

Peripheral Neuropathy

Making a Difference Today

Peripheral neuropathy is a neurological disorder that causes a variety of debilitating symptoms, including pain, muscle weakness, numbness, and difficulty walking. Some forms can lead to respiratory failure and other potentially fatal complications. As its name indicates, the disorder affects the peripheral nervous system—the nerves of the face, arms, legs, torso, and head—rather than the central nervous system (the spinal cord and brain).

About 20 million Americans suffer from the 100-plus identified types of peripheral neuropathy, including at least half of the people with diabetes. Other common causes of the disorder include: autoimmune diseases, such as lupus and rheumatoid arthritis; hereditary disorders; complications of bacterial or viral infections, such as Guillain-Barre syndrome; poor nutrition; exposure to toxic substances; alcoholism; and certain medications, especially those used to treat cancer and HIV/AIDS. In many cases, however, the cause remains unknown.

The emotional and financial impact of peripheral neuropathy on individuals and their families is enormous. The annual cost to the U.S. economy of diabetes-related peripheral neuropathy alone has been estimated to be over \$13 billion. Yet, according to the National Institute of Neurological Disorders and Stroke, federal funding for peripheral neuropathy research averages only \$2.55 a year for every American with this painful disorder.

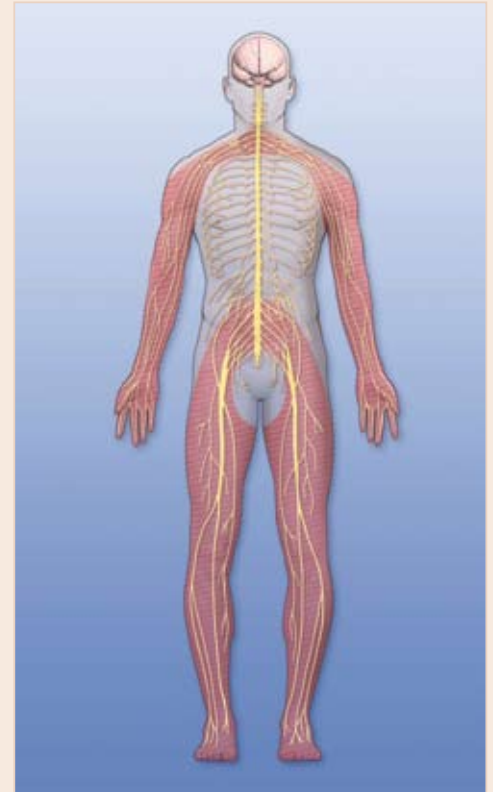
Past Research Breakthroughs

Funding from the National Institutes of Health and other organizations has greatly helped scientists in their quest to unravel the mysteries of peripheral neuropathy and to develop more effective treatments for this painful and disabling disorder. But treatments are effective for only a few patients.

Research has led to new treatments that enable some patients to control pain, one of the disorder's most disabling symptoms. Recent studies, for example, have found that two over-the-counter supplements, acetyl-L-carnitine (a naturally occurring amino acid) and alpha-lipoic acid (an antioxidant), may help ease the severe pain and other symptoms often associated with diabetic neuropathy without the unwanted side effects of other medications used to treat the disorder, such as narcotics, antidepressants, and anti-seizure drugs. Long-term trials of these compounds are now underway.

Major breakthroughs have occurred in genetics research. Over the past 20 years, scientists have identified many of the mutant genes that cause hereditary neuropathies, which are known collectively as Charcot-Marie-Tooth (CMT) disease. Thanks to such discoveries, many subtypes of CMT can now be identified with a blood test, thus helping people receive an accurate diagnosis in the initial stage of their disease.

During the last decade, researchers have successfully developed animal models for some types of peripheral neuropathies, which provide invaluable tools for understanding how such disorders develop and for testing new therapies. For example, researchers recently found that ascorbic acid (vitamin C) improves the motor function in rodent models of CMT. Vitamin C appears to help promote the production of myelin, the protective sheath around nerve fibers; myelin abnormalities have been implicated in CMT and other types of peripheral neuropathy.



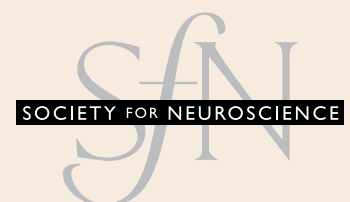
Peripheral neuropathy affects the nerves of the arms, hands, legs, and feet.

