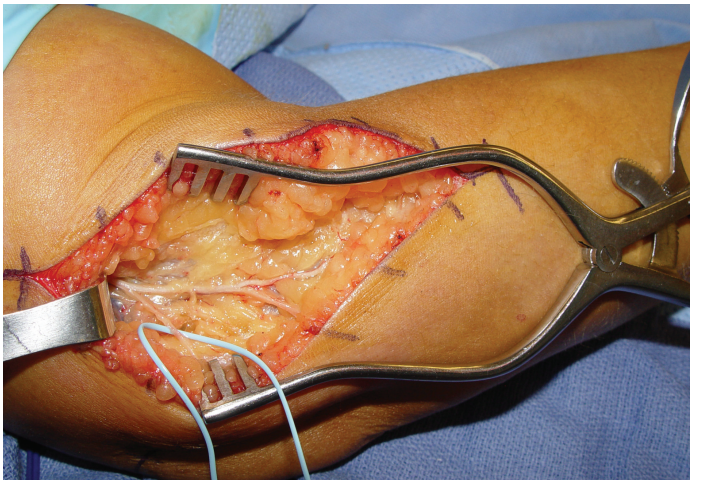

Figure 1-5. The blue plastic loop holds Carmen's painful nerve, illustrated in Figure 1-3.

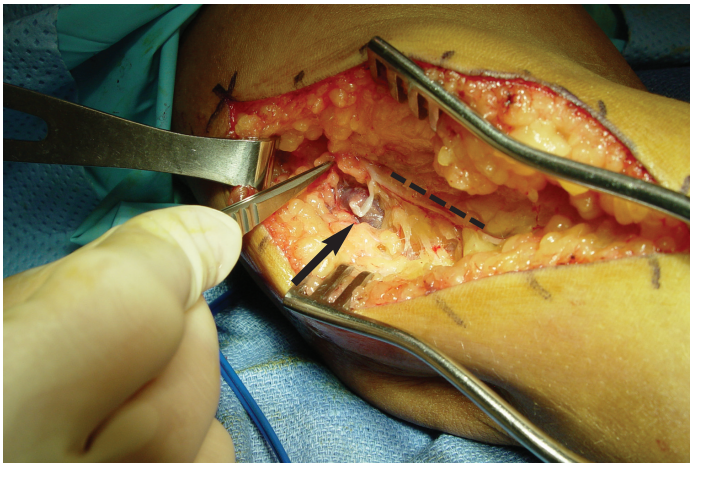

Figure 1-6. The injured nerve shown in Figures 1-3 and 1-6 is buried in muscle (arrow) to prevent it again from causing pain. The rest of the nerve has been preserved (dotted line).

YOU SHOULD HAVE YOUR PAINFUL NERVE REMOVED IF: You have had pain for more than 6 months; The function of the nerve is not critical (if its function is critical, the nerve should be reconstructed); You have not responded to non-operative treatments such as anti-inflammatory drugs, steroid injection, opiates or neuropathic pain medication (gabapentin); You have had relief of pain following a nerve block.

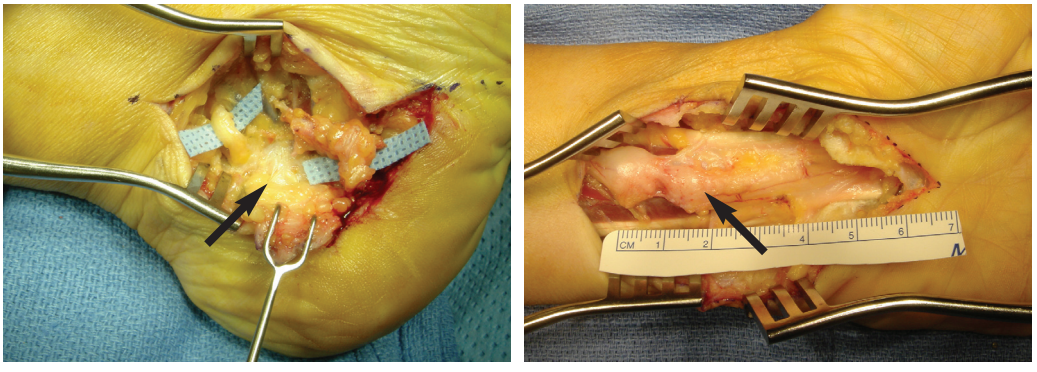

Figure 1-7. Examples of neuromas. The heel, where the calcaneal nerve was injured during surgery for plantar fasciitis (arrow, left), and of the wrist, where median nerve was injured in a suicide attempt (arrow, right).

Figure 1-8. Top left: Surgery to correct an arthritic bunion on the left big toe was done three times. The toe is now straight, and the joint deformity corrected, but the striped area near the incision is painful. At surgery (top right) two separate injured nerves are shown, each with a painful neuroma (arrows). The treatment is to remove the painful neuroma, and to take the end of the nerve (bottom left) and implant it into a muscle (bottom right), the location of which is shown by the pointing clamp. The muscle is an area where no pressure occurs while walking.

