Lecture 1
Physiotherapy

الدكتور

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اختصاص جراحة العظام والكسور

بورد عربي جراحة العظام والكسور

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- Physiotherapy Definition
- Physiotherapy History
- Role of physiotherapist
- Methods used in Physiotherapy
- Manipulative therapy
- Exercise therapy
- Rehabilitation

Physiotherapy keeps you Moving…

What is Physiotherapy??

Physiotherapy is a branch of medical science where physical measures such as heat, light, ultrasound, water, electricity and exercises are used in the diagnosis and treatment of the injured tissues and structures.

Physiotherapy,

- also referred to as physical therapy, involves evaluating, diagnosing, and treating a range of diseases, disorders, and disabilities using physical means.

HISTORY

- Hippocrates & later Galenus first practitioner of physiotherapy (460 BC)

- Per hendrik ling – “father of Swedish gymnastics”
- Modern Physiotherapy was established in Great Britain
- Emergence of physiotherapy : World Wars

- Modern Physiotherapy was established in Great Britain toward the end of 19th century.
- Physiotherapy is a result of the Second World War.
- During the Second World War, when a large number of soldiers and civilians suffered injuries, the need for putting them back on health track became imperative.
- The number of injured persons was so large that acute shortage of medicines was felt. The situation gave rise to a new science of healing,
- Now known as ‘Physiotherapy’.

Physiotherapy is cheapest treatment without drugs

Introduction to physiotherapy

- This is a branch of health care science that mainly concentrates on the physical aspects of an individuals health care, by treating their physical ailments.

- Physiotherapist must coordinate and work with the other members, throughout rehabilitation period.

Types of physiotherapy

Passive Physiotherapy directed toward the alleviation of symptoms

Active Physiotherapy directed toward restoration of function by activity

GOALS OF PHYSIOTHERAPY

For Passive Exercises

For lessening the symptoms

Preventing further deterioration

For Active Exercises

Restoration of functional abilities, through resistance exercises

Increasing muscle strength.

Aims of Physiotherapy

- To treat disability and deformity.
- To correct disability and deformity
- To prevent disability and deformity

ROLE OF PHYSIOTHERAPIST

- Assess ,manage & treat a broad range of medical conditions
- Relieve physical pain & heal injuries.
- Increase mobility, build strength, improve balance & enhance
- Cardiopulmonary performance.
- Use a variety of techniques to strengthen the muscles & joints.
- Make individual independent for his/ her activity of daily living.
- Provides gait training & Posture correction.

Physiotherapy Specialties

- Orthopedic
- Neurology
- Cardiopulmonary
- Pediatric
- Geriatric
- Sports
- Rehabilitation

CATEGORIES

Depending on severity of the ailment

- Short term physiotherapy
- Long term physiotherapy

Short Term Physiotherapy

Includes patients with minor neuromuscular-skeletal lesions like:

- Simple soft tissue injuries
- Simple fractures
- Non traumatic lesions

Long term physiotherapy

Refers to more complicated diseases of musculoskeletal origin Includes condition like:

- Fractures of major bones
- Spinal trauma resulting in physical disability and complications like paraplegia, quadriplegia etc.
- Surgical procedures involving major joints
- Chronic conditions like RA

Goals of Short And Long Term physiotherapy

- Protect the involved area
- Reduce pain and inflammation
- Reduce intra or extra capsular effusion
- Increase range of joint movement
- Increase musculotendinous flexibility
- Increase muscle strength power and endurance
- Restore normal biomechanical functions
- Increase balance and proprioception


PHYSIOTHERAPY
FUNCTIONAL
PROFESSION
PHYSICAL
MOVEMENT
MOBILITY
REHABILITATION
PRACTICE
SPORTS
TREATMENT
THERAPY
INJURY
MEDICAL
DIAGNOSE
CENTRAL
CAPACITY
ABILITY
BARRIERS
ARTERIAL
ASSISTIVE
CERTIFIED
ATTENTION
ACHIEVE CLINICS
ASSOCIATION
ACTIVITIES
ABBREVIATED
ALLOW APPLY
ADDITION
ASSISTANTS
ASSISTANCE
BALANCE CLIENTS
AROUSAL
CENTERED
CLEARANCE
CARDIOPULMONARY
ADMINISTRATION
COMMUNICATION
ANOTHER
COMMONLY
COMMUNITIES
BIOMECHANICS
ASSISTANT
ANTHROPOMETRIC
ARRIVE
BODY
ACT
AMONG
CARDIOVASCULAR
CARRIED
ACCREDITING
ADAPTIVE
CERTIFICATION
CIRCULATION
AGREED
CLINICAL
CENTERS
ASSESSED
COGNITION
ACTIVE
AREAS
ACTING
CLIENT
ASSESS
CASES
AGE


Thank
you!

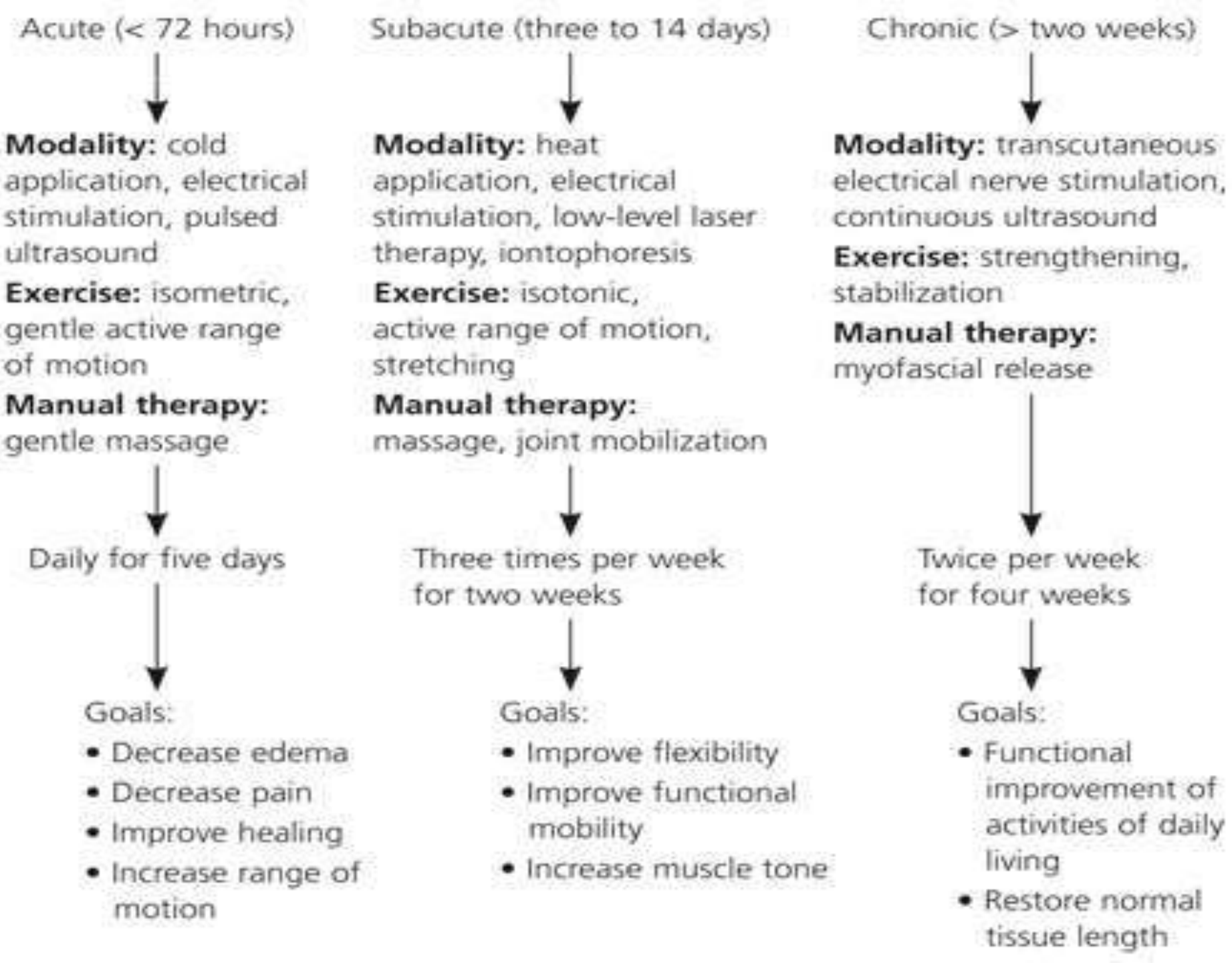
LECTURE II

Methods used in Physiotherapy

DR.YASIR YOUSIF

Methods used in Physiotherapy

- Cryotherapy (Ice Therapy)
- Hydrotherapy
- Thermotherapy
  - Superficial heat
    - infrared
  - Deep heat
    - Ultrasound
    - Shortwave diathermy
    - Microwave diathermy
- Extracorporeal Shock Wave Therapy
- Electrotherapy
- Laser
- Spinal Traction


Acute (< 72 hours)
Modality: cold application, electrical stimulation, pulsed ultrasound
Exercise: isometric, gentle active range of motion
Manual therapy: gentle massage
Daily for five days
Goals:
• Decrease edema
• Decrease pain
• Improve healing
• Increase range of motion
Subacute (three to 14 days)
Modality: heat application, electrical stimulation, low-level laser therapy, iontophoresis
Exercise: isotonic, active range of motion, stretching
Manual therapy: massage, joint mobilization
Three times per week for two weeks
Goals:
• Improve flexibility
• Improve functional mobility
• Increase muscle tone
Chronic (> two weeks)
Modality: transcutaneous electrical nerve stimulation, continuous ultrasound
Exercise: strengthening, stabilization
Manual therapy: myofascial release
Twice per week for four weeks
Goals:
• Functional improvement of activities of daily living
• Restore normal tissue length

Cryotherapy (Ice Therapy)

Cryotherapy

Refers to treatment by the lowering of local tissue temperature.

- Cryotherapy or ice therapy is the application of cold to the body tissues after injury. This practice is as old as medicine itself.
- Nowadays, local cold application may be applied by the use of various forms of ice or frozen gel packs, or by evaporation of volatile fluids from the skin. Often skin temperature is reduced to 10 C°.

Physical Principles

- When ice is applied to the skin, heat is conducted from the skin to the ice in order to melt it.
- To change its state, ice requires considerable energy that is known as latent heat of fusion.
- A specific amount of energy required to change the solid form of a particular substance into a liquid, or the liquid into a gas. This energy is called Latent Heat and is the energy required to change of state.

- Thus ice therapy is very useful in removing swelling and accelerating tissue repair. i.e. ice cubes massage may be used to accelerate the rate of repair of pressure sores.
- The reduced metabolic rate of cooled tissues allows cooled muscle to contract many more times before fatigue sets in.

Uses of Ice Therapy

- Reduces pain.
- Reduces spasticity.
- Reduces muscle spasm.
- Reduces swelling.
- Promote repair of the damaged tissues.
- Provide excitatory stimulus to inhibited muscles.
- Used in strength training.

Indications

- Acute pain
- Chronic pain
- Acute swelling (controlling hemorrhage and edema)
- Myofascial trigger points
- Muscle guarding
- Muscle spasm
- Acute muscle strain
- Acute ligament sprain
- Acute contusion
- Bursitis
- Tenosynovitis
- Tendinitis
- Delayed onset muscle soreness

Contraindications

1. Impaired circulation (i.e., Raynaud's phenomenon)
2. Peripheral vascular disease
3. Hypersensitivity to cold
4. Skin anesthesia
5. Open wounds or skin conditions (cold whirlpools and contrast baths)
6. Infection

Techniques of Application of Cryotherapy

- The way which ice is applied will vary according to the required effects.
- It may be applied in the following ways:
  - Ice towels
  - Ice packs
  - Immersion
  - Ice cube massage
  - Cold compression units
  - Ice spray
  - Contrast bath

Ice packs

- Simple cold packs
- Silica gel packs
- Endothermic reaction /chemical cold packs.

- **ICE BAGS:**
  - simple plastic bags, chemical cold packs or frozen vegetables.
  - The skin will pass through four stages of sensation in 10-15 minutes.
  - These sensations in order are:
    - Cold
    - Burning
    - Numbness

- **ICE MASSAGE**
  - DO NOT hold the ice in one area for more than 3 minutes since this may cause frostbite.
- **Cold therapy should be stopped once the skin feels numb**

Ice towel

- Wet towel is used
- Ice towel need to be replaced after 2-3 min. and total 20 min .of treatment can be given.
- Useful in treating muscle and allows movement to be performed.

IMMERSION

- Simple immersion
- Whirlpool immersion

Cold compression unit

Cold water is circulated in a sleeve which Is put over the limb and part of it is inflamed At intervals.

ICE CUBE MASSAGE

- Slow circular motion for 5-10 min. During this time the patient will feel cold, burning and then aching sensation before the part become numb.
- Short strokes should be given.

Cold / Ice sprays

- Ethyl chloride was originally used but it is highly inflammable an thus posses some risks.
- Fluorimethane is now used widely as it is non inflammable.
- The liquid is sprayed on to the area to be cooled in series of stroke of about 5 second each with a few seconds interval between each.
- The nozzle is held at the angle of 45 or right angle from the skin surface.

Advantages of cryotherapy

- Usually inexpensive.
- Quick application with little preparation.
- Faster muscle recovery
- Promotes healthier skin complexion
- Effective with chronic pain management
- Reduces stress & anxiety

Disadvantages of cryotherapy

- It is difficult to keep the ice in place
- Quickly melts
- No compression is applied.
- Can only be applied for short periods of time (10-20 minutes).

Hydrotherapy

Definition of Hydrotherapy

- Application of water, internally or externally, for the treatment of physical or psychological dysfunction.

TYPES OF HYDROTHERAPY

- Immersion
- Non-Immersion

Primary Use of Hydrotherapy

- Treatment of Wounds
- Enhanced Environment for exercise
- Pain
- Edema
- Health maintenance /disease prevention

Physiological Effects

- Cleansing
  - Pressure (Force = Rate of Flow)
  - Dissolved antimicrobial agents, etc. (*Wounds*)
- Musculoskeletal Effects
  - Decreases weight-bearing (*Arthritis*)
    - 75% immersion WB 75%
  - Increases blood flow to muscles
  - Strengthening
- Decreased bone density loss
- Decreased fat loss
  - *Compared to other forms of exercise*
  - Good for obese secondary to non-weight bearing exercise
  - Not good for general weight loss

Cardiovascular Effects

- Increased venous circulation
  - Secondary to hydrostatic pressure, increased venous pressure
- Increased cardiac volume
- Increased cardiac output
  - Up to 30% while upright to neck
- Decreases heart rate and Systolic Blood Pressure (*cool water*)
  - May increase in warm or hot water

Respiratory Effects

- Increases work of breathing
  - Due to hydrostatic pressure on lungs
    - ✓ up to 60%
    - ✓ May need to be very careful with respiratory and/or cardiac patients
- Decreases exercise-induced asthma
  - High humidity

Renal Effects

- Increases urine production
- Increases sodium and potassium excretion
  - May be used to patient's advantage with hypertension, peripheral edema

Psychological Effects

- Relaxing
  - Warm water
- Invigorating
  - Cold water

Clinical Uses of Hydrotherapy

1. Superficial Heating
2. Wound Care
3. Treatment of Burns
4. Pain Control
5. Edema Control

Selection of Hydrotherapy

- Whirlpool
  - Tanks
    - ✓ Low-Boy
    - ✓ High-Boy
    - ✓ Extremity
    - ✓ Hubbard Tank
  - Turbine

Temperature Range

- **Cold** (0-26 C)
  - Acute inflammation
- **Tepid** (26-33 C)
  - Exercise
  - Acute inflammation if cold not tolerated
- **Neutral warmth** (33-35.5 C)
  - Open wound
  - Medically compromised patients
  - Decrease tone
- **Mild warmth** (35.5-37 C)
  - Increase mobility
  - Burn
- **Hot** (37-40 C)
  - Pain
  - Increase ROM
  - Increase soft tissue extensibility
- **Very Hot** (40-43.5 C)
  - Limited body area
  - Chronic conditions

DO NOT use WP at temperatures **> 43.5 C** !!

Aquatic Exercise

Uses

- Increase circulation
- Increase muscle strength
- Increase joint ROM, flexibility
- Improve ambulation
- Improve coordination
- Increase cardiovascular, respiratory conditioning
- Decrease pain, spasm
- Decrease weight-bearing on joints
- Relaxation/ psychological well-being

Types of Aquatic Exercise

- Swimming
- Running
- Walking
- Cycling
- Stretching
- Underwater treadmill or parallel bars, etc.

Hydrotherapy Contraindication

- Infected wounds
- Acute skin conditions
- Pyrexia
- Incontinence
- Cardiac disease
- DVT
- Recent pulmonary embolus
- Recent CVA
- GIT disorders
- Tracheostomy
- Low vital capacity
- Kidney disease
- Diabetes
- Thyroid deficiency
- Radiotherapy in the previous 3 months
- Careful consideration is essential for patients with open wounds covered with a waterproof dressing.
- Epilepsy
- Vertigo


THANK YOU

- Use of electric current and various types of electric energy (electric fields and magnetism)
- preventive and curative purpose,
- Electrotherapy has a thermal, mechanical, and chemical effect And magnetic on tissues,
- electrotherapy includes direct use of electricity and its derivatives It includes the release of electrical energy as a product of electrotherapy and works to speed up recovery body functions, so it is used in cases of disorders of the musculoskeletal system

Use of Electrotherapy

- 1.Pain management

___Improves range of joint movement

2. Treatment of neuromuscular dysfunction

__Improvement of strength

__Improvement of motor control

__Retards muscle atrophy

__Improvement of local blood flow

3. Improves range of joint mobility

__Induces repeated stretching of contracted, shortened soft tissues

- 4. Tissue repair

___Enhances microcirculation and protein synthesis to
___heal wounds
___Restores integrity of connective and dermal tissues

- 5. Acute and chronic edema

___Accelerates absorption rate
___Affects blood vessel permeability
___Increases mobility of proteins, blood cells and
___lymphatic flow

- 6. Peripheral blood flow

__Induces arterial, venous and lymphatic flow.

- 7. Iontophoresis

___Delivery of pharmacological agents

- 8. Urine and fecal incontinence

___Affects pelvic floor musculature to reduce pelvic pain and strengthen musculature

___Treatment may lead to complete continence

Types of electrical treatments:

- Electrolytic treatment includes three basic groups:

- **First** - Low-frequency electrotherapy: 0-1 kHz
- **second** -Medium Frequency: 1-300 KHz
- **Third**- High-frequency electrical treatments: from 300 kilohertz

Low-frequency electrotherapy:

- direct current (galvanic)
- Current Direct Intermittent Compression Devices
- High voltage D-C galvanic catalysts
- Faradic Current
- electrical muscle stimulators
- (F.E.S) Functional Electrical Activation
- Die Dynamic currents
- Electrical nerve stimulation

Medium Frequency: 1-300 KHz

- Interferential Current (التيار المتداخل)
- Cutaneous Trans Electrical Nerve Stimulation (TENS)

التخدير بتنبيه الأعصاب الطرفية من خلال الجلد

- stimulus inferential التحفيز الاستنتاجي

High frequency electrotherapy

- short waves
- Microwaves
- Ultrasound

Galvanic Current

- It is a direct current
- Unidirectional
- It is very painful to patients because it is unidirectional
- To overcome this regular pause can be given between stimulation
- Interrupted galvanic current (IGC)
- Constant direct current is used for Iontophoresis
- IGC is used for denervated muscle stimulation

شكل رقم (18) الكلفنه

- It is a direct Current used to activate muscle directly, without activation of the peripheral nerve.
- Direct muscle stimulation requires pulse or phase durations of at least 1 milliseconds, and more often uses even longer durations.

- Dosage:
- A regular 20-30 contractions with an average of 90-200 contractions per muscle per day.
- Cease when motor point responds to faradic current.

Evidence for

- appropriate electrical stimulation can cause denervated muscle to contract
- contraction of a denervated muscle may help limit edema and venous stasis within the muscle, and therefore delay muscle fiber degeneration and fibrosis
- recovery time following denervation appears to be shortened with appropriate electrical stimulation

Evidence against

- contraction of the denervated muscle may disrupt regenerating neuromuscular junctions and subsequently delay re-innervation
- denervated muscle is more sensitive to trauma than innervated muscle, and electrical stimulation may further traumatize the denervated muscle
- prolonged electrical stimulation until reinnervation occurs is not worth the financial and time costs involved

Uses of galvanic current

- 1. Constant direct currents are used for iontophoresis
- 2. Modified direct current are used to stimulate denervated muscles.
- 3. Maintain the properties of muscle.
- 4. Retards the denervation atrophy.
- 5.Helps the muscle to utilize all the substances and maintain nutrition.
- 6. Improves absorption and activates pumping function of muscle.
- 7. Prevents venous and lymphatic stasis.
- 8. Maintain the working hypertrophy of denervated muscles.
- 9. Maintain the extensibility of the muscles.
- 10.Improves local circulation.
- 11.Prevents contracture.

