Peripheral Neuropathy Caused by Chemotherapy

What is chemotherapy-induced peripheral neuropathy or CIPN?

Peripheral neuropathy is a set of symptoms caused by damage to the nerves that are further away from the brain and spinal cord. These distant nerves are called *peripheral nerves*. They carry sensations (feeling) to the brain and control the movement of our arms and legs. They also control the bladder and bowel. Some of the chemotherapy drugs used to treat cancer damage peripheral nerves. When this happens it is called *chemotherapy-induced peripheral neuropathy*. Chemotherapy-induced peripheral neuropathy (CIPN) can be a disabling side effect of cancer treatment.

What are the symptoms of CIPN?

The symptoms or signs of chemo-induced peripheral neuropathy (CIPN) depend mostly on which nerves are involved. The most common symptoms are:

- Pain (may be there all the time or come and go, like shooting or stabbing pain)
- Burning
- Tingling (“pins and needles” feeling) or electric/shock-like pain
- Loss of feeling (can be numbness or just less ability to sense pressure, touch, heat, or cold)
- Trouble using your fingers to pick up or hold things; dropping things
- Balance problems
- Trouble with tripping or stumbling while walking
- Pressure may hurt more than usual
- Temperature may hurt more than usual (mostly cold; this is called *cold sensitivity*)
- Shrinking muscles

- Muscle weakness
- Trouble swallowing
- Constipation
- Trouble passing urine
- Blood pressure changes
- Decreased or no reflexes

CIPN can cause severe pain and can affect your ability to do things like walk, write, button your shirt, or pick up coins. If it gets very bad, it can cause more serious problems like changes in your heart rate and blood pressure, dangerous falls, trouble breathing, paralysis, or organ failure.

Talk to your doctor or nurse right away about any signs of CIPN that you may have. They'll want to watch you closely to see if the problems get worse. They may need to change your treatment plan.

What else can cause these symptoms?

Peripheral neuropathy can be caused by other things besides chemo, such as:

- Other cancer treatments, like surgery or radiation
- Tumors pressing on nerves
- Infections that affect the nerves
- Spinal cord injuries
- Diabetes
- Alcohol abuse
- Shingles
- Low vitamin B levels
- Some autoimmune disorders
- HIV (human immunodeficiency virus) infection
- Poor circulation (peripheral vascular disease)
- The cancer itself (for instance, multiple myeloma can cause PN)

It's very important to know what's causing peripheral neuropathy so that the right treatment can be given. The focus here will be on peripheral neuropathy that's a side effect of chemo – CIPN.

How does CIPN start?

Chemo drugs spread through the whole body, and certain types of chemo can damage different nerves. Symptoms tend to start farthest away from the head, but move closer over time. In most cases, people will notice chemo-induced peripheral neuropathy (CIPN) symptoms in the feet, then later on in the hands. Symptoms may start in the toes, but move on to the ankles and legs. Likewise, symptoms can move up from the fingers to the hands and arms.

CIPN most often affects both sides of the body in the same way. When it affects both hands and both feet, doctors may call it a *stocking-glove distribution*.

CIPN can begin any time after treatment starts. It often gets worse as treatments go on.

What drugs are most likely to cause CIPN?

Certain chemo drugs are more often linked to CIPN. These include:

- Platinum drugs like cisplatin, carboplatin, and oxaliplatin
- Taxanes including paclitaxel (Taxol®), docetaxel (Taxotere®), and cabazitaxel (Jevtana®)
- Epothilones, such as ixabepilone (Ixempra®)
- Plant alkaloids, such as vinblastine, vincristine, vinorelbine, and etoposide (VP-16)
- Thalidomide (Thalomid®), lenalidomide (Revlimid®), and pomalidomide (Pomalyst®)
- Bortezomib (Velcade®) and carfilzomib (Kyprolis®)
- Eribulin (Halaven®)

CIPN can last a short-time. Or it can become a long-term problem, depending on factors like:

- Your age
- Having other medical conditions that cause neuropathy (like diabetes or HIV infection)
- Prescription drugs you are taking
- If others in your family have neuropathy
- The drug or combination of chemo drugs used (including those used in the past)
- The drug dose (some drugs only cause CIPN at high doses)
- The drug frequency (how often the drug is given)
- The total dose of chemo given over time

Can CIPN be prevented?

