

# **Iontophoresis and Phonophoresis**

Iontophoresis and phonophoresis are used to drive medication into a desired tissue. Iontophoresis uses electrical stimulation to deliver the medication while phonophoresis uses sound waves, through ultrasound, to drive the molecules into the tissue.

With iontophoresis a low-voltage, direct current is used with a medication that has a certain charged ion. Ions want to move towards the opposite polarity of their charge so the direct current of the low-volt equipment can drive the medication from one pad to the other through the tissue the medication needs to be applied to. These medications can decrease inflammation, reduce pain, heal tendonitis, and encourage wound healing. Dexamethasone and Lidocaine are two commonly used solutions used in iontophoresis. These treatments have a risk of skin burns so care should be taken and all contraindications considered.

Phonophoresis uses sound waves instead of electrical currents to drive molecules through the skin into the tissues. The ultrasound involvement in phonophoresis opens pathways that allow the medication to be absorbed through the skin, instead of the medication being driven into the skin through the flow of ions as in iontophoresis. The risk of burns is less with phonophoresis but all contraindications should be reviewed with regards to ultrasound.

# **Electromyographic Biofeedback**

Biofeedback is the use of an electrical instrument to provide information about actions in the body. Electromyographic feedback is the most common use of biofeedback in the therapeutic rehabilitation setting. Biofeedback measures the action of a muscle and then gives feedback to the patient through visual or auditory signals. This information can help patients regain muscle control and reduce muscle guarding.

# Diathermy

Diathermy uses high frequency electromagnetic energy to generate heat within the body. It is a thermal modality because it causes high frequency vibrations of molecules within the body that result in deep heating of targeted tissues. Diathermy can produce both thermal and non thermal effects on tissue. The thermal effects include muscle relaxation, pain reduction, increased circulation, decreased inflammation, and reduced stiffness. Non thermal effects of the treatment include wound and tissue healing, as well as edema reduction. Shortwave and microwave are the two kinds of diathermy.

Shortwave diathermy can be continuous or pulsed. Continuous setting creates a deep heat where as pulsed has non thermal effects. Shortwave diathermy is considered safer than microwave diathermy and the electromagnetic field in shortwave diathermy is created by either a capacitor or through induction.

Microwave diathermy uses a higher frequency and shorter wavelength than shortwave diathermy to create the electromagnetic field. Microwave diathermy has not been shown to penetrate fat layers as well.

Make sure and review the indications and contraindications of Diathermy from figure 7.0 on page 192.