College of Health and Medical Technologies - Al-Dour
Department of Physical Therapy
The second stage

Primary Therapeutic equipment

Dr .Mazhar Ali Abboud

PHYSIOTHERAPY EQUIPMENTS

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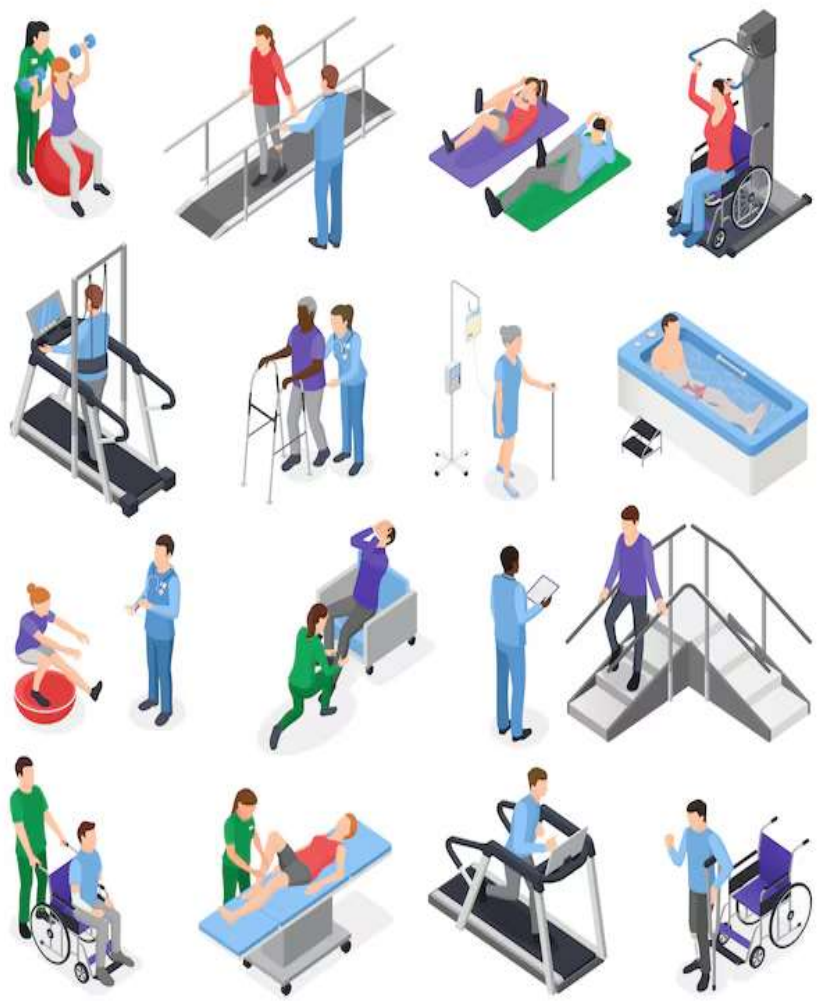
Electrical Muscle Stimulation (EMS) and Ultrasound Machines are two common examples.



PHYSIOTHERAPY EQUIPMENTS

Therapeutic modalities refer to the administration of the following ***energies*** for therapeutic purposes :-

- Thermal energy.
- Mechanical energy.
- Electromagnetic energy.
- light energy.

PHYSIOTHERAPY EQUIPMENTS

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1. ***Reduce inflammation.***

2. ***Restore body function.***

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1. ***Reduce inflammation: -*** Pain relief …..
2. ***Restore body function: -*** Increase ROM, enhance muscle activation, and decrease unwanted muscular activity. leading to preservation of strength after illness, injury, or surgery.

PHYSIOTHERAPY EQUIPMENTS

Classification of Therapeutic Modalities

Therapeutic modalities can be classified into several ***categories***, including:

1. *Physical Modalities.*
2. *Mechanical Modalities.*
3. *Therapeutic Exercise Equipment.*
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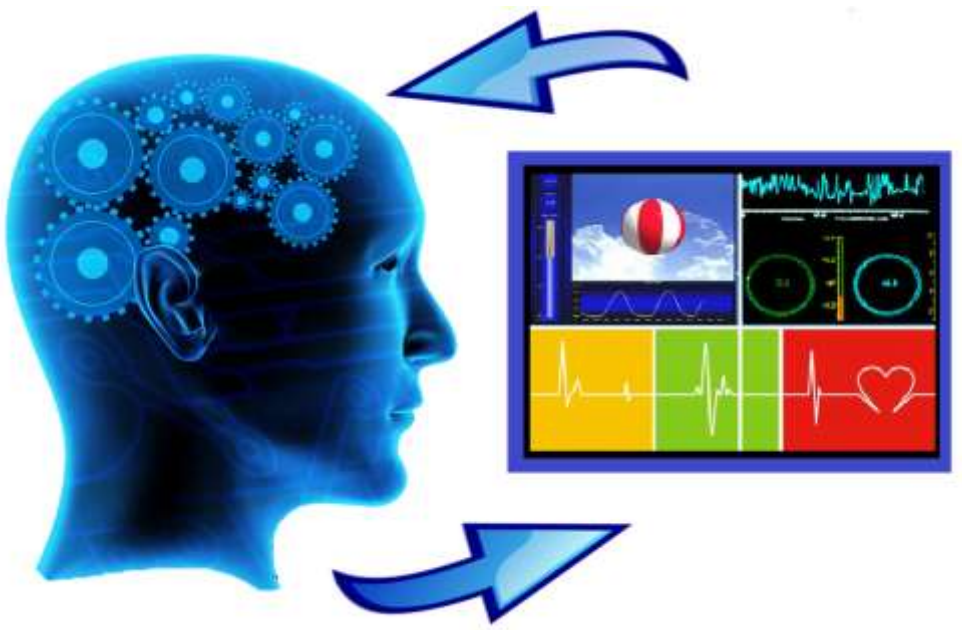

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Interview assessments go a long way to building rapport.

Therapy ***assessments*** that evaluate movement and function provide an evidence base diagnosis and by extension proper treatment plans.

Pain Assessment

Goniometer ROM Assessment

MUSCLE GRADE

OXFORD SCALE	EXPLANATION
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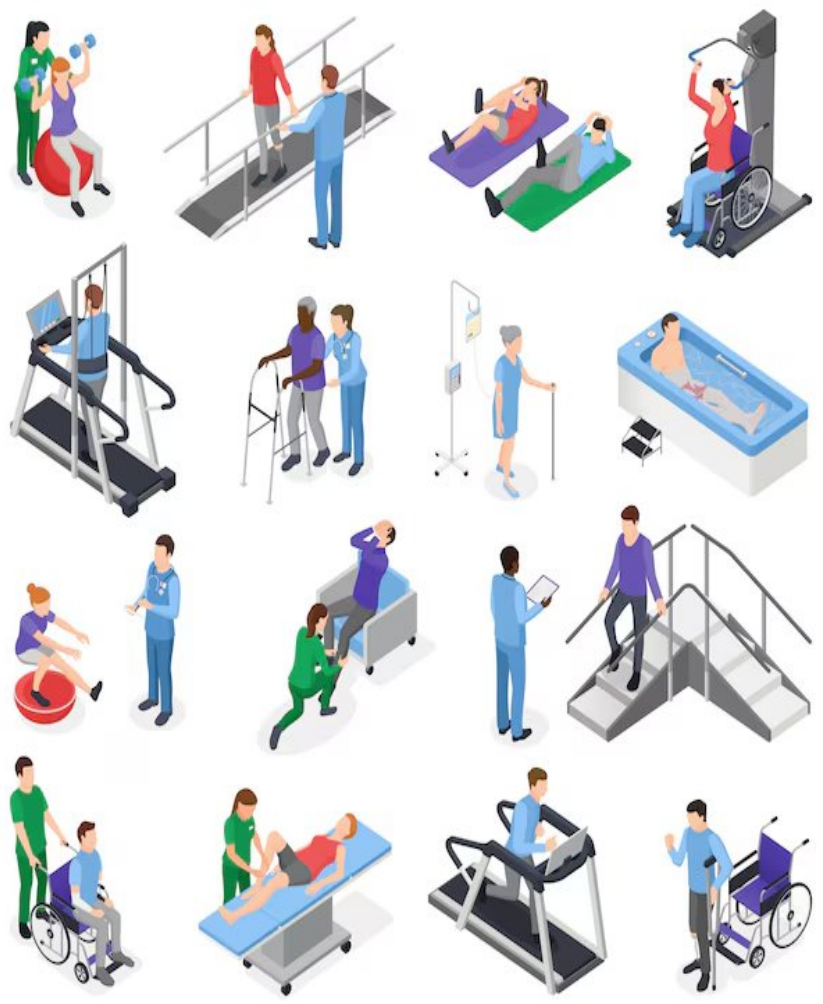

