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treatment



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a cure



*the* FOUNDATION *for*  
PERIPHERAL NEUROPATHY<sup>®</sup>

DEDICATED *to* REVERSING *the* IRREVERSIBLE

# Peripheral neuropathy disease. It's a general term for a group of disorders that result in damage to the body's peripheral nerves.

## What is the Peripheral Nervous System (PNS)?

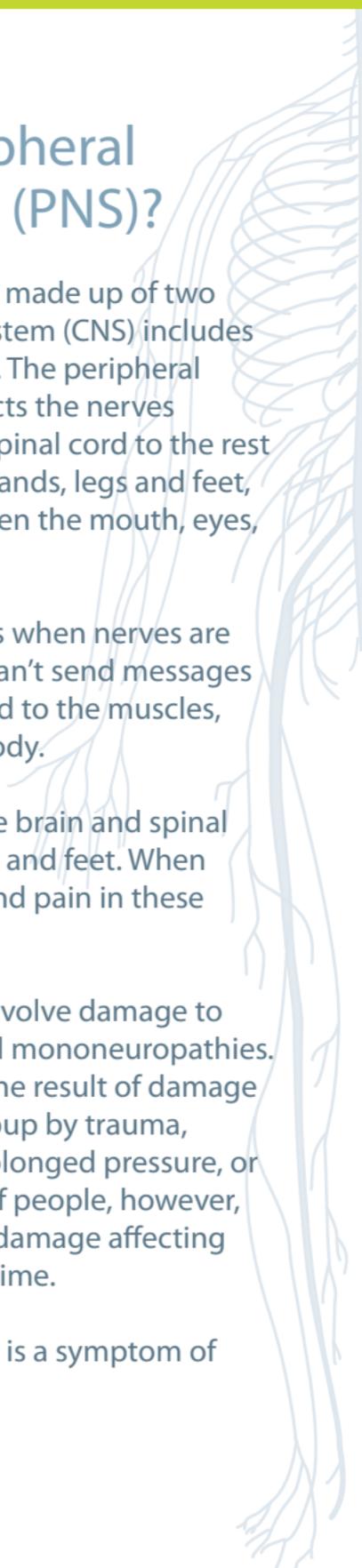
The body's nervous system is made up of two parts. The central nervous system (CNS) includes the brain and the spinal cord. The peripheral nervous system (PNS) connects the nerves running from the brain and spinal cord to the rest of the body...the arms and hands, legs and feet, internal organs, joints and even the mouth, eyes, ears, nose, and skin.

Peripheral neuropathy occurs when nerves are damaged or destroyed and can't send messages from the brain and spinal cord to the muscles, skin and other parts of the body.

Peripheral nerves go from the brain and spinal cord to the arms, hands, legs, and feet. When damage occurs, numbness and pain in these areas may occur.

Some forms of neuropathy involve damage to only one nerve and are called mononeuropathies. Mononeuropathy is usually the result of damage to a single nerve or nerve group by trauma, injury, local compression, prolonged pressure, or inflammation. The majority of people, however, suffer from polyneuropathy, damage affecting multiple nerves at the same time.

Occasionally, the neuropathy is a symptom of another disorder.



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## What Causes Peripheral Neuropathy?

Peripheral neuropathy is the manifestation of many different conditions that can damage the peripheral nerves and is considered a neurological disorder rather than one distinct disease. Peripheral neuropathy may be either inherited or acquired.

Causes of acquired peripheral neuropathy include exposure to toxic chemicals, trauma, poor nutrition, alcoholism, protein abnormalities, autoimmune diseases, such as HIV/AIDS, Lyme disease, Diphtheria and Leprosy, and systemic diseases such as Diabetes Mellitus, kidney disorders, cancers and benign tumors, and vitamin deficiencies. In some cases, however, even with extensive evaluation, the cause of a person's peripheral neuropathy remains unknown—this is called idiopathic neuropathy.

Inherited forms of peripheral neuropathy are caused by inborn mistakes in the genetic code or by new genetic mutations. The most common inherited neuropathies are a group of disorders referred to as Charcot-Marie-Tooth disease. This disease includes extreme weakening and wasting of muscles in the lower legs and feet, gait abnormalities, loss of tendon reflexes and numbness in lower limbs.