Stimulating Denervated Muscle

- Electrical currents may be used to produce a muscle contraction in denervated muscle
- Denervated muscle has lost its peripheral nerve supply
- Purpose for electrically stimulating denervated muscle is to help minimize the extent of atrophy while the nerve is regenerating
- Muscle fibers experience a decrease in size, diameter and weight of the
- individual muscle fibers
- There is a decrease in amount of tension which can be generated and an
- increase in the time required for contraction
- Degenerative changes progress until muscle is re-innervated by axons regenerating across site of lesion

If re-innervation does not occur within 2 years fibrous connective tissue replaces contractile elements and recovery of muscle function is not possible

Application of Galvanic current

Denervated muscles
Facial muscle weakness secondary to Bell's Palsy & Facial palsy.
Iontophoresis

contraindication

- Acute infections
- Dermatology
- Malignant tumors
- The presence of minerals in the body to stabilize the bones in cases of fractures because it causes metal ionization, which It causes great harm to the body
- Lack of self-acceptance of this type of treatment in some individuals

FARADIC CURRENT

- It is a short-duration interrupted current, with a pulse duration ranging from 0.1 and 1 ms and a frequency of 30 to 100 Hz.
- Faradic currents are always surged for treatment purposes to produce a near normal tetanic-like contraction and relaxation of muscle.
- Current surging means the gradual increase and decrease of the peak intensity

شكل رقم (19) التيار الفارادي(السينوسويدال)

شكل رقم (20) التيار الفارادي

Effects of faradic currents

1.Stimulation of sensory nerves:

-----It is not very marked because of the short duration.

------It causes reflex vasodilatation of the superficial blood vessels leading to slight erythema.

____The vasodilatation occurs only in the superficial tissues.

2.Stimulation of the motor nerves:

- It occurs if the current is of a sufficient intensity, causing contraction of the muscles supplied by the nerve distal to the point of stimulus.
- A suitable faradic current applied to the muscle elicits a contraction of the muscle itself and may also spread to the neighboring muscles.
- The character of the response varies with the nature and strength of the stimulus employed and the normal or pathological state of muscle and nerve.
- The contraction is tetanic in type because the stimulus is

repeated 50 times or more / sec.

- If this type is maintained for more than a short time, muscle fatigue occurs.
- So, the current is commonly surged to allow for muscle

relaxation i.e. “when the current is surged, the contraction gradually increases and decreases in strength in a manner similar to voluntary contraction”

3. Faradic currents will not stimulate denervated muscle

- The nerve supply to the muscle being treated must be intact because the intensity of current needed to depolarize the muscle membrane is too great to be comfortably tolerated by the patient in the absence of the nerve.

5. Reduction of swelling and pain:

It occurs due to alteration of the permeability of the cell membrane, leading to acceleration of fluid movement in the swollen tissue and arterial dilatation.

- Moreover, it leads to increase metabolism and get red of waste products.

5. Chemical changes

- The ions move one way during one phase of the

current; and in the reverse direction during the other phase of the current if it is alternating.

- If the two phases are equal, the chemicals formed during one phase are neutralized during the next phase.
- In faradic current, chemical formation should

not be great enough to give rise to a serious danger of burns because of the short duration

of impulses.

Application of faradic current

- Muscle stimulation with faradic current the muscle must have a good general innervation.
- The current may be applied for both **diagnostic** and **therapeutic** objectives.

Diagnostic objectives

- Investigation of myasthenia reaction;
- Investigation of myotonic reaction;
- Localization of a neurapraxia (nerve compression) block.

Indications:

- 1. Facilitation of muscle contraction inhibited by pain:

Stimulation must be stopped when good voluntary contraction is
obtained.

- 2. Muscle re-education:

Muscle contraction is needed to restore the sense of movement in
cases of prolonged disuse or incorrect use; and in muscle transplantation. The brain appreciates movement not muscle actions, so the current should be applied to cause the movement
that the patient is unable to perform voluntarily.

- 3. Training a new muscle action:

After tendon transplantation, muscle may be required to perform a different action from that previously carried out. With stimulation by faradic current, the patient must concentrate with the new action and assist with voluntary contraction.

- 4. Nerve damage:
- When a nerve is severed, degeneration of the axons takes place
- after several days.
- So, for a few days after the injury, the muscle contraction may be
- obtained with faradic current.
- It should be used to exercise the muscle as long as a good response
- is present but must be replaced by modified direct current as soon
- as the response begins to weaken

- 5. Improvement of venous and lymphatic drainage:

In oedema and gravitational ulcers, the venous and lymphatic return should be encouraged by the pumping action of the alternate muscle contraction and relaxation.

- 6. Prevention and loosening of adhesions:
- After effusion, adhesions are liable to form, which can be prevented
- by keeping structures moving with respect to each other.
- Formed adhesions may be stretched and loosened by muscle
- contraction.
- 7. Painful knee syndromes:
- After trauma, there is inhibition of muscle contraction, leading to
- muscle atrophy.

contraindications:

- dermatological conditions,
- Acute infections and inflammations.
- Thrombosis.
- Loss of sensation.
- Cancer.
- Cardiac pacemakers.
- Superficial metals.

Precautions

- Adequate precautions should be taken for patients with heart problems.
- Placement of electrodes across the heart or transthoracic can cause an arrhythmia.
- The device should not be used over skin eruptions or swollen, infected or inflamed areas.
- Turn the unit off when applying or removing electrodes.
- Do not use over the eyelids.

FARADIC & GALVANIC MUSCLE STIMULATOR

- Generation of impulse by a electric device

- Delivered through electrodes on the skin in direct proximity to the muscles

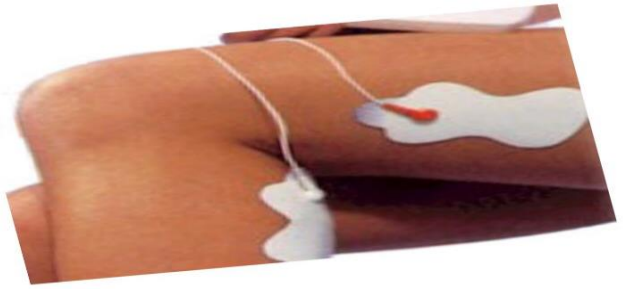
- elicitation of muscle contraction using electric impulse

- stimulation of blood flow and pain reduction, as well as ionization

Transcutaneous Electrical Nerve Stimulation (TENS)

- Most commonly used forms of electro analgesia
- Goal - block pain signals and to stimulate the release of naturally produced pain killers such as endorphin
- Uses:
- Low Back Pain (LBP)
- Myofascial And Arthritic Pain
- Sympathetically Mediated Pain
- Bladder Incontinence
- Neurogenic Pain
- Visceral Pain
- Postsurgical Pain

شكل رقم (27) العلاج بجهاز التينس



شكل رقم (28) العلاج بجهاز التينس

Interferential current therapy (IFC)

- Placement of electrodes
- two currents produced cross each other in the affected area
- Two currents 'interfere' with each other

“INTERFERENTIAL”

- This modality addresses the issues of pain, spasm, and inflammation

شكل رقم (25) جهاز انتيرفيرنشال

Iontophoresis

- Iontophoresis is the technique of using the charges of ions and particles to drive them across tissues and membranes under the influence of an imposed electrical field.
- The primary use of iontophoresis in medicine is to aid in transcutaneous systemic or local delivery of medicines and substances.

LECTURE 4
THERMOTHERAPY

الدكتور

ياسر يوسف العبيدي

THERMOTHERAPY

- It is one of the most common methods used in physical therapy to relieve pain, especially in Muscle spasm,
- includes all types of heat used in the field of treatment and rehabilitation,
- transmitted Heat to the skin upon

___ direct skin-to-skin contact with a heat source,

__ or by using a transfer Thermal radiation, as in infrared or ultraviolet rays,

- used Heat after a 48-72 hours from the occurrence of the injury and after the bleeding has stopped

Indications 1

•Moist Heat Packs•

- Subacute or chronic inflammatory conditions
- Reduction of subacute or chronic pain
- Subacute or chronic muscle spasm
- Decreased ROM
- Hematoma resolution
- Reduction of joint contractures
- Infection

Biophysical Characteristics 1

•Moist Heat Packs•

- Increased blood flow/vasodilatation.
- Increased cell metabolism.
- Muscular relaxation secondary to reducing muscle spindle sensitivity.

Contraindications 1

•Moist Heat Packs•

- Acute conditions- because of increase of inflammation
- Peripheral vascular disease (PVD)
- Impaired circulation
- Poor thermal regulation

Medical Diathermy

- It is an increase in temperature without exceeding the physiological level, which if exceeded, causes damage to the bod

Types of thermotherapy

There are two :

- **superficial HEAT**
- **Deep HEAT .**

Superficial heating agents elevate the skin temperature and tissue within 1 to 2 cm of the skin surface

- ***Superficial*** **HEATING DEVICES**

- HEAT PAD
- HYDROCOLLATOR PACKS
- WAX AND PARAFFIN BATH
- HOT WHIRLPOOL
- Infrared
- Ultraviolet rays
- Sauna Bath :
- Hot baths
- Hot air treatment with cellulose particles

• Deep Heat diathermy

- Shortwave (s.w)
- Microwave (M.W)
- Longewa
- Ultrasounds Wave (u.s)
- Laser Diathwermy

heating pad

is a pad used for **warming of parts of the body** in order to manage pain.

Localized application of heat causes blood vessels in that areato dilate, enhancing perfusion to the targeted tissue.

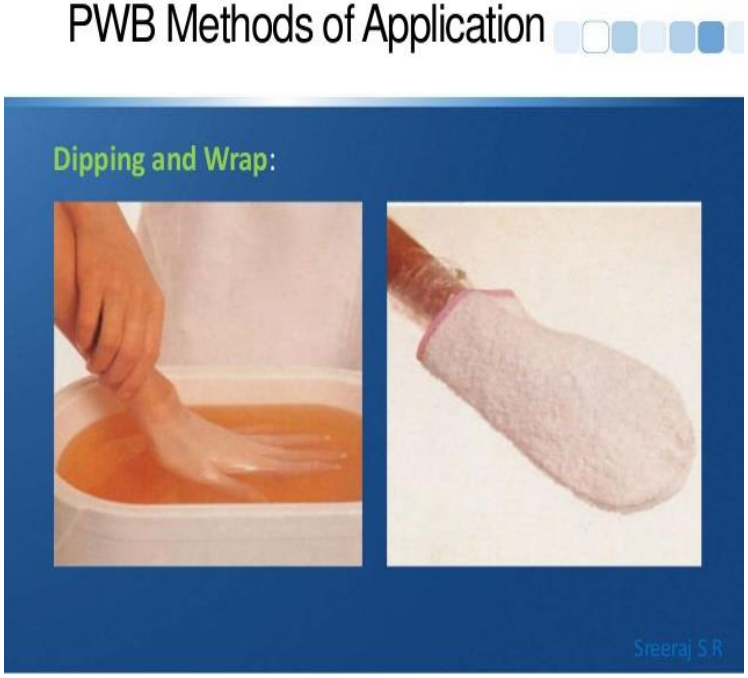
Types of heating pads include electrical, chemical and hot water bottles.

What is paraffin wax Bath ?

- Paraffin wax Bath is a white or colorless soft, solid wax used for treatment of Joint and Muscle pain.
- Wax is made from saturated hydrocarbons.
- The actual temperature of paraffin wax is 42-52°C whereas its melting point is 51-54.4°C.
- The melted wax should not be poured directly on the body tissue as it may lead to thermal injuries.
- In order to avoid this, melting point of wax is usually lowered by adding an impurity in the form of paraffin oil….

PWB methods off application:-

- There are mainly 5 methods of Paraffin wax Bath for applying Wax Bath.
- **Dipping and Wrap:-**
- **Immersion**
- **Direct pouring method:**
- **Toweling or Bandaging method:**
- **Brushing Method:**



Indications

Osteoarthritis
Rheumatoid arthritis
Joint stiffness
Soft tissue contractures

Contraindications

- Open wounds
- Infective conditions
- Allergic rashes
- Deep vein thrombosis
- Impaired sensations
- Acute dermatitis

Hydrocollator packs

- packs filled with bentonite clay and they are applied to areas of pain and inflammation to reduce discomfort.

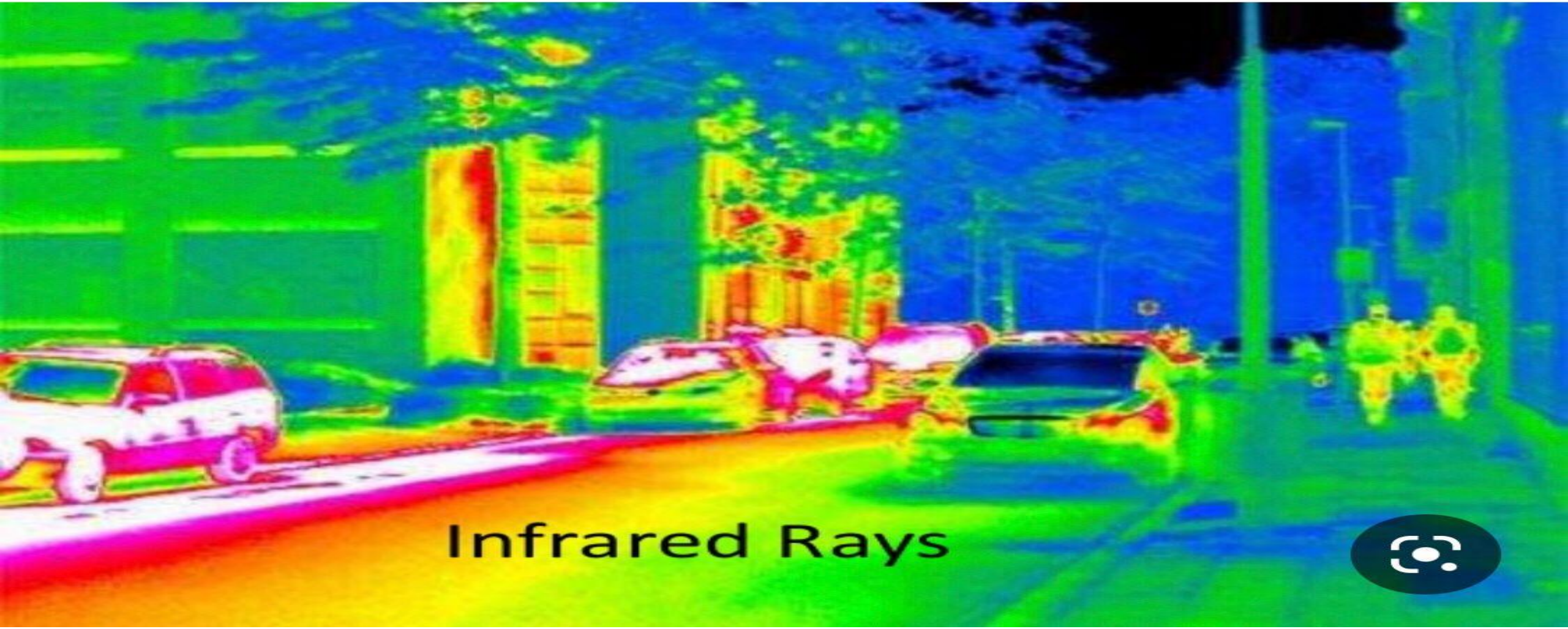
HOT (Whirl Pool)

- It is a hydrotherapy with massage at the same time,
- the affected part is immersed in a basin of water to a Controllable heat with the use of pneumatic force (turbine for air),
- which causes the creation of Circular waves around the affected area (i.e. hydrotherapy with massage)
- To relieve pain and muscle spasm
- Reduce swelling
- Move the affected part

THANK YOU

LECTURE 5
THERMOTHERAPY

الدكتور
ياسر يوسف العبيدي



What is infra-red ray?

- ELECTROMAGNETIC WAVE WHOSE WAVELENGTH IS JUST BELOW THE RED RAY OF THE VISIBLE LIGHT.
- ITS WAVELENGTH IS 750 NM-400000 NM.
- INFRA-RED RAYS IS EMITTED BY ANY HOT OBJECT.
- IT CAN BE HOT IRON, HOT METAL, FIRE, BURNING CHARCOAL.
- SUN RAY ALSO HAS INFRA-RED RAYS IN IT & THAT'S WHY IT FEELS THE HEAT

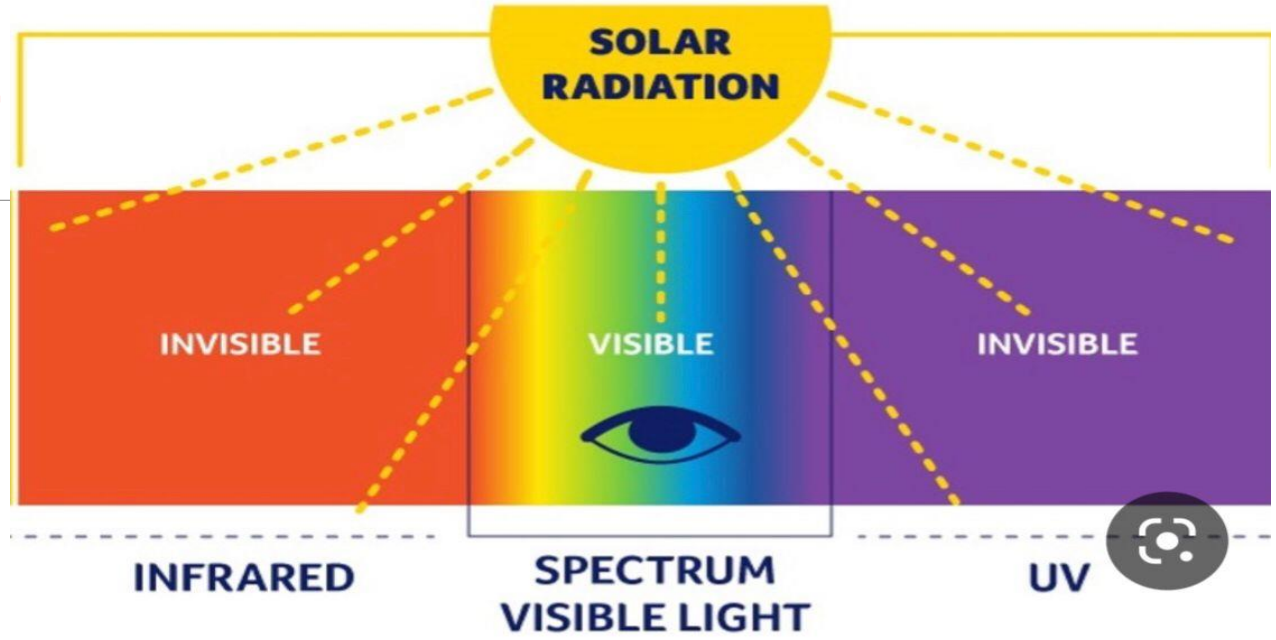
TYPE OF IR RADITION

IR is divided into different bands:

Near-Infrared (NIR, 0.78~3.0 µm),

Mid-Infrared (MIR, 3.0~50.0 µm)

Far-Infrared (FIR, 50.0~1000.0 µm)



Type	Wavelength
IR A (Near IR)	0.7– 1.4 µm (700-1400nm)
IR B (Mid-IR)	1.4– 3.0 µm (1400-3000nm)
IR C (Far-IR)	3.0– 100 µm (3000 nm– 0.1 mm)

- The Near infrared are also known as 'luminous' as they have some visible light .
- The luminous source is found to be more effective in tissue-heating as it penetrates deeper and energy is distributed in larger areas of the tissues .
- The Far infrared (FIR) also called non-luminous.
- absorbed in the skin.
- FIR wavelength is too long to be perceived by the eyes, however, the body experiences its energy as a gentle radiant heat which can penetrate up to 4 cm beneath the skin .

Production of Infrared.

Different kinds of lamps are used for production of therapeutic infrared:

Non-luminous generator

Luminous generators -

Non luminous generators

- Also known as low temperature generators.
- Produces only infra-red rays of wavelength 750 nm to 15000 nm.
- These generators are heated by passage of electric current through a bare wire or carbon, held in a non-conducting material like porcelain, mounted in the center of parabolic reflector.
- For acute injury, sedative effect of non luminous generators may prove more useful

Luminous generators

. Also known as high temperature generators.

Emits visible rays, ultraviolet rays, and infra-red rays of wavelength 350 nm to 4000 nm.

Are in the form of incandescent bulb – consist of a wire filament enclosed in a glass bulb which may contain inert gas at low pressure.

Filament made of tungsten as it tolerates repeated heating and cooling.

For lesion of more chronic type the effect of shorter rays may prove to be of value and under these circumstances a luminous generator is used.

Non Luminous generators

↕↕

luminous generators

↕↕↕

✓ Absorption and Penetration of IR

Some rays are reflected from the skin surface. penetrate, get scattered, refracted and ultimately absorbed in tissues.
Water and protein in the tissues strongly absorb IR.
Penetration depth is the depth at which approximately 63% of radiation energy is absorbed.

Factors of Absorption and Penetration of IR

- Wavelength of rays
- Angle of incidence of ray
- Distance from source of infrared
- Density of tissue

Physiological Effects

- local cutaneous vasodilation due to the release of chemical vasodilator (histamine) as well as possible effect on the blood vessels,
- occurs after 1-2 minutes.

Therapeutic Uses

- pain relief
- decreases muscle spasm
- increases the sensory nerve conduction velocity,
- increase in endorphins influencing the pain gate mechanism
- acceleration of healing and tissue repair- pressure sores
- used prior to electrical stimulation/testing or biofeedback to make the skin a better conductor

Dangers

- Burns
- Skin irritation
- Eye damage
- Dehydration
- Low BP
- Electric shock
- Headache
- Defective arterial blood flow

Application

- Patient is placed in a comfortable position
- the area to be treated is exposed.
- Nature and effects of treatment are explained.
- Skin is examined and thermal sensations are tested.
- Eyes are shielded in case they are irradiated.
- To achieve maximum penetration, the lamp is placed at right angles to area to be treated.
- Distance from the lamp can be about 60-75 cm for large lamp (750-1000W) and 45-50cm for smaller ones.
- Intensity of heat is controlled by altering the position of the lamp or in some lamps by altering the resistance thereby the current to the element.
- Non-luminous lamp has to be switched on up to 15 minutes before application to allow maximum emission.