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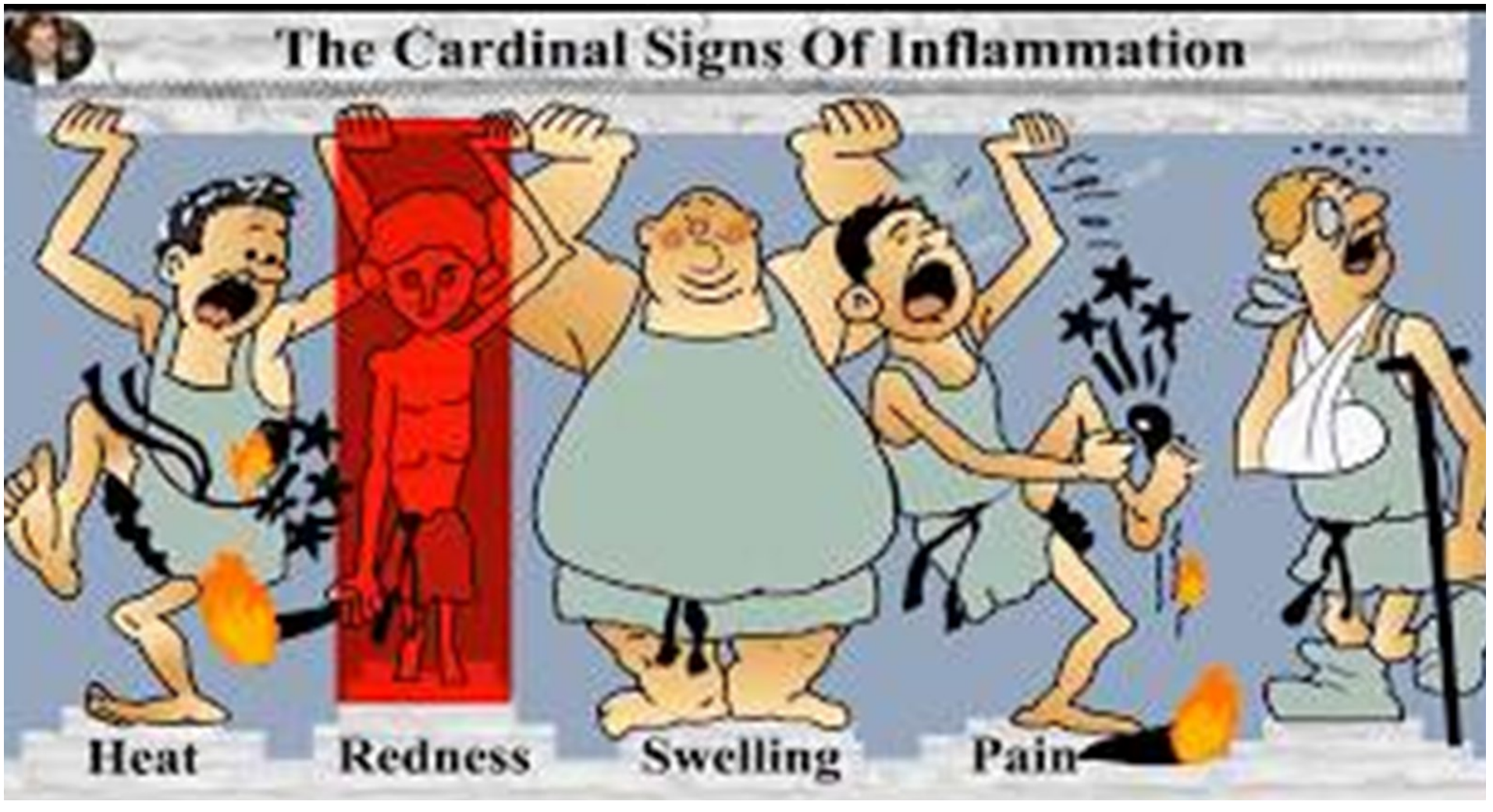