# Symptoms

Peripheral Neuropathy usually starts with numbness, prickling or tingling in the toes or fingers. It may spread up to the feet or hands and cause burning, freezing, throbbing and/or shooting pain that is often worse at night. The pain can be either constant or periodic, but usually the pain is felt equally on both sides of the body—in both hands or in both feet. Some types of peripheral neuropathy develop suddenly, while others progress more slowly over many years. The symptoms of peripheral neuropathy often include:

- *A sensation of wearing an invisible “glove” or “sock”*
- *Burning sensation or freezing pain*
- *Sharp, jabbing or electric-like pain*
- *Extreme sensitivity to touch*
- *Difficulty sleeping because of feet and leg pain*
- *Loss of balance and coordination*
- *Muscle weakness*
- *Difficulty walking or moving the arms*
- *Unusual sweating*
- *Abnormalities in blood pressure or pulse*

Symptoms such as experiencing weakness or not being able to hold something, not knowing where your feet are, and experiencing pain that feels as if it is stabbing or burning in your limbs, could be signs of peripheral neuropathy.

The symptoms of peripheral neuropathy may depend on the kind of peripheral nerves that have been damaged.

There are three types of peripheral nerves: motor, sensory and autonomic. Some neuropathies affect all three types of nerves, while others involve only one or two.

### 3 Types of Peripheral Nerves

- **Motor**
- **Sensory**
- **Autonomic**

**MOTOR NERVES** send impulses from the brain and spinal cord to all of the muscles in the body. This permits people to do activities like walking, catching a baseball, or moving the fingers to pick something up. Motor nerve damage can lead to muscle weakness, difficulty walking or moving the arms, cramps and spasms.

**SENSORY NERVES** send messages in the other direction—from the muscles back to the spinal cord and the brain. Special sensors in the skin and deep inside the body help people identify if an object is sharp, rough, or smooth; if it's hot or cold; or if it's standing still or in motion. Sensory nerve damage often results in tingling, numbness, pain, and extreme sensitivity to touch. Larger sensory fibers enclosed in myelin (a fatty protein that coats and insulates the nerves) registers vibration, light touch and position sense. Damage to large sensory fibers decreases the ability to feel vibrations and touch, resulting in a general sense of numbness, particularly in the hands and feet. Loss of position sense often makes people unable to coordinate complex movements like walking, holding a pen, and fastening buttons. Smaller sensory fibers without myelin sheaths transmit pain and temperature sensations. Damage to these fibers can interfere with the ability to feel pain or changes in temperature.

**AUTONOMIC NERVES** control involuntary or semi-voluntary functions, such as heart rate, blood pressure, digestion, and sweating. When the autonomic nerves are damaged, a person's heart may beat faster or slower. They may get dizzy when standing up; sweat excessively; or have difficulty sweating at all. In addition, autonomic nerve damage may result in difficulty swallowing, nausea, vomiting, diarrhea or constipation, problems with urination, abnormal pupil size, and sexual dysfunction.

# Diagnosis

Before diagnosing peripheral neuropathy, your physician will review your medical history and conduct a physical exam and neurological evaluation.

A neurological evaluation, which consists of a number of simple and painless tests, is usually performed to diagnose peripheral neuropathy. Depending on your symptoms and the outcome of the neurological evaluation, you may encounter other tests that can determine what type of peripheral neuropathy you have.

## *Testing may include:*

- Computed Tomography (CT scan) is a noninvasive, painless process used to produce two dimensional images of organs, bones and tissues.
- Magnetic Resonance Imaging (MRI) can examine muscle quality and size.
- Electromyography (EMG) involves inserting a fine needle into a muscle to compare the amount of electrical activity.
- Nerve Conduction Velocity (NCV) tests can precisely measure the degree of damage in larger nerve fibers, identifying whether symptoms are being caused by degeneration of the myelin sheath or the axon.
- Nerve Biopsy involves removing and examining a sample of nerve tissue, most often from the lower leg.
- Skin Biopsy is a test in which doctors remove a thin skin sample and examine nerve fiber endings.

