

| Therapeutic Agents | Therapeutic Goals | Mechanism of Effect | Physiological Effect | Contraindications | Precautions |
|--|--|--|--|--|---|
| <p>Massage (STM) Effleurage Petrissage Tapoment Friction Vibration</p> | <p>Warming Relaxation Inhibition Release Stretching</p> | <p>Assist venous flow Assists lymphatic flow Stretches tissue Scar tissue stretching or release</p> | <p>Metabolic stimulus Combat venostasis Reduce edema</p> | <p>Malignancy Pregnancy (over abdomen during first trimester) Inflammation Acute injury Osteoporosis Hemorrhage or hematoma Fracture Acute rheumatic Condition Systemic conditions Localized conditions 24 hours after scuba diving Intoxication Psychosis</p> | <p>Tissues vulnerable to hemorrhage or hematoma Near skin lesions/damage Over thoracic area in thin or frail pts Over eyes Over neoplasm or infection Cranio-facial/cervical area in pts with h/o seizure CVA Over abdomen, lumbo-pelvic area during pregnancy Impaired mentation Impaired sensation Lack of voluntary control While operating motor vehicles (motor level) Obesity Osteoporosis While sleeping</p> |
| <p>Electrotherapy</p> | <p>Elicit muscle contractions (NMES) Control pain (TENS) Enhance tissue healing (HVPC, Interferential) Facilitate movement Biofeedback Nerve conduction velocity testing Electroacupuncture</p> | | <p>Gate theory of pain control Release of endorphins</p> | <p>Pacemaker Over carotid sinus Thrombophlebitis Indwelling stimulator (ie: for urinary bladder or phrenic nerve) Near diathermy (5 meters)</p> | |

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| Laser (cold) Electromagnetic rad | Healing | Electric and magnetic fields Inverse squared law Cosine law | Cellular ↑ ATP production stim macrophages stim fibroblast to ↑ collagen prod. Δ nerve conduction or regeneration Vasodilatation | Eyes 4-6 month after radiation therapy Hemorrhaging regions Endocrine glands | Malignancy Over the abdomen during menstruation Epilepsy Fever Gonads Epiphyseal plates – kids Disorientation Infection Over/near sympathetic ganglia |
| UV Electromagnetic rad | ↓ Skin disorders ↓ psoriasis Wound healing | | Erythema Tanning Epidermal hyperplasia Vit D synthesis Immune system effects | Eyes Skin cancer Pulmonary tuberculosis Cardiac, kidney, liver disease Syst. Lupus Erythem. Fever | Photosensitive drugs Photosensitivity Recent x-ray tx Didn't check previous UV dose Young/old Renal & hepatic disease (e.g. diabetes) |
| Diathermy Electromagnetic rad. Types: Inductive Capacitive plates Magnetron | ↓ edema ↓ pain Wound healing Nerve healing Bone healing Other (thermal benefits) | | <u>Thermal:</u> discussed earlier <u>Non-thermal:</u> ↑ microvas. perfusion Δ ion binding Regulates cell growth ATP & protein synth. Δ Ca2+ binding | Malignancy Pregnancy Pacemaker Metal Electromedical devices Hemorrhagic areas Acute inflammation Ischemic tissue Eyes Internal organs Moist wound dressings | Impaired mentation Impaired sensation Joint inflammation Space occupying lesion Menstruation Bones in kids PT overexposure Obese pt |

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| <p>Hydrotherapy <i>Potential adverse effects – drowning, burning, fainting, hypotremia, infection, ↑ edema, systemic effects.</i></p> <p>104-110° to increase tissue extensibility for approx. 20 minutes</p> <p><i>Not more than 110°!!</i></p> | <p>Heating/cooling Wound care Water exercise Pain control Edema control</p> | <p>Specific heat Thermal conductivity Buoyancy Hydrostatic pressure Viscosity Heat transfer – Conduction convection</p> | <p>Cleansing – mech agil. Musculoskeletal CV - ↑SV, ↑CO Resp. effects - ↑ Wb Renal - ↑ urine product. Psychological effects</p> | <p><i>Local Immersion</i> Maceration of wound Bleeding <i>Full body immersion</i> Cardiac instability Infections Severe epilepsy Suicidal patients</p> | <p><i>Local immersion</i> Impair. thermal sens. Impaired mentation Infection Recent skin grafts <i>Full body immersion</i> Confusion/imp. ment. Alcohol ingestion Limited strength, endurance, balance & ROM Urinary incontinence Medications (check) Respiratory problems</p> |
| <p>Cryotherapy Cold packs Ice bag (28±12.5) Cryocuff Cryokinetics Ice mass. (18±2.5) Vapocoolant spray Cold whirlpool approx. 32-79°F</p> <p>10-15 minutes for pain inflammation and edema. 30 minutes to decrease spasticity.</p> | <p>↓ pain ↓ swelling ↓ edema ↓ inflammation ↓ muscle spasm facilitate movement</p> | <p>Conduction Convection Evaporation</p> | <p>Vascular Vasocon(<15min) Vasodil.(>15min) Metabolic - ↓ met rate Neurological ↓ conduct. velocity ↑ pain threshold ↓ Spasticity Facilitate mus.contr. Δ muscle strength</p> | <p>Cold hypersensitivity Cold intolerance Cryoglobulinemia Cryoglobulinuria Raynauds disease Over regenerating nerve Circulatory compromise</p> | <p>Superficial nerve Open wound Hypertension Poor sensation Poor mentation Very young/old</p> |

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| <p>Superficial heat</p> | <p>↓ Pain ↑ Soft tissue exten. Relaxation ↑ Circulation healing</p> | <p>Conduction Convection Radiation</p> | <p>Vascular-vasodilation Metabolic Neuromuscular Connective tissue - thixotropy</p> | <p><u>Hard:</u> Recent or potential hemorrhage Thrombophlebitis IR irradi of eyes Infection <u>Relative:</u> Acute injury/inflammation Impaired mentation Impaired sensation Malignancy</p> | <p>Pregnancy Impaired circulation Poor thermal regulation Edema Cardiac insufficiency Metal in area Over an open wound Topical counterirritant application (recent).</p> |
| <p>Ultrasound</p> | <p><u>1. Thermal:</u> Warm tissue-↑ exten. ↓ Pain ↓ Plantar warts <u>2. Non/Thermal:</u> ↓ Muscle spasm <u>3. Nonthermal:</u> ↓ Inflammation Ulcers ↓ Resorption of Ca2+ Bone fx healing Surg. incision healing ↑ drug delivery (phono) ↓ herpes zoster infect.</p> | <p><u>Thermal</u> (absorption of sound waves causes oscillation of molecules) ↑ heat. <u>Non-thermal</u> Cavitation Acoustic steaming Microstreaming</p> | <p><u>Thermal:</u> ↑ Metabolic rate ↑ Circulation ↑ Extensibility Relaxation ↓ Pain ↑ Healing ↑ ROM <u>Nonthermal:</u> ↑ intracell. Ca2+ ↑ Mast cell degran. ↑ Chemotaxic factor ↑ Phagocytosis ↑ Fibro. protein syn. ↑ Skin/cell permeab</p> | <p>Malignancy Pregnancy Pacemaker Plastic components Joint cement CNS tissue Over reprod. organs Eyes Thrombophlebitis</p> | <p>Acute inflammation Breast implants Impaired circulation Over epiphyseal plates Fractures Impaired mentation Impaired sensation</p> |