Nerve Compression

Compression of a nerve is very common. The name of the commonest site of nerve compression is now almost a household word: Carpal Tunnel Syndrome. Almost everyday, you will see someone wearing a splint on their wrist to keep the wrist straight, preventing it from bending over and compressing the median nerve. Almost everyone knows someone who has had carpal tunnel surgery. Decompression of the median nerve at the wrist may be the most common operation done in the United States. About 500,000 of these operations are done almost every year. About 125 out of every 100,000 people in the United States will get carpal tunnel syndrome during their lifetime. The surgery is successful in about 85% of people in relieving their symptoms.

The commonest symptom of carpal tunnel syndrome is that you wake up at night with your thumb, index and middle fingers asleep, but sometimes it seems as if the whole hand is asleep. With time, these three fingers become numb most of the day. In the advanced condition, some of the thumb muscles become weak, and may atrophy.

The initial treatment of chronic nerve compression is NOT surgery. First, daily activity that prolongs wrist flexion is altered. For example, the position in which you hold your wrist while typing on the computer should be altered so it is not so bent. Next, you will take an anti-inflammatory medication to reduce swelling of the tissues that surround the tendons within the carpal tunnel (there are nine such tendons that move the fingers). This tissue can become swollen and stuck to the median nerve with injury or arthritis or over-use. You will wear a splint to keep the wrist from bending, especially at night. You may receive an injection of steroid into the carpal tunnel to shrink the swollen tissues (but do not have the nerve itself injected!).

Finally, surgical decompression of the carpal tunnel will be done (see Figure 1-9). This surgery is done today through a small incision, but is illustrated with a longer incision that permits demonstration of the indentation of the median nerve and the removal of the scar tissue around the nerve (neurolysis).

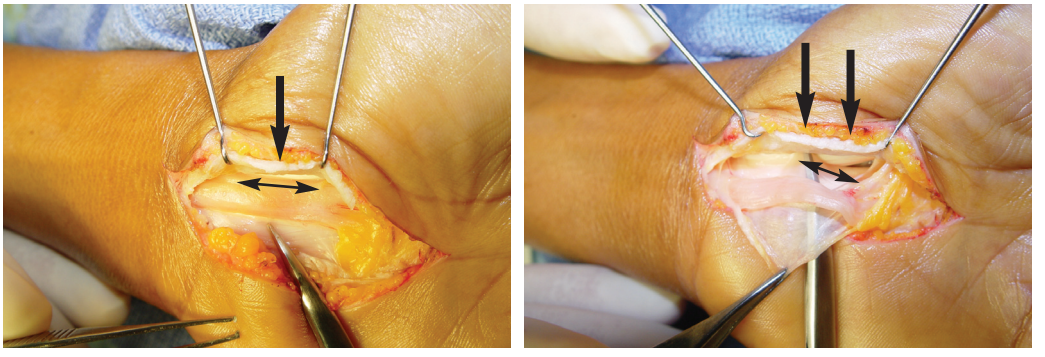

Figure 1-9. Left: The carpal tunnel is opened widely at the wrist in this example of decompression of the median nerve (arrow) at the wrist for treatment of carpal tunnel syndrome. The region of compression can clearly be seen at the end of the clamp (double arrow). The divided edge of the ligament that was causing compression, the transverse carpal ligament is the white edge indicated by the small arrows (Left and Right). This surgery can be done through a much smaller incision. Right: The clamp holds the scarred covering of the median nerve, which is removed during this neurolysis. The narrowed area of the median nerve is still noted (double arrows).

Between a Rock and a Hard Place

A nerve is a soft structure that goes from the spine to either muscle or skin. Along the pathway from its origin to its destination, the nerve passes by ligaments and bones. In many locations, the passageway between the ligament and the bone is narrow. When the nerve passes through such a narrow region, it is between a rock and a hard place. The nerve can become compressed in this area.

Nerve compression means the pressure on the nerve is increased. This causes blood flow in the nerve to decrease. Decreased blood flow in the nerve results in too little oxygen. When the nerve gets too little blood flow, the nerve sends a message to the brain, asking for help. This message makes you feel like your hand is buzzing , or tingling, or "falling asleep."

If you are being choked, your brain does not get oxygen, and you will collapse and become unconscious. When a nerve does not get oxygen, it stops conducting normal electrical impulses. When this occurs , it is like the electricity going off in your house; the lights flicker, and then go out.

When you awaken at night with your "hand asleep," or buzzing, it is because the nerves at the wrist or elbow are compressed, and the lack of oxygen to the nerve sends the message that awakens you.