DOSAGE

- For acute cases irradiation with infra-red rays can be given for 10 to 15 minutes daily for 1 to 3 times as per the requirement.

- For chronic cases upto 30 minutes once (daily) or on alternate days can be given

Ultraviolet Radiation (UVR) in Physiotherapy

Ultra-violet radiation (UVR) is electromagnetic energy that is invisible to the human eye, with wavelengths between 10nm and 400nm.

Ultra-violet lies between visible light and x-rays in the electromagnetic spectrum.

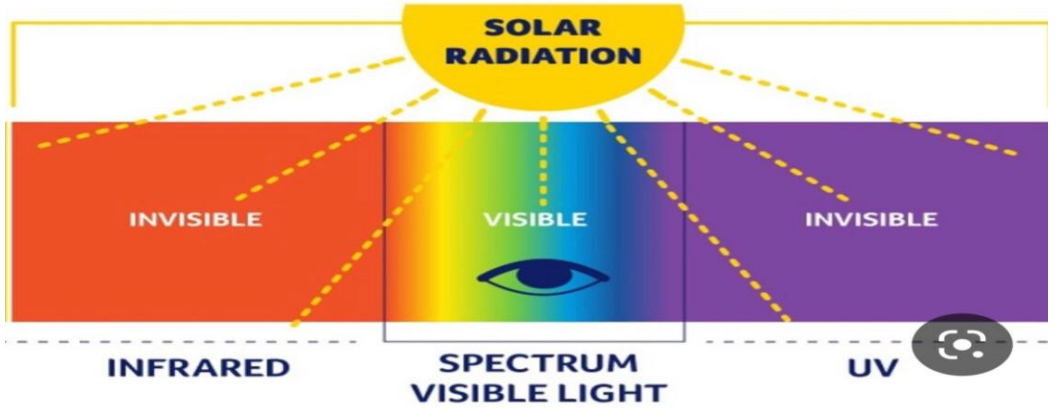
The therapeutic part of the ultra-violet spectrum may be divided into:

UVA ⇒ 400-315 nm

UVB ⇒ 315-280 nm

UVC ⇒ below 280 nm

UVA and UVB are biotic, where as UVC is abiotic



Production of UVR

The Sun emits a broad spectrum of ultraviolet radiation, including UVA, UVB, UVC. Both UVA and UVB reach the earth from the sun. however, UVC is filtered out by the ozone layer. For therapeutic purposes, some form of generator is used to emits UVR.

Types of UVR Generators

Two types of UVR generators-

- Mercury vapor lamp– can be of two types;

------- Air cooled medium pressure mercury vapor

------Water cooled mercury vapor lamp Fluorescent lamps

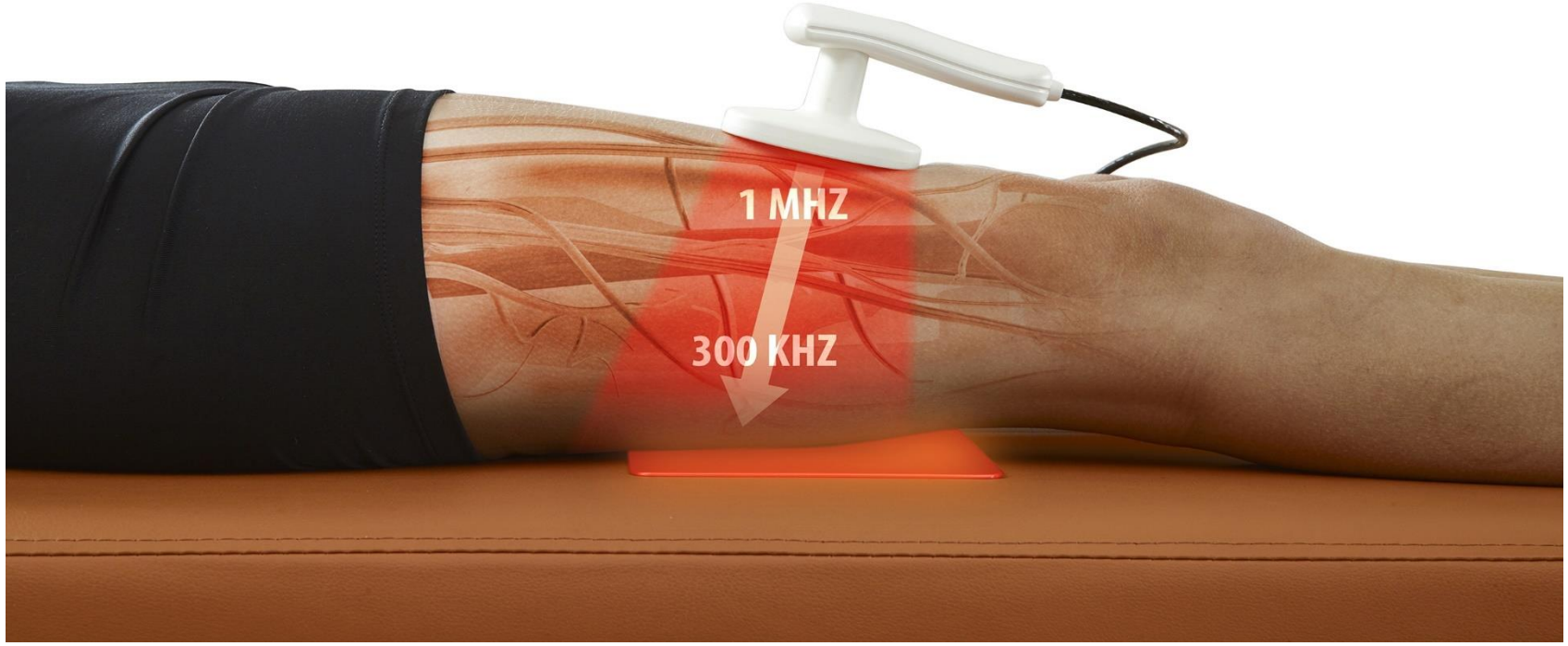
- Fluorescent lamps

Absorption of UV Rays in body

- The superficial layer of our body is skin.
- it is a protective layer of our body.
- it absorbs the ultraviolet light and prevent its penetration down to unprotected or weak cells.
- The extent of the reaction or damage depends on the wavelength of ultraviolet and the amount of ultraviolet absorbed.

DIATHERMY….

A THERAPEUTIC APPROACH



INTRODUCTION

- Diathermy is a therapeutic treatment commonly prescribed for muscular and joint associated pains.
- The term ‘diathermy’ means ‘through heating’ or producing deep heating directly in the tissues of the body.

  ‘ Dia’ ««««««« through (also means two)

  ‘thermy’ ««««««« heat or temperature

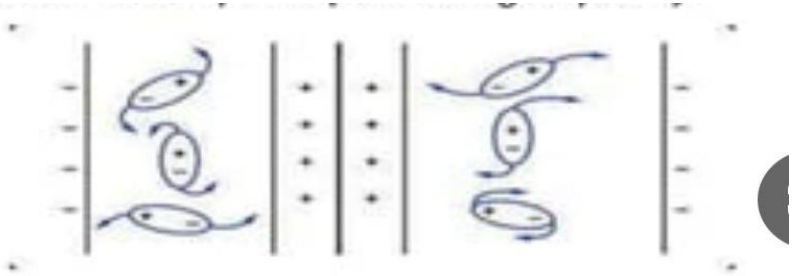
- It simulates the circulation, relieve pain, enhances rate of recovery of healing the tissue.

PRINCIPLE OF DIATHERMY

1. Before injury, the dipole molecules of the body tissue are arranged on the basis of polarity .

2. When the tissue is damaged the dipoles distribution become irregular and deviates from polarity based arrangement .

3. Under the influence of an electric field , they rotate according to the polarity of their charge in the direction of the field lines and get rearranged and tends to acquire its previous stage of polarity.



CHALLENGES OF DIATHERMY

1. As the subcutaneous layer is fatty , direct delivery of heat to the deep layers of tissue is not possible.
2. Diathermy involves uneven and uncontrolled delivery of heat therefore sometimes instead of the target tissue , surrounding tissue gets affected Subcutaneous layer

DIATHERMY

- uses an electric current to produce heat deep inside a targeted tissue.

It can reach areas as deep as two inches from the skin's surface.

- The diathermy machine does not apply heat directly to the body. Instead, the current from the machine allows the body to generate heat from within the targeted tissue.
- As the heat increases, it promotes blood flow. It can also help improve flexibility in stiff joints and connective tissue

BENEFITS OF DIATHERMY

- Intense heat delivered provides pain relief and better flexibility
- Reduces inflammation
- Improves circulation
- Accelerate healing

TYPES OF DIATHERMY

1. SHORT WAVE DIATHERMY
2. LONGWAVE DIATHERMY
3. MICROWAVE DIATHERMY
4. ULTRASOUND DIATHERMY
5. LASER DIATHERMY

SHORTWAVE DIATHERMY

- Shortwave diathermy uses high-frequency electromagnetic energy to generate heat.
- It may be applied in pulsed or continuous energy waves.
- It is used to treat pain from sinusitis, kidney stones, and pelvic infections.
- It is effective for conditions that cause pain and muscle spasms.

Shortwave Diathermy Machine | Intelect Shortwave

Shortwave Has Three Main Frequencies:

- 27.12 MHz, wavelength 11 M (most common used one).
- 13.56 MHz wavelength 22 M.
- 40.68 MHz 7.5 M.

MICROWAVE DIATHERMY

- Microwave diathermy uses microwaves to generate heat in the body.
- It can be used to evenly warm deep tissues without heating the skin.
- Since it can’t penetrate deep muscles, it is best suited for areas that are closer to the skin, such as shoulders.

انتقال

Microwave diathermy unit - PHYSIOTHERM-M -

ULTRASOUND DIATHERMY

- Ultrasound diathermy uses sound waves to treat deep tissues.
- Heat is generated by the vibration of the tissue.
- This promotes blood flow into the area.
- It is used for many types of musculoskeletal sprains strains, and fractures

انتقال

Ultrasound diathermy unit - Sonopulse - Ibramed -

LONGWAVE DIATHERMY

- Long wave diathermy is based on capacitor field method.
- It can work in heavy voltage fluctuation
- Long wave can be used as an alternative for shortwave diathermy applications.
- it is portable and light weight

Long Wave Diathermy Supplier In India | Ultrasound

DIATHERMY PROVIDES RELIEF IN:

- ARTHRITIS
- BACK PAIN
- MUSCLE SPASMS
- NEURALGIA
- MYOSITIS
- SPRAINS AND STRAINS
- TENDONITIS
- BONE INJURIES
- BURSITIS

UNWANTED EFFECTS OF DIATHERMY

- The electromagnetic energy used in diathermy can cause extreme heat in metal devices such as bone pins, dental fillings, and metal sutures causing burns
- During diathermy treatment, the patient becomes a part of the electrical field. Touching a bare metal object, such as a cabinet, during diathermy can cause a shock or burn.

RISKS ASSOCIATED WITH DIATHERMY

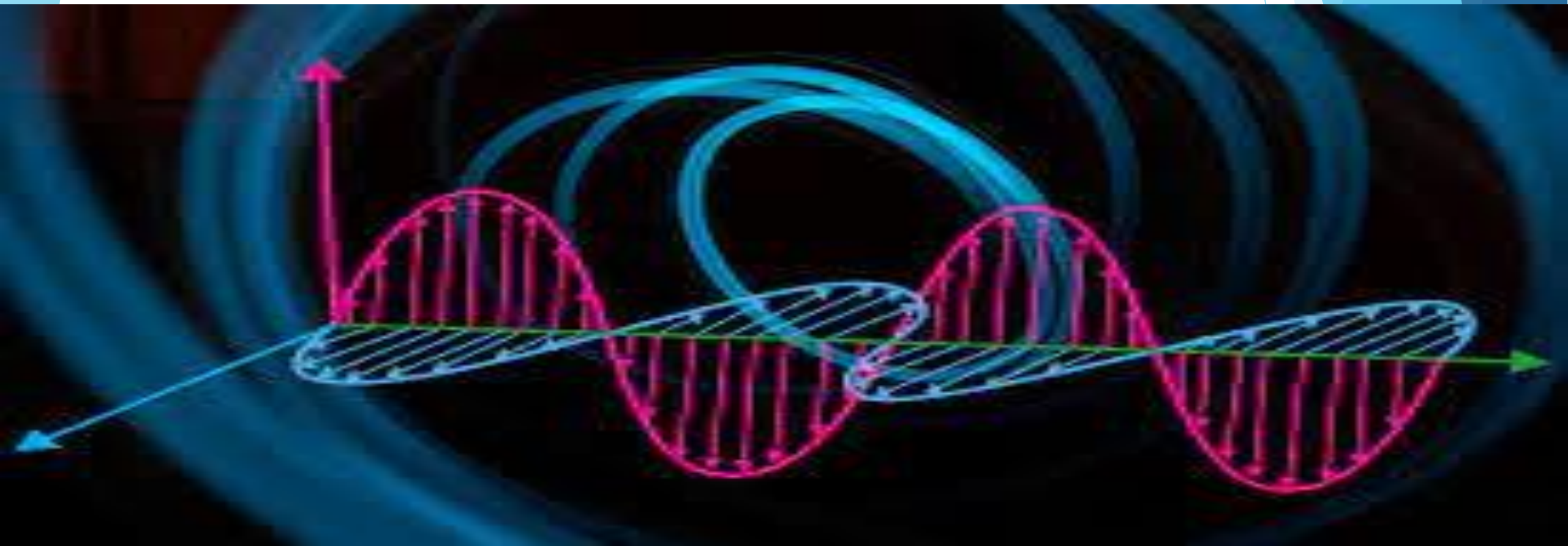
Diathermy should be avoided in following cases:

- implanted metal devices
- peripheral vascular disease
- tissue with restricted blood supply (ischemia)
- cancer
- bleeding disorders , wound dressings
- severe heart, liver, or kidney conditions
- pregnancy


Thank you
for listening

LECTURE ٦
الدكتور
ياسر يوسف العبيدي

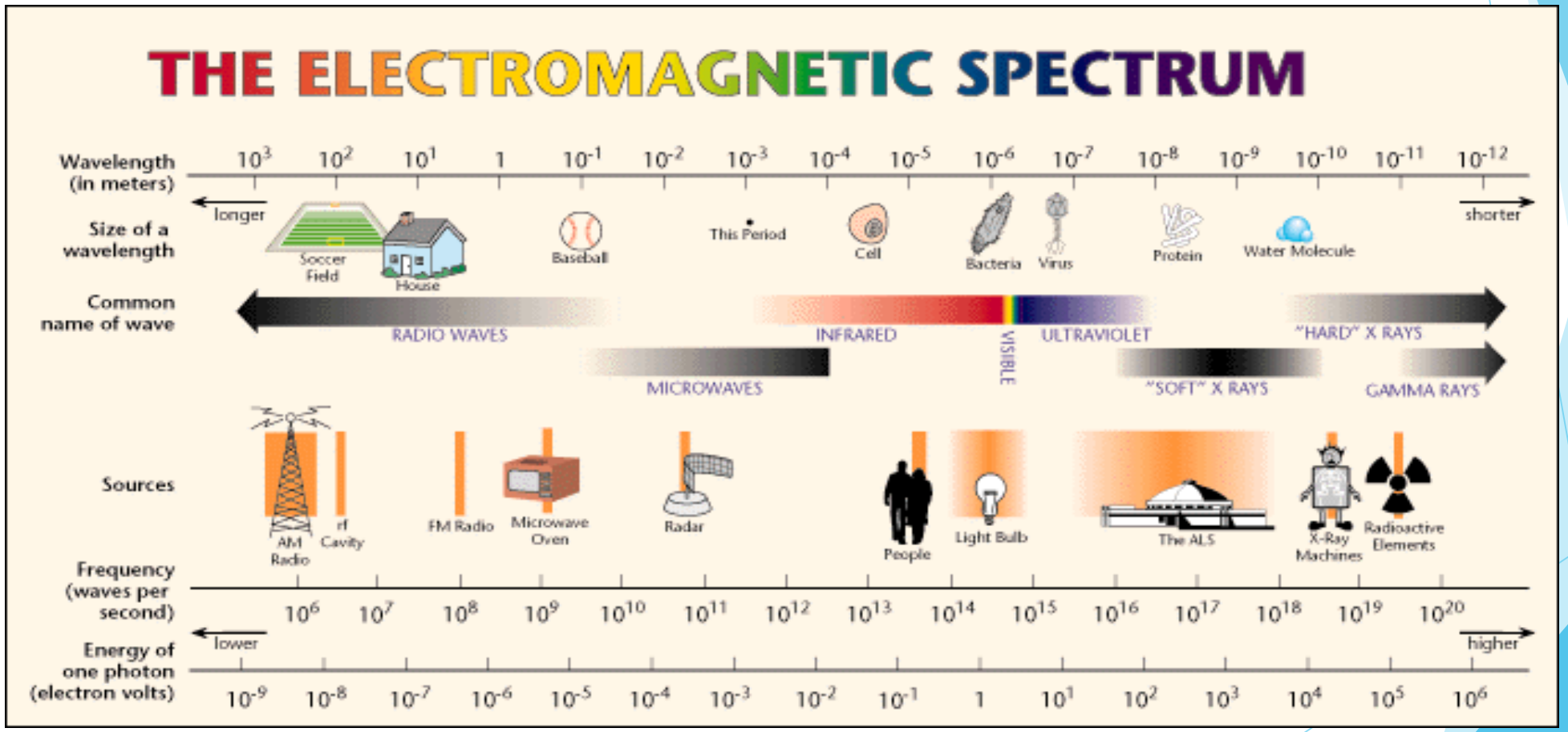
Laser therapy physiotherapy



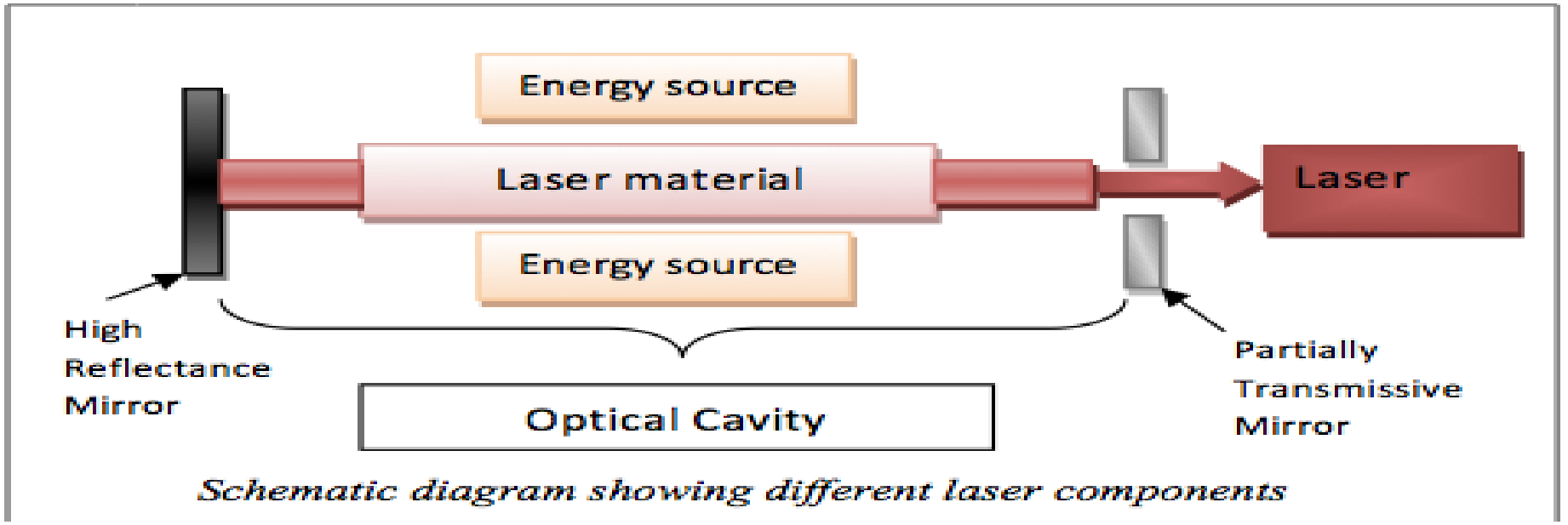
What is Laser Therapy?