Continued funding for research could lead to:

- A better understanding of the genetic factors involved in the development of peripheral neuropathy
- More knowledge of the role the immune system plays in some forms of peripheral neuropathy
- The development of new therapies that can halt or perhaps even reverse the progression of peripheral neuropathy
- More effective medications for reducing neuropathic pain

For more information please email brss@sfn.org.

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Peripheral Neuropathy

Making a Difference Tomorrow

Although scientists have made considerable progress in understanding peripheral neuropathy and its many causes, a cure remains elusive. Did you know that:

- More than 100 different types of peripheral neuropathy have been identified.
- About 20 million Americans live with the disorder, which often causes severe and crippling pain.
- At least half of people who have diabetes and one-third of people with HIV/AIDS develop symptoms of peripheral neuropathy.
- The peripheral neuropathy disorder known as Charcot-Marie-Tooth disease is one of the most common inherited neurological diseases in the United States, affecting about 125,000 Americans.

Federally funded research is helping scientists better understand the neurobiological complexities of peripheral neuropathy. With continued funding, scientists will be able to translate this knowledge into therapeutic breakthroughs.

Research Brings Hope for the Future

Peripheral nerves have a remarkable ability to regenerate themselves—a factor that offers great hope for the development of effective new treatments. For many neuropathies, gene therapy is an exciting and promising area of research. Studies involving cell cultures and animal models have shown that it's possible to deliver genes to Schwann cells, the specialized cells that form the myelin sheath. One NIH-funded study found that injections of a vector with the gene for glutamic acid decarboxylase (GAD), an enzyme that makes a neurotransmitter that dampens activity in nerve cells, reduced neuropathic pain in rats with the disorder.

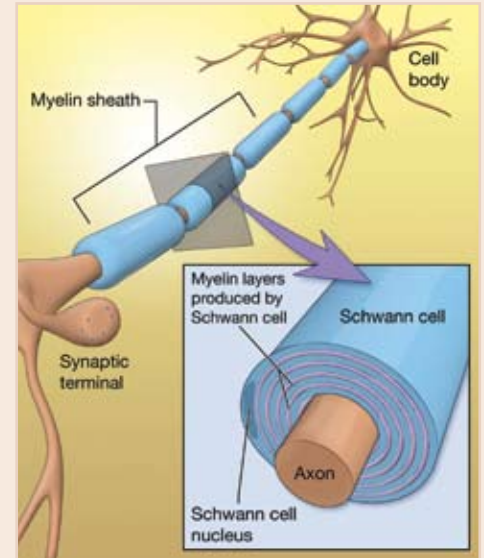
Another very promising area of research involves neurotrophic factors. These proteins, produced naturally by the body, are essential for the development and survival of nerve cells. In the laboratory, some neurotrophic factors have also been shown to be capable of stimulating regeneration of damaged neurons. Scientists are attempting to learn more about the effects of these powerful substances on the peripheral nervous system.

Some peripheral neuropathy disorders, such as Guillain-Barre syndrome, appear to be triggered by a viral or bacterial infection that somehow tricks the immune system into damaging the myelin sheath around peripheral nerve cells. Scientists are actively investigating the workings of the immune system to determine which cells are responsible for initiating and carrying out this attack on the nervous system. They're also looking at the characteristics of viruses and bacteria that set the process in motion.

Efforts to develop new drug therapies for neuropathic symptoms also continue. Clinical trials are now underway for several promising therapies, including acetyl-L-carnitine, alpha-lipoic acid, and high-dose ascorbic acid treatment.

Hope for Other Diseases

Only with continued funding will scientists be able to bring about the medical breakthroughs needed to ease the pain and suffering of the millions of Americans with peripheral neuropathy. But the benefits of such research do not end there. As scientists search for new treatments and a possible cure for peripheral neuropathy, they're also shedding new light on other myelin-related disorders, including multiple sclerosis and spinal cord injuries, which affect hundreds of thousands of other Americans.



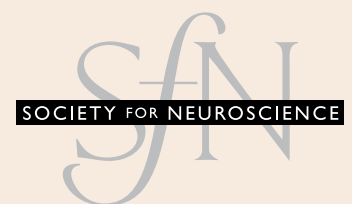
Many types of peripheral neuropathy result from abnormalities in the myelin, the insulating sheath that surrounds nerve fibers and assists the movement of electrical signals through the nervous system.

Already research has led to:

- More effective treatments for controlling the pain and other disabling symptoms associated with peripheral neuropathy
- The identification of mutant genes that cause the common forms of Charcot-Marie-Tooth disease
- New animal models for peripheral neuropathy that enable scientists to develop and test new therapies

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