14.	**4 Types of Energy Transfer**	(1) Absorption (2) Transmission (3) Reflection (4) Refraction
3.	**Acute Inflammatory Phase**	0-2 weeks 1.) Immediate Vasoconstriction: E and sympathetic NS shock 2.) Cellular Reaction: white cells are sent out to heal and help out, coupled with vasodilation and infusion of blood 3.) Chemical Reaction: histamine is released= vasodilation 4.)Early Healing Begins: fibroblastic activity begins, which can be regulated by modalities
23.	**Adverse Effects of Cryotherapy**	frostbite, skin irritation
31.	**Adverse Effects of Heat**	burning
57.	**Adverse Effects of Pain ESTIM**	burning
50.	**Adverse Effects of strength ESTIM**	burning
41.	**Adverse Effects of US**	burning or mottling
89.	**Aphasia**	condition without speech
76.	**Basophil**	WBC with dark stained granules
85.	**Bronchitis**	Inflammation of the bronchi
43.	**Cause and Effect with US**	• ↑ f = ↑ heat • ↑ protein or water content = ↑ heat • ↑ heat at tissue interfaces • Thermal US ↓'s calcification • ↑ blood flow = ↓ heat
79.	**CBC**	Complete Blood Count
4.	**Clinical Signs of Acute Phase**	Inflammation (pain, redness, swelling, warmth, and loss of function) pain before tissue resistance
10.	**Clinical Signs of Remodeling Phase**	absence of inflammation, pain after tissue resistance
7.	**Clinical Signs of Repair Phase**	decreased inflammtion, pain synchronous with tissue resistance
22.	**Contraindications for Cryotherapy**	Impaired Circulation (PVD), Hypersensitivity (Reynaud's), Skin Anesthesia, Open Wound, Cardiac or Respiratory Disease, Infection
60.	**Contraindications for Iontophoresis**	same as estim and US
55.	**Contraindications for Pain ESTIM**	cardiac pacemaker, cardiac arrhythmia's, pregnancy, electronic implants, transcervcal regions, superficial metal, unstable fractures, arterial-venous thromboses, skin/lymph cancer
48.	**Contraindications for strength ESTIM**	cardiac pacemaker, cardiac arrhythmias, pregnancy, electrical implants, transcervial regions, superficial metal, unstable fractures, arterial-venous thromboses, skin/lymph cancer
39.	**Contraindications for US**	over eyes, ears, ovaries, brain, testes, spinal cord, tumors, infected tissues, growing epiphyses, hemorrhaging, post radiation sites, DVT, cardiac pacemaker site, areas of decreased sensation
30.	**Contraindications of Heat**	Acute Injuries, Impaired Circulation (PVD, DVT), Skin Anesthesia, Skin Irritations, Hemorrhaging, Malignancy, Age
86.	**COPD**	Chronic Obstructive Pulmonary Disease (ex: emphysema)
17.	**Cryotherapy**	superficial cold Rx-- heat removal--takes longer to cool than to heat, but effects of cool last longer
91.	**CVA**	damage to the brain caused by occlusion or hemorrhage of a blood vessel
18.	**Depth of Cryotherapy Penetration**	1 minute: skin (0-1 cm) 15 minutes: subcutaneous tissues (1-3 cm) 30 minutes: muscle (5 cm)
68.	**Descending Pain Control**	blocks the brain to muscle signal where pain exists- works best when medications are used to block the message
44.	**Dosage Selection for US**	frequency- 1 MHz is deep, 3 MHz is superficial intensity- based on tissue type, thermal vs non-thermal Rx duration- 5 min for 2x the US head, pulsed takes longer
34.	**Electrical Therapeutic Currents: General Info**	Ohm's Law: I = V/R DC: direct current (less comfortable) AC: alternating current (more effective and comfortable) Pulsated AC: monophasic or biphasic (more effective) f= pulse/sec, pps= 35-60 for tetany; 100-180 for pain Ramp time: 2-3 delay as intensity works way up

93.	**Encephalitis**	Inflammation of the brain
74.	**Eosinophil**	WBC with rose stained granules
83.	**Epistaxis**	nosebleed
78.	**Erythrocyte**	RBC
52.	**ESTIM for Pain**	IFC (sensory or motor), high voltage, or TENS (sensory, motor, or noxious) use of estim to block the pain messages
45.	**ESTIM for strengthening: Russian (NMES)**	used for its with muscle weakness -want good strong contraction for about 5 seconds, 10 times -tyr 10/50 first then move to whats comfortable
16.	**Factors Affecting the Amount of Energy Transferred**	Intensity, Time, Thermal Medium 1.) Intensity 2.) Temperature Gradient: do not want it too high or too low 3.) Duration of Treatment (Rx): longer exposure results in deeper transmission 4.) Size of Area to be Treated: larger Rx areas will cause systemic, not just local affects 5.) Type of Tissue: different types of tissue absorb different types of energy better
12.	**Factors Effecting Tissue Healing**	size of injury, edema, bleeding, blood flow, spasm/guarding, infection, diabetes, nutrition, mediation, age, other health conditions
67.	**Gate Theory of Pain**	try to block all lines sending pain messages so that the message never makes it to the brain
84.	**Hemoptysis**	coughing up blood
29.	**Indication of Heat**	-Fibroblastic/Remodeling (subacute/chronic) Phase of Healing -decreased ROM -subacute/chronic edema -muscle guarding -pain -infection
21.	**Indications for Cryotherapy**	Acute Injury, Acute Swelling, Pain, Trigger Points, Muscle Guarding, DOMS (delayed onset muscle soreness)
59.	**Indications for Iontophoresis**	transdermal drug delivery
54.	**Indications for Pain ESTIM**	pain, tendonitis, trigger points, spasm/guarding, acute/chronic injury