- ▫ **L**ight **A**mplification by the **S**timulated **E**mission of **R**adiation
- ▫ Compressed light of a wavelength from the cold, red part of the spectrum of electromagnetic radiation

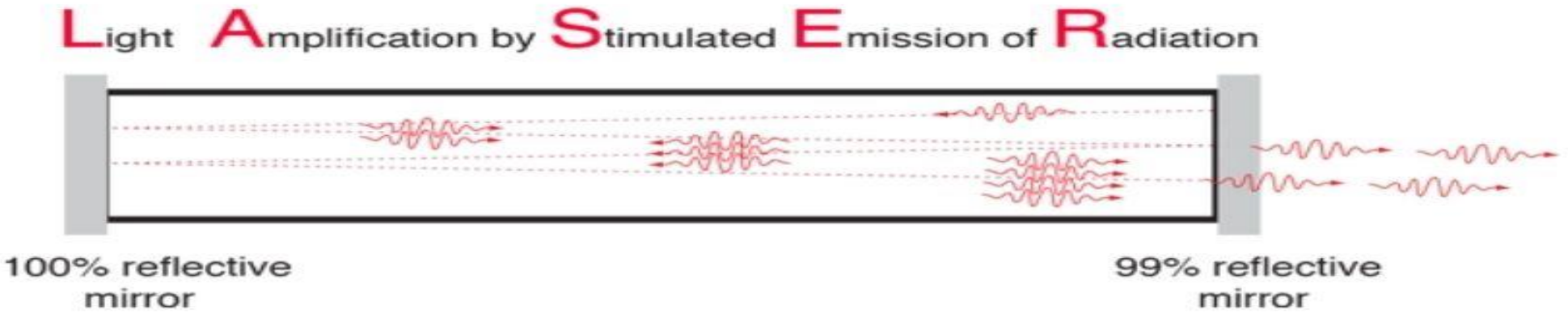
Electromagnetic Spectrum



Laser Generators

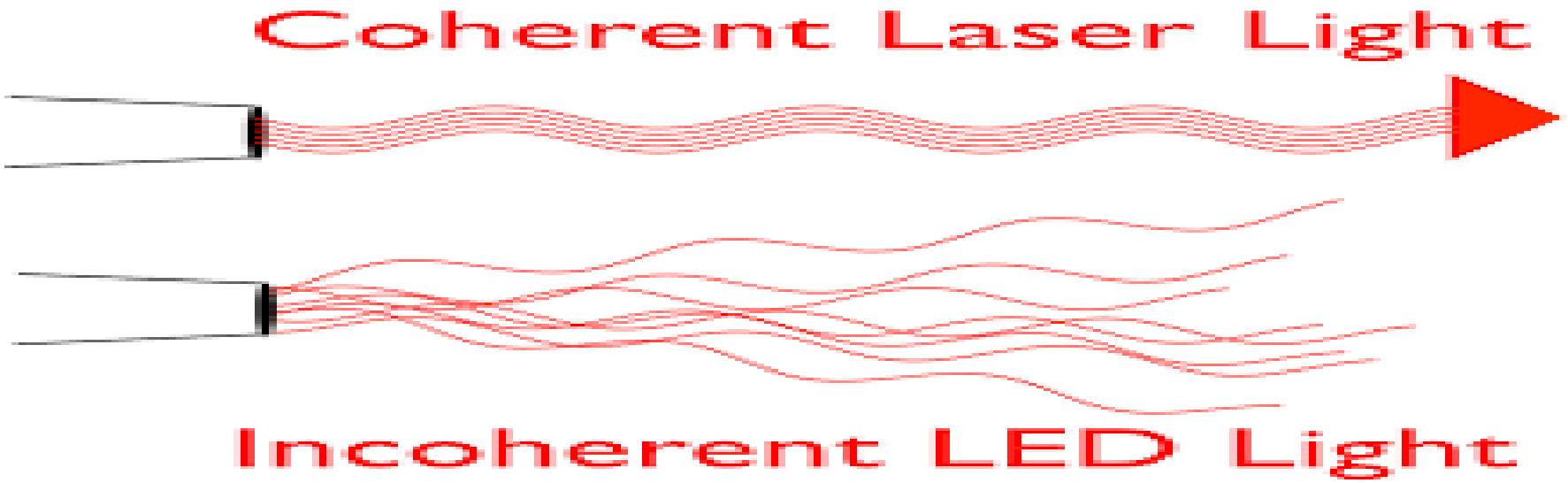


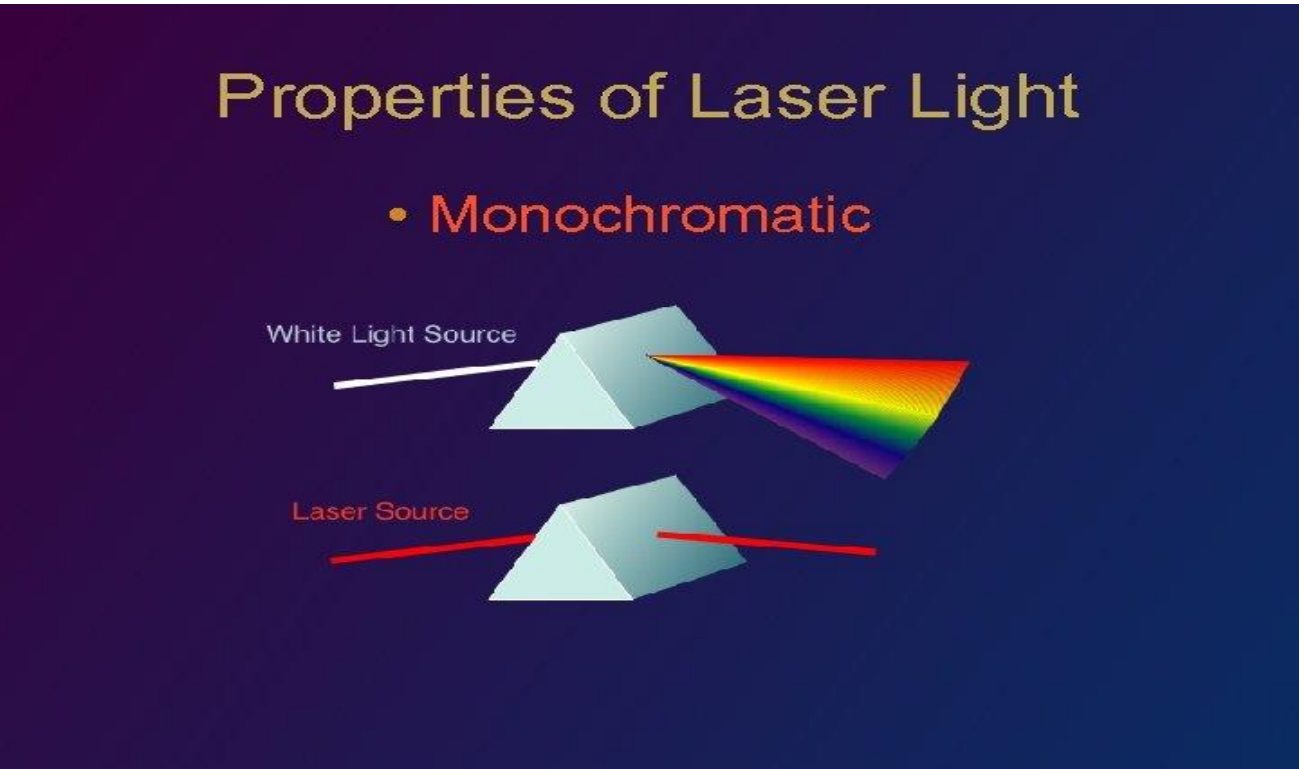
Schematic diagram showing different laser components

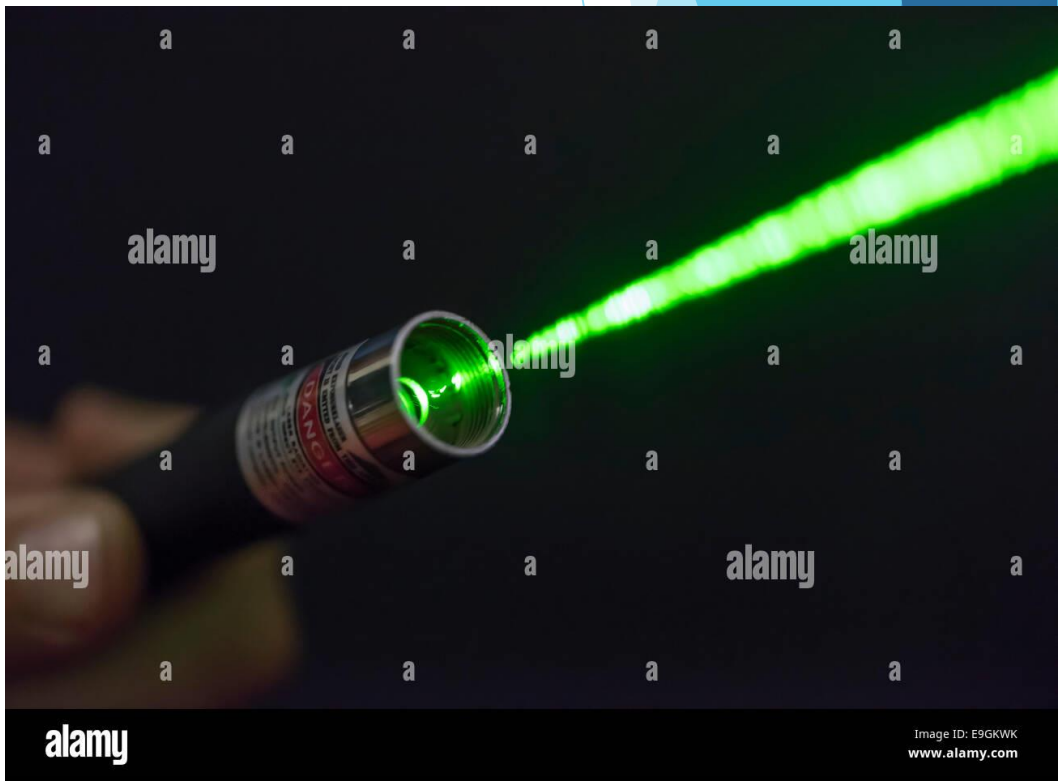


Properties of laser

- **Monochromaticity:** Laser light is concentrated in a narrow range of wavelength (same wavelength and same color).
- **Coherence:** All photons emitted in one phase (same time and distance).
- **Collimation (directionality):** In one direction and non-spread (Focusing the beam of light on certain point).


Coherent Laser Light
Incoherent LED Light


Properties of Laser Light
• Monochromatic
White Light Source
Laser Source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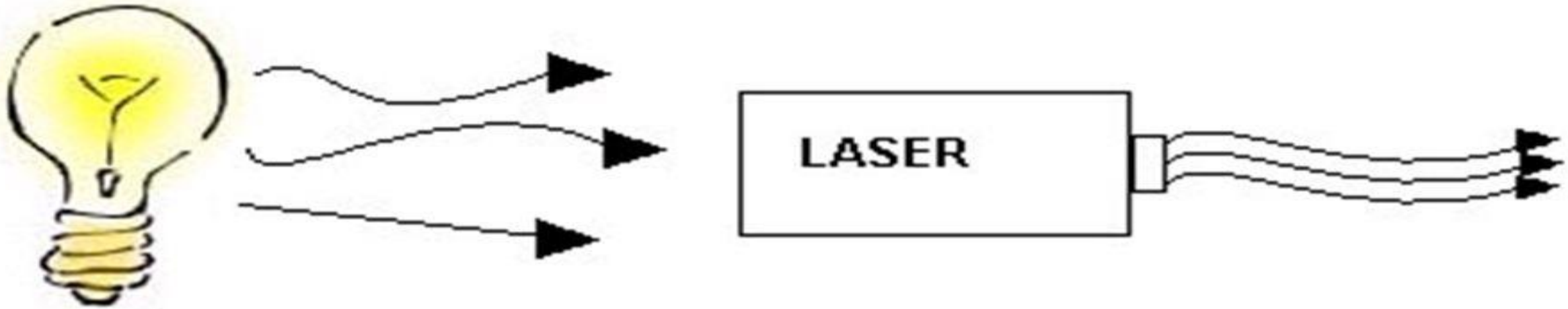
Incandescent v/s Laser Light



1. Many wavelengths
2. Multidirectional
3. Incoherent

1. Monochromatic
2. Directional
3. Coherent

Classification of laser

1. According to nature of the material placed between two reflecting surfaces.
2. According to intensity.
3. According to hazards.

1. According to nature of the material placed between two reflecting surfaces.

- a) Crystal lasers (solid state lasers) include
- - Ruby crystal (aluminum oxide and chromium)
- – Neodymium crystal is embedded in yttrium-aluminium garnet (Nd:YAG) lasers.
- b) Gas lasers include

  - Helium neon (HeNe) - Argon - Carbon dioxide (CO2)
- c) Semiconductor or diode laser

- Gallium arsenide (GaAs)

d) Liquid laser - Polyphenyle - Oxazine

- e) Chemical laser

- Laser with high intensity not used therapeutically but used in industrial production

2. According to intensity.

a) High power:

known as "hot" lasers because of the thermal responses they generate. These are used in the medical realms in numerous areas, including surgical cutting and coagulation, ophthalmologic, dermatologic, oncologic, and vascular specialties.

b) Low power:

known as "low power laser therapy" or "low level laser therapy". It used for wound healing and pain management.

These lasers produce a maximal output of less than 1 milliwatt (1 mW =1/1000 W) causing photochemical, rather than thermal effects. No tissue warming occurs.

… 3. According to hazards.

- **Class 1 (less than 0.5 mW)**
  - Visible and non-visible
  - No eye or skin danger
  - Laser printers, car entry, CD players
  - No heating/no healing
  - Safe in all uses unless focused through magnifier
- **Class 2 (less than 1 mW)**
  - Visible
  - Safe for short periods on eyes and extended on skin
  - Safe because blink reflex limits retina exposure
  - No healing/no heating

Class 3 (1mW to 500 mW)

- Visible and invisible.
  - Helium neon (HeNe).
  - Galium Arsenide (GaAs)—infrared.
    - GaAluminumAs (GaAlAs)—infrared.
    - MPE can be exceeded with limited effects (skin).
    - Protective eye ware if direct viewing of beam.

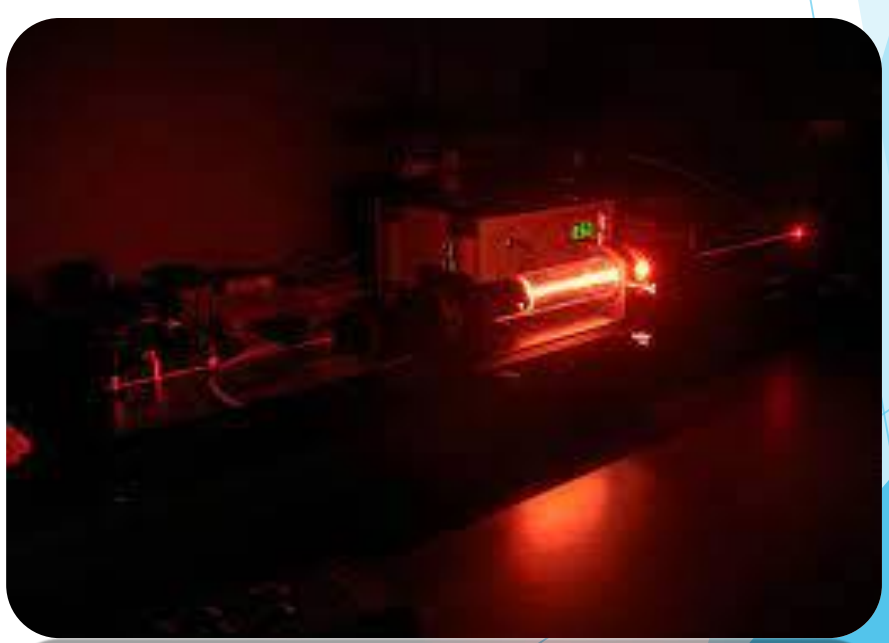
Class 4 (more than 500 mW)

- Increases tissue temperature--can burn
- Dehydrates tissue
  - Coagulates protein
- Thrombolysis
- CO2, Argon, YAGlaser
  - Eye danger can result from indirect or reflected beam

- Most Commonly Used Lasers

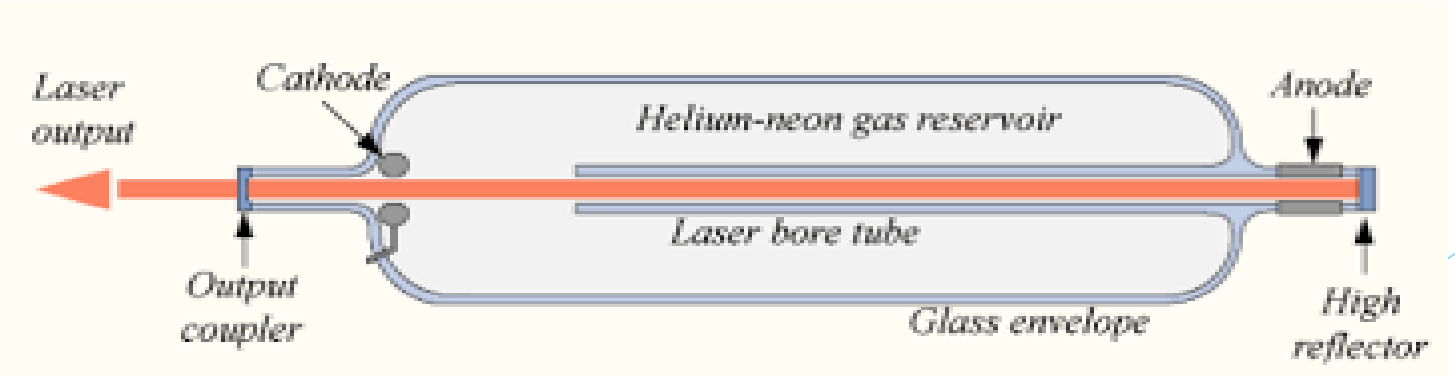
  Helium neon (HeNe)

  Gallium arsenide (GaAs)



1- Helium neon (HeNe)

- ▫ The HeNe gas laser uses a gas mixture of primarily helium with neon in a pressurized tube.
- This creates a laser in the red portion of the electromagnetic spectrum with a wavelength of 632.8 nm.
- The power output of the HeNe can vary, but typically runs from 1.0 to 10.0 mW, depending on the gas density used.



2- Gallium arsenide (GaAs

- The GaAs lasers utilize a diode to produce an infrared (invisible) laser at a wavelength of 904 nm.
- Diode lasers are composed of semiconductor silicone materials that are precisely cut and layered.
- An electrical source is applied to each side, and lasing action is produced at the junction of the two materials.
- The cleaved surfaces function as partially reflecting surfaces that will ultimately produce coherent light.
- The 904-nm laser is delivered in a pulsed mode because of the heat produced at the junction of the diode chips.
- N.B: Diode laser can single beam or multisource cluster beam

Physiological effects

1- Reducing Pain

a) There is an increase in serotonin (5-HT) levels (inhibit pain transmission to brain and from nociceptors).

b) There are also increases in Beta Endorphins, which decrease pain sensation.

c) Decrease bradykinins (is an inflammatory mediator. It is a peptide that causes blood vessels to dilate (enlarge)) which can be prevalent in injured tissue, induce pain sensation by stimulating nociceptive afferents.

d) Increase release of Acetylcholine: Acetylcholine helps normalize nerve signal transmission in the autonomic and somatic pathways.

2- Reducing Inflammation

a) Enhancement of ATP by stimulation of mitochondria.

b) Stabilization of the Cellular Membrane.

c) Acceleration of Leukocyte Activity

d) Increased Angiogenesis (is the physiological process through which new blood vessels form by vascular endothelial cells in proliferation (growth of new tissue)).

3- Promoting Tissue Healing

a) Increased macrophage activity.

b) b) Increased fibroblast proliferation.

c) c) Keratinocyte proliferation.

(Keratinocyte: the outermost layer of the skin The primary function of keratinocytes is the formation of a barrier against environmental damage by pathogenic bacteria, fungi, parasites, and viruses, heat, UV radiation)

4- Recovery from nerve injury

a) Accelerate nerve regeneration
b) by stimulation of Nerve growth factor)
c) Increase frequency of action potential.
d) Increase rate of nerve conduction.

5- Increase bone and cartilage formation

(by stimulation of bone morphogenetic proteins that stimulate bone cell differentiation)

Indications of laser therapy

- 1. Dermatological disorders
  - a) Wounds
  - b) Ulcers
- 2. Pain and inflammation in orthopedic and sport cases.
  - a) Ankle sprain
  - b) Chronic Low back pain
  - c) Tennis Elbow d) Plantar fasciitis
  - e) Frozen shoulder
- 3. Neurogenic pain a) Trigeminal neuralgia

▫ Treatment procedures

- 1) Preparation of the patient:

a) The skin in the area of electrode placement should be cleaned by saline water, soap or Vaseline to lower skin resistance.

b) Special gels, sprays or water is applied to the skin as a condition medium for better stimulation.

c) Electrodes should be fixed in position, using mending tapes to maintain good contact throughout the treatment period

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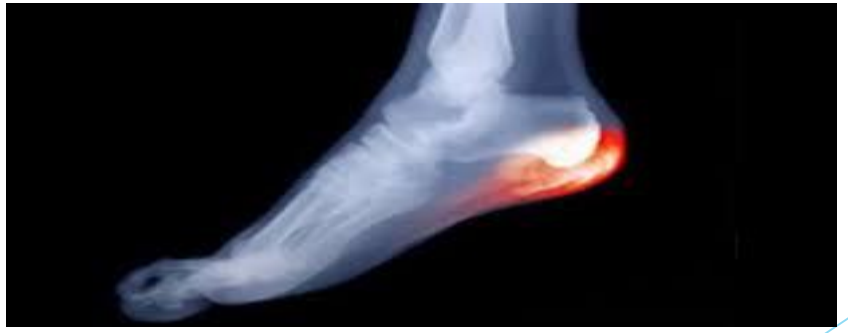
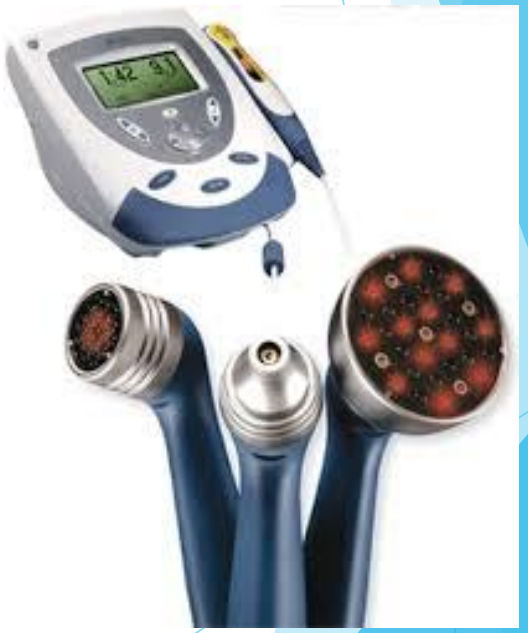




Clinical application of laser

- 1. Calculation of laser dose.
- 2. Penetration of laser.
- 3. Techniques of laser.