When you cross your legs, and your top leg "goes to sleep," it is because the nerve on the outside of the knee is getting compressed and sends the message to warn you of this problem. If this problem persists, you have weakness in your foot, and it feels as if you can hardly take a step.

When the pressure on the nerve is sudden and heavy, you experience pain as well as buzzing. But if the pressure comes on slowly, and lasts a long time, and continues for many months, you do not have pain. Just numbness that comes and goes, and then the skin supplied by the nerve stays numb and loses its feeling. This is chronic nerve compression.

The Dellon Institutes for Peripheral Nerve Surgery® specialize in decompression of nerves in both the upper and lower extremities. Descriptions of some of these operations are available to download from our website at Dellon.com. Brochures are available on these subjects:

Carpal Tunnel Syndrome
Cubital Tunnel Syndrome
Radial Nerve Entrapments
Brachial Plexus Compression (Thoracic Outlet Syndrome)
Tarsal Tunnels Syndrome
Foot Drop
Heel Pain Syndromes

The research models I helped to develop in the early 1980's demonstrated that within 2 months of nerve compression, fluid begins to leak from blood vessels into the nerve, that by 6 months of compression, the myelin protein covering the nerve fibers begins to get damaged, and that by one year, nerve fibers have begun to die. Scar tissue forms between the bundles within the large nerve.* The nerve itself, may become stuck to the surrounding ligaments. Once this degree of scar tissue forms, only surgery can relieve pressure on the nerve sufficiently to relieve symptoms.

Surgery must relieve pressure on the compressed nerve. Either the rock or the hard place must be removed, or the nerve itself must be moved to place without a rock or a hard place to compress it.

*References to research on nerve compression from the 1980's:

*Dellon AL, Kallman CH: Evaluation of functional sensation in the hand. J Hand Surg 8:865-870, 1983.

*Mackinnon SE, Dellon AL, Hudson AR, Hunter D: Chronic nerve compression – an experimental model in the rat. Ann Plast Surg 13:112-120, 1984.

*Mackinnon SE, Dellon AL, Daneshvar A: Histopathology of the tarsal tunnel syndrome: Examination of a human tibial nerve. Contemp Orthop 9:43-48, 1984.

*Mackinnon SE, Dellon AL, Hudson AR, Hunter DA: A primate model for chronic nerve compression. J Reconstr Microsurg 1:185-194, 1985.

*Mackinnon SE, Dellon AL, Hudson AR, Hunter DA: Histopathology of compression of the superficial radial nerve in the forearm. J Hand Surg 11A:206-209, 1986.

*Dellon AL: Musculotendinous variations about the elbow. J Hand Surg 11B:175-181, 1986.

An example of removing one of the hard places is given for the carpal tunnel in Figure 1-9. An example of moving the nerve to a new place is given for ulnar nerve compression at the elbow, Cubtial Tunnel Syndrome, in Figure 1-10.

