UNIT 2: Therapeutic Modalities

THERMAL AGENTS

BELLWORK
DEFINE THE FOLLOWING
CRYOTHERAPY
HEAT THERAPY
THERAPEUTIC MODALITIES
KEY TERMS

- Analgesic – an agent that relieves pain without causing a complete loss of sensation (ice pack, icy hot, flex-all)
- Analgesia – pain reduction
- Vasoconstriction – decrease size of blood vessel (decrease blood flow)
- Vasodilation – increase size of blood vessel (increase blood flow)
- RICE – Rest, Ice, Compression, Elevation (used to control swelling)
- Edema – collection of fluid in connective tissue
Cryotherapy (cold therapy)

- Application of cold for the 1st aid of trauma to the body
- Depending on the severity of an injury, RICE may be used from 1 day to as long as 2 weeks after the injury
- Muscle temp can be reduced depending on depth and amount of time cold is applied
Cold Modalities

- Gel Pack
- Ice pack
- Ice towel
- Ice cup
- Whirlpool or bucket
Physiological Effects of Cold

- 15 min or less causes vasoconstriction of the arterioles and venules in affected area
- 15 – 30 min vasodilation occurs 4 – 6 min
  - Known as hunting response – reaction against tissue damage from too much cold exposure
Physiological Effects of Cold

- Cold slows the metabolic rate of cells, which results in less damage to the tissues, thus decreasing rehab time.
- When applying cold to an injury, swelling will be reduced in an acute inflammatory phase.
Physiological Effects of Cold

- Cold does not reduce swelling that is already present
- Cold decreases muscle spasm, pain perception (analgesia), blood flow, metabolic rate and collagen elasticity
- Increase jt stiffness
Special Considerations

- Allergic to cold (rash, blister, labored breath)
- Extended exposure can cause frostbite (no longer than 20 – 30 min)
- Nerve Palsy – peroneal nerve at fibular head and ulnar nerve at elbow (loss of motor nerve function)
- Condition resolves after a short period of time after ice is removed
Cryokinetics

A technique that combines cryotherapy with exercise

Application
- Apply ice (12 – 20 min)
- Exercise – numbness (3 – 5 min)
- Apply ice (3 – 5 min)
- Exercise
- Repeat 5 times
Cryostretch

- Indicated when pain inhibits stretching
- A technique that combines cryotherapy with stretching
REVIEW TIME!!!!

- What is another name for ice application or cold therapy?
- Identify 3 different cold applications.
- Identify three physiological effects of ice application.
- For an acute ankle sprain, what would be the most practical therapeutic modality?
  - Shin splints?
  - Patella tendinitis?
  - Shoulder dislocation?
  - Ulnar nerve damage?
TRANSFER OF HEAT

- HEAT WILL ESSENTIALLY DO THE EXACT OPPOSITE OF ICE
- IT’S USE IS MORE LIMITED THEN ICE APPLICATIONS DUE TO THE PHYSIOLOGICAL EFFECTS OF HEAT
ROLE OF THERMAL AGENTS

- TRANSFER OF ENERGY TO A PATIENT TO INCREASE OR DECREASE TISSUE TEMP
- HOT PACK: GREATEST CHANGE IN TEMP OVER TREATED AREA,
  - SUPERFICIAL
- ULTRASOUND:
  - 5CM deep
  - only in a small area
HEAT MODALITIES: THERMOTHERAPY

APPLICATIONS ARE CLASSIFIED AS SUPERFICIAL OR DEEP

LOCAL EFFECTS:

- VASODILATION
- INCREASED:
  - CELL METABOLISM
  - CAPILLARY PERMIABILITY
  - VENOUS & LYMPHATIC DRAINAGE
  - ELASTICITY OF LIGAMENTS, CAPSULES, MUSCLES, ETC.,
LOCAL EFFECTS CON’T

- EDEMA FORMATION
- REMOVAL OF METABOLIC WASTE
- ANALGESIA AND SEDATION OF NERVES
- DECREASED MUSCLE TONE
- DECREASED MUSCLE SPASM (NOT IN ALL CASES)
- INCREASED NERVE CONDUCTION
SYSTEMIC EFFECTS