# Treatments

There are no treatments known today that can cure peripheral neuropathy. If the specific cause of a patient's neuropathy is known, further nerve damage can be prevented by eliminating the underlying cause, however, the focus of treatment is often on symptom control. Mild pain may sometimes be alleviated by analgesics sold over the counter and more severe pain can sometimes be palliated with prescription drugs or by medical procedures. Other patients find that complementary and alternative therapies combined with other therapies help manage pain caused by peripheral neuropathy. Mechanical aids and physical or occupational therapy can help reduce pain and lessen the impact of physical disability. Although some advances have been made in the diagnosis and treatment of peripheral neuropathies, it is not uncommon for the cause of a patient's neuropathy to remain unidentified, and many patients continue to experience pain and disability despite available therapies. In general, adopting healthy habits such as maintaining optimal weight by eating a well-balanced diet, avoiding exposure to toxins, following a physician-supervised exercise program, correcting vitamin deficiencies, and limiting or avoiding alcohol consumption can reduce the physical and emotional effects of peripheral neuropathy. Active and passive forms of exercise can reduce cramps, improve muscle strength, and prevent muscle wasting in paralyzed limbs. Timely treatment of injury can help prevent permanent damage.



## Prevention

The best way to prevent peripheral neuropathy is to carefully manage any medical condition that puts you at risk. That means controlling your blood sugar level if you have diabetes or talking to your doctor about safe and effective treatments if you think you may have a problem with alcohol.

Whether or not you have a medical condition, eat a healthy diet that's rich in fruits, vegetables, whole grains and lean protein. The best food sources of vitamin B-12 are meats, fish, eggs, low-fat dairy foods and fortified cereals. If you're a strict vegetarian, fortified cereals are a good source of vitamin B-12 for you, but you may also want to talk to your doctor about B-12 supplements.

As much as possible, avoid repetitive motions, cramped positions and toxic chemicals, all of which may cause nerve damage.

## Self-Care & Coping Skills

### SELF-CARE

The following suggestions can help you manage peripheral neuropathy:

- Take care of your feet, especially if you have diabetes. Check your feet daily for signs of blisters, cuts or calluses. Tight shoes and socks can worsen pain and tingling and may lead to sores that won't heal. Wear soft, loose cotton socks and padded shoes. You can use a semicircular hoop, which is available in medical supply stores, to keep bedcovers off hot or sensitive feet.
- Quit smoking. Smoking can affect circulation, increasing the risk of foot problems and possibly amputation.
- Eat healthy meals. If you're at high risk of neuropathy or have a chronic medical condition, healthy eating is especially important. Emphasize low-fat meats and dairy products and include lots of fruits, vegetables and whole grains in your diet. Drink alcohol in moderation.



- Massage your hands and feet, or have someone massage them for you. Massage helps improve circulation, stimulates nerves and may temporarily relieve pain.
- Avoid prolonged pressure. Don't keep your knees crossed or lean on your elbows for long periods of time. Doing so may cause new nerve damage.

## COPING SKILLS

Living with chronic pain or disability presents daily challenges. Some of these suggestions may make it easier for you to cope:

- Set priorities. Decide which tasks you need to do on a given day, such as paying bills or shopping for groceries, and which can wait until another time. Stay active, but don't overdo.
- Get out of the house. When you have severe pain, it's natural to want to be alone. But this only makes it easier to focus on your pain. Instead, visit a friend, go to a movie or take a walk.
- Seek and accept support. It isn't a sign of weakness to ask for or accept help when you need it. In addition to support from family and friends, consider joining a chronic pain support group. Although support groups aren't for everyone, they can be good places to hear about coping techniques or treatments that have worked for others. You'll also meet people who understand what you're going through. To find a support group in your community, check with your doctor, a nurse or the county health department.
- Prepare for challenging situations. If something especially stressful is coming up in your life, such as a move or a new job, knowing what you have to do ahead of time can help you cope.
- Talk to a counselor or therapist. Insomnia, depression and impotence are possible complications of peripheral neuropathy. If you experience any of these, you may find it helpful to talk to a counselor or therapist in addition to your primary care doctor. There are treatments that can help.