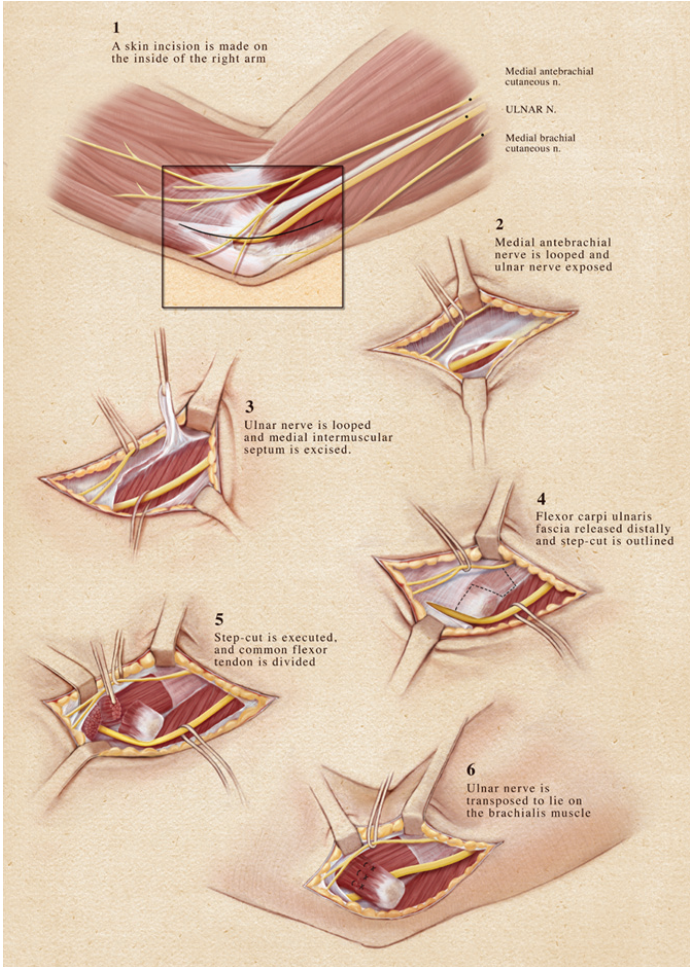

Figure 1-10. Cubital Tunnel Syndrome is the name given to ulnar nerve compression at the elbow. Symptoms of numbness in the little and ring finger, weakness of pinch and grasp, and of clumsiness or dropping objects are corrected by moving the ulnar nerve from between the two bones and ligament that cause the compression. The operation I developed for this purpose is illustrated here. The ulnar nerve is seen moving from its location behind the elbow in (5) to a new place created for it in front of the elbow (6). The muscles are lengthened (4) to provide a large place for the ulnar nerve. Immediate elbow movement is permitted to prevent scar tissue from making the nerve stuck in the new location. The most recent report of success with this operation notes more than 600 patients treated without recurrence of symptoms (Dellon AL, Coert JH: Technique of musculofascial lengthening for treatment of ulnar nerve compression at the elbow. J Bone Joint Surgery, 86A: 169-179, 2004., with permission from http://ww.Dellon.com)

Figures 1-11 and 1-12 show examples of different nerve decompressions.

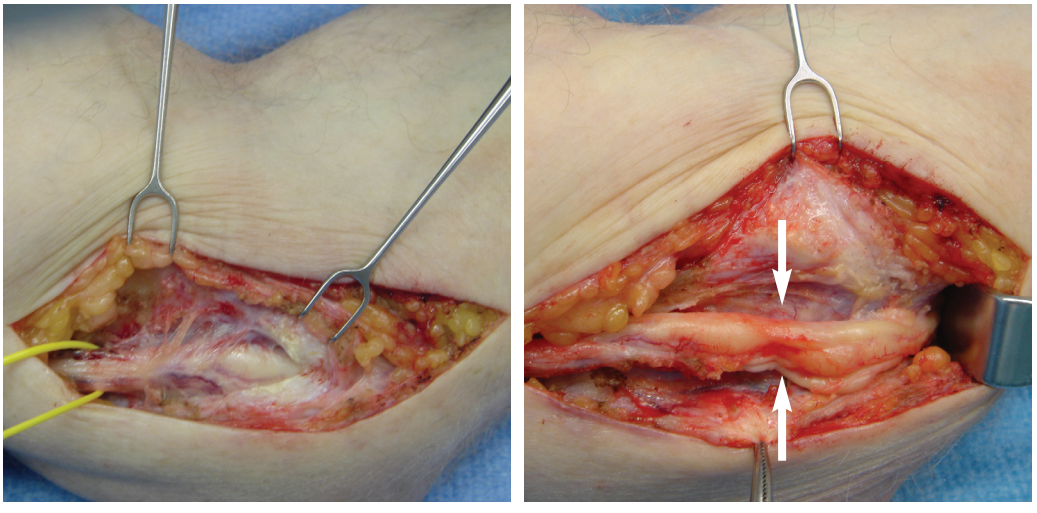

Figure 1-11. Example of ulnar nerve compression at the right elbow. Left: This nerve is entrapped in scar tissue overlying the site where the elbow was bruised in a fall. Right: The site of indentation of the ulnar nerve is noted by the white arrow, with swelling of the nerve in either side of the entrapment. After completion of this neurolysis stage of the surgery, the ulnar nerve will be transposed to lie beneath the lengthened flexor-pronator muscle mass using Dr. Dellon's operation (Figure 1-10).

