

A Patient's Guide to Pain Management: Transcutaneous Electrical Stimulation (TENS)



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This education section was created to help my patients and referring physicians learn more about common orthopedic and sports injuries.

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Introduction

Electrical nerve stimulation is a treatment for pain that can be used for acute pain (e.g., during labor or after surgery) or for chronic pain. It is a form of electrical energy sent in various wave forms to the nerves. When it is delivered through electrodes or patches placed on the skin, it is called *transcutaneous electrical stimulation* or TENS for short.

TENS is a noninvasive way to override or block signals from the nerves to the spinal cord and brain. Pain messages may be altered enough to provide temporary or even long-lasting pain relief. Besides controlling pain, this type of electrical stimulation can also improve local circulation and reduce or eliminate muscle spasm.

This guide will help you understand

- who may benefit from a TENS unit
- how a TENS unit works
- what to expect with a TENS unit

Who may benefit from TENS?

TENS can be used for relief of pain associated with a wide variety of painful conditions. This may include back pain caused by spine

degeneration, disc problems, or failed back surgery. Nerve pain from conditions such as chronic regional pain syndrome (CRPS) and neuropathies caused by diabetes or as a side effect of cancer treatment may also be managed with TENS.

TENS has been used for people suffering from cancer-related pain, phantom-limb pain (a chronic pain syndrome following limb amputation), and migraine or chronic tension-type headaches.

TENS can also be used for muscle soreness from overuse, inflammatory conditions, and both rheumatoid and osteoarthritis. Athletes with painful acute soft tissue injuries (e.g., sprains and strains) may benefit from TENS treatment.

Sometimes it is used after surgery for incisional or post-operative pain from any type of surgery (e.g., joint replacement, cardiac procedures, various abdominal surgeries, cesarean section for the delivery of a baby). Studies show that TENS can significantly reduce the use of *analgesics* (pain relievers, including narcotic drugs) after surgery.

TENS is usually used along with other forms of treatment and pain control such as analgesics, relaxation therapy, biofeedback, visualization or guided imagery, physical therapy and exercise, massage therapy, nerve block injections, and/or spinal manipulation.

To summarize, the benefits from TENS treatment can include:

- pain relief
- increased circulation and healing
- improved sleep pattern
- decreased use of pain relievers or other analgesic drugs
- increased motion and function

How does TENS work?

TENS produces an electrical impulse that can be adjusted for pulse, frequency, and intensity. The exact mechanism by which it works to reduce or even eliminate pain is still unknown. It is possible there are several different ways TENS works. For example, TENS may inhibit (block) pain pathways or increase of the secretion of the pain reducing substances (e.g., endorphins, serotonin) in the CNS.

Electrical nerve stimulation is a treatment for pain that is used primarily for chronic pain. The electrical stimulation is delivered through electrodes or patches placed on the skin. The technique and the device used is called *transcutaneous electrical neurostimulation* or TENS for short.

TENS is a noninvasive way to override or block signals from the nerves to the spinal cord and brain. Pain messages may be altered enough to provide temporary or even long-lasting pain relief. Besides controlling pain, this type of electrical stimulation can also improve local circulation and reduce or eliminate muscle spasm.

Recent research has also shown that *autosuggestion* or the *placebo effect* is a powerful way many people experience pain relief or improvement in symptoms. Simply by believing the treatment (any treatment, including TENS) will work has a beneficial effect on the nervous system. Many studies have shown that people get pain relief through the placebo effect alone.

How do I use my TENS unit?

You will be shown how to use your TENS device by your healthcare provider trained in the set-up and use of this modality. Round or square rubber electrodes are applied to the skin over or around the painful area. Usually four electrodes (two pairs) are used to get

maximum benefit from this treatment.

The electrodes are self-adhesive with a protective layer of gel built in to prevent skin irritation or burning. The unit is battery-operated with controls you manipulate yourself to alter the strength of the electrical signal. The unit can be slipped into a pocket or clipped to your belt. You may use two or four electrodes.

The electrodes will be placed on your body at positions selected by a physician or physical therapist. The electrode placement is determined based on the location of the involved nerves and/or the location of your pain.

The first place to try the electrodes is either directly over the painful area or on either side of the pain. You will slowly turn up the intensity of the unit until you feel a buzzing, tingling, or thumping sensation strong enough to override the pain signals.

If that doesn't work, you may get better results putting the electrodes over the area where the spinal nerve root exits the vertebra. Sometimes it takes a bit of trial and error to find the right settings and best electrode placement for you.