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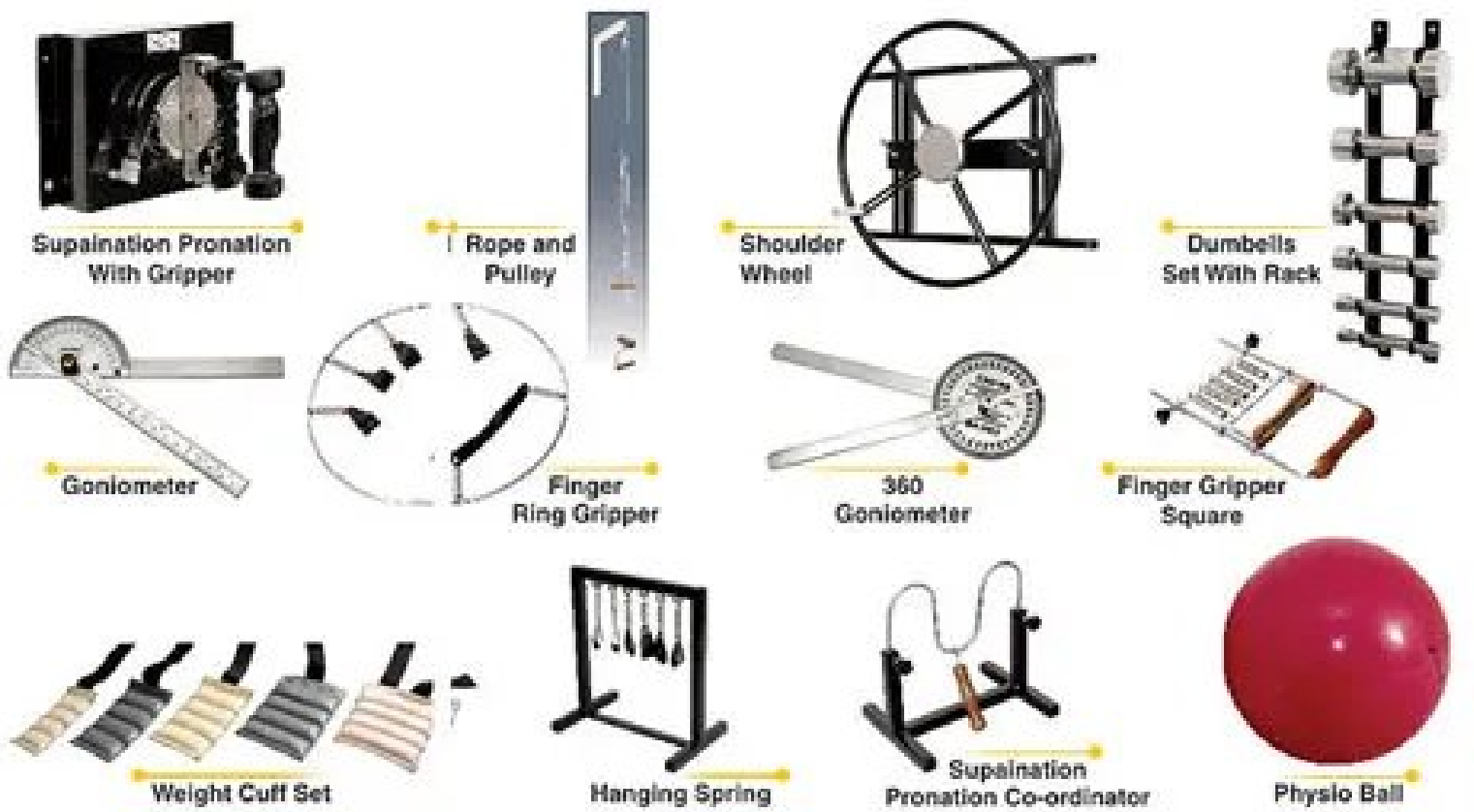

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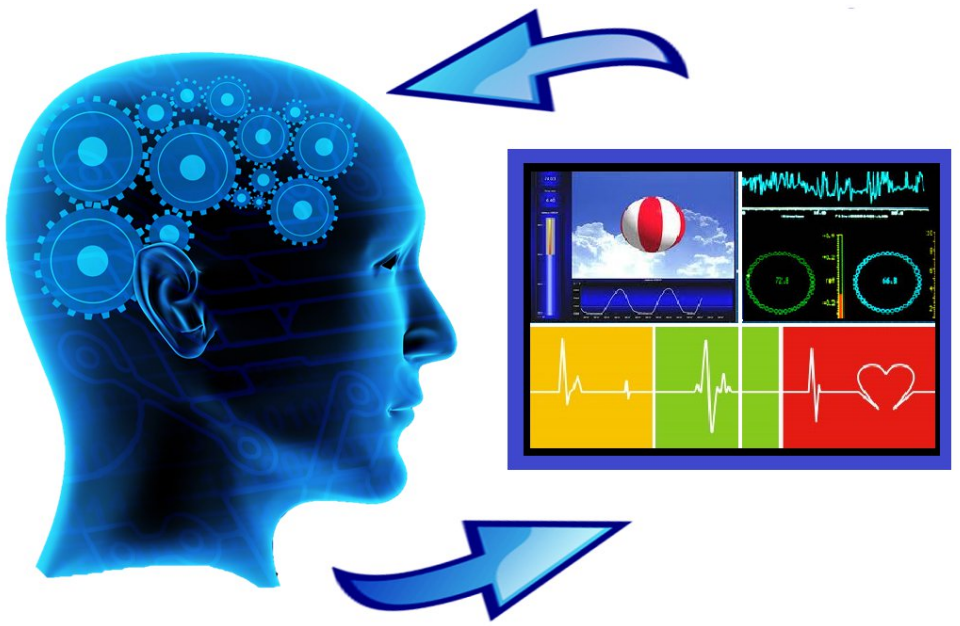