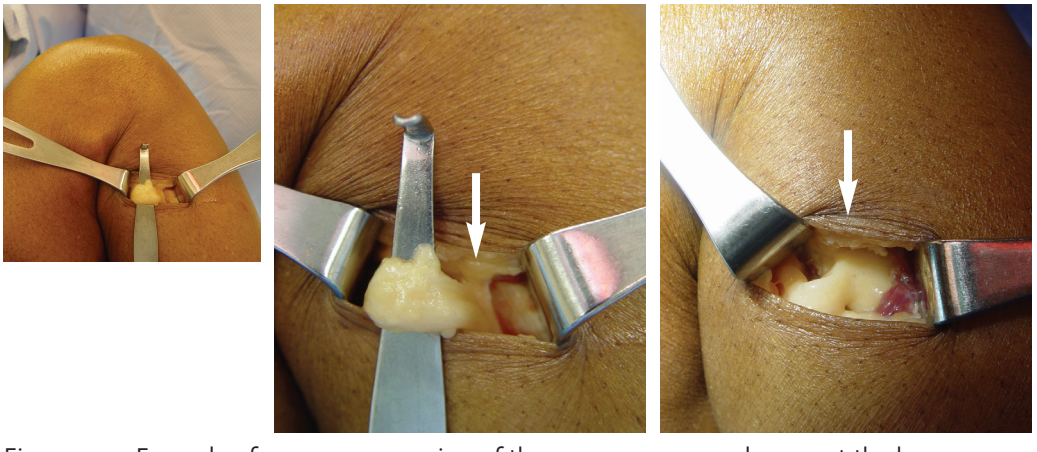

Figure 1-12. Example of nerve compression of the common peroneal nerve at the knee. Left: overall view to orient the surgical view. The incision is located at the boney prominence of the fibular, where the site of compression is. This patient injured the outside of this knee. Center: The metal retractor is underneath the large nerve, which is white in color in contrast the appearance (yellow) noted in patients with diabetes or some forms of neuropathy. The band that is compressing the nerve is noted by the white arrow. Right: the compressive band has been removed. The white arrow points to the indentation or notch in the common peroneal nerve at the site of compression by the band. With pressure gone from the nerve, sensation and strength will return to the leg and foot.

Documentation of Nerve Compression

"Doctor Dellon," my medical doctor sent me to a neurologist to see if my symptoms of numbness were due to a nerve compression. The neurologist said I had to have nerve conduction testing and electromyography. The NCV and EMG really hurt! The test cost about $1,600. And after all that the Neurologist said I was 'normal! But I really have a problem Doctor Dellon. Isn't there some test that can identify my nerve problem?

This patient's experience is all too common. The traditional electrodiagnostic testing was developed in the 1950's. It gives electrical stimulus, or shocks to the nerves through the skin, and sometimes actual needles are inserted into the skin and the response to the shock is recorded through the needle. Of course this hurts, and is very expensive. Unfortunately, because this test measures the speed of electrical activity in the fastest nerve fibers, a lot of nerve fibers can be injured or not working and the test still shows a normal measurement. This electrical test is simply not sensitive enough to identify many nerve compressions. The electromyography is still necessary if your doctor is evaluating a nerve root compression in your neck or a primary muscle disease. An MRI, a special form of x-ray will be necessary to image your spinal cord.

This is a subject I have written extensively about for many years. My most recent writing on this subject compares traditional electrodiagnostic testing to a test that I developed in 1989 and have been proving the value of ever since.* This neurosensory test is non-painful, has no needles, and is not expensive. The testing instrument is called the Pressure-Specified Sensory Device™ (PSSD). Here is how it works.

You are seated comfortably in a chair, and the PSSD is touched to your finger tip, your toe, or your lip (see Figure 11-4). The two rounded metal prongs are pressed gently into the skin. You press a button when you can feel the pressure for the first time and when you can tell whether one or two tips are pressing the skin. This does not hurt. By comparing how hard you had

*Dellon AL: Measuring Peripheral Nerve Function: Neurosensory Testing versus Electrodiagnostic Testing, in Atlas of the Hand Clinics: Nerve Repair and Reconstruction, D. Slutsky, editor, Elsevier, Philadelphia, Chapter 1, pp 1-31, 2005.

to be touched to feel the prongs, and how close together you could tell you were being touched, the PSSD results give us the information to know whether you have nerve compression and whether the nerve is dying (see Figure 1-16.) If the nerve has begun to die, which means you cannot tell when two points are touching the skin close together, then it is time for surgery to decompress the nerves.

Neuropathy

"Neuropathy" is best understood to be a problem with the nerves in your body, in contrast to a neuroma or a nerve compression, which is a problem with a single nerve in your body. If your median nerve is injured, you can have a neuroma of the median nerve, somewhere along its path, on either your left or your right side (see Figure 1-7 right). If you have a compression of your median nerve, you have an area at which this nerve is compressed, for example at your wrist (carpal tunnel syndrome, see Figure 1-9). About 50% of people have carpal tunnel syndrome bilaterally, which is on both sides of your body, your right and your left hand. The carpal tunnel syndrome on the right side may be worse than your left side. If all the fingers of both your right and left hands are equally numb and/or painful, then you have a neuropathy. Something systemic in your body is affecting your peripheral nerves. You have a peripheral neuropathy.

The most common cause of a peripheral neuropathy is diabetes. Other common causes of neuropathy are thyroid disorders: if the thyroid function is low, then water accumulates in your nerves, making them swell and causing them to become compressed in regions with tight anatomic tunnels like the wrist and ankle. Another cause of neuropathy are diseases in which the body attacks itself with antibodies, like lupus and rheumatoid arthritis; the inflammation along the blood vessels (vasculitis) in the nerves makes them susceptible to compression at known sites of anatomic narrowing like the wrist and ankle. Another cause of neuropathy is poisoning by heavy metals, like arsenic, lead, and mercury: these cause fluid to leak from the blood vessels into the inside of the nerve, making it susceptible to compression at known sites of anatomic narrowing like the wrist and ankle.

