

# Chapter 9

## Musculoskeletal and Posturo–Occlusal Disorders Managed With Transcutaneous Electrical Nerve Stimulation (TENS) and T–Scan–Guided Occlusal Therapy

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### ABSTRACT

*Masticatory muscle hyperactivity has been considered a significant factor in promoting and perpetuating dysfunctional symptoms observed in Temporomandibular Disorder patients. Many therapeutic modalities have evolved within dental medicine that attempt to lessen or resolve the varying symptoms frequently reported by dysfunctional patients. One such method, known as ultra low frequency (ULF) transcutaneous electrical neural stimulation (TENS), has been used to relax the masticatory musculature by applying an electrical stimulus to the efferent motor fibers of the V<sup>th</sup> and VII<sup>th</sup> cranial nerves, such that TENS can result in pain analgesia and patient sedation, restore compromised muscle physiology and increase muscle resting length. TENS also aids in establishing a neuromuscular maxillomandibular relationship by inducing a muscularly contracted involuntary arc of closure. This chapter will illustrate TENS as a treatment modality for Temporomandibular Disorders (TMD), explain how to employ TENS to obtain a neuromuscular maxillomandibular relationship, and describe a case report of TENS use in combination with T-Scan computerized occlusal analysis, to measurably and physiologically balance a removable anatomical acetyl resin orthotic overlay prosthesis. This chapter will also explain the interrelationships between TMD musculoskeletal problems and Posturo-Occlusal disorders, and how Disclusion Time Reduction therapy (DTR) with occlusal rebalancing, performed with the T-Scan 10/BioEMG synchronization, can improve whole body alignment. A few clinical case examples of how changing the occlusion with the T-Scan technology can improve whole body posture illustrates this important component of the chapter, as dental treatment is often provided without considering how occlusal changes affect a patient's body far away from the oral cavity. Lastly, the five Kinetic Chains that provide all human physiologic functionalities are described in detail, after which the chapter concludes with a discussion about the*

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*three problems of occlusion.*

## **INTRODUCTION**

Masticatory muscle hyperactivity has been considered a significant factor in promoting and perpetuating dysfunctional symptoms observed in Temporomandibular Disorder patients. Muscle hyperactivity leads to facial pain, clenching and grinding habits, temporal headaches, and mandibular fatigue. Suggested muscle relaxation treatments include muscle relaxant medications (Dionne, 1997), biofeedback (Dalen, Ellertsen, Espelid, & Gronningsaeter, 1986), stress reduction counseling (Schumann, Zwiener, & Nebrich, 1988), intraoral orthosis (Carr, Christensen, Donegan, & Ziebert, 1991), and therapeutic massage (Wright & Schiffman, 1995).

Ultra Low Frequency (ULF) Transcutaneous Electrical Neural Stimulation (TENS) has been shown in to cause direct stimulation of motor nerves (Gomez & Christensen, 1991). This stimulatory effect can be used to relax hyperactive masticatory musculature, by applying a once-per-second electrical stimulus to the efferent motor fibers of the V<sup>th</sup> and VII<sup>th</sup> cranial nerves (Kamyszek, Ketcham, Garcia, & Radke, 2001). After electrodes are properly placed on the patient's head (Figure 1), brief rhythmic twitch contractions are induced within the musculature, resulting in an increase in circulation and a reduction in posturing electrical activity (Kamyszek, Ketcham, Garcia, & Radke, 2001). Afferent nerve fibers are also stimulated during the pulsing, such that TENS has been used to provide analgesia for patients suffering from facial pain (Holt, Finney, & Wall, 1995), to control the pain response to cavity preparation (Horiuchi, Suda, Hanada, & Suzuki, 1978), and as a method of patient sedation (Shane & Kessler, 1967).

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