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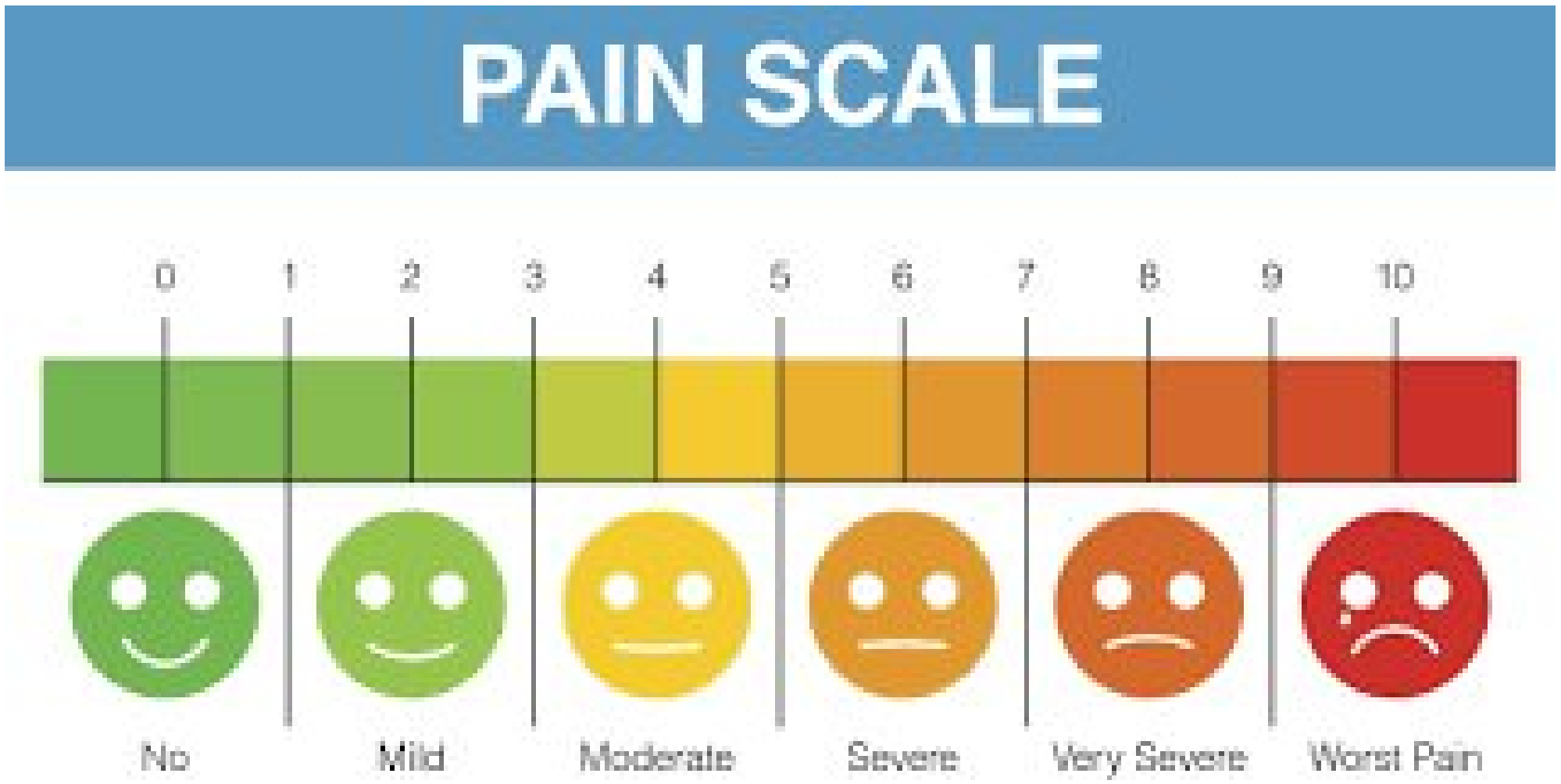

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physical modalities including:

1. heat (superficial and deep)
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physical modalities including:

1. heat (superficial and deep)

a) heat (superficial)

Superficial heat is the use of a thermogenic agent which induces a temperature increase and subsequent physiologic changes to the superficial layer(s) of the skin, fat, tissues, blood vessels, muscles, nerves, tendons, ligaments, and joints.

Superficial heat penetration is usually less than 1 cm

PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

1. heat (superficial and deep)

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Commonly used superficial heat modalities include *hot packs, heating pads, paraffin bath, infrared, ultrasound, and fluid therapy.*

Physiologic effects: Thermal energy (high temperature; heat) provides *pain relief, increase in local blood flow, metabolism, and elasticity of connective tissues.*

Heat increases blood flow and subsequently may induce edema and exacerbate acute inflammation.

PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

1. heat (superficial and deep)

a) <u>heat (superficial)</u>

<u>Indications</u>: Heat is usually used for subacute to chronic conditions.

It can reduce pain and muscle spasm, relax skeletal muscles, and decrease joint stiffness.