Chemotherapy drugs used to fight cancer, like, vincristine, taxol, cisplatin, and thalidomide, can slow down the transport of critical molecules within the nerve. Again, this makes the nerve susceptible to compression. It is clear that neuropathy, what ever its cause, may create symptoms through mechanisms similar to those that give symptoms with a single nerve compression, and this gives us a cause for optimism, a cause for hope. In many people with neuropathy, there are compressed nerves that are responsible for most of the symptoms. If this is true, then these symptoms, attributed to neuropathy, can be relieved by decompression of nerves.

Stocking and Glove

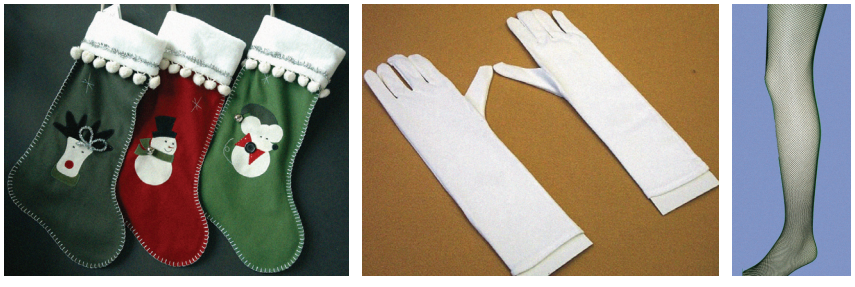

Figure 1-13. A peripheral neuropathy causes loss of sensation and or pain in a specific pattern. In the legs the pattern is that of a stocking. In the arms it is the pattern of a glove. A stocking pattern can be created by compression of several nerves in the leg and ankle, and a glove pattern can be created by compression of several nerves in the arm and wrist. Compressed nerves can be decompressed, creating the possibility of hope for neuropathy.

Usually, with a peripheral neuropathy, your feet become involved, symptomatic, first. The feet are involved in both the top and bottom of your feet, and the symptoms extend up the ankle, in what is the pattern of a stocking. When the neuropathy is in the upper extremities, it occurs in the pattern you would have if you were wearing gloves.

In the upper extremity, if you combine compression of the ulnar nerve at the elbow (cubital tunnel syndrome), compression of the radial nerve in the forearm (radial sensory nerve compression), and compression of the median nerve at the wrist (cubital tunnel syndrome) you will have a pattern

of sensory loss that fits a glove. As you now know, from reading above, a compressed nerve can be decompressed by surgery, relieving pain and numbness in most patients. The same thinking applies to the leg and foot.

In the lower extremity, if you combine compression of the common peroneal nerve at the knee (fibular tunnel syndrome), compression of the deep peroneal nerve over the top of the foot (described by me in 1990), and compression of the tibial nerves and its branches in the four medial (inside of) ankle tunnels (tarsal tunnels syndrome), you will have a pattern of sensory loss that fits like a stocking. As you now know, compressed nerves can be decompressed with surgery, relieving pain and numbness in most patients. This is discussed in detail in Chapter 2.

New "Ropathy"

"I have neuropathy?," the patient with diabetes asked her doctor. "I have numbness and burning in my hands and feet. Is it going to get better? Can you help me?"

" I am sorry Mrs. Brown," her doctor answered, "Certainly I can help you keep your blood sugar under control, and I can give you medicine for the pain, but neuropathy is progressive and irreversible" he informed her.

"PROGRESSIVE AND IRREVERSIBLE." For decades, this was the correct answer in medical school, the correct answer on a medical exam, and the answer given to patients. "Neuropathy is progressive and irreversible" means there is no hope. If your medical problem is hopeless, depression and disability is likely.

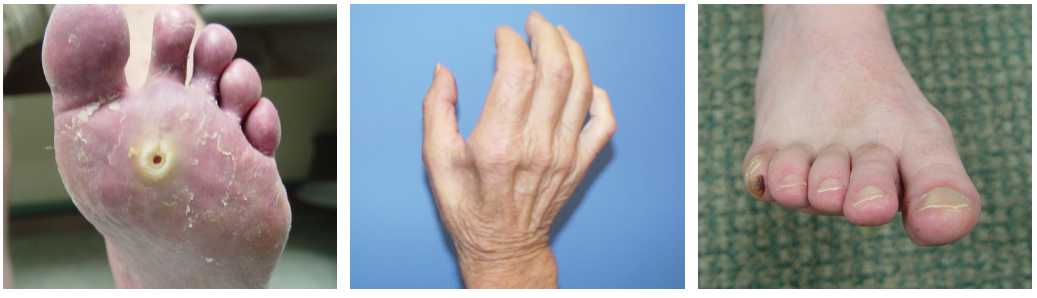

Figure 1-14. Examples of progressive neuropathy. Ulcer beneath the bottom of the second toe (left) and at tip of fifth toe (right) develop because of lack of sensation. Muscle wasting in the hand is noted in the center. The fingers begin to form a "claw" and this can happen in the foot as well. On the right, the toes are beginning to curl up.

