Peripheral Neuropathy in Cancer
Inside, you can learn about:

What is peripheral neuropathy in cancer patients?

Symptoms of peripheral neuropathy caused by chemotherapy

Distinguishing chemotherapy-associated peripheral neuropathy from other neuropathies

How symptoms are evaluated

Prevention and management of peripheral neuropathy in cancer
What is Peripheral Neuropathy?

Peripheral neuropathy is a condition caused by damage to the body’s **peripheral nerves** — the motor, sensory, and autonomic nerves that connect the brain and spinal cord to the rest of the body (Figure 1).

Motor nerves are those that control the muscles, while sensory nerves are activated by our senses (touch, sight, taste, sound, and smell). Autonomic nerves control those bodily functions that normally fall below consciousness, such as breathing, digestion, respiration, and perspiration.

Peripheral neuropathy is a fairly uncommon condition, affecting 3-4% of the population. Most people with the disorder are 55 years of age or older. Unfortunately, many cases of peripheral neuropathy are not diagnosed, and poor assessment means that many patients miss out on potential management of their pain and other symptoms.

There are several causes of **peripheral neuropathy**. They include genetics, autoimmune diseases such as rheumatoid arthritis and AIDS, infection, poor diet, diabetes, and certain medications. Peripheral neuropathy also is a **common complication of cancer and cancer chemotherapy**; therefore, distinguishing between peripheral neuropathy arising from cancer treatment and neuropathy caused by other factors is an important step in developing strategies to manage the condition.

Determining the cause and most effective response is crucial. Peripheral neuropathy may diminish your quality of life, ability to function, and long-term survival. Moreover, when peripheral neuropathy is a result of chemotherapy, the condition can delay, slow down, or even stop your treatment.
Symptoms of Chemotherapy-Related Peripheral Neuropathy

Although cancer patients may develop several types of neuropathies, the most important is peripheral neuropathy caused by chemotherapy. If you are advised to take chemotherapy treatment, you may experience peripheral neuropathy, the symptoms of which may vary in severity. Some may be merely discomforting, while others can be quite debilitating. Your symptoms also may either develop slowly over time or suddenly appear. Often, the severity and frequency of symptoms are related to the dose, duration, and schedule of chemotherapy you receive.

The most common problems you are likely to experience include:

• **Sensory symptoms** — numbness, tingling, unusual touch sensations or cold sensitivity. The pain is often described as burning, freezing, or like a shock.

• **Motor symptoms** — a generally mild weakness in your arms, hands, or legs. There may also be a loss of reflexes at the ankles. Some people experience difficulty walking or note that they drop objects frequently.

• **Autonomic symptoms** — these are rare but may include diarrhea, urinary problems, an irregular heartbeat, or sexual dysfunction.

Figure 2 shows the location and type of peripheral neuropathy symptoms in cancer patients taking chemotherapy.
Symptoms of Chemotherapy-Related Peripheral Neuropathy

(Figure 2)
Distinguishing Chemotherapy-Related Peripheral Neuropathy

Several features typical of peripheral neuropathy associated with chemotherapy help physicians distinguish it from other types of neuropathy. For instance, chemotherapy-related peripheral neuropathy often appears in “glove and stocking” locations (see Figure 2) such as the hands or feet and ankles. You also are more likely to have:

- **Sensory symptoms**, especially pain, rather than motor symptoms
- Symptoms **after chemotherapy is delivered**, which worsen with higher doses

By assessing the characteristics of your complaint, physicians can determine whether your neuropathy is related to chemotherapy or another cause.

In some cases, an accurate diagnosis is hard to make. You may have pre-existing neuropathy due to diabetes or other causes. You could experience more severe peripheral neuropathy due to the additional toxic effects of your chemotherapy. Despite the difficulty, making the correct diagnosis is necessary to determine which treatment options are best for you.
Many types of cancer drugs are known to cause peripheral neuropathy. The following table lists some of the more common therapies, their most common symptoms, and the typical length of time to recovery:

<table>
<thead>
<tr>
<th>Drug</th>
<th>Symptoms</th>
<th>Time to Recovery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Platinum Drugs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cisplatin (Platinol&lt;sup&gt;®&lt;/sup&gt;)</td>
<td>- Painful numbness or tingling in both arms and legs</td>
<td>Partial recovery: symptoms may progress for months after stopping treatment</td>
</tr>
<tr>
<td>Oxyplatin (Eloxatin&lt;sup&gt;®&lt;/sup&gt;)</td>
<td>- Loss of muscle coordination and walking problems</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- An abnormal sense of touch</td>
<td></td>
</tr>
<tr>
<td>Vinca Alkaloids</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vincristine (Oncovin&lt;sup&gt;®&lt;/sup&gt;)</td>
<td>- Numbness or tingling in both limbs, including</td>
<td>Symptoms typically disappear after 3 months, although they may persist with Oncovin</td>
</tr>
<tr>
<td></td>
<td>- loss of ankle stretch reflex</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Constipation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Walking disturbances</td>
<td></td>
</tr>
<tr>
<td>Taxanes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paclitaxel (Taxol&lt;sup&gt;®&lt;/sup&gt; or Abraxane&lt;sup&gt;®&lt;/sup&gt;)</td>
<td>- Painful numbness or tingling in both arms and legs</td>
<td>Patients usually recover after 3 weeks (Abraxane) to 3 months (Taxol or Taxotere)</td>
</tr>
<tr>
<td></td>
<td>- Occasional weakness and loss of muscle coordination</td>
<td>Some symptoms may persist with Taxol or Taxotere</td>
</tr>
<tr>
<td></td>
<td>- Some walking difficulties</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ixabepilone (Ixempra™)</td>
<td>- Painful numbness or tingling</td>
<td>Symptoms resolve after 4 to 6 weeks after reduction or stopping of treatment</td>
</tr>
<tr>
<td></td>
<td>- A burning sensation</td>
<td></td>
</tr>
</tbody>
</table>

Fortunately, most symptoms of peripheral neuropathy associated with cancer therapy usually stop after treatment is over. (The platinum drugs are the exception.) Even though most patients soon recover, you may experience long-term consequences. As a result, early intervention is essential — if you have symptoms that seem like peripheral neuropathy, contact your oncologist as soon as possible.
Evaluating Symptoms of Peripheral Neuropathy in Cancer Patients

If you have symptoms suggestive of peripheral neuropathy, your doctor will conduct a thorough evaluation. The process usually includes several components:

**Personal History**
- Previous episodes of neuropathy
- A family history of neuropathy
- Past diagnosis with other conditions associated with neuropathy, such as diabetes, HIV/AIDS, or Guillain-Barré Syndrome
- Alcohol use
- Review of your chemotherapy regimen: dosing, duration, and schedule
- Assessment of symptoms: type, location, and severity graded on a scale of 0 (none) to 4 (disabling)
- Assessment of degree of pain

**Physical Examination**
- Assessment of your senses, including touch, vibration, temperature, and sense of the relationship between neighboring parts of the body
- Assessment of your reflexes, any walking problems, or difficulty holding objects
- Determination of **autonomic problems**, such as constipation, urinary difficulties, sexual dysfunction, or dizziness
Functional Assessment Skills Test

- Getting up and walking in a straight line
- Name-writing
- Buttoning

You also will be asked a series of personal questions. The purpose is to help your oncologist determine whether your sensations are due to neuropathy and, if so, your cancer therapy is the cause. Typical questions include:

- Do you feel numbness or tingling in your hands or feet?
- Do you feel pain in your hands and feet; if so, rate it on a scale of 1 to 10?
- Do you feel as if you are wearing gloves or stockings?
- Do these sensations bother you? Are they getting worse?
- Do you feel weakness in your arms and legs?
- Have you fallen recently?
- Do you drop things frequently?
- Do you have difficulty walking or climbing stairs?
- Do these sensations interfere with your work or daily activities?

Once these questions are answered, then treatment decisions can be made.
Prevention and Management of Peripheral Neuropathy in Cancer Patients

Prevention

In an ideal world, peripheral neuropathy associated with chemotherapy could be prevented rather than treated. Some vitamins and minerals have shown promise in preventing the development of peripheral neuropathy. For instance, vitamin E and intravenous calcium and magnesium have demonstrated some effectiveness as preventive therapies, as have glutamine and glutathione. Additional supplements, such as vitamin B12/B6 and alpha lipoic acid, are now under study as well. Unfortunately, the evidence to support the general use of these supplements is not yet available. Check with your physician to see if these vitamins may be beneficial to you.

Management

At present, no treatments are available for peripheral neuropathy caused by chemotherapy. You should communicate closely with your doctor to monitor symptoms. In some severe cases, you may need to have your drug doses reduced or even stopped. Each cancer patient with peripheral neuropathy is unique, and you and your medical team must weigh the risks and benefits in making treatment decisions.