Many treatments are used to try to prevent chemo-induced peripheral neuropathy (CIPN). Below is a list of some of the treatments that have been tried. So far, study results have been mixed for all of these treatments, and more research is needed.

Vitamin E: Some studies have shown that this antioxidant may protect nerves from the damage caused by cisplatin and paclitaxel.

Calcium and magnesium: One small study showed patients who were given calcium and magnesium infusions before and after oxaliplatin reported less CIPN.

Anti-convulsants: The anti-seizure drug carbamazepine (Tegretol®) is being studied to see if it can help prevent or treat CIPN.

Other substances: Vitamins, supplements, substances made by our bodies, and other drugs are also being looked at to see if they can help protect nerve cells from chemo damage. This includes things like amino acids and proteins. Many of these are being studied as supplements given before and after chemo.

So far, there's no sure way to prevent CIPN. But this is a major problem for some people, and doctors are looking for treatments that work. A lot of research is being done in this area. Clinical trials are needed so that volunteers can help researchers find out more about what helps. Talk with your doctor if you are interested in getting into a clinical trial looking at CIPN.

What can be done to help lower the risk of CIPN?

There are some things that your doctor may do to try to lower your risk of CIPN. For instance

- Instead of giving one large chemo dose once a week, smaller doses may be given 2 or 3 times a week.
- The same dose may be given over 6 hours instead of over 1 hour.
- The chemo may be given as a non-stop, very slow infusion over a few days.
- For certain problems, drug doses may be reduced while preserving most of the good effects.

Doctors may also try a stop-and-go treatment plan. This treatment gives chemo until a certain dose is reached, or until CIPN reaches a certain level. Then the treatment is stopped until the CIPN gets better or until the cancer seems to be growing again. When this happens the chemo is restarted, often at a lower dose than before. This stop-and-go treatment is now being studied to see how it affects CIPN and treatment outcomes.

What happens if I get CIPN?

Your health care team needs to know if your chemo is causing signs of chemo-induced peripheral neuropathy (CIPN), so be sure to tell them about any changes you notice. During treatment, they will ask you about your symptoms and watch you to see if the CIPN is getting worse. Your team may need to delay your treatment, use smaller doses of the chemo drugs, or stop treatment with the

drug that is causing the CIPN until your symptoms get better. These actions must be started right away to prevent long-term damage that won't get better.

Can CIPN be treated?

The goal of treatment is to ease the symptoms of CIPN. Sometimes the symptoms of CIPN are short-term. They go away over time after treatment is done. In other cases, it can take years for the symptoms to totally go away. But sometimes they last much longer and need long-term treatment. Severe CIPN may never go away.

Treatment is mostly given to relieve the pain that can come with CIPN. Some of the drugs used include the following:

- **Steroids**, only for a short time until a long-term treatment plan is in place
- **Patches or creams of numbing medicine** that can be put right on the painful area (for example, lidocaine patches or capsaicin cream)
- **Anti-depressant medicines**, often in smaller doses than are used to treat depression
- **Anti-convulsant medicines,** which are used to help many types of nerve pain
- **Opioids or narcotics,** for when pain is severe

Researchers are looking at which drugs work best to relieve this kind of pain. It may take more than one try to find out what works best for you.

Other treatments that can be tried to ease *neuropathic* pain (pain that comes from nerves) and their effects on your life:

- Electrical nerve stimulation
- Occupational therapy
- Physical therapy
- Relaxation therapy
- Guided imagery
- Distraction
- Acupuncture
- Biofeedback

Physical therapy and occupational therapy may be able to make you stronger. They might also help you find ways to do things that you are not able to do because of CIPN. For more information on these topics visit our Web site or call us at 1-800-227-2345.

What can I do to deal with CIPN?

There are some things you can do to better deal with the symptoms of neuropathy, such as