A close-up, dark-toned photograph showing a person's hand massaging another person's knee. The image is partially obscured by a yellow vertical bar on the left and a dark blue vertical bar on the right.

## Exercise

Research has shown that strengthening exercise moderately improves muscle strength in people with peripheral neuropathy. In addition, regular exercise may reduce neuropathy pain and can help control blood sugar levels. Ask your physician to refer you to a Physical Therapist regarding an exercise program that's right for you.

*A comprehensive physical activity routine includes four kinds of activities:*

- Aerobic Exercise
- Flexibility Exercise
- Strength Training Exercise
- Balance Exercise

Aerobic exercise increases your heart rate, works your muscles, and raises your breathing rate. For most people, it's best to aim for a total of about 30 minutes a day, between 3-5 days a week. If you haven't been very active recently, you can start out with 5 or 10 minutes a day and work up to more time each week. Or split up your activity for the day—try a 10-minute walk after each meal.

- Take a brisk walk (outside or inside on a treadmill)
- Take a low-impact aerobics class
- Swim or do water aerobic exercises
- Stationary bicycle indoors

# Flexibility Exercises

Flexibility exercises, also called stretching, help keep your joints flexible and reduce your chances of injury during other activities. Gentle stretching for 5 to 10 minutes helps your body warm up and get ready for aerobic activities such as walking or swimming.

As a “rule of thumb”, stretching should be comfortable. As you hold the stretch you will feel the tension decrease in the muscle. You should then be able to go a little farther on the next repetition. If you feel pain with the stretching, do not push as hard. If the pain remains, contact your healthcare professional.

Tear out these pages and follow the exercises at home or visit our website to see a complete list.

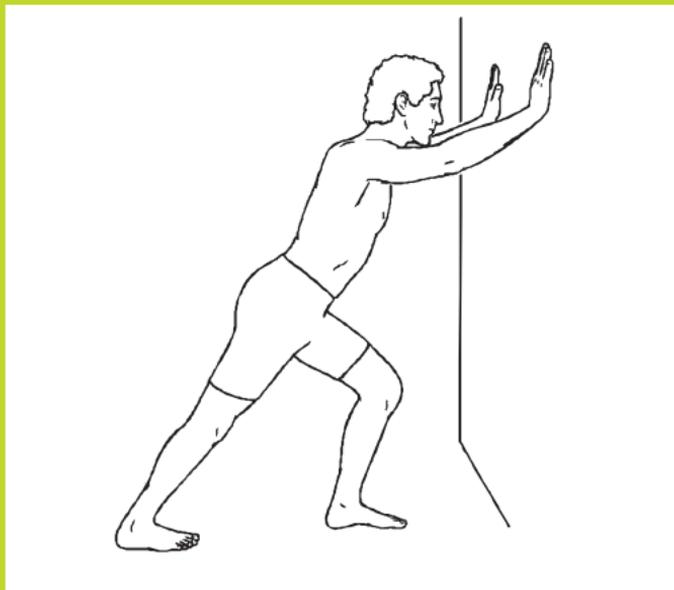
**Check with your physician before beginning any exercise treatment.**

## CALF STRETCH

*Place one leg far behind you with the toe pointed slightly inward. Take a large step forward with the opposite foot. With the front knee slightly bent, lean forward keeping your back heel on the floor. You should feel a muscle stretch in the calf of your back leg.*

