

# Transcutaneous Electrical Nerve Stimulation

TENS  
FACT  
SHEET



## What is Transcutaneous Electrical Nerve Stimulation (TENS)?

Transcutaneous Electrical Nerve Stimulation (TENS) is the use of electric current produced by a medical device to stimulate the nerves for therapeutic purposes.

TENS may be used as a single therapy or in combination with medication or other medical treatments in patients to relieve various types of pain.

## How does TENS work?

TENS therapy relieves pain by activating sensory nerve fibres in both the central and peripheral areas of the nervous system. This results in the activation of natural pain relief mechanisms, to reduce activity in the body's pain sensing system.

At the peripheral level, TENS therapy applied at high frequency HF (in the order of 90 - 130 Hz), activates fast transmitting, non-painful sensory nerves in a mechanism called "gate control".

By travelling faster, non-painful sensory input reaches the spinal cord before the slower moving pain signals. The non-painful input hence competes with and prevents painful input from travelling to the pain-sensing regions of the brain, by flooding conduction pathways to the brain and closing the nerve "gates" to painful stimuli.

TENS therapy applying low frequency LF (in the order of 2 - 5 Hz), nerve stimulation affects the central level of the nervous system, reducing pain by promoting the:

- Release of the natural opioid (endorphins) and other pain inhibiting chemicals such as serotonin.

Endorphins act on opiate receptors to reduce pain perception in the same manner as medications like morphine and codeine. However, unlike medication, opiate receptor activation by endorphins does not lead to addiction or dependence.

- Reduction of several chemicals that would otherwise increase painful sensations including kinins, cytokines, arachidonic acid derivatives.

Clinical studies examining brain scans confirm pain inhibiting activity in the cerebral cortex when TENS therapy was applied.

**Note:** It is unlikely that a single central and peripheral frequency in ranges quoted above works best for everybody. As the effectiveness of TENS Therapy is based on a range of parameters, individual experimentation to discover the most appropriate combination of frequencies is required to achieve the best treatment outcome.



## What can TENS Treat?

Clinical evidence supports TENS use for the relief of pain associated with the following conditions<sup>2</sup>:

- **Acute Pain** – sprains, hematomas, contusions, muscle tears, fractures, tendon and ligament conditions, menstrual cramps, labour, post-operative, and dental pain
- **Chronic Pain** – osteo- and rheumatoid arthritis, joint pain, fibromyalgia, musculoskeletal pain, repetitive strain injuries, sciatica
- **Central Neuropathic Pain** - spinal cord injury, post-stroke pain, multiple sclerosis,
- **Peripheral Neuropathic Pain** – trigeminal neuralgia, diabetic and chemotherapy induced neuropathy, post herpetic pain.
- **Miscellaneous Pain** -wound pain, tension headache, muscle tension

## Benefits of TENS Therapy

TENS therapy has potential benefits relating to:

- Being a non-invasive therapy for pain relief without risk of addiction or toxicity.
- Efficacy, comparative safety, convenience, simplicity and low cost.
- Therapy is available on demand and may be administered at any time – empowering patients.
- Wellness including improved sleep, increases blood circulation and lymphatic flow, etc
- It reduces tension, which can assist patients increase physical function and range of movement.



# Transcutaneous Electrical Nerve Stimulation

TENS  
FACT  
SHEET



## When is TENS Unsuitable to Use?

TENS therapy should be avoided, unless first approved by your doctor, in the following groups:

- People with heart problems or who are fitted with a pacemaker or with another type of electrical or metal implant
- Pregnant women should avoid using TENS devices early in their pregnancy.
- Those with epilepsy, as applying electrodes to the head or neck areas may induce seizures.
- People with malignant conditions

Avoid electrode placement over the carotid artery and heart.

## Benefits of TENS Therapy

TENS therapy has potential benefits relating to:

- Being a non-invasive therapy for pain relief without risk of addiction or toxicity.
- Efficacy, comparative safety, convenience, simplicity and low cost. Therapy is available on demand and may be administered at during activity or while sleeping - helping patients feel empowered.
- Wellness including improved sleep, increases blood circulation and lymphatic flow, etc
- It reduces tension, which can assist patients increase physical function and range of movement.



## Caution

For the treatment of minor medical complaints TENS use offers effective self-treatment.

TENS self-treatment is not a substitute for adequate diagnosis and ongoing clinical management for serious medical conditions and rehabilitation procedures.

In such situations, the most effective way to use TENS is in the context of a multidisciplinary pain management approach, which addresses the physical, psychological, social and environmental factors that influence your pain.

Following medical diagnosis and advice, TENS therapy can be self-administered.

## Summary

- TENS stands for Transcutaneous Electrical Nerve Stimulation
- It is a drug-free therapy that can be helpful in reducing many types of pain
- The pain relief benefits of TENS therapy are comparable to or better than massage, acupuncture, heat packs, over-the-counter analgesics, and muscle relaxants
- Following medical diagnosis and advice, TENS can be self-administered at home and on demand

## References

- Robertson, V, Ward A, et al, Electrotherapy Explained – Principles and Practice; Fourth Ed Butterworth Heinemann Press, 2006
- Johnson, MI Transcutaneous Electrical Nerve Stimulation (TENS) Chapter 8, 151-168. Oxford Uni Press, 2014
- DeSantana, J., Walsh, D, et al.: Effectiveness of Transcutaneous Electrical Nerve Stimulation for Treatment of Hyperalgesia and Pain. *Curr Rheumatol Rep.* 2008 December; 10(6): 492-499
- Karasuno, H., Ogihara, H., et al., The Combined Effects of Transcutaneous Electrical Nerve Stimulation (TENS) and Stretching on Muscle Hardness and Pressure Pain Threshold. *J Phys Ther Sci.* 2016 Apr; 28(4): 1124-1130.
- Dubinsky RM, Miyasaki J Assessment: Efficacy of transcutaneous electric nerve stimulation in the treatment of pain in neurologic disorders (an evidence-based review): Report of the Therapeutics and Technology Assessment Subcommittee of the American Academy of Neurology. *Neurology.* 74 (2): 173-176.
- Ellrich J, Lamp S Peripheral Nerve Stimulation Inhibits Nociceptive Processing: An Electrophysiological Study in Healthy Volunteers. *Neuromodulation: Technology at the Neural Interface.* 2005, 8 (4): 225-232.