1. Calculation of laser dose dependent on:

(1) The output power of the laser in mw.

(2) The time of exposure in seconds.

(3) The beam surface in cm2 (area of irradiation).

• Equations:

Energy or total energy (Joule) = Watts X Seconds Time of exposure (seconds)/Joules/Watts.

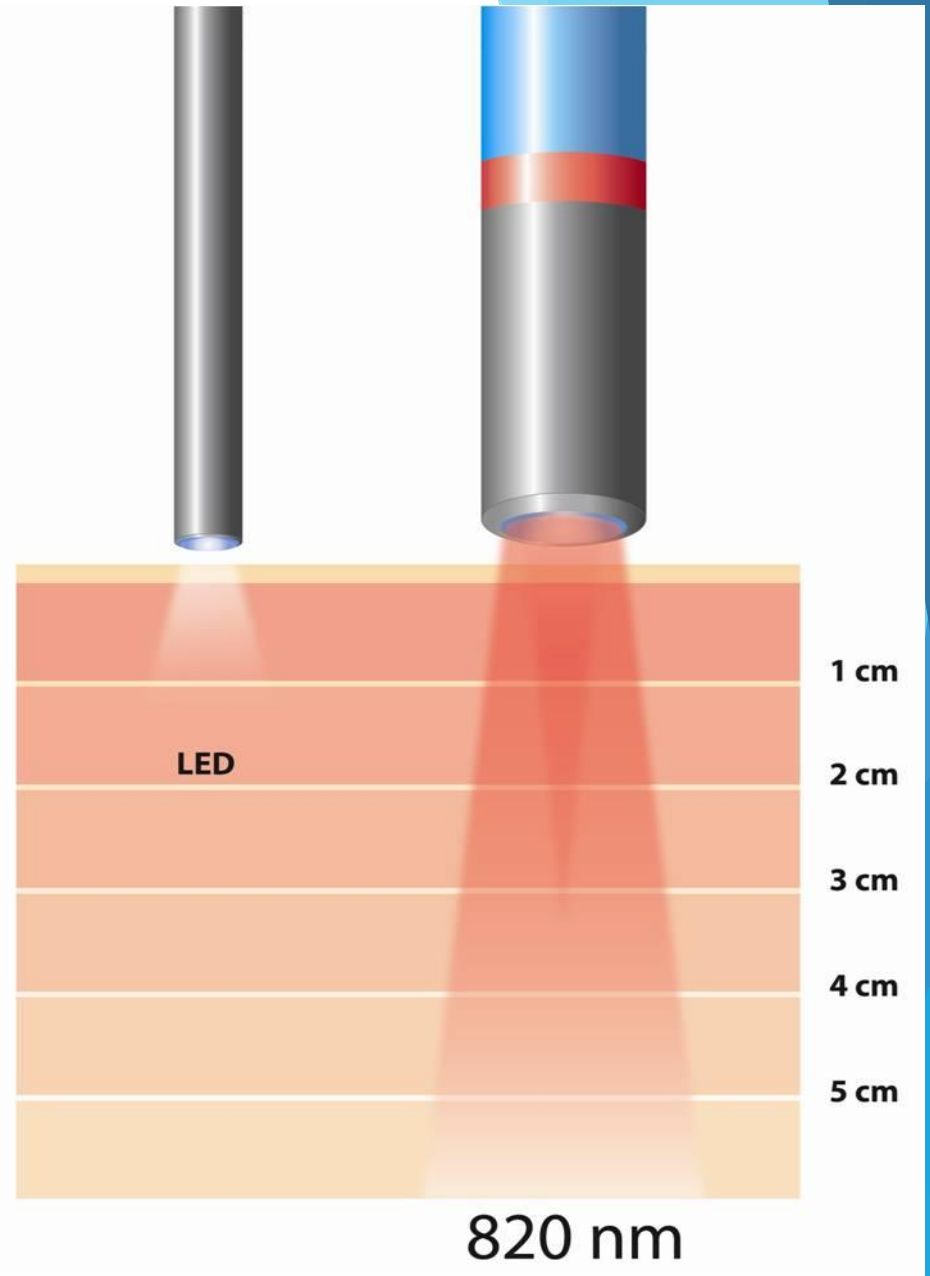
$$\text{Energy density (Joules/cm2 \{J/cm2\})} = \frac{\text{Output power (mw) x time (seconds)}}{\text{Beam surface area (area of irradiation)}}$$

2. Depth of Penetration

- a)HeNe laser energy Absorbed rapidly in the superficial structures, especially within the first 2-5 mm of soft tissue. The response that occurs from absorption is termed the "direct effect.

" HeNe laser has an indirect effect on tissues up to 8-10 mm.

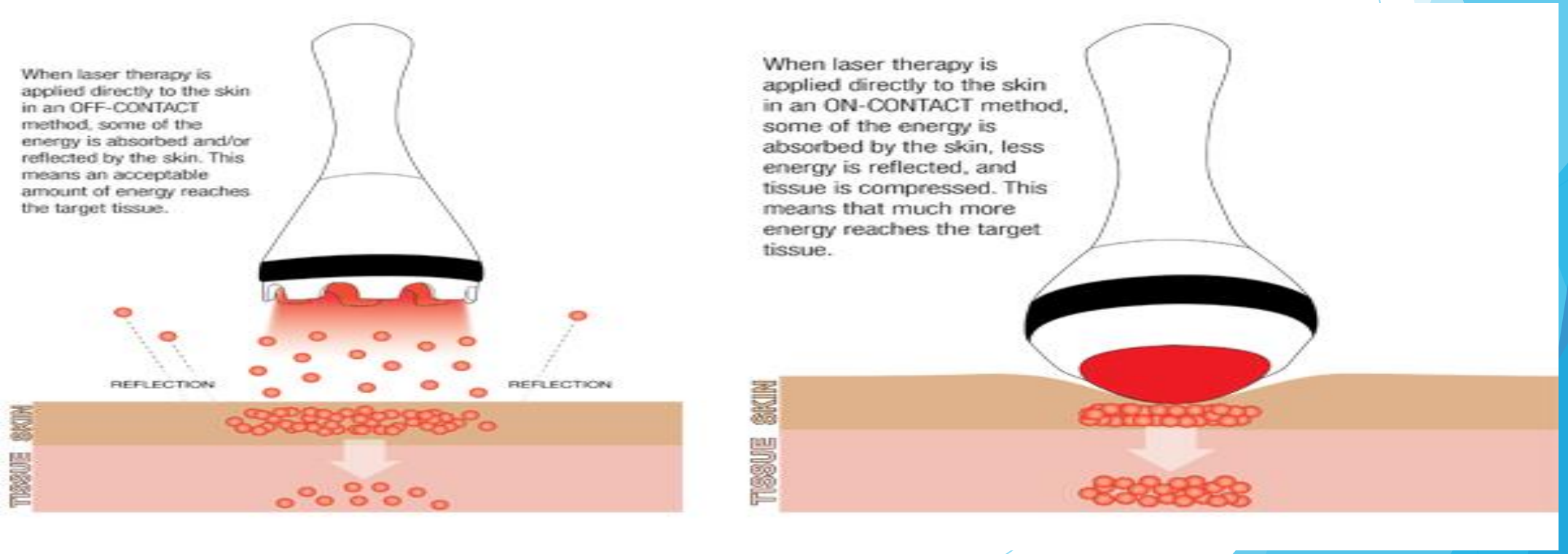
- B)The GaAs, which has a longer wavelength, is directly absorbed in tissues at depths of 1-2 cm and has an indirect effect up to 5 cm



3) Laser treatment techniques

- There are two main techniques

1. Contact technique: GaAs only for trigger points or around wound.
2. Non-contact technique: for HeNe and GaAs for superficial wounds or stimulation of wound bed



Contraindications

- ▫ Application over eyes
- ▫ Cancerous growths
- ▫ Pregnancy – over & around uterus
- ▫ Over cardiac region
- ▫ Growth plates in children
- ▫ Over & around thyroid gland & endocrine glands
- ▫ Patients who have been pre-treated with one or more photo sensitizers

Side Effects

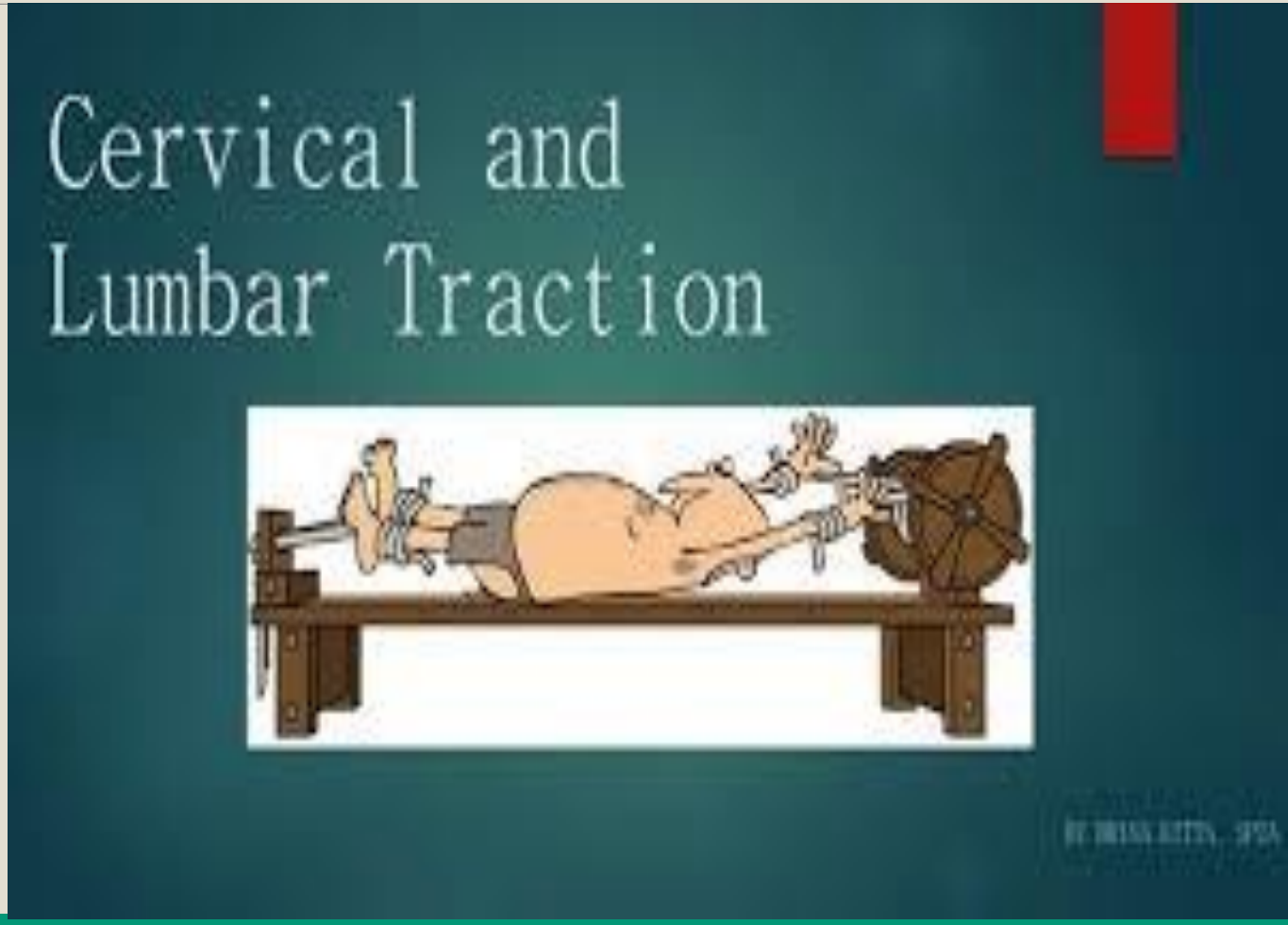
- Redness –
- Mild Itching –Pigmentation Changes
- –Crusting –Eye Injury
- –Minor Infection –
- Burns and Blisters –Scarring – Scarring is a very rare side effect of laser treatment,
- Change In Skin Texture –.

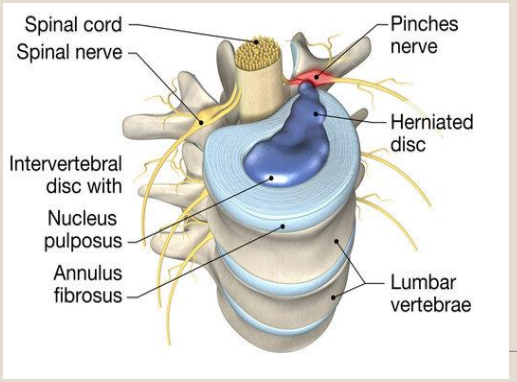

Thank You

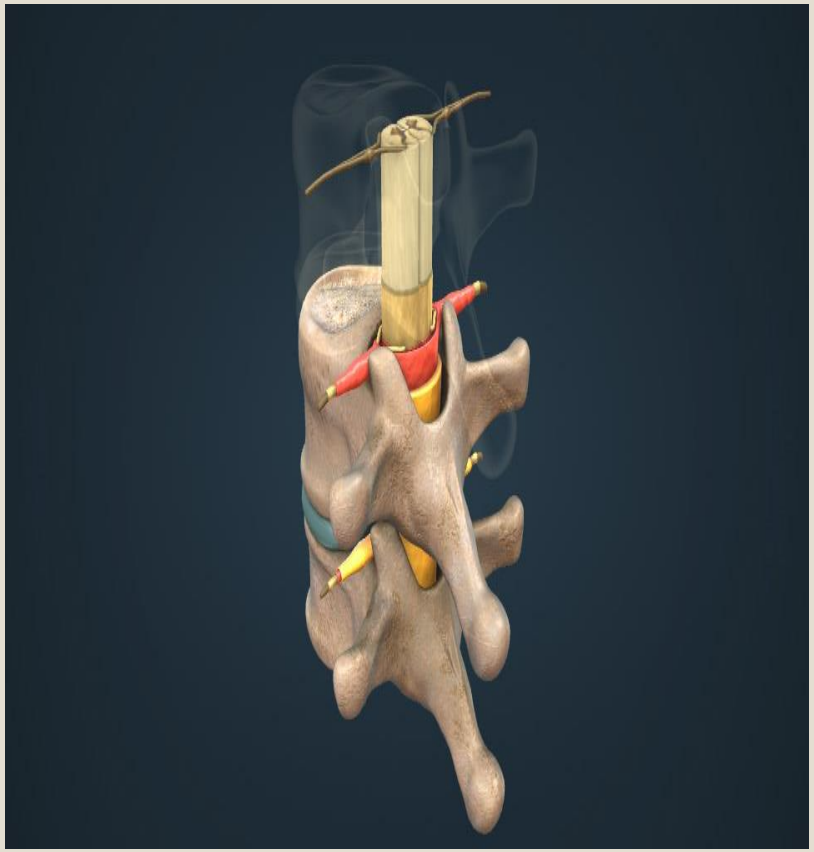
LECURE 6

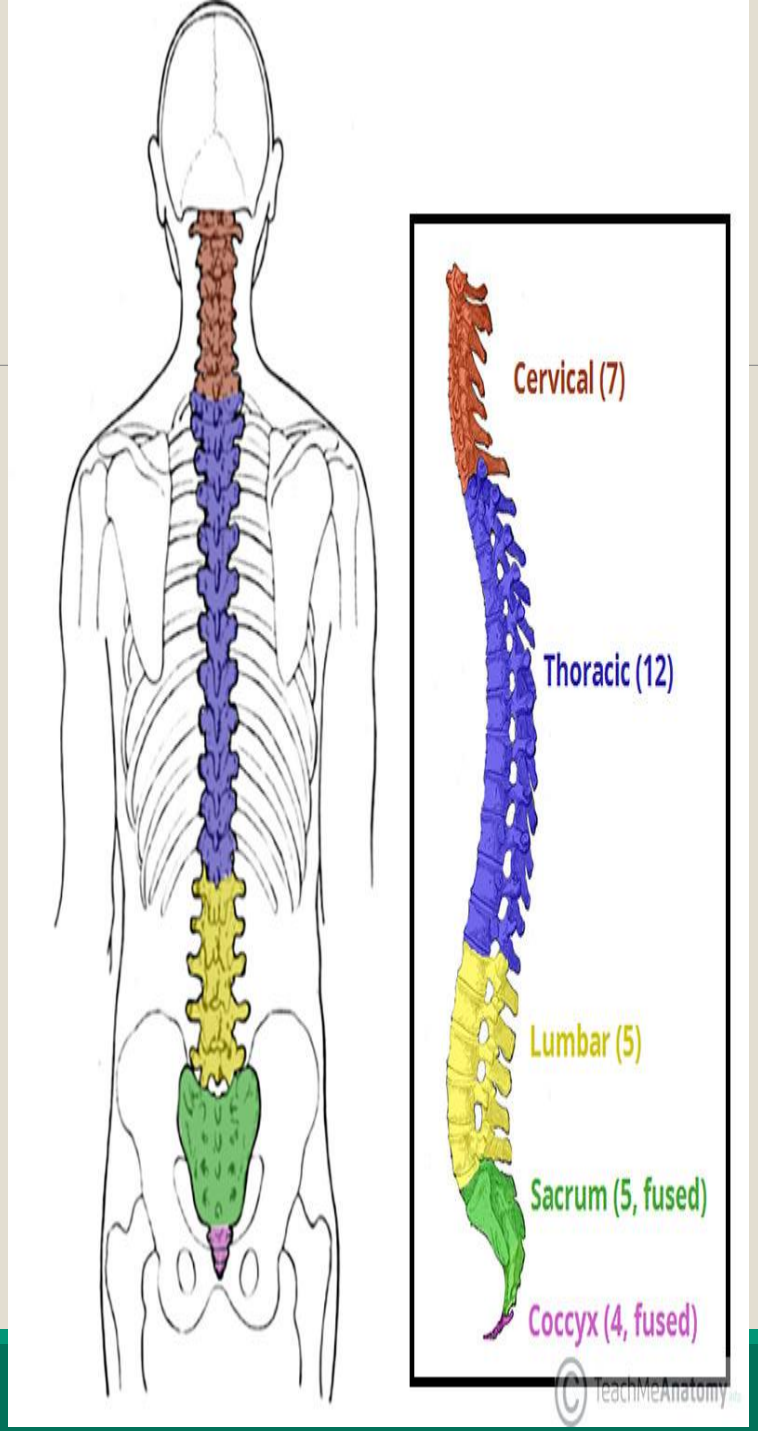
SPINAL TRACTION

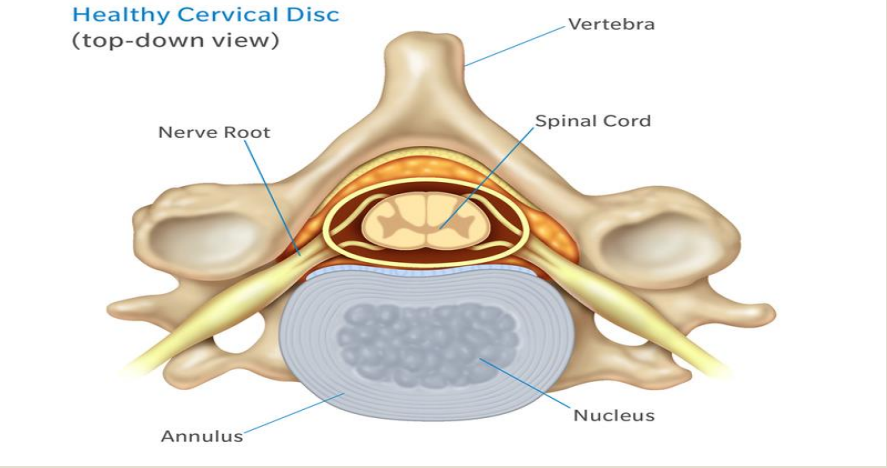
الدكتور
ياسر يوسف العبيدي

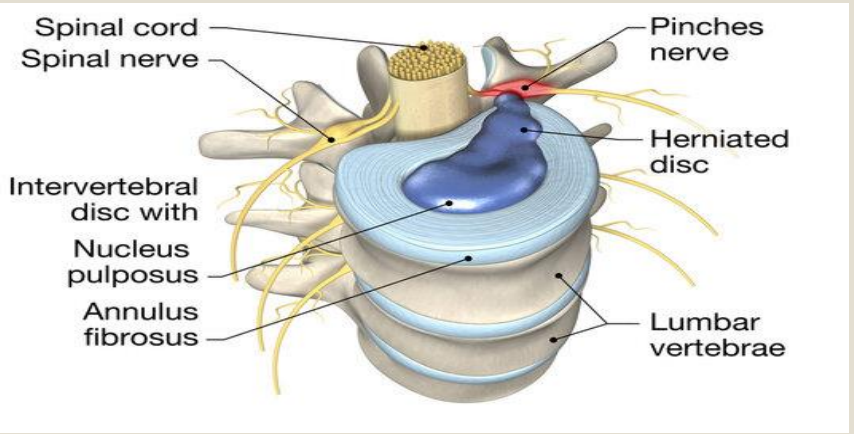



Spinal cord
Spinal nerve
Pinches nerve
Herniated disc
Intervertebral disc with
Nucleus pulposus
Annulus fibrosus
Lumbar vertebrae




