

## **INTRODUCTION TO T.E.N.S.**

*You have just been prescribed TENS, a medical device to assist you in your management of pain.*

### **WHY DO WE HAVE PAIN?**

Pain is the body's warning system. It alerts us to injury or illness. When the body is functioning normally pain serves as a vital warning sign when something is not right. Without pain a person would not know when to get away from danger or to seek medical help.

Pain signals in the form of electrical impulses travel through the body's nervous system from the site of injury or ailment to the brain. Then, at the brain, these impulses are interpreted as pain.

### **WHAT IS TENS?**

T.E.N.S. stands for Transcutaneous Electrical Nerve Stimulation. Pain, whether chronic (long-term) or acute (short-term, often from surgery or trauma) can be relieved through a variety of methods including drugs, topical ointments, surgery and electrical stimulation. TENS devices deliver mild electrical pulses through the skin to stimulate the cutaneous (surface) and afferent (deep) nerves to help control pain. Unlike drugs and topical ointments TENS does not have any known side effects other than the possibility of mild irritation at the site of stimulation.

### **HOW DOES TENS CONTROL PAIN?**

There are two major theories as to how electrical stimulation relieves pain. According to the “**gate control theory**” pain and non-pain impulses are sent to the brain from the local nervous system. These impulses travel through the cutaneous nerves to the deeper afferent nerves and then to the spinal cord and brain. Along the path are many areas referred to as “gates”. These gates control which impulses are allowed to continue to the brain. The gates prevent the brain from receiving too much information too quickly. Since the same nerve cannot carry a pain impulse and a non-pain impulse simultaneously, the stronger non-pain impulse (from the TENS device) “controls the gate” and basically overrides the pain signal, resulting in less pain perception.

According to the second theory, TENS stimulation encourages one's own body to produce and release greater amounts of a chemical called **endorphin**. Endorphins are our body's own natural painkillers that are released as a natural function to overcome pain. Endorphins interact with pain receptors, blocking the perception of pain much as the pharmaceutical drugs or a narcotic such as morphine does, but without the side effects associated with these types of drugs.

TENS has no curative value; however for many people who are suffering from pain due to an injury or ailment, the use of TENS can help manage their pain considerably. Pain sufferers who have not been able to find relief from drugs or who may have experienced uncomfortable side effects from drugs may find TENS to be a great alternative in controlling their pain. In today's fast-paced lifestyle, many people just do not have the time to be set back due to pain. TENS devices can help them control and manage their pain so that they may still be able to perform their daily functions at home or at work, return to work sooner, or perhaps enjoy more activities than they have before.

## **CONTROLS AND THEIR FUNCTIONS**

*Please read the following information before proceeding to operate your TENS device.*

### **AMPLITUDE CONTROLS**

These controls regulate the strength or intensity of the stimulation. For older 'analog' units the amplitude adjustments are performed with small turn knobs while most 'digital' devices use push buttons. The push button approach helps avoid the problem of increasing the stimulation too much with an accidental twist of the knob controls.

### **RATE and WIDTH CONTROLS**

These controls determine how fast and how long the electrical impulses are applied through the skin. Please follow any instructions given to you by your treating professional for proper control settings.

#### **PULSE RATE:**

The pulse rate control adjusts the number of pulses per second of each wave. Pulse rate is also referred to as frequency. Typical devices offers adjustable rates or frequencies (Hz) in the range of 2 - 150 pulses per second. This simply means how many pulses are coming out per second. Lower pulse frequencies produce a “beating” sensation whereas higher pulse frequencies produce a smoother, constant “tingling” sensation.

#### **PULSE WIDTH:**

The pulse width control adjusts the time length of each pulse within the wave. Pulse width is measured in micro-seconds. The typical device offers adjustable pulse widths of 40 - 300 u/seconds. Wider pulse widths (greater than 150 u/seconds) usually create a sensation of “deeper” stimulation.

## **MODE SELECTION**

Besides basic constant (non-changing) stimulation TENS devices offer several different mode settings for a variety of stimulation sensations: BURST, NORMAL and many MODULATED settings.

### **BURST:**

The Burst mode provides a "burst" of several pulses per second (usually at a fixed rate of 100 Hz). There are two bursts that are delivered per second. Use the Burst mode at low intensity settings to treat acute, superficial pain. Use at higher intensity settings resulting in strong muscle contractions to treat deep, chronic pain. This type of treatment is usually given in sessions lasting 15-30 minutes. You will feel a strong rhythmic pumping action of the affected muscles.

### **NORMAL:**

The Normal mode produces a continuous train of impulses. The stimulation parameters are not automatically interrupted nor varied in any way. In this mode the pulse rate, width and amplitude are fully adjustable. The normal mode is quite versatile because it may be applied with a variety of rate and width settings.

#### **High Rate - Normal Mode Settings** (most common):

RATE: 60 -150 Hz  
WIDTH: 70-150 u/sec

Wear minimum 30 minutes or longer for most general applications

#### **Low Rate/High Width - Normal Mode Settings** (acupuncture-like):

RATE: 2-4 Hz  
WIDTH: 200-250 u/sec

Treat 15 - 30 minutes. Greater endorphin release can help with pain from muscle spasms.

#### **Brief Intense - Normal Mode Settings** (analgesic effect):

RATE: 150 Hz  
WIDTH: 200-250 u/sec

Restrict to less than 20 minutes depending on degree of muscle stimulation and discomfort.  
Brings short-term relief for acute pain

**MODULATION:** In the modulation mode, the pulse width or rate (depending on your model) is automatically varied in a cycle to produce a pleasant, massage-like sensation. It is believed that nerves can become accustomed to or "accommodate" to the same electrical stimulus after a period of time and thus would require increasing the intensity to further "block" the pain. These Modulation modes were developed to offer a variety of different electrical stimuli, thus preventing nerve accommodation so that less intensity is required for long and effective treatment.

Using high intensity and/or wide pulse widths with this mode is recommended for 30 minutes to one hour; the analgesic effect may last several hours after the unit is turned off. If narrow pulse widths under 100 u/sec and/or low intensities are used the treatment period may have to be extended to be similarly effective.

## **ELECTRODE PLACEMENT GUIDELINES**

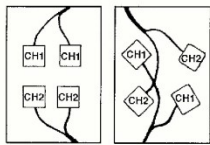


Figure 1  
In-line Placement is recommended for neck, sciatica and lower-back spine pain

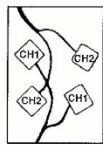
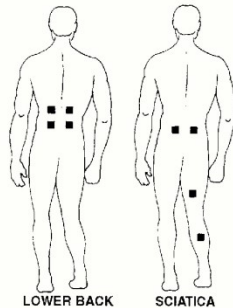
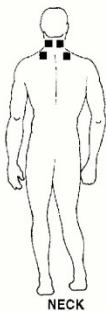


Figure 2  
Criss-Cross Placement is recommended for shoulder and lower-back spine pain



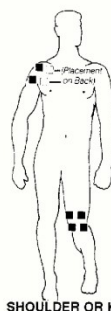
LOWER BACK      SCIATICA



NECK



NECK/LOWER BACK



SHOULDER OR KNEE

This chart shows common electrode placement positions for treatment of typical pain conditions. This is only a guideline. If you are not sure where to place your electrodes or what settings to use, please consult your therapist or doctor.

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