The good news is that medications and other tools are available to manage your symptoms. Many cancer patients have found these techniques to be beneficial in alleviating the pain and sensations caused by peripheral neuropathy.
Medications to Treat Pain, Tingling, and Distorted Touch

These drugs may be combined if one does not relieve your peripheral neuropathy-related sensations. Consult with your doctor to select the medicines that are right for you.

| Anti-epileptic drugs      | Gabapentin (Neurontin®) |
| Local anesthetics         | Lidocaine               |
| Antidepressants           | Duloxetine (Cymbalta®), amitriptyline,nortriptyline, desipramine |
| Systemic analgesics       | Morphine, methadone, oxycodone |

Non-pharmaceutical Approaches to Managing Peripheral Neuropathy

These non-drug approaches, which are non-invasive and not very costly, may provide relief if drug treatments have not worked.

| Electrical stimulation | Spinal cord and deep-brain stimulation Transcutaneous or percutaneous electrical nerve stimulation (TENS or PENS) |
Complementary and Alternative Medicine (CAM) Therapies

Although none of these CAM techniques have been fully evaluated, acupuncture may be the most promising. As with TENS, acupuncture is not expensive and does not require surgery or systemic medication. Many cancer patients with peripheral neuropathy have explored this treatment and found it beneficial.

<table>
<thead>
<tr>
<th>Megavitamins</th>
<th>Vitamin E, topical capsaicin, alpha linoic acid, glutathione, L-glutamate, omega-3 fatty acid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acupuncture</td>
<td></td>
</tr>
<tr>
<td>Massage</td>
<td></td>
</tr>
</tbody>
</table>

Managing Functional Losses

- **Rehabilitation therapy** and physical training can address existing deficits
- **Gait training** and leg strengthening exercises can improve balance and reduce the chance of falling
- **Assistive devices**, such as canes, walkers, and wheelchairs, can make walking easier and safer
- **Modifying the home** by removing potential hazards (eg, throw rugs), adding adequate lighting, tidying loose wires, and using non-skid bath mats can make your living environment safer
- If you cannot live alone, **educate your caregiver** about peripheral neuropathy
• **Switch to loafer-style shoes** or those with Velcro® closures, and consider orthotics to improve walking ability
  — All shoes should have firm insoles and grippy outsoles
  — Women should avoid high heels
• **Using enlarged handles** on eating utensils, button hooks, and Velcro® on computer keyboards can improve your ability to carry out daily activities

### Managing Autonomic Symptoms — Dizziness or Lightheadedness, Bloating, Urinary Retention, Constipation or Diarrhea, Impotence

<table>
<thead>
<tr>
<th>Problem</th>
<th>Management Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dizziness or lightheadedness due to orthostatic hypotension</td>
<td>Rise slowly, maintain adequate salt intake and hydration</td>
</tr>
<tr>
<td>Urinary retention</td>
<td>Drug therapy, self-catheterization</td>
</tr>
<tr>
<td>Constipation</td>
<td>Maintain adequate water and food intake, use stool softeners or laxatives</td>
</tr>
</tbody>
</table>
Peripheral neuropathy caused by chemotherapy has become a growing problem for cancer patients, affecting their quality of life, ability to perform daily activities, and, in some cases, long-term survival. Although well-proven treatments to prevent and treat the disorder are not yet available, various drug and non-pharmacological techniques can address the pain and other sensations associated with peripheral neuropathy. You should be aware of the signs and symptoms of peripheral neuropathy and report unusual sensations to your oncologist as soon as possible to minimize the effects of this debilitating disorder.

Conclusion

Peripheral neuropathy caused by chemotherapy has become a growing problem for cancer patients, affecting their quality of life, ability to perform daily activities, and, in some cases, long-term survival. Although well-proven treatments to prevent and treat the disorder are not yet available, various drug and non-pharmacological techniques can address the pain and other sensations associated with peripheral neuropathy. You should be aware of the signs and symptoms of peripheral neuropathy and report unusual sensations to your oncologist as soon as possible to minimize the effects of this debilitating disorder.

Taxol is a registered trademark of Bristol-Myers Squibb Company
Abraxane is a registered trademark of Abraxis BioScience, LLC
Taxotere is a registered trademark of Sanofi-Aventis US, LLC
IXEMPRA is a trademark of Bristol-Myers Squibb Company
Cymbalta is a registered trademark of Eli Lilly and Company
Neurontin is a registered trademark of Pfizer Inc.
Velcro is a registered trademark of Velcro Industries BV
If you have been diagnosed with breast cancer, the next step is to review your treatment options with your doctor.