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physical modalities including:

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Contraindications: patients with peripheral vascular disease, bleeding disorders, local malignancy, acute inflammation or trauma, edema, infection, open wounds, over large scars, patients with impaired sensation (neuropathy) or impaired ability to communicate/cognitive impairments (dementia or dysphasia).

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b) heat (deep) In contrast, the use of deep heat penetration is up to about 3-5 cm. or more without overheating underlying subcutaneous tissue or skin.

Deep heat modalities include ultrasound, shortwave diathermy (SWD) and microwave diathermy (MWD).

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The ultrasound machine converts electrical energy into acoustic energy via the piezoelectric effect.
SWD and MWD convert electromagnetic energy to thermal energy.

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physical modalities including:

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a) heat (superficial).....

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Physiologic effects: Same as superficial heat. The physiologic effects of ultrasound ***can be divided into thermal (heat) and non-thermal effects*** (cavitation, acoustic streaming, and standing waves).

The non-thermal effects of ultrasound may improve repair of soft tissue injury, the inflammatory response, protein synthesis, and modulate membrane properties.

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Indications: Ultrasound has been widely used in the treatment of various soft tissue disorders including bursitis, tendinitis, degenerative arthritis, adhesive capsulitis musculoskeletal pain, contractures, and promotes wound healing.

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SWD has good bone penetration, commonly used to heat *large area of deep tissues* and within the joints, such as hip, knee, or ankle.

MWD has *more superficial heat* penetration compared to SWD and ultrasound. It is commonly used to heat superficial muscles and shallow joints.

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Contraindications: Besides the superficial heat contraindications listed above, specific ultrasound contraindications include use over the eyes, pregnant uterus, malignant area, near the heart, brain or spine, laminectomy sites, epiphyseal plates of children and patients with pacemakers.

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MWD increases the chance of miscarriages among pregnant therapists.

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physical modalities including:

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Common cold modalities include cold packs, ice massage, cold baths, vapocoolant sprays, and cold compression units.

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PHYSIOTHERAPY EQUIPMENTS

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known as Cryotherapy or ice application, is the simplest and oldest way to treat injuries.

Its worldwide use spread because of its effectiveness, convenience, low cost, and ease of transportation.

Ice is believed to control pain by instigating local anesthesia.

PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

1. heat (superficial and deep)
2. Cold : -

<u>It also decreases</u>

- Oedema.
- Nerve conduction velocities.
- Cellular metabolism, and local blood flow.

PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

1. heat (superficial and deep)
2. Cold : -

Physiological Effects of Cryotherapy: -

The following physiologic effects are the expected responses to cryotherapy: -

- ***Decreased inflammatory sequel*** such as local temperature, accumulation of oedema, and vasoconstriction of arterioles and capillaries, which subsequent decreased metabolism
- ***Decreased electrophysiological effect*** such as nerve conduction velocity, muscle excitability and decreased muscle spindle depolarisation and Extreme anaesthetic effects, lead to pain reduction and relief muscle spasm.

PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

1. heat (superficial and deep)

2. Cold : -

Application Methods: -

- **Ice Packs.**
- **Commercial Cold Packs.**
- **Vapocoolant Spray.**
- **Immersion.**
- **Ice Massage.**
- **Dipstick Method.**
- **Whole Body Cryotherapy.**

PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

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2. Cold : -

<u>Application Methods: -</u>

- Ice Packs: It is the most common method of cryotherapy.

There are different types of ice used in ice packs.

The most common types are ice packs made with cubed, crushed, and wetted ice.

PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

1. heat (superficial and deep)
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Application Methods: -

- **Ice Packs.**
- **Commercial Cold Packs:**

Commercial cold packs, such as Col Pac and Elastic-Gel, are an efficient and commonly used method of cryotherapy.

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Application Methods: -

- **Ice Packs.**
- **Commercial Cold Packs.**
- **Vapocoolant Spray:**

Utilised as a ***superficial, cooling*** agent for reduction of muscle guarding and release of myofascial trigger points.

PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

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<u>Application Methods: -</u>

- **Ice Packs.**
- **Commercial Cold Packs.**
- **Vapocoolant Spray.**
- **Immersion:**

Simple immersion, such as an ice bath, can be utilised ***<u>for full concealment of a distal extremity</u>*** (e.g., foot, ankle, hand, or wrist).

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- **Vapocoolant Spray.**
- **Immersion.**
- **Ice Massage:**

Ice massage involves applying ice directly to the skin with slow strokes in *circular motion for 5-10 minutes.*

To achieve the desired cooling effect, move the ice about 5-7 cm/second.