- INCREASED BODY TEMP
- INCREASED PULSE RATE
- INCREASED RESPIRATORY RATE
- DECREASED BLOOD PRESSURE
INDICATIONS FOR USE

- SUBACTUE OR CHRONIC INFLAMMATORY CONDITIONS
- REDUCTION OF SUBACUTE OR CHRONIC PAIN
- SUBACUTE OR CHRONIC MUSCLE SPASM
- DECREASED ROM
- REDUCTION OF JOINT CONTRACTURES
- DOMS
CONTRAINDICATIONS

- ACUTE INJURIES
- IMPAIRED CIRCULATION
- POOR THERMAL REGULATION
- ANAESTHETIC AREAS
# CONTRAST HEAT VS COLD

<table>
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<th>EFFECT</th>
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<tr>
<td>DEPTH</td>
<td>5CM</td>
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<td>MUSCLE SPASM</td>
<td>DECREASE - SENSITIVITY</td>
<td>DECREASE – ISCHEMIA &amp; PAIN</td>
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TYPES OF HEAT MODALITIES

HOT WHIRLPOOL

CONTRAST BATH:
3-1 OR 4-1 HOT TO COLD – SUBACUTE/CHRONIC

WHY DO THIS?

THEORY:

   VASCULAR EXERCISE: VASODILATION TO
   VASOCONSTRICTION CREATING A PUMPING
   MECHANISM
   STIMULATING BLOOD FLOW, VENOUS RETURN
   ETC.,
   SOMETIMES UTILIZED DURING TRANSITION FROM
   COLD TO HOT TREATMENT
TYPES CON’T

HOT PACKS:
SUPERFICIAL HEAT MODALITY
CREATE THE GREATEST CHANGE IN TEMP
20-30 MINUTES

PARAFFIN BATH
15-20 MINUTES
IRREGULAR AREAS
INCREASES PERSPIRATION OF THE TREATED AREA

INFRARED LAMP – RADIANT ENERGY FOR SUPERFICIAL HEATING

SHORTWAVE DIATHERMY – DEEP-HEATING MODALITY
CONVERTS HIGH FREQUENCY ELECTROMAGNETIC ENERGY TO HEAT
ASSIGNMENT

IDENTIFY AND EXPLAIN THE BENEFITS OF BOTH HOT AND COLD MODALITIES AND PROVIDE 3 EXAMPLES OF SPECIFIC TYPES OF TREATMENTS FOR EACH MODALITY AND FOR WHAT CONDITION THEY WOULD BE USED FOR. THEN EXPLAIN WHY YOU WOULD USE THEM IN THE IDENTIFIED SITUATIONS. USE COMPLETE SENTENCES IN ESSAY FORMAT.
Ultrasound

Physical Effects:

- **Thermal**: Deep heating modality
- **Mechanical**: results from mechanical vibrations; causes a “micromassage”; this concept is thought to break up collagen fibers – scar tissue
- **Chemical**: accelerates enzyme activity; increases capillary permeability; increases ATP activity
Clinical Use:

- Utilized for treating the following:
  - Contractures
  - Tendonitis
  - Bursitis
  - Scar tissue
  - Muscle spasming
  - Pain
  - Calcification
Application Methods

- **Direct Skin**: coupling medium is used directly between the skin and ultrasound device – used a variety of levels depending on what treatment you are trying to achieve

- **Underwater**: used over irregular areas to maintain a air tight application, ie ankles, hands fingers, etc.,
SETTINGS/DOSAGES:

Dosages and treatment times are dependant on:

- Depth of tissue being treated, and state of injury
- Low intensity - 0.1 - 0.3 watts/cm³
- High Intensity – 1.5 – 3.0 watts/cm³
- Time: 3-8 minutes
PHONOPHORESIS:
Method of driving molecules through the skin by ion transfer by the mechanical vibration of ultrasound. Used with the application of corticosteroids to reduce subacute or chronic inflammation.