47.	**Indications for strength ESTIM**	muscle weakness
38.	**Indications for US**	decreased ROM, decreased tissue healing, decreased flexibility, pain, spasm/guarding
5.	**Interventions for Acute Phase**	PRICE to decrease inflammtion P-protection; R- rest; I- ice; C-compression; E- elevation also modalities, and gentle movement
11.	**Interventions for Remodeling Phase**	progressive stretching, strengthening, and functional exercises-- al with the goal to restore normal function
8.	**Interventions for Repair Phase**	prevent or minimize contracture formation (decreased ROM), and adhesion formation, and to control pain
58.	**Iontophoresis General Info**	can work better at getting to a particular spot than oral or surgical methods. CATHODE: negative charge, collects alkaline underneath it, which can burn more acid, more comfortable ANODE: positive charge, collects acids under it, which can burn so very uncomfortable
19.	**Local Physiological Effects of Cryotherapy**	Decreased metabolism, decreased blood flow, decreased nerve conduction, increased pain threshold, increased viscosity of fluids
27.	**Local Physiological Effects of Heat**	Increased metabolism, increased blood flow, increased lymphatic drainage, increased pain threshold, decreased muscle guarding, plastic elongation
75.	**Lymphocyte**	agranulocyte active in immunity
9.	**Maturation/Remodeling Phase**	can be up to a year--- chronic stage 1.) Maturation of Connective Tissues 2.) Contracture of Scar Tissue 3.) Collagen Aligning to Stress 4.) Remodeling of Scar Tissue
24.	**Methods of Cryotherapy**	ice/cold packs, ice massage, cold baths/whirlpools, vapocoolant sprat, cryocuff- cold compression cuff (cold gels and creams are not a cold modality)
32.	**Methods of Heat**	hot packs, paraffin wax, electric heating pads (dangerous), air-activated heat wraps, Fluidotherapy, Ultrasound, infrared lamps, whirlpools,

15.	**Methods of Heat Transfer**	1. Conduction: direct contact over an area (hot/cold pack) 2. Convection: energy transfer through air or water current 3. Radiation: energy transfer through space (infrared of UV light) 4. Conversion: changing one kind of energy into another kind of energy (ultrasound uses vibrations from sound waves to generate heat) 5. Evaporation: cooling that extracts heat from tissues
62.	**Methods of Pain Assessment**	VAS (visual analog scale): 10 cm line and point to measure pain level VRS (verbal rating scale): scale 0-10 McGill Pain Questionnaire: pain adjectives that help decide if pain is all physical Body Charts: picture to show where pain is and how bad
71.	**Motor Level Pain Relief**	-frequency= 1-10 pps (low) -duration/width= 250 usec (high) -Intensity= increased until a flicker of the muscle is present -Rx duration= 20-45 min -Indication: trigger points, chronic pain, pain that needs longer lasting relief
65.	**Muscle Vs. Visceral Pain**	muscle = DOMS visceral= can appear to be other issues
94.	**Narcolepsy**	sleep disorder characterized by sudden uncontrollable need to sleep
73.	**Neutrophil**	polymorphonuclear WBC
37.	**Non-Thermal Physiological Effects of US**	1.) Protein synthesis 2.) Bone repair 3.) Decreased swelling 4.) Tissue regeneration 5.) Decreased pain 6.) Decreased muscle guarding/spasm
72.	**Noxious Level Pain Relief**	-frequency= 150-250pps (high) -duration/width= 250-400 usec (high) -Intensity= increase until feels numb in between electrodes, may be uncomfortable, may have strong contraction -Rx duration= less than 15 minutes -Indication: severe pain, muscle guarding, used during painful procedures for as long as the procedure lasts (ex: shot)
81.	**Orthopnea**	ability to breathe only in an upright position
61.	**Pain**	must assess pain before and after treatment
64.	**Pain Receptors**	myelinated transmit better than unmyelinated
66.	**Pain Transmission**	1st order-- reflex to pull away from painful stimulus 2nd order-- message send to the thalamus (attempted to be blocked by estim) 3rd order-- neuron allows the brain to register and recognize what is going on
95.	**Paraplegia**	paralysis from the waist down
2.	**Phases of Healing**	Acute- Inflammatory Response Subacute- Repair/Fibroblastic Phase Chronic- Maturation/Remodeling Phase
53.	**Physiological Effects of Pain ESTIM**	blocks the pain message by sensory stimulation, motor stimulation, or pain stimulation
77.	**Platelet**	thrombocyte
87.	**Pleural Effusion**	accumulation of fluid within the pleural cavity
88.	**Pneumothorax**	air in the pleural cavity caused by puncture of the lung or chest wall
56.	**Precautions for Pain ESTIM**	pregnancy, over the eyes, anesthetic skin, scars, open wounds, cognitive impairment, seizure precautions, cancer
49.	**Precautions for strength ESTIM**	pregnancy (if not over abdomen), over the eyes, anesthetic skin, scars, open wounds, cognitive impairment, seizure precautions, cancer
40.	**Precautions of US**	acute bursitis, acute arthritic joints, bony prominences, metal implants, superficial nerves
80.	**PTT**	Prothrombin time
13.	**Radient Energy**	energy that travels through space, at the speed of light, and in a straight line-- different forms have different frequencies and wavelengths (ex: infrared, UV, hot packs, etc.)