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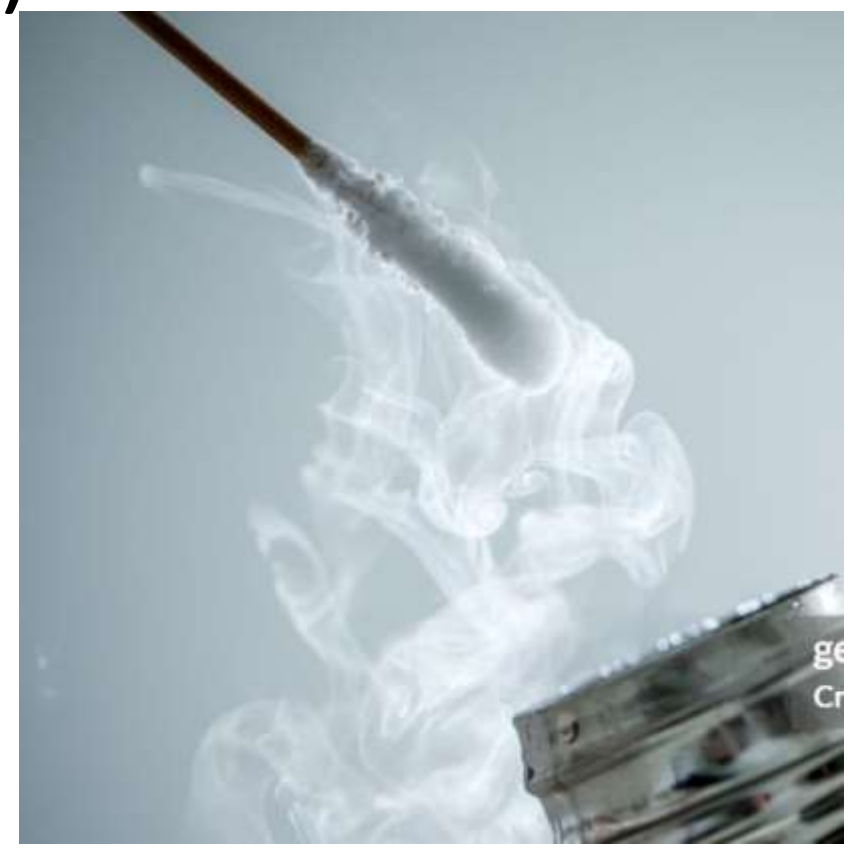

- **Ice Packs.**
- **Commercial Cold Packs.**
- **Vapocoolant Spray.**
- **Immersion.**
- **Ice Massage.**
- **Dipstick Method:** A cotton bud is soaked in cryogen, such as liquid nitrogen slush or dry ice, which is placed in a disposable container.

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- **Immersion.**
- **Ice Massage.**
- **Dipstick Method:**

This method is cost-effective as it does not require specialised equipment like a spray or probe.

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Application Methods: -

- **Ice Packs.**
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- **Immersion.**
- **Ice Massage.**
- **Dipstick Method.**
- **Whole Body Cryotherapy:**

More recently, whole-body cryotherapy has become popular among athletes to help aid recovery. More research is needed to understand the effect on the body and its relation to pain.

PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

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<u>Duration of Cryotherapy:</u>

Several factors influence temperature changes during cryotherapy, such as:

1. The type of cooling agent used.
2. The location of application.
3. The inclusion of compression.
4. Individual variations in sensitivity.

Therefore, treatment times may need to be adjusted based on these factors to optimise effectiveness.

PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

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2. Cold : -

Indications: -

Cryotherapy can be utilized as an adjunct to treatment for the following conditions:

1. Acute soft tissue injuries (e.g., ankle sprain, muscular strain, ligament sprain)
2. Myofascial trigger points, muscle spasm and muscle guarding
3. Tendinitis and Tenosynovitis
4. Acute swelling and Bursitis
5. Post orthopedic surgery.
6. Reducing temperature
7. DOMS(Delayed onset muscle soreness)

PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

1. heat (superficial and deep)
2. Cold : -

<u>Contraindications: -</u>

Be aware of conditions in which cryotherapy is contraindicated:

1. CRPS(Complex Regional Pain Syndrome)
2. Hemoglobinuria
3. Cryoglobulinemia
4. Peripheral vascular disease, impaired circulation and Raynaud's disease
5. Urticaria and hypersensitivity to cold
6. Skin anesthesia and over a regenerating peripheral nerve
7. Open wounds

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Precautions: -

When applying cryotherapy, be cognisant of the following:

1. Over a superficial nerve.
2. Hypertension.
3. Impaired cognition.
4. Patients who are very young or very old.

PHYSIOTHERAPY EQUIPMENTS

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2. Cold : -

<u>Expected Sensations to Cryotherapy: -</u>

Throughout the duration of treatment, the expected sensations begin with a cold feeling and should reach numbness by the end.

