

**Part 3:
Cryotherapy, Thermotherapy, Ultrasound,
and Other Modality Techniques**

Review pages 193-218 of the textbook for this section of the workbook

DEFINE YOUR KNOWLEDGE

Cryotherapy and Thermotherapy

Heat and cold modalities both use the principle of heat transfer to move thermal energy across a temperature gradient. Heat will always travel towards cooler areas. This thermal transfer can create a change in circulation, muscle spasm, and pain. There are three methods of heat transfer:

1. **Conduction** occurs when there is a direct contact between the body and the hot or cold modality.
2. **Convection** occurs when air or water particles move across the body and create temperature changes.
3. **Radiation** is the transfer of heat from a warmer source to a cooler source without physical contact.

Cryotherapy uses cold modalities to decrease the temperature of body tissues and is most often used in acute and sub acute injuries. There are three common physiological responses to Cryotherapy. Cold treatment has an analgesic effect that decreases pain sensations. It also creates vasoconstriction that reduces inflammation by slowing blood flow. Finally, cold treatments can decrease cellular metabolism and the accumulation of edema.

When a cold modality is applied, the body will typically go through a progression of sensations.



Since cryotherapy has the ability to reduce edema and pain, it is commonly used for at least the first 72 hours after an injury. Each treatment is usually at least 15 minutes long. The most common forms of cryotherapy treatment include ice bags, frozen gel packs, ice cup massage, and cold whirlpool.

Thermotherapy uses superficial heating in primarily sub-acute and chronic conditions to reduce pain and relax muscle tissues. The physiological response of heat is the dilation of blood vessels which improves circulation and encourages the removal of waste at the injury site. Common forms of thermotherapy treatment include hydrocollator packs, microwave heat packs, paraffin baths, and warm whirlpools.

Therapeutic Ultrasound

Ultrasound uses acoustic energy at a high frequency that can have both diagnostic and therapeutic effects. In the chiropractic setting, ultrasound is used as a therapeutic modality that has both thermal and non-thermal physiological effects. Ultrasound creates the vibration of molecules in targeted tissue and the resulting physiological effects achieved during ultrasound are dependent on several factors.

1. Frequency of an ultrasound determines the depth of penetration. Measured in megahertz (MHz), higher frequency waves absorb more quickly than lower frequency ones. The setting of 1 MHz will be a deeper penetration than 3 MHz which will be more superficial.
2. Choosing pulsed or continuous ultrasound will determine if the treatment has thermal or non-thermal effects. Continuous ultrasound produces thermal effects because it is constantly generating energy and vibrating molecules. Pulsed ultrasound only produces energy part of the time so it creates non-thermal effects.
3. Intensity of ultrasound is the amount of energy delivered to the area. Expressed in watts per square centimeter (W/cm^2), higher intensity means the patient will feel more heat.