6.	**Repair/Fibroblastic Phase (subacute)**	2-6 weeks (post acute) 1.) Decrease Swelling/Edema 2.) Capillary Bed Formation: increased circulation 3.) Collagen Formation: increased support in the form of scar tissue 4.) Fragile and Easily Injured
46.	**Russian Physiology**	changes cell permeability so that cells can depolarize more readily- recruits all muscle fibers, non-selective

70.	**Sensory Level Pain Relief**	-frequency= 80-150 pps (high) -duration/width= 50-100 usec (low) -Intensity= increase until a strong tingle is felt, no contraction -Rx duration=as long as want -Indication: acute or neurogenic pain
51.	**settings for strength ESTIm**	On/off time: 10/50 Frequency: 30-65 pps, symmetrical Pulse width/duration: 300-500 usec Ramp up time: 3 sec Intensity: turn it up until there is a good strong contraction held for 5 seconds
1.	**Signs of Inflammation**	Pain, Redness, Swelling, Warmth, Loss of function
96.	**Spina Bifida**	congenital defect in the spinal column
25.	**Stages of Cryotherapy/Rx Time**	(1) COLD (2) Burning (3) Aching/Tingling (4) Numb---usually 10-15 minutes to get through these stages
82.	**Stridor**	a high-pitched crowding breath sound that is a sign of obstruction in the upper airway
90.	**Syncope**	Fainting
20.	**Systemic Physiological Effects of Cryotherapy**	Systemic vasoconstriction, increased BP, decreased HR and RR, shivering and increased muscle tone
28.	**Systemic Physiological Effects of Heat**	Increased body temperature, Increased HR and RR, Decreased BP, Decreased muscle tone/ relaxation
42.	**Terminology of US**	SAI= amount of energy passing through the sound head SPI= constant wave, maximum power produced TAI= average output for pulsed US Duty Cycle= on time + off time x 100 (how much time off vs on) ERA= 5 minutes to cover 2x the sound head area BNR= safety factor
36.	**Thermal Physiological Effects of US**	1.) increased blood flow 2.) increased pain threshold 3.) increased plastic elongation 4.) increased metabolic rates 5.) decreased skeletal muscle tension
26.	**Thermotherapy or Heat**	superficial heating-- must increase tissue temperature to 40-45 degrees C or 106-113 degrees F to get desired physiological effects-- there is only a 3-4minute window of time where the effects of heat will last because of increased blood flow heat can comfort and distract
92.	**TIA**	brief episode of loss of blood flow to the brain
33.	**Treatment time for Heat**	usually 15 minutes (check skin at beginning, 5, 10, and after Rx)
63.	**Types of Pain**	1.) Acute Pain- injury that just happened 2.) Chronic Pain- pain that is lasting too long, maybe after tissues have healed 3.) Referred Pain- pain in one place because of something happening at another (e. MI) 4.) Radiating Pain- pain that follows a nerve 5.) Sclerotomal Pain- bone pain 6.)Affective Pain- pain associated with a psychological aversion... behavior 7.)Peripheral Nociceptive Pain- pain in extremities 8.)Central Pain- pain because of spinal cord injury 9.)Peripheral Neurogenic Pain- pain from nerve irritation 10.)Sympathetic NS Pain- pain blown out of proportion
35.	**Ultrasound**	deep or superficial heating- high frequency sound waves generated causing tissues to vibrate, which generates heat. frequency between .5 and 3 MHz
69.	**What to use with ESTIM for pain?**	thermal agents, massage, and lasers