"Progressive and irreversible" is the old view of neuropathy.

"Doctor Dellon, I have neuropathy. Can you help me?" This is the e-mail question that comes through my website, Dellon.com so often each day, and through my phone line 1 877-DELLON-1. "Yes, I can help you. In most people who have a nerve compression associated with their neuropathy, the nerve can be decompressed. Symptoms can be relieved in 80% of people."

"Doctor Dellon, will I still be at risk for getting an ulcer or having an amputation," the questions go on.

"If sensation is restored to your feet, you will not have an ulcer, you will NOT have an amputation, and even your balance can be improved," I answer. That is the new neuropathy, or "new-ropathy" as I like to call it.

New-Ropathy is the first good news about neuropathy. It is optimistic. There is hope. "Restore sensation. Relieve Pain."

Figure 1-15. Adam, Bob, and Clark, shown above, have had each arm and each leg operated upon to decompress nerves. Every three months for one year, they each had an operation till all four extremities was decompressed. Each has neuropathy still. But each no longer has pain, and each has recovered sensation. They each now have... "New-Ropathy," a systemic disease without the symptoms of nerve compression.

Neurosensory Testing and the PSSD

"Doctor Dellon," the man sitting in my office said, "I know I have neuropathy. I have been to so many doctors. They have done electrical testing that show I have neuropathy, but they say nothing can be done. How did you decide that I have a nerve compression and that I can be helped? How did you decide that I would most likely be better in about three months?"

My new approach to neuropathy, or new-ropathy, is based upon:

The concept that the symptoms of neuropathy can be due to the presence of nerve compression;

The ability to measure peripheral nerve function with the Pressure-Specified Sensory Device™;

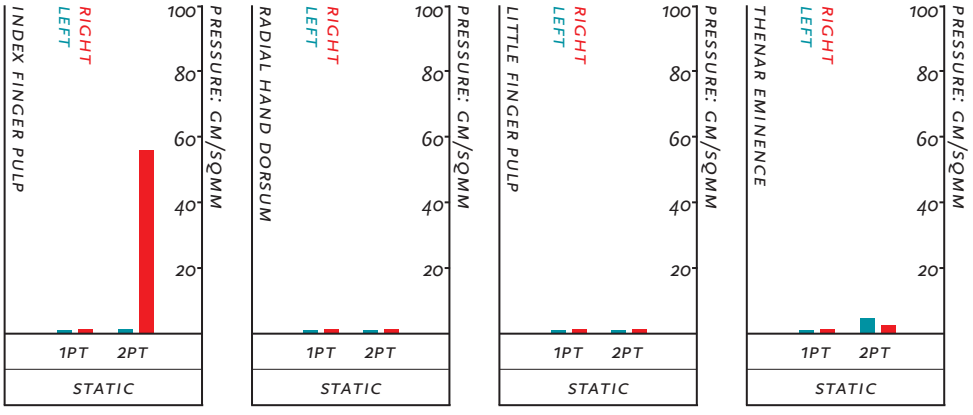

Figure 1-16. PSSD report demonstrating mild carpal tunnel syndrome. The blue bars are for the left side and the red bars are for the right side. Normal bar height is below the black lines, representing low pressure. The far left graph is the index finger, the left-center is the back of the hand, the right-center is the little finger, and the far right is the palm. The right index finger bar is elevated indicating abnormal pressure on the right median nerve. Since there is no * (asterisk) next to the bar, no nerve fibers are dying. This test is consistent with mild right carpal tunnel syndrome. Splinting is advised, not surgery.

Identification of the site of nerve compression along the length of the nerve by knowing where the anatomy can create the tight area, and the ability to determine if the nerve can still regenerate by tapping on the nerve (the presence of a positive Tinel sign);

If there is a tingling into the skin when the nerve is tapped at the site of compression, and the PSSD shows a moderate degree of degeneration, there is an 80% chance of recovery and this recovery usually occurs by three months after surgery. If the PSSD shows more advanced degeneration, then recovery can take up to one year for the nerves to regenerate into the toes.