- Use your pain medicines if you have them. Most pain medicines work best if they are taken before the pain gets bad.
- Avoid things that seem to make your CIPN worse, such as hot or cold temperatures, or snug clothes or shoes.
- Give yourself extra time to do things. Ask friends for help with tasks you find hard to do.
- Don’t drink alcohol. It can cause nerve damage on its own, and might make CIPN worse.
- If you have diabetes, control your blood sugar. High blood sugar levels can damage nerves.
- If you have neuropathy in your hands, use knives, scissors, box cutters, and other sharp objects gently and carefully. Use them only when you can give your full attention to your task.
- Protect your hands by wearing gloves when you clean, work outdoors, or do repairs.
- If the neuropathy is in your feet, sit down as much as possible, even while brushing your teeth or cooking.
- Take care of your feet. Look at them once a day to see if you have any injuries or open sores. Always wear shoes that cover your whole foot when walking, even at home. Talk to your doctor about shoes or special inserts that can help protect your feet.
- Falling can be a big problem. Be sure that you have ways to support yourself if you have problems with stumbling and walking. Hand rails in hallways and bathrooms may help you keep your balance. A walker or cane can give you extra support.
- Use night lights or flashlights when getting up in the dark.
- Protect yourself from heat injuries. Set hot water heaters between 105° to 120°F to reduce scalding risk while washing your hands. Use oven gloves and hot pads when handling hot dishes, racks, or pans. Check bath water with a thermometer.
- Keep your hands and feet warm and well covered in cold weather. Avoid extreme temperatures.
- If constipation is a problem, follow your doctor’s recommendations about laxatives and exercise. Drink plenty of water and eat fruits, vegetables, and whole grains to get enough fiber.
- Talk to your doctor or nurse about the problems you are having in daily life. They might be able to suggest ways to make you feel better or function better.
- If your neuropathy is permanent, ask your doctor to refer you to an occupational therapist (OT). They are experts who help people lead more normal lives despite physical limits. OTs can visit your home to help you with safety and mobility (walking or getting around in your home and community).

What questions should I ask about CIPN?

Here are some questions you might want to ask your health care team:

- Is the chemo I’m getting likely to cause CIPN?

- Am I at high risk for CIPN?
- What symptoms do I need to watch for and report to you?
- How will you test me to see if I have CIPN?
- Have you treated CIPN in other patients? How? Did it work?
- If my CIPN gets bad and is very painful, will it change my treatment plan?
- Is it likely that my CIPN will get better or go away after treatment is over?

Talk to your health care team

It's important to work closely with your doctor or nurse to manage peripheral neuropathy caused by chemotherapy. Talk to your doctor about any changes in how you feel, and any trouble you have walking or holding things. Tell the doctor how your symptoms affect the things you do every day.

Be sure to tell your cancer team about any pain you have. You can learn more about pain, how to talk about it, and how to manage it in our document called *Pain Control: A Guide for Those With Cancer and Their Loved Ones*.

If you get medicines to help CIPN, be sure to keep your doctor posted on whether the drugs are helping and if new problems start up. You might also want to talk with your doctor about whether you can get into a clinical trial to help deal with your CIPN.

If you are concerned about how future treatment might affect your quality of life, talk with your doctor about what's most important to you. Remember that only you can decide whether you want to get, or keep getting, a certain treatment.

To learn more

More information from your American Cancer Society

Here is more information you might find helpful. You also can order free copies of our documents from our toll-free number, 1-800-227-2345, or read them on our Web site, www.cancer.org.

More on chemo and pain

Pain Control: A Guide for Those With Cancer and Their Loved Ones (also in Spanish)

Understanding Chemotherapy: A Guide for Patients and Families (also in Spanish)

Coping with cancer and getting help from your doctor

Coping With Cancer in Everyday Life (also in Spanish)

After Diagnosis: A Guide for Patients and Families (also in Spanish)

Talking With Your Doctor (also in Spanish)

National organizations and Web sites*

Along with the American Cancer Society, other sources of information and support include:

National Cancer Institute
Toll-free number: 1-800-422-6237 (1-800-4-CANCER)
TTY: 1-800-332-8615
Web site: www.cancer.gov

> Has accurate, up-to-date information about cancer to patients, their families, and the general public. Also has clinical trials information for patients and the public that covers understanding clinical trials, deciding whether to take part, and finding specific trials.

The Neuropathy Association
Telephone: 212-692-0662
Web site: www.neuropathy.org

> Provides support and education, and funds research on neuropathy. Answers questions about neuropathy, including chemotherapy-induced neuropathy, and offers print materials; lists neurologists and neuropathy clinical centers; refers to neuropathy support groups; gives clinical trial information; and has an online bulletin board.

**Inclusion on this list does not imply endorsement by the American Cancer Society.*

No matter who you are, we can help. Contact us anytime, day or night, for cancer-related information and support. Call us at **1-800-227-2345** or visit www.cancer.org.

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