PHYSIOTHERAPY EQUIPMENTS

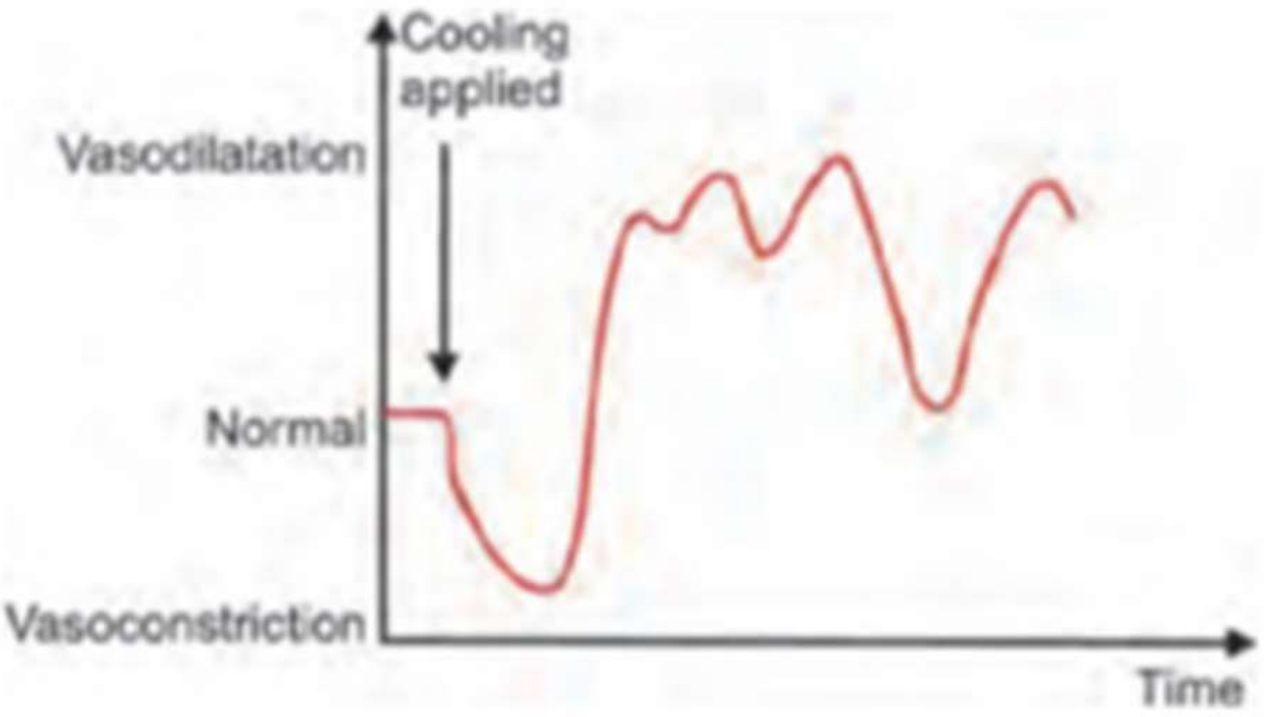
physical modalities including:

1. heat (superficial and deep)
2. Cold : -

Lewis Hunting Reaction: -

The Lewis hunting reaction refers to the process of *alternating vasoconstriction and vasodilation* in extremities exposed to cold.

This phenomenon, was first described by Thomas Lewis in 1930.



Lewis-Hunting reaction

PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

1. heat (superficial and deep)
2. Cold : -

Possible Risks/Undesirable Effects: -

1. Inhibit Muscle Function
2. Ice burn
3. Cryotherapy-induced nerve injuries
4. Generalised cooling and decrease in core temperature
5. Reduced range of motion (ROM)

PHYSIOTHERAPY EQUIPMENTS

Second year

PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

1. heat (superficial and deep)
2. cold
3. Sound.
4. Electricity.
5. mechanical forces.
6. light.

PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

1. heat (superficial and deep)
2. Cold : -

known as Cryotherapy or ice application, is the simplest and oldest way to treat injuries.

Its worldwide use spread because of its effectiveness, convenience, low cost, and ease of transportation.

Ice is believed to control pain by instigating local anesthesia.

PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

1. heat (superficial and deep)
2. Cold : -

<u>It also decreases</u>

- Oedema.
- Nerve conduction velocities.
- Cellular metabolism, and local blood flow.

PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

1. heat (superficial and deep)
2. Cold : -

<u>Physiological Effects of Cryotherapy: -</u>

The following physiologic effects are the expected responses to cryotherapy: -

- ***<u>Decreased inflammatory sequel</u>*** such as local temperature, accumulation of oedema, and vasoconstriction of arterioles and capillaries, which subsequent decreased metabolism
- ***<u>Decreased electrophysiological effect</u>*** such as nerve conduction velocity, muscle excitability and decreased muscle spindle