Cervical (7)
Thoracic (12)
Lumbar (5)
Sacrum (5, fused)
Coccyx (4, fused)
TeachMeAnatomy

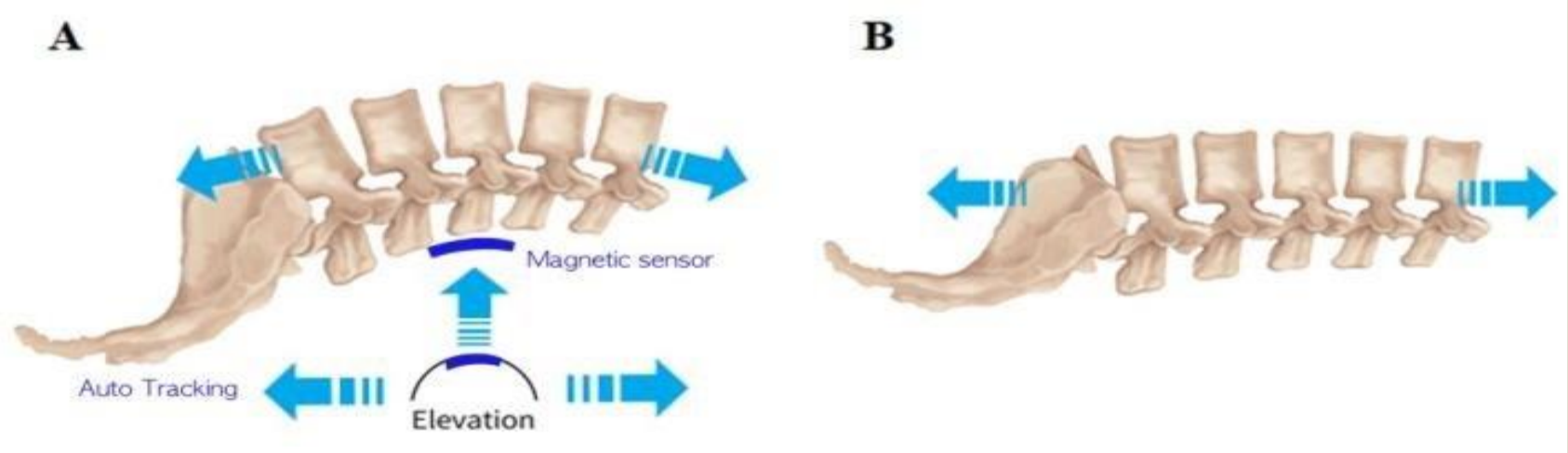

Healthy Cervical Disc
(top-down view)
Vertebra
Nerve Root
Spinal Cord
Annulus
Nucleus


Spinal cord
Spinal nerve
Pinches nerve
Herniated disc
Intervertebral disc with
Nucleus pulposus
Annulus fibrosus
Lumbar vertebrae

The Purpose of Traction

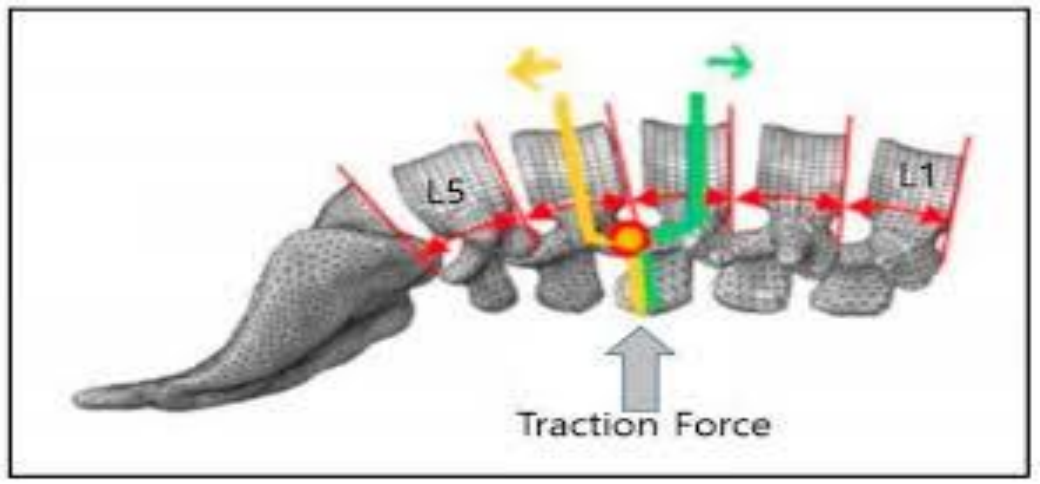
 In medical terminology, traction refers to the practice of exerting a slow, gentle pull on a body part.

 The purpose of spinal traction is to pull the vertebrae apart from each other to relieve pressure.



Traction

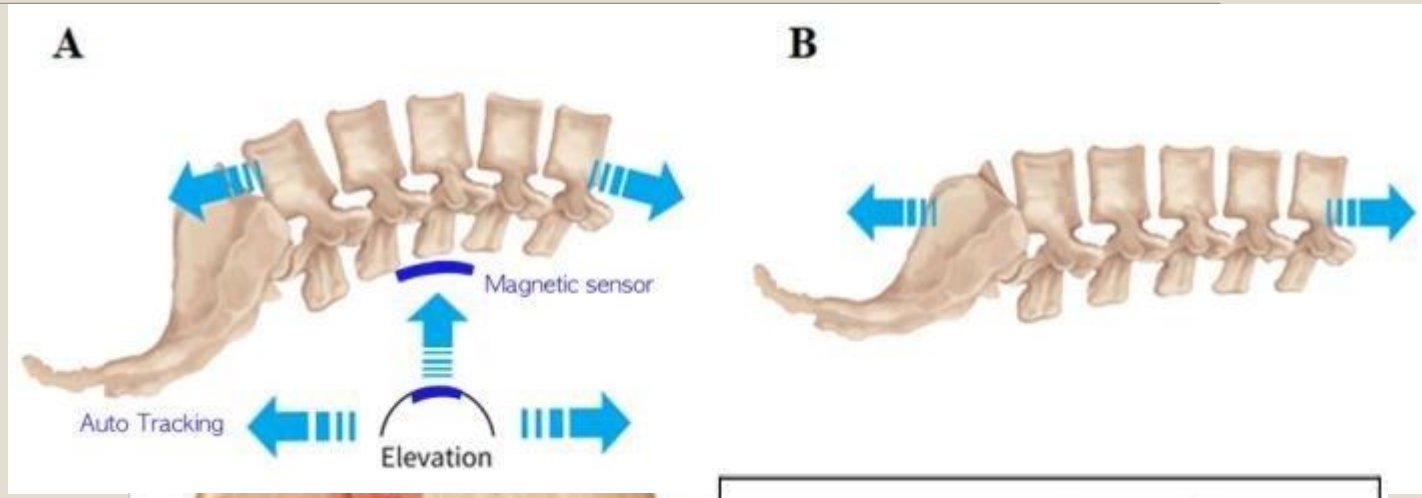
- Increases the separation of the vertebrae
- Decreases the central pressure in the disk space
- Encourages the disk to return to a central position
- The mechanical tension of the ligaments surrounding the disk (especially the posterior longitudinal ligament) help push the DISK back into its proper place.

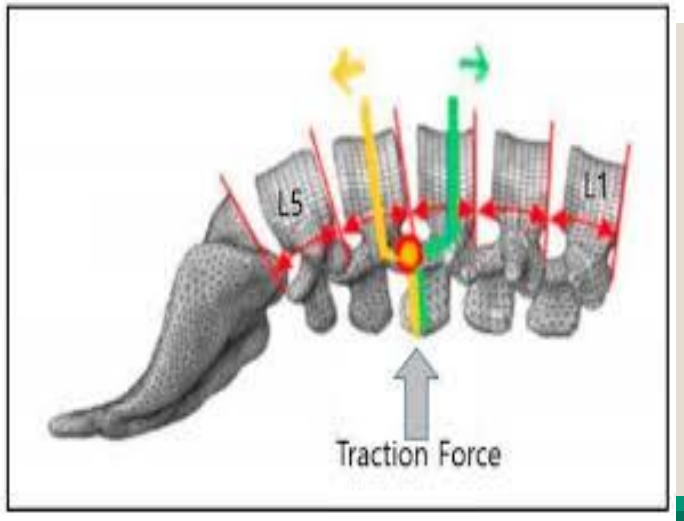


➢ Why Use Traction?
Principal reason is pain relief

How Does Traction Relieve Pain?

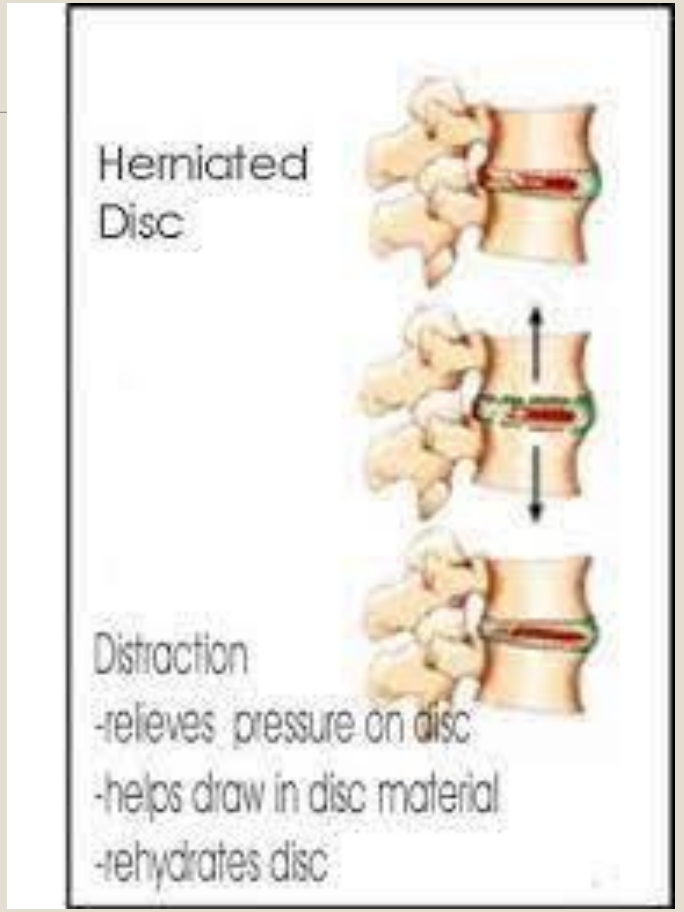
- Increasing the space between vertebrae
- Separating the apophyseal joints
- Widening the intervertebral foramina
- Removing pressure on injured tissue
- Reducing muscle spasm
- Increasing peripheral circulation
- Relaxing muscles
- Changing intervertebral disk pressures
- Tensing the posterior longitudinal ligament
- Creating suction to draw protruded disks toward their center
- Flattening an abnormal lumbar curvature





Indications

- Compression of nerve roots
- Disk protrusion
- Joint hypo mobility
- Adhesions
- Muscle spasm
- Disk degeneration
- Foraminal stenosis
- Contracted connective tissue
- Apophyseal joint impingement
- Radiating pain that does not improve with trunk or neck movement



Contraindications

- MALIGNANCY PRIMARY OR METASTATIC
- INFECTIOUS DISEASES OF THE SPINE TUBERCULOSIS
- UNCONTROLLED HYPERTENSION
- RHEUMATOID ARTHRITIS
- SPINAL CORD COMPRESSION
- OSTEOPOROSIS
- CARDIOVASCULAR DISEASE
- ACUTE NECK OR LOW BACK PAIN

- OLDER ADULTS
- SEVERE RESPIRATORY DISEASE
- HYPERMOBILE VERTEBRAE SPONDYLOLISTHESIS
- WHEN TRACTION INCREASES RADICULAR PAIN

Commonly Used Traction Devices

Manual traction

Tractive force is applied by another person

Mechanical traction

Tractive force is applied with a machine or other apparatus

Cervical Traction

- Generally applied with the patient

  supine or sitting

- Supine preferred because it eliminates gravity
- Three main types

  Manual Pneumatic Motorized

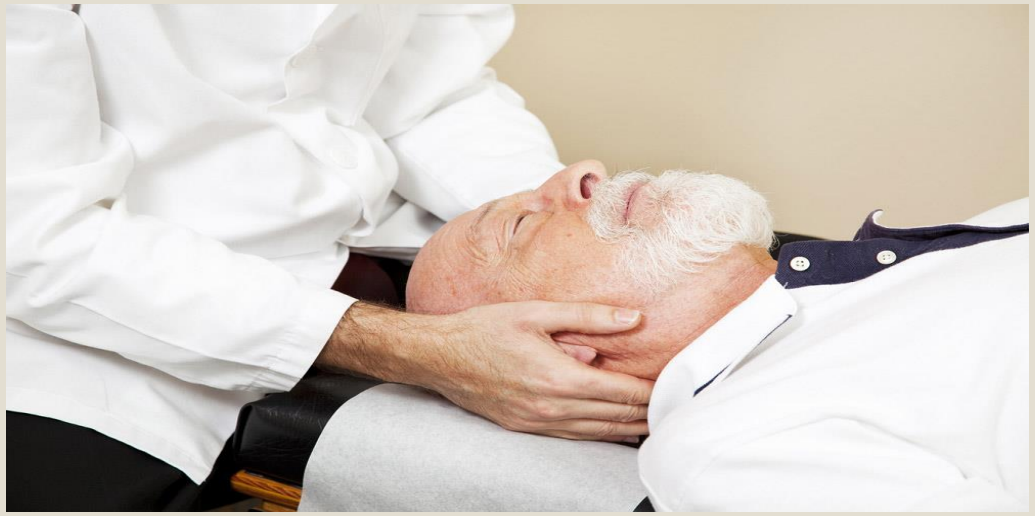
- tip With cervical traction,
- always start with manual traction. Why?

  You can rapidly stop a motion that might be troublesome to the patient.

Manual cT

- To perform manual cervical traction
- PHYSITIAN sits at head of table facing patient
- Head is cradled to allow distraction of cervical vertebrae without hurting patient
- Traction is applied
- Head is slowly moved to maximize relaxation and comfort

- slowly move head into relaxation and comfort
- Neutral position ««««»»»»»»»»pain: affecting upper cervical vertebrae
- Flexed 30 °«««««»»»»»»» pain: affecting lower cervical vertebrae
- Lateral flexion ««««»»»»»»»pain: pressure on spinal nerves with radiating pain into arms or hands



Harness traction

- Harness traction device hung over a doorway
- Amount of tension adjusted by patient
- As patient pulls one click on the pulley,

  1 lb of pressure is applied, separating the vertebrae.

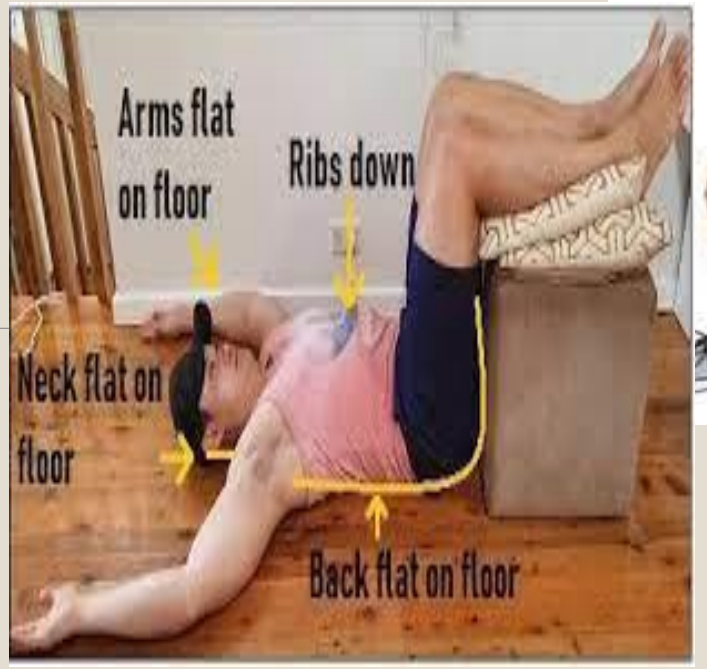
Table traction

- intermittent or sustained table traction
- Involves use of head harness attached to mechanical device at end of table
- Device can pull sustained or intermittent traction
- Usually 30 sec on, 10 sec off

.Lumbar Traction

- There are more types of lumbar traction than cervical traction.
- Some of the most commonly used techniques are presented.
- Manual Allows the clinician to feel patient's reaction to treatment
- Can be used as examination technique
- Clinician uses her hands or a belt to pull on patient's legs, separating vertebrae


REHABIT


Arms flat on floor
Ribs down
Neck flat on floor
Back flat on floor


Traction by rocking back into heels
Watch body mechanics!
Monitor for excessive lumbar extension

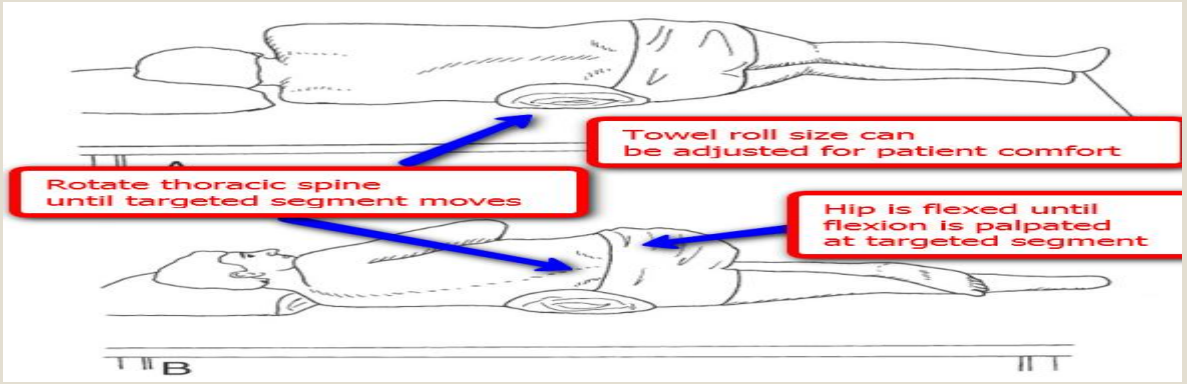
Lumbar-Traction-Physiotherapy-1280x720.webp

Mechanical

- Uses a specialized table that separates when adequate forces are applied
- Patient's head and torso are on one half; hips and legs are on other half.
- One end of belt or strap is attached to patient; other end is attached to mechanical device that separates table
- Can be delivered in either sustained or intermittent mode

Auto traction

- **Positional traction** Uses pillows and bolsters to position vertebrae so that there is less pressure on nerves and surrounding tissues



- **Pool traction** Flotation belt and water cuffs cause drag, which result in traction on lumbar vertebrae.

Inversion table traction

Inversion table traction When patient is suspended upside down, weight of upper body acts as a traction force

Post –inversion traction tip Lying prone and extending somewhat on a wedge after inversion traction can be helpful to a patient suffering from a posterior bulging lumbar disk.


THANK YOU!
from your Chiropractic Staff

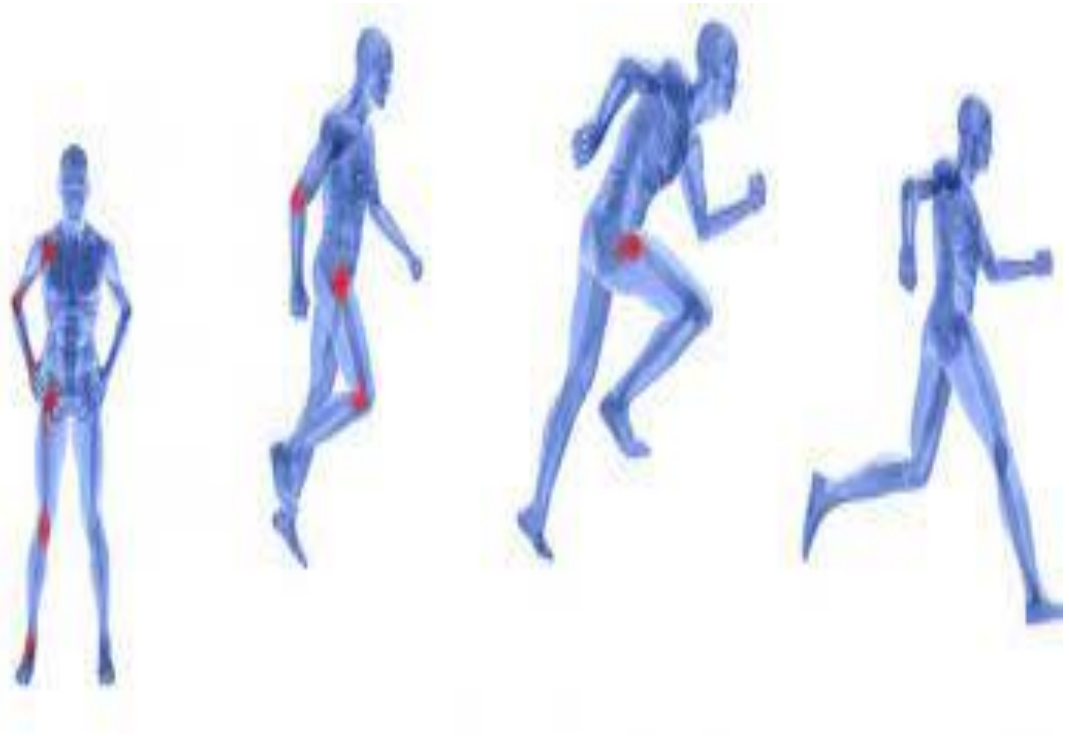
Kinesiotherapy

LECURE 8

الدكتور

ياسر يوسف العبيدي

اختصاص جراحة العظام والمفاصل



Kinesiotherapy or Kinesitherapy or kinesiatrics (kinēsis, "movement"), literally “is the therapeutic treatment of disease by **passive and active** muscular movements (as by massage) and of exercise.