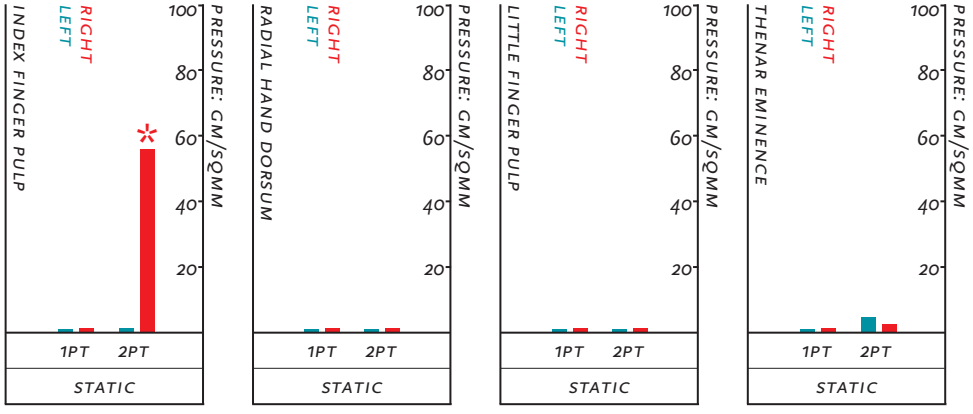

Figure 1-17. PSSD report demonstrating severe carpal tunnel syndrome. The blue bars are for the left side and the red bars are for the right side. Normal bar height is below the black lines, representing low pressure. The far left is the index finger, the left-center is the back of the hand, the right-center is the little finger, and the far right is the palm. The right index finger bar is elevated indicating abnormal pressure on the right median nerve, and there is an * (asterisk) next to the bar; nerve fibers are dying. This test is consistent with severe right carpal tunnel syndrome. Nerve decompression is advised.

Figure 1-16 and 1-17 should be compared to Figure 1-18 below to see the difference in appearance of the results of testing with the PSSD. It is clear that chronic nerve compression can easily be differentiated from a neuropathy, and the degree of these nerve problems can be determined as well. This painless testing with the PSSD documents your peripheral nerve problem and helps your doctor plan your treatment.

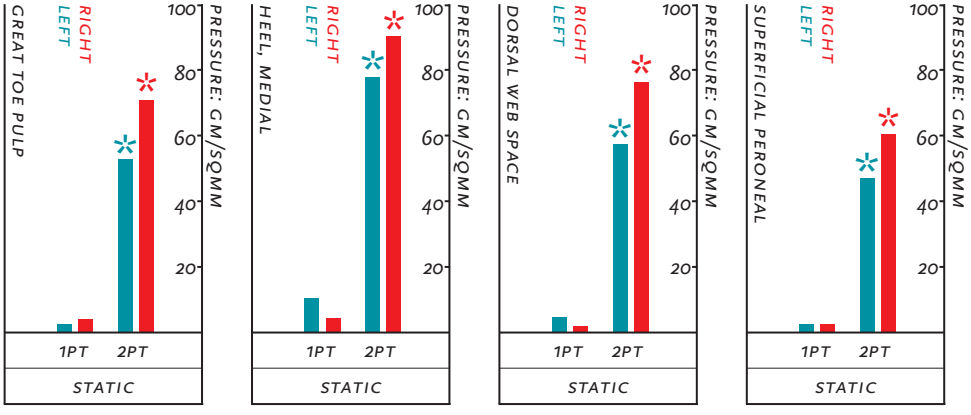

Figure 1-18. PSSD report demonstrating neuropathy. The blue bars are for the left side and the red bars are for the right side. Normal bar height is below the black lines, representing low pressure. The four skin territories tested represent the big toe (far left) and the heel (left-center), innervated by the tibial nerve, in the tarsal tunnel, and the two areas on the top of the foot (right-center and far right), innervated by the peroneal nerve. Note that the bars are elevated for the left and the right side of the top and the bottom of the foot, indicating a problem with multiple nerves, to the same degree on each side of the body. This is the pattern of a neuropathy, such as that seen in diabetes. The elevated bars are for two-point static touch, the first test to become abnormal with nerve compression or neuropathy. Other traditional testing would still indicate the nerves are normal. The small plastic filaments, called Semmes-Weinstein nylon monofilaments, attempt to give a measure of one point static touch, which is similar to the low bars on the left of each graph. Note that this measurement is still normal, so that the nylon filament test would still say this patient had normal sensation even though the PSSD demonstrates neuropathy. The asterisks indicate that nerve fibers are dying at each site tested. This result demonstrates a sensory neuropathy with axonal loss, but is also consistent with nerve entrapments at the knee, the top of the foot, and the ankle region. Decompression of these nerves offers hope for relief of the symptoms attributed to neuropathy.

Pain Solutions Summary

There are three categories of problems that can occur with a peripheral nerve, and each can be helped by approaches I have developed. The three categories of nerve problems are:

1. Neuroma which is an actual injury to the nerve.
2. Nerve Compression which is localized area of pressure.
3. Neuropathy which is systemic disease that affects the nerves in the body, usually the legs and feet worse, then the hands, but which also can make the nerves more likely to become compressed at predictable locations.

My research into peripheral nerve problems over the past 25 years has demonstrated that:

Painful neuromas can be removed. Scarring can be removed from compressed nerves.

Even in the presence of neuropathy, areas of tightness, *causing chronic nerve compression,* can be opened about the nerves, restoring sensation, relieving pain, preventing ulceration and amputation, and permitting balance to recover. This is the new news about neuropathy.

Go to Dellon.com or call +1 877-DELLON-1 (+1 877-335-5661) for more information.