*Hold: 15-20 seconds on each leg*

*Repeat: 3 repetitions each leg/2 times a day.*

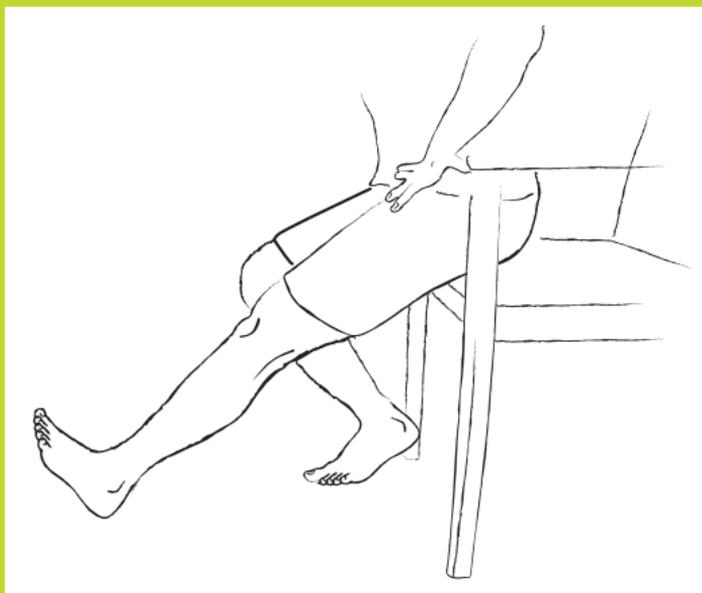


## **SEATED HAMSTRING STRETCH**

*Sitting on the front half of a firm chair, place one leg out straight with the foot pointing up. Bend the opposite knee so that your foot is flat on the floor. Center your chest over the straight leg, and slowly straighten your back until you feel a muscle stretch in the back of your leg.*

*Hold: 15-20 seconds on each leg*

*Repeat: 3 repetitions each leg/ 2 times a day.*

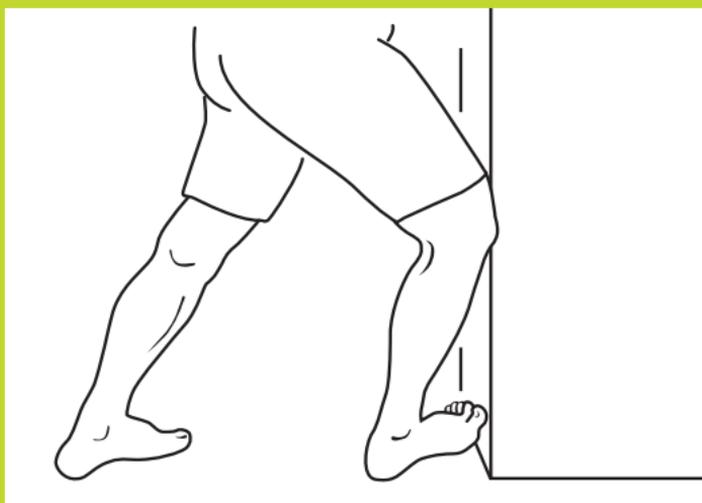


## **PLANTARFASCIA STRETCH**

*While facing a door frame, place your heel as close to the door frame as possible. Slowly lean forward, allowing your heel to slide back as your toes extend upward. To increase the stretch, bend the front knee toward the door frame. You should feel a muscle stretch in the bottom of your foot and along your heel cord.*

*Hold: 15-20 seconds*

*Repeat: 3 repetitions each leg/ 2 times a day.*

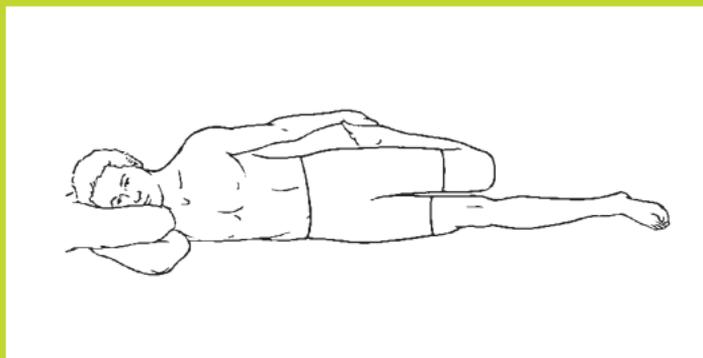


## QUADRICEPS STRETCH

*Lying on your side, pull heel toward buttocks until a comfortable stretch is felt in the front of the thigh.*