It is the core element of physiotherapy/physical therapy.

ACTIVE & PASSIVE MOVEMENT

- **ACTIVE MOVEMENT :** Freely active movements are those which are performed by the patient's muscular efforts without the assistance or resistance of any external force.

- **PASSIVE MOVEMENT** : This is a rhythmic passive movement with the help of external force.

  This movement is performed within the unrestricted range by an external force

Indications of Soft tissue manipulation

- Scar tissue
- Muscle spasm
- Muscle tightness
- Fascial tethering
- Oedema
- Pain
- Slow healing scars or ulcers

Contraindications Soft tissue manipulation

- Acute inflammation
- Weeping conditions
- Infection
- Recent fractures
- Patient preference

EXERCISE THERAPY

- 1.exercise Resistance
- 2. Flexibility and stretching exercises
- 3.proprioception exercises
- 4.Cryokinetics
- 5.Cardiovascular Enduran1
- 6.Motor control exercises
- 7.Balance AND COARDINATIO Exercise
- 8. Walking Exercise

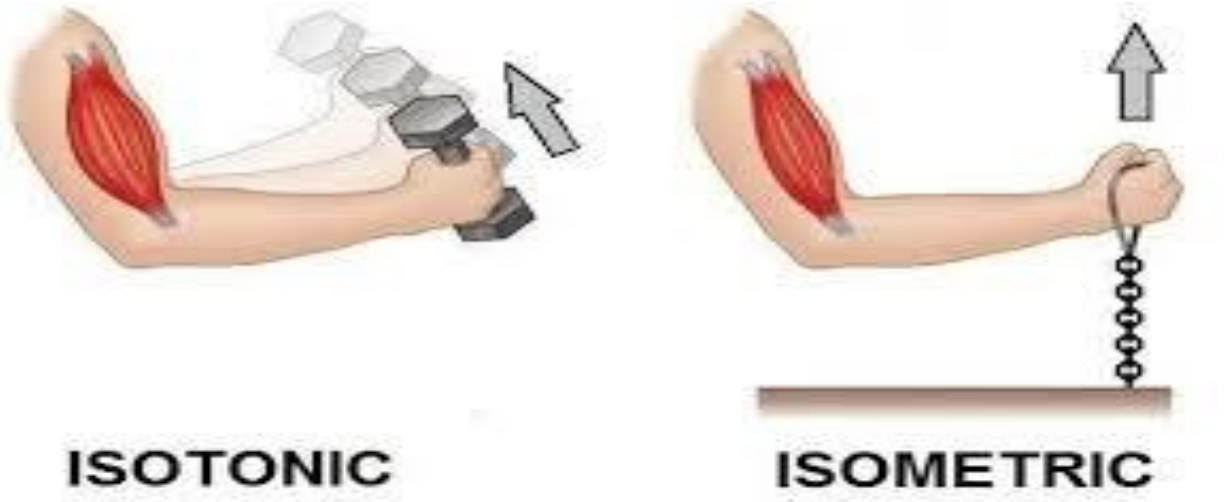
1==exercise Resistance

Include

- isometric
- Isotonic

Isometric muscle work:

- in this type of muscle work there is increase in tone of the muscle without any change in the muscle length.
- e.g. isometric strengthening for neck extensors: the clasped hand behind the head is pushed back by the head. No movement of the head or neck occurs but the tone of neck extensors increases.

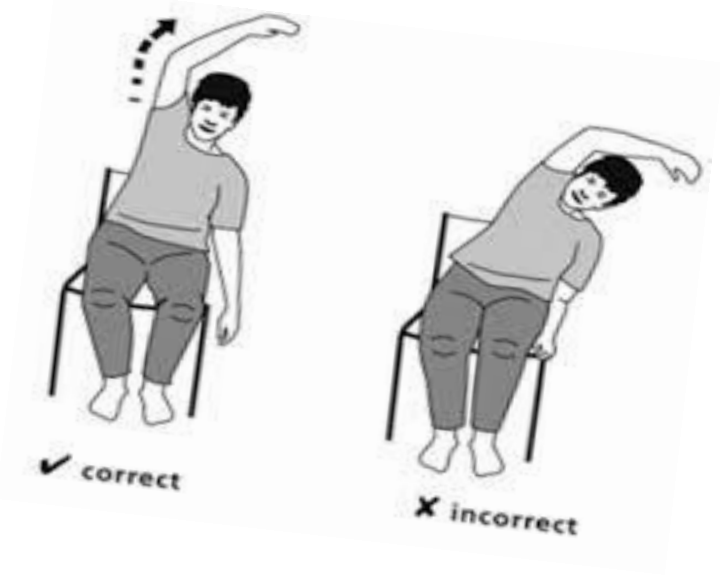


Isotonic muscle work:

- in this type of muscle work there is change in length of the muscle while it maintains an even tone throughout the contraction period.
- **Concentric work:** here the origin and insertions come closer and the muscle length shortens.
- e.g getting up from a chair: knee and hip extensors contract concentrically to bring about extension in these two joints.
- **Eccentric work:** here the origin and the insertion go away from each other and the muscle length increases.
- e.g. sitting on a chair from standing: : knee and hip extensors contract eccentrically to bring about flexion in these two joints.

2. Flexibility and stretching exercises

- a general term used to describe any therapeutic maneuver designed to increase the extensibility of soft tissues, thereby improving flexibility by elongating (lengthening) structures that have adaptively shortened and have become hypomobile over tim



- Mobility and Flexibility of soft tissues (muscles, tendons, fascia, joint capsule, and skins) surrounding the joint along with adequate joint mobility, are necessary for normal ROM.
- • Mobility: is the ability of segments of the body to move through range of motion for functional activities.
- • Flexibility: is the ability to move a single joint or series of joints smoothly and easily through an unrestricted, pain –free ROM

Types of Stretching

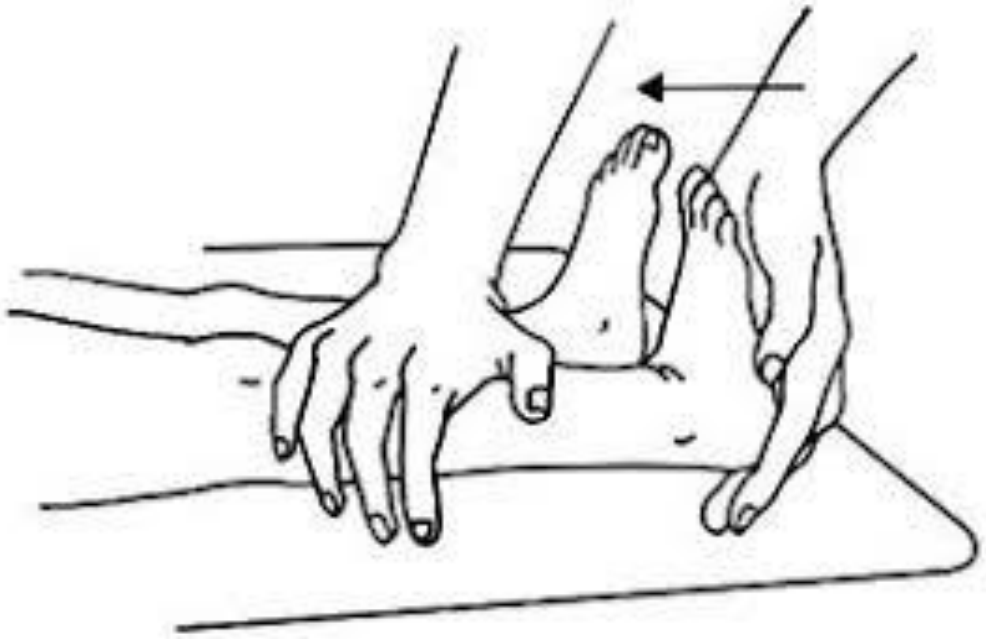
1- Passive stretching

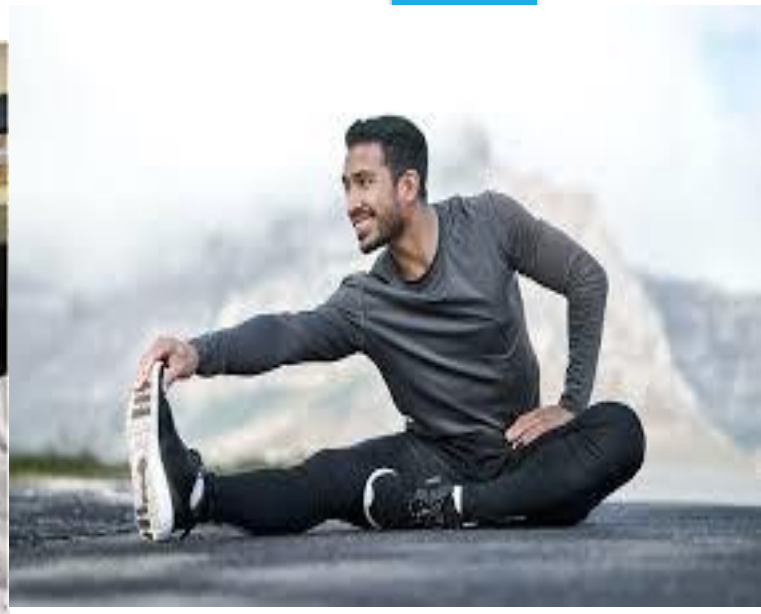
- A sustained external force applied at the end –range manually or mechanically to elongates a shortened muscle-tendon unit, while the patient is relaxed.

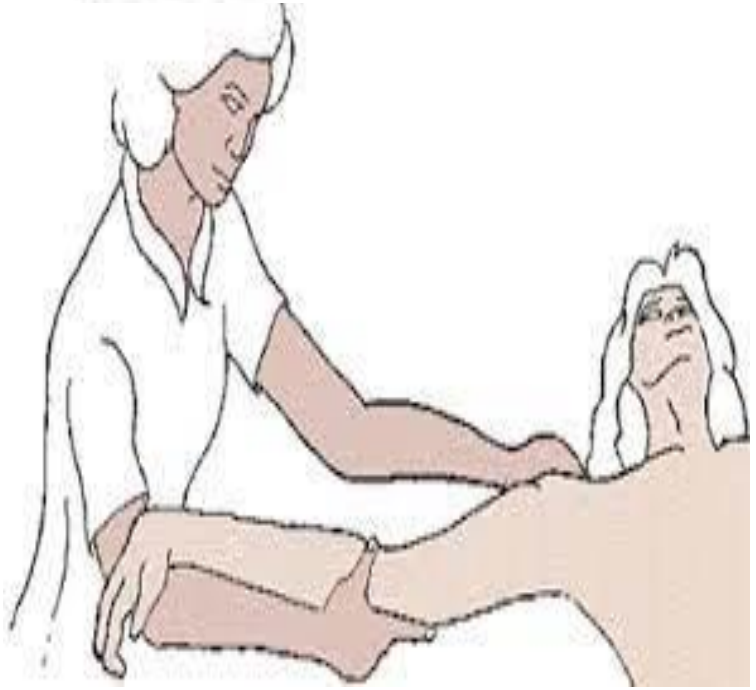
a - Manual Passive Stretch

b- Prolonged Mechanical Passive Stretch

c - C-Cyclic (Intermittent) stretch*A short duration stretch





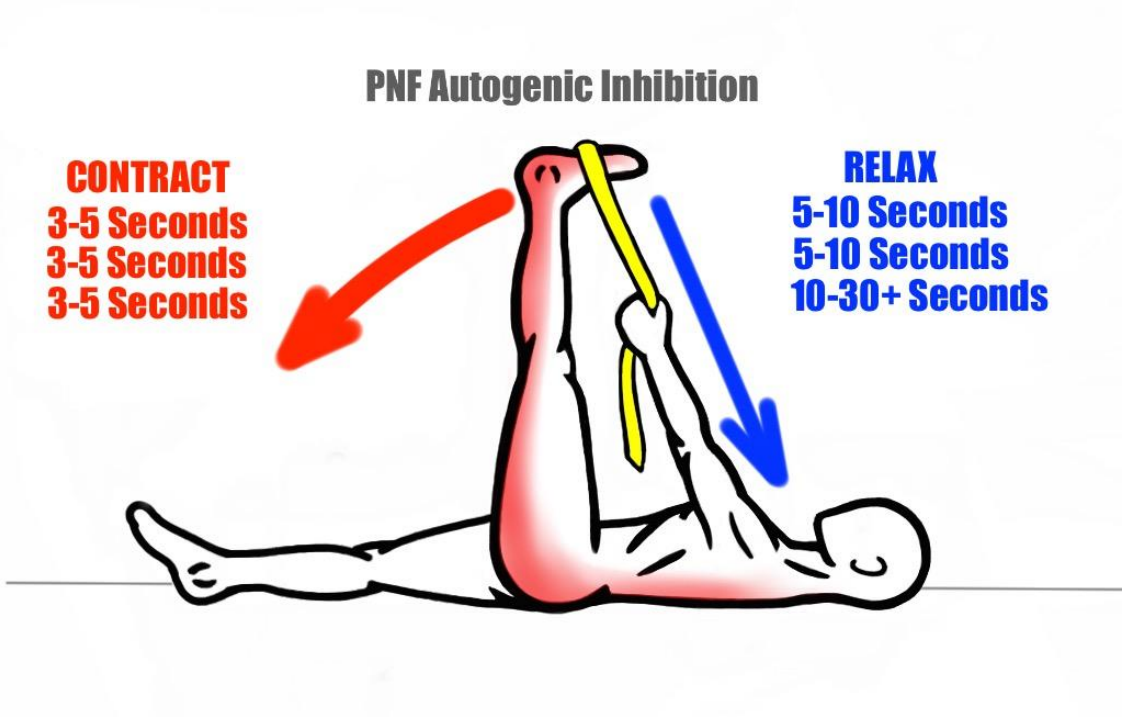



A


B

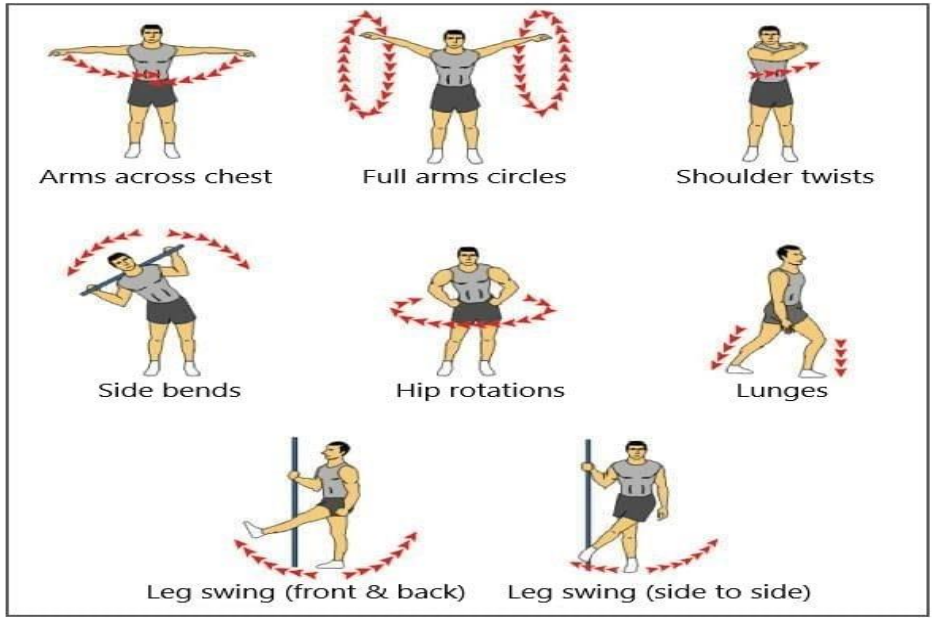
2- Active (Neuromuscular) Inhibition stretching

- These procedures reflexively relax the tension in shortened muscles prior to or during stretching maneuver.
- • When a muscle is reflexively inhibited, there is less resistance to elongation by the contractile unites of the muscle.
- • Inhibition techniques increase muscle length by relaxing and elongating the contractile components of muscle.
- • This type of stretching is only done with normally innervated muscle and under voluntary control.
- • It can not be used in patient with severe muscle weakness, spasticity, or paralysis from neuromuscular dysfunction.


PNF Autogenic Inhibition
CONTRACT
3-5 Seconds
3-5 Seconds
3-5 Seconds
RELAX
5-10 Seconds
5-10 Seconds
10-30+ Seconds

3- Self Stretching

- active stretching.
- a home exercise program.
- • Self stretching can also be carried out actively
- by the patient first inhibiting and then lengthening
- the tight muscle.



4- Ballistic stretching

- • A rapid, forceful intermittent,
- high-speed and high-intensity stretch. •

COUTION

- first 72 hours after the injury. there should not be any stretching at all… completely avoid it.
- Instead, focus on what is called the R.I.C.E.R. treatment. This is the
- acronym for rest, ice, compression, elevation, referral
- no stretching at all to avoid further injury.

3.proprioception exercises

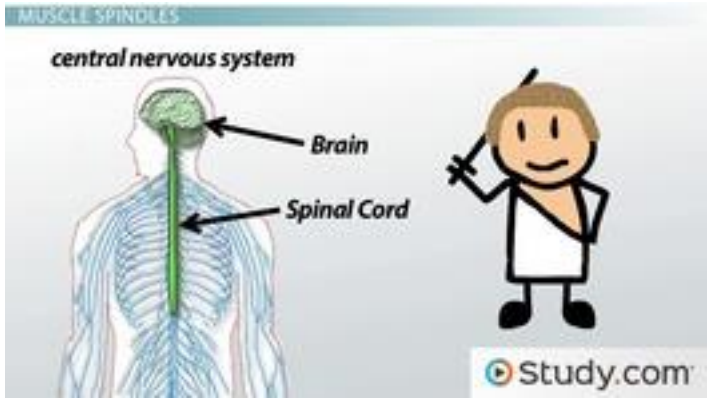
Proprioception refers to sensations generated by the body's own actions

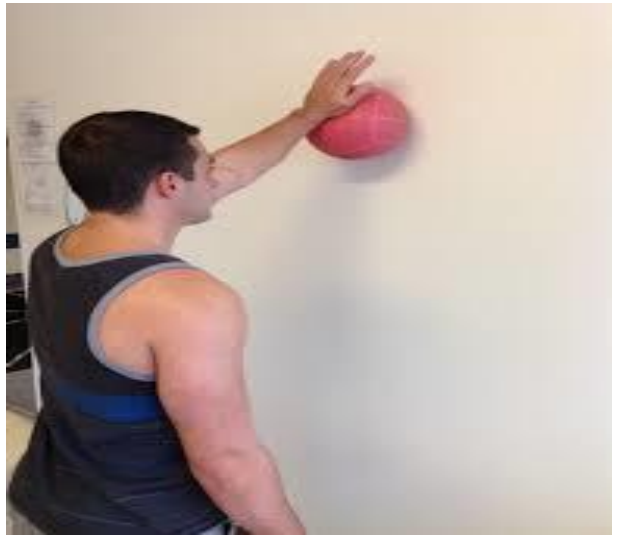
By convention,

these include four senses:

- movement and limb position
- the sense of tension or force;
- - the sense of effort
- - the sense of balance

proprioception exercises





4.Cryokinetics

- Cryokinetics involves applying cold therapy to a part of the body and then performing active exercises.
- Apply cold therapy before rehabilitation exercises. This allows you to do pain-free exercises sooner than you might otherwise be able to .
- Apply cold therapy for a maximum of twenty minutes to produce a numbing effect.
- Repeat for five minutes to re-numb the area if necessary.
- Exercises performed during cryokinetics should be active exercises.

5.Cardiovascular Enduran1

Cardiovascular fitness is probably the most important aspect of physical fitness because of its importance to good health and optimal physical performance.

A strong heart and healthy vessels (developed from regular physical activity) help to make a strong cardiovascular system.