Be sure and let your healthcare provider know if you experience increased pain. Electrodes placed below the level of a peripheral nerve impairment might actually block the input from the TENS unit and cause increased pain. Or placement over an area of scar tissue from surgery can cause increased skin resistance and decreased transmission of the electrical impulses.

Another way to use TENS is over spots in the muscles that trigger pain called *trigger points* (TrPs). Trigger points are areas of hyperirritability in the muscles that can cause chronic pain. The healthcare provider will identify any TrPs present during your exam. Usually TrPs are taken care of with a treatment

designed to eliminate them. In some patients they are chronic and don't go away or come back easily. In such cases, TENS may be helpful.

Your health care team will guide you through the trial-and-error process for finding the best electrode placement for you and make any changes needed in the program.

When you should not use TENS

- If you have loss of skin sensation or even decreased sensation, you should not use TENS. With altered sensation, there is a risk of turning the unit up too high and causing injury or harm.
- The use of TENS is not recommended for older adults with Alzheimer's, dementia, or other cognitive problems.
- If you have a cardiac pacemaker, you should not use TENS as the electrical signals could interfere with your pacemaker. Cardiac patients should not use TENS without their physician's approval.

Some guidelines when using TENS

- Before applying the electrodes, it is important to remove all lotions, oils, or other applications to the skin. You may want to shave hair from the local area where the electrode will be applied.
- Daily use of TENS for several hours at a time is recommended. You should not wear the unit for long periods of time (e.g., 24 hours) or during extended sleep time (napping is okay but TENS should not be used while sleeping at night or for more than a couple of hours).
- Never place an electrode over an open wound or area of skin irritation. Report any skin problems or burns immediately.

- Do not place electrodes near your eyes or over your throat.
- Do not use TENS in the shower or bathtub.
- Move the electrodes a bit each time you put them on to avoid skin irritation.
- You should experience a comfortable tingling sensation that is comfortable enough to allow you to complete daily tasks and activities.
- You may want to keep a daily journal of your pain levels, the settings you use, and a record of the medications you are taking for pain relief. By reviewing your notes, you may find the best combination of electrode placement and unit settings that gives you the most pain relief.

What can you expect with TENS?

You should feel a mild to moderately strong tingling or buzzing sensation. Some people experience a more unpleasant sensation described as *burning* or *prickling*. Depending on the intensity and duration of your pain, you may or may not get results right away.

It can take several days to even several weeks to get the desired results. Differences in results may occur based on properties of skin resistance, type of pain, and individual differences in the mechanism of pain control. Be patient and persistent. Do not hesitate to contact your healthcare provider as often as it takes to get the desired results.

Many patients do report good-to-excellent results, first with pain control, then pain relief, and finally reduction in the use of medications. Although it doesn't happen for everyone, some chronic pain patients are "cured" permanently from their pain.

As each of these benefits from the TENS treatment occur, you may find yourself

increasing your activity level – either with the same level of TENS usage or even with reduced frequency of use, intensity of signal, or duration (length of time the unit is turned on).

If for any reason your pain starts to increase in frequency, duration, or intensity, don't assume the treatment isn't working for you. First, check the TENS unit for any malfunction, need to recharge, or replace the electrodes with new ones. If your unit is battery-operated, you may find it necessary to turn the intensity up to obtain the same sensation when the batteries are low. This should alert you to the need for battery replacement.

Finally, be aware that some patients experience “breakthrough pain,” referring to a situation in which you get pain relief at first but then even with the TENS unit, you start to have pain once again. Turning the intensity up high enough to cause muscle contraction is an indication of breakthrough pain.

Sometimes a different setting for the stimulator may be needed when this happens. Most units have a setting that allows for random pulse frequency, duration, and amplitude. The use of this setting helps keep the nervous system from getting used to a specific amount of stimulation and ignoring it. This phenomenon is called *habituation* or *adaptation*.

Summary

TENS is an effective method of pain control for chronic pain when you want to maintain your normal routine of daily activities that would otherwise be hampered by too high of pain levels. TENS helps many people reduce and sometimes even eliminate the use of pain medications, thus avoiding side-effects of long-term drug use.

Even without complete pain relief, TENS makes it possible to stay active and participate in work, family, and even recreational activities. There are no significant adverse effects from the use of TENS. The ability of this treatment technique to moderate pain and reduce the use of pain medications is a real benefit -- especially with the potential for serious or adverse effects from long-term use of pain relievers.

Notes