*Hold: 15 seconds*

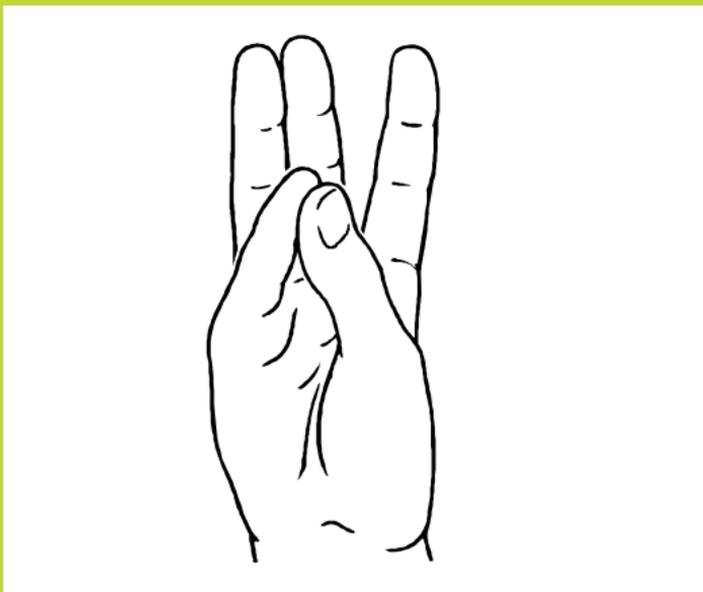
*Repeat: 3 repetitions each leg/2 times a day*



## FINGER OPPOSITION

*Touch each thumb to each fingertip. Begin with the index finger and proceed toward the little finger. Begin with slow controlled movements and move more rapidly as coordination improves.*

*Repeat : 15 repetitions/2 times a day.*

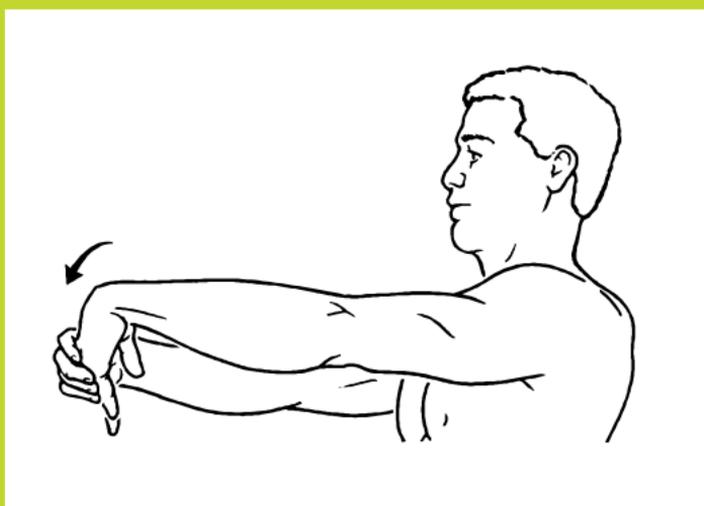


## **WRIST FLEXOR STRETCH**

*Keep the elbow straight, grasp hand and fingers, then slowly bend wrist back until stretch is felt.*

*Hold: 15 seconds*

*Repeat: 3 repetitions each wrist/2 times a day*

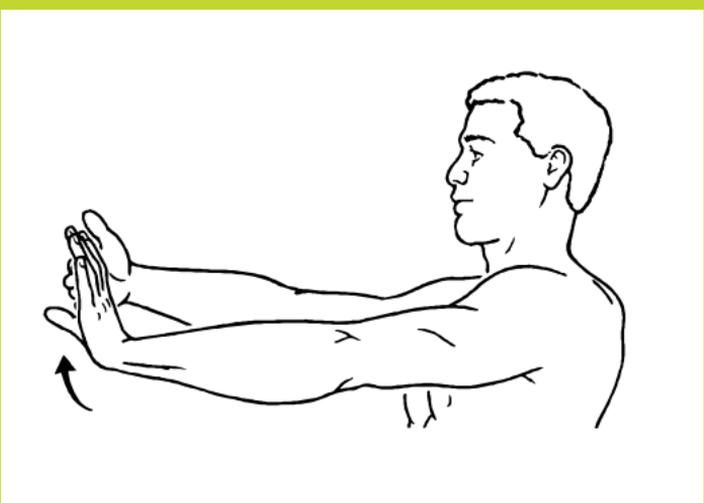


## **WRIST EXTENSOR STRETCH**

*Keep the elbow straight, grasp hand and fingers, then slowly bend the wrist forward until stretch is felt.*