6.Motor control exercises

- The working muscles are matched by muscles that perform the task of stabilization and control to complete the muscular work,

- (example at Standing or walking, the thigh muscles, which are abducted and rotated outward, control the pelvis. Thus, it is a stabilizing muscle)
- and it is considered a reflexive work that requires complete and continuous motor performance

7.Balance AND COARDINATIO Exercise

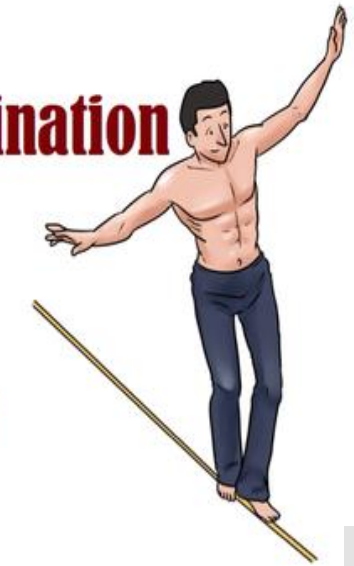
- It is the ability to perform smooth, accurate and controlled movements.
- Coordination is necessary for:

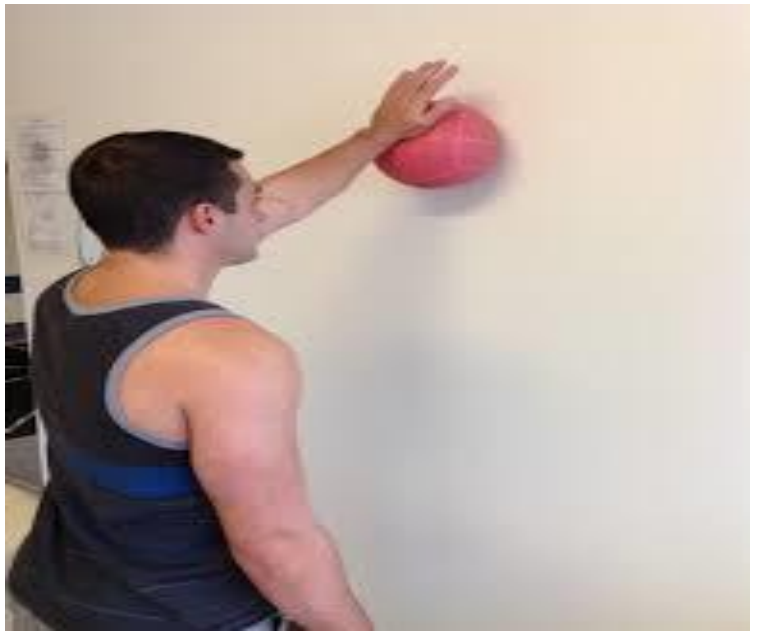
  ---The execution of fine motor skills and manipulation of small objects.

  ---Performing gross motor skills, e.g. walking, running, jumping, …….
- Bases of smooth and efficient movements which often occur automatically.
- Coordination refers to using the right muscle, at the right time with the right intensity.
- Balance It is : the ability to maintain the center of gravity over the base of support.

Balance and Coordination

- Definition
- Benefits
- How to Improve it?





8 - walking exercises

- It included training the individual who suffers from walking difficulties (the stroke on Self-walking)
- after joint surgeries in the lower extremities
- Training for those who use prostheses in cases of amputation (loss of the leg), paralysis and stroke .
  - Training the person to walk with crutches
  - Training him to use the seat

walking FOR HEALTH

- Healthiest & easiest way to stay FIT and HEALTHY.
- 30 Minutes of walking every day is good for overall wellbeing.
  - Benefits:
  - Lose Weight
  - Improves Heart Rate
  - Prevents Heart Diseases
  - Maintains BSL & BP
  - Improves HDL Cholesterol (Good Cholesterol)

Types of walking

1- Brisk Walking walking for 4 miles per hour of pace.

- It should not be too slow or too fast.

2.Hill Walking

It is a recreational outdoor activity of walking on hills and mountains.

3. Water Walking

- Easy and effective type of exercise
- Can be done in swimming pool, lake or water tank.
- Helps to reduce stress on joint pain.

7. Interval Walking

- Here you need to walk as fast as you can for 20 sec, then walk with moderate pace for 40 sec , repeat the procedure for 20-30 mins.

8. Treadmill Walking

- It helps to avoid Injuries like muscle soreness and knee pain
- You do not have to pay attention to the obstacles while walking.
- You can enjoy your music or watch TV while walking.
- Good for arthritis patient.

30 Minutes is the KEY

- ! Choose any type of walking and get started!
- It is very important to do it for at least 30 minutes Everyday.

START WALKING, GET FIT

THERAPEUTIC MASSAGE Lecture 9

الدكتور

ياسر يوسف العبيدي

اختصاص جراحة العظام والمفاصل

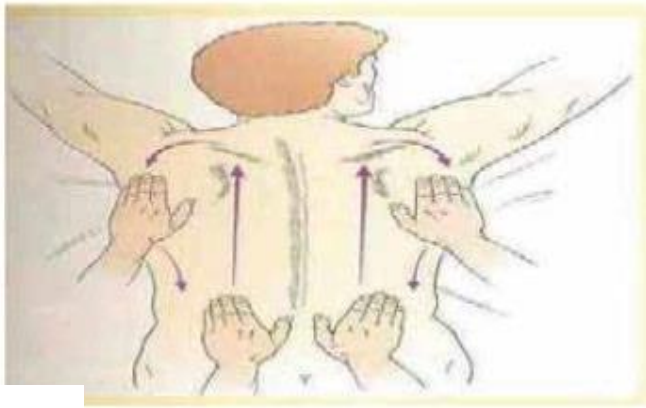
INTRODUCTION

- The word ‘Massage’ comes from the Arabic word ‘mass’ denoting ‘to press’.
- Massage is the scientific manipulation of soft tissues of body with hands in order to produce effect on nervous, muscular & circulatory systems which will help to restore or improve function.
- It is a means used to create energy & is a natural method of restoring part either locally or generally injured, to its normal condition.
- Massage demands the skilled use of hands & brain that comes with practice.

EFFECTS OF MASSAG

- MECHANICAL
- PHYSIOLOGICAL
  - CIRCULATORY SYSTEM
  - CENTRAL NERVOUS SYSTEM
  - MUSCULOSKELETAL SYSTEM
- PSYCHOLOGICAL

Massage Techniques



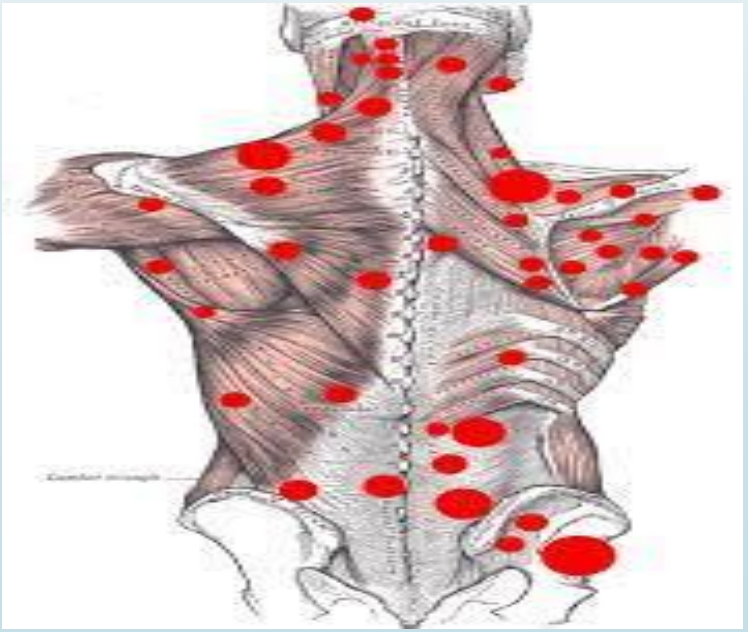
- Stroking manipulation _Effleurage_

- Petrissage (Kneading

- Percussion/Tapotement

- Myofascial Release

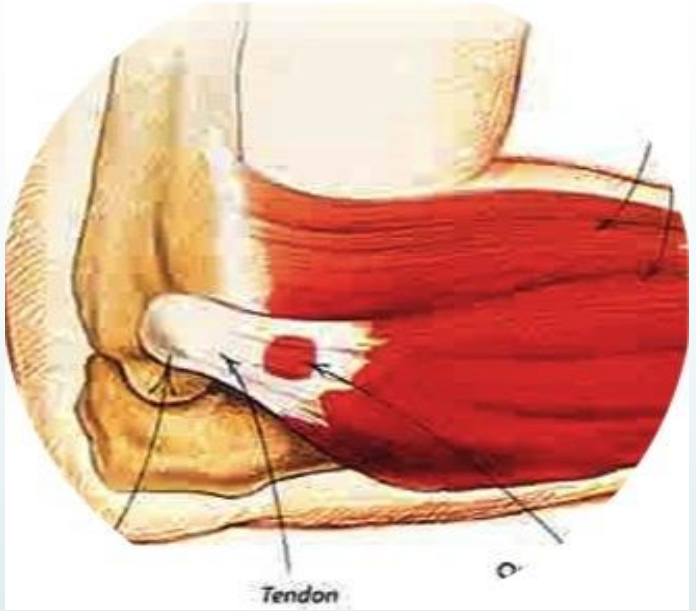
- Trigger Point Therapy



- Deep Transverse Frictions

- Compression Massage

- Cross-Fibre Massage



- Swedish Massage techniques

includes long strokes, kneading, friction, tapping, percussion, vibration,effleurage, and shaking motions

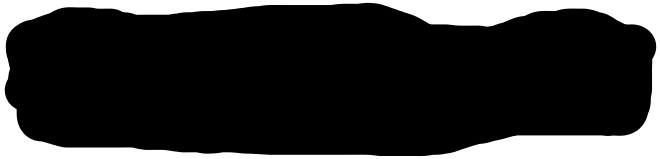
Indications & Contraindications

- **Indications**
- Patients with adhesions, edema, muscle spasm, bursitis, tendinitis, tenosynovitis, strains, and sprains.
- **Contraindications**
- Patients with myositis ossificans, thrombosis or embolism, severe varicose veins (caution), acute phlebitis, cellulitis, synovitis, abscesses, shin injections, and massage of a cancerous site.


Thank you!

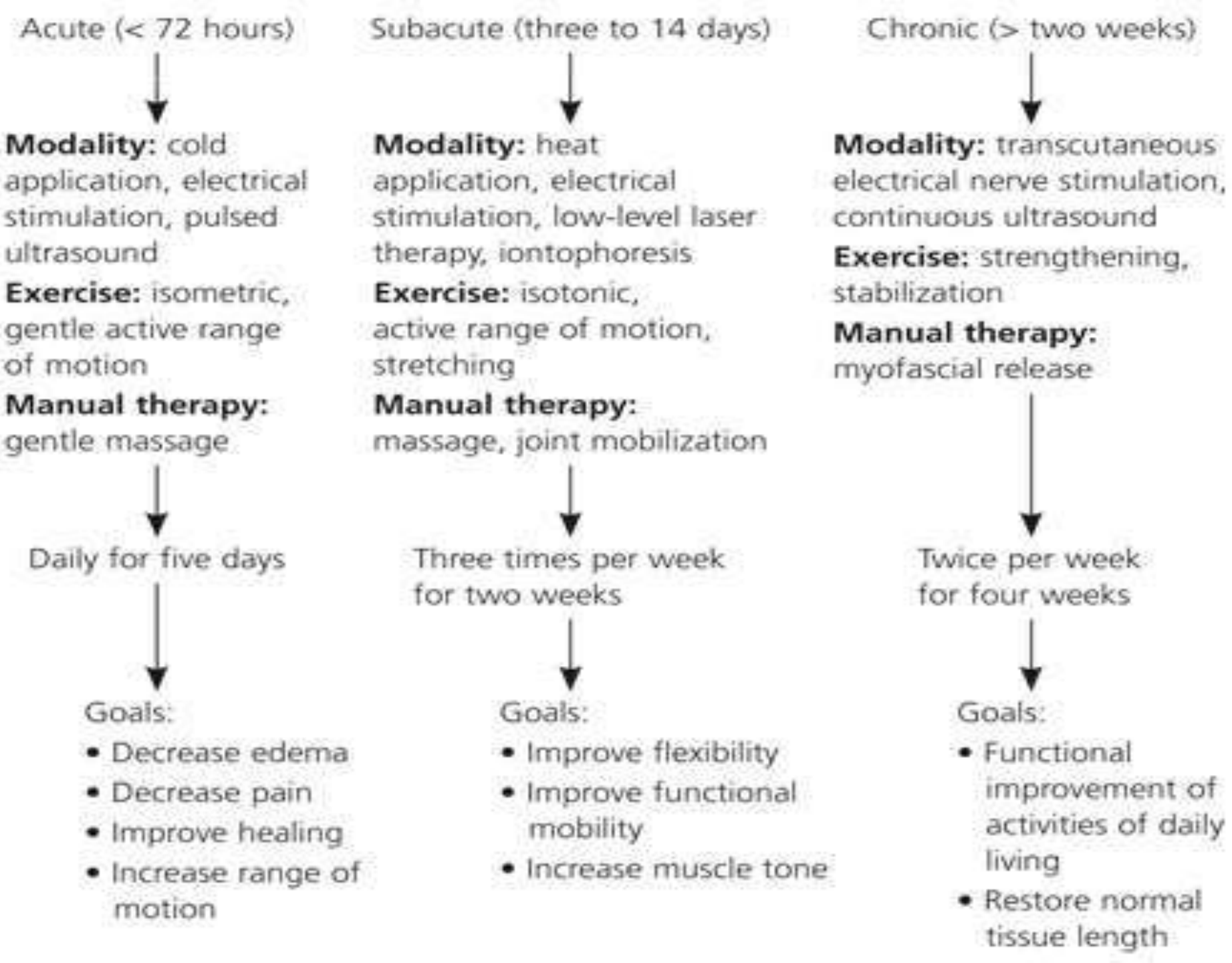
LECTURE 4

Methods used in Physiotherapy



Methods used in Physiotherapy

- Cryotherapy (Ice Therapy)
- Hydrotherapy
- Thermotherapy
  - Superficial heat
    - infrared
  - Deep heat
    - Ultrasound
    - Shortwave diathermy
    - Microwave diathermy
- Extracorporeal Shock Wave Therapy
- Electrotherapy
- Laser
- Spinal Traction


Acute (< 72 hours)
Modality: cold application, electrical stimulation, pulsed ultrasound
Exercise: isometric, gentle active range of motion
Manual therapy: gentle massage
Daily for five days
Goals:
• Decrease edema
• Decrease pain
• Improve healing
• Increase range of motion
Subacute (three to 14 days)
Modality: heat application, electrical stimulation, low-level laser therapy, iontophoresis
Exercise: isotonic, active range of motion, stretching
Manual therapy: massage, joint mobilization
Three times per week for two weeks
Goals:
• Improve flexibility
• Improve functional mobility
• Increase muscle tone
Chronic (> two weeks)
Modality: transcutaneous electrical nerve stimulation, continuous ultrasound
Exercise: strengthening, stabilization
Manual therapy: myofascial release
Twice per week for four weeks
Goals:
• Functional improvement of activities of daily living
• Restore normal tissue length

Cryotherapy (Ice Therapy)

Cryotherapy

Refers to treatment by the lowering of local tissue temperature.

- Cryotherapy or ice therapy is the application of cold to the body tissues after injury. This practice is as old as medicine itself.
- Nowadays, local cold application may be applied by the use of various forms of ice or frozen gel packs, or by evaporation of volatile fluids from the skin. Often skin temperature is reduced to 10 C°.

Physical Principles

- When ice is applied to the skin, heat is conducted from the skin to the ice in order to melt it.
- To change its state, ice requires considerable energy that is known as latent heat of fusion.
- A specific amount of energy required to change the solid form of a particular substance into a liquid, or the liquid into a gas. This energy is called Latent Heat and is the energy required to change of state.

- Thus ice therapy is very useful in removing swelling and accelerating tissue repair. i.e. ice cubes massage may be used to accelerate the rate of repair of pressure sores.
- The reduced metabolic rate of cooled tissues allows cooled muscle to contract many more times before fatigue sets in.

Uses of Ice Therapy

- Reduces pain.
- Reduces spasticity.
- Reduces muscle spasm.
- Reduces swelling.
- Promote repair of the damaged tissues.
- Provide excitatory stimulus to inhibited muscles.
- Used in strength training.

Indications

- Acute pain
- Chronic pain
- Acute swelling (controlling hemorrhage and edema)
- Myofascial trigger points
- Muscle guarding
- Muscle spasm
- Acute muscle strain
- Acute ligament sprain
- Acute contusion
- Bursitis
- Tenosynovitis
- Tendinitis
- Delayed onset muscle soreness

Contraindications

1. Impaired circulation (i.e., Raynaud's phenomenon)
2. Peripheral vascular disease
3. Hypersensitivity to cold
4. Skin anesthesia
5. Open wounds or skin conditions (cold whirlpools and contrast baths)
6. Infection

Techniques of Application of Cryotherapy

- The way which ice is applied will vary according to the required effects.
- It may be applied in the following ways:
  - Ice towels
  - Ice packs
  - Immersion
  - Ice cube massage
  - Cold compression units
  - Ice spray
  - Contrast bath

Ice packs

- Simple cold packs
- Silica gel packs
- Endothermic reaction /chemical cold packs.

- **ICE BAGS:**
  - simple plastic bags, chemical cold packs or frozen vegetables.
  - The skin will pass through four stages of sensation in 10-15 minutes.
  - These sensations in order are:
    - Cold
    - Burning
    - Numbness

- **ICE MASSAGE**
  - DO NOT hold the ice in one area for more than 3 minutes since this may cause frostbite.
- **Cold therapy should be stopped once the skin feels numb**

Ice towel

- Wet towel is used
- Ice towel need to be replaced after 2-3 min. and total 20 min .of treatment can be given.
- Useful in treating muscle and allows movement to be performed.

IMMERSION

- Simple immersion
- Whirlpool immersion

Cold compression unit

Cold water is circulated in a sleeve which Is put over the limb and part of it is inflamed At intervals.

ICE CUBE MASSAGE

- Slow circular motion for 5-10 min. During this time the patient will feel cold, burning and then aching sensation before the part become numb.
- Short strokes should be given.

Cold / Ice sprays

- Ethyl chloride was originally used but it is highly inflammable an thus posses some risks.
- Fluorimethane is now used widely as it is non inflammable.
- The liquid is sprayed on to the area to be cooled in series of stroke of about 5 second each with a few seconds interval between each.
- The nozzle is held at the angle of 45 or right angle from the skin surface.

Advantages of cryotherapy

- Usually inexpensive.
- Quick application with little preparation.
- Faster muscle recovery
- Promotes healthier skin complexion
- Effective with chronic pain management
- Reduces stress & anxiety

Disadvantages of cryotherapy

- It is difficult to keep the ice in place
- Quickly melts
- No compression is applied.
- Can only be applied for short periods of time (10-20 minutes).

Hydrotherapy

Definition of Hydrotherapy

- Application of water, internally or externally, for the treatment of physical or psychological dysfunction.

TYPES OF HYDROTHERAPY

- Immersion
- Non-Immersion

Primary Use of Hydrotherapy

- Treatment of Wounds
- Enhanced Environment for exercise
- Pain
- Edema
- Health maintenance /disease prevention

Physiological Effects

- Cleansing
  - Pressure (Force = Rate of Flow)
  - Dissolved antimicrobial agents, etc. (*Wounds*)
- Musculoskeletal Effects
  - Decreases weight-bearing (*Arthritis*)
    - 75% immersion WB 75%
  - Increases blood flow to muscles
  - Strengthening
- Decreased bone density loss
- Decreased fat loss
  - *Compared to other forms of exercise*
  - Good for obese secondary to non-weight bearing exercise
  - Not good for general weight loss

Cardiovascular Effects

- Increased venous circulation
  - Secondary to hydrostatic pressure, increased venous pressure
- Increased cardiac volume
- Increased cardiac output
  - Up to 30% while upright to neck
- Decreases heart rate and Systolic Blood Pressure (*cool water*)
  - May increase in warm or hot water

Respiratory Effects

- Increases work of breathing
  - Due to hydrostatic pressure on lungs
    - ✓ up to 60%
    - ✓ May need to be very careful with respiratory and/or cardiac patients
- Decreases exercise-induced asthma
  - High humidity

Renal Effects

- Increases urine production
- Increases sodium and potassium excretion
  - May be used to patient's advantage with hypertension, peripheral edema

Psychological Effects

- Relaxing
  - Warm water
- Invigorating
  - Cold water

Clinical Uses of Hydrotherapy

1. Superficial Heating
2. Wound Care
3. Treatment of Burns
4. Pain Control
5. Edema Control

Selection of Hydrotherapy

- Whirlpool
  - Tanks
    - ✓ Low-Boy
    - ✓ High-Boy
    - ✓ Extremity
    - ✓ Hubbard Tank
  - Turbine

Temperature Range

- **Cold** (0-26 C)
  - Acute inflammation
- **Tepid** (26-33 C)
  - Exercise
  - Acute inflammation if cold not tolerated
- **Neutral warmth** (33-35.5 C)
  - Open wound
  - Medically compromised patients
  - Decrease tone
- **Mild warmth** (35.5-37 C)
  - Increase mobility
  - Burn
- **Hot** (37-40 C)
  - Pain
  - Increase ROM
  - Increase soft tissue extensibility
- **Very Hot** (40-43.5 C)
  - Limited body area
  - Chronic conditions

DO NOT use WP at temperatures **> 43.5 C** !!

Aquatic Exercise

Uses

- Increase circulation
- Increase muscle strength
- Increase joint ROM, flexibility
- Improve ambulation
- Improve coordination
- Increase cardiovascular, respiratory conditioning
- Decrease pain, spasm
- Decrease weight-bearing on joints
- Relaxation/ psychological well-being

Types of Aquatic Exercise

- Swimming
- Running
- Walking
- Cycling
- Stretching
- Underwater treadmill or parallel bars, etc.

Hydrotherapy Contraindication

- Infected wounds
- Acute skin conditions
- Pyrexia
- Incontinence
- Cardiac disease
- DVT
- Recent pulmonary embolus
- Recent CVA
- GIT disorders
- Tracheostomy
- Low vital capacity
- Kidney disease
- Diabetes
- Thyroid deficiency
- Radiotherapy in the previous 3 months
- Careful consideration is essential for patients with open wounds covered with a waterproof dressing.
- Epilepsy
- Vertigo


THANK YOU