*Hold: 15 seconds*

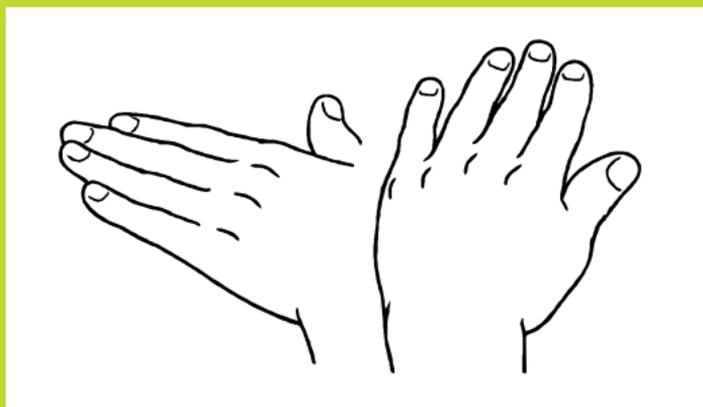
*Repeat: 3 repetitions each wrist/2 times a day*



## WRIST/ HAND RADIAL AND ULNAR DEVIATION

*With fingers straight, gently bend wrist from side to side as far as possible.*

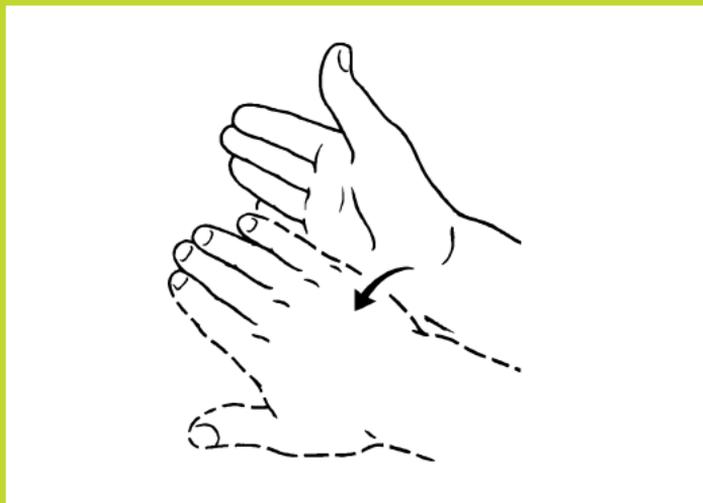
*Repeat: 15 repetitions each wrist/2 times a day*



## HAND/FOREARM PRONATION/SUPINATION

*With the arm in a handshake position, slowly rotate palm down until stretch is felt. Relax. Then rotate palm up until stretch is felt.*

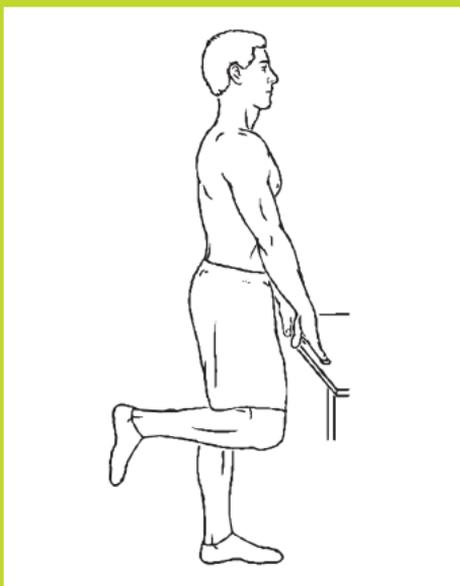
*Repeat: 15 repetitions each wrist/2 times a day*



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## Balance Exercises

Keeping your balance system healthy is especially important if you have problems due to illness, such as joint pain, weakness or dizziness. Balance training can help you get back to normal, and overcome feelings of stiffness or unsteadiness. Balance, in particular, is emerging as an important element for the elderly. Older muscles are smaller and slower and respond less efficiently when you need to brace yourself, making you more vulnerable to falls.



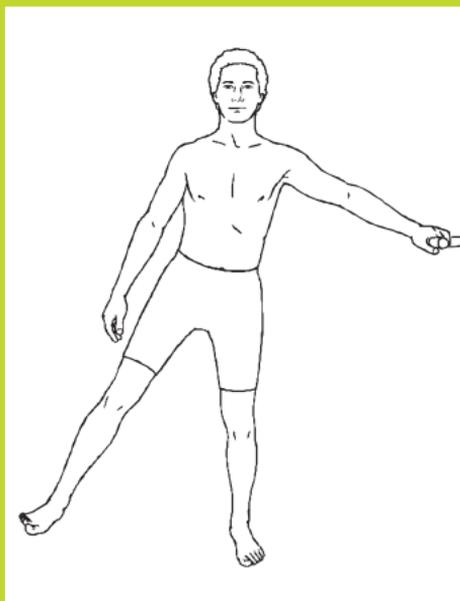
### **KITCHEN COUNTER—STANDING BALANCE**

*While standing at the kitchen counter, place two finger tips on the counter. Stand on one foot lifting the other off the floor. Slowly lift your hands away from the counter and maintain your balance as long*

*as you can. Minor balance checks are acceptable as long as you continue to maintain your balance with minimal help from your hands.*

*Hold: 5-10 seconds*

*Repeat: 2 repetitions each leg/2 times a day.*



### **SIDE LEG RAISE**

*Hold chair or table with one hand, then one fingertip, then no hands; then do exercise with eyes closed, if steady. Stand straight, directly behind chair or table, feet slightly apart. Hold chair or table for balance. Slowly lift one leg to side, 6-12 inches. Slowly lower leg and*

*repeat with other leg. Your back and knees are straight throughout exercise.*

*Hold: 5-10 seconds*

*Repeat: 2 repetitions each leg/2 times a day*

# Physical Therapy

Physical therapy may be helpful in maintaining strength, mobility, and function regardless of the underlying cause of Peripheral Neuropathy (PN).

*The objectives of physical therapy include:*

- Maintaining and improving functions via range-of-motion exercises consisting of progressive stretching and self stretches
- Strengthening muscles—this includes exercising against increasing resistance, use of weights, and isometric exercise
- Balance training which provides stability and prevents falls
- Enhancing balance and posture through braces and/or splints as recommended by your physical therapist

# Occupational Therapy

Occupational therapy is instrumental in helping you cope with the functional, vocational, and social impact of peripheral neuropathy by:

- Improving sensory-motor skills
- Teaching you to avoid exposure to environmental or industrial toxins
- Teaching self-care activities
- Teaching you safety issues, (e.g., paying more attention to the terrain when walking since falling or tripping may pose a risk for patients with PN)
- Teaching you to pay attention to issues which involve automatic functions (e.g., learning how to change positions smoothly to avoid a sudden drop in blood pressure and the risk of falling)
- Splinting is often used in the treatment of compression mononeuropathies, such as carpal tunnel syndrome

Contact the facility nearest  
you for more information  
on diagnosis and treatment

**Beth Israel Deaconess Medical Center**

Center for Autonomic and Peripheral Nerve Disorders  
One Deaconess Road, Palmer 111  
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**617-632-8454**

**Johns Hopkins Outpatient Center (clinic)**

601 N. Caroline Street, 5th Floor  
Baltimore, MD 21287  
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**Johns Hopkins University (office location)**

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**Icahn School of Medicine at Mount Sinai**

1468 Madison Ave.  
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**212-241-0784**

**Northwestern University**

Peripheral Neuropathy Clinic  
675 North St. Clair Street, Suite 20-100  
Chicago, IL 60611  
**312-695-7950**

*For other locations visit our website.*



*To learn more about  
peripheral neuropathy  
and the Foundation,  
visit our website:  
[www.foundationforpn.org](http://www.foundationforpn.org)*

MAKING A

difference

TOMORROW

The mission of the Foundation for Peripheral Neuropathy can only be sustained through the generosity of people who share our vision to advance research and provide an improved quality of life for those living with Peripheral Neuropathy. With your contribution, you become an important part of our success and a special part of our family. We hope that you will share in our commitment to dramatically improve the lives of those living with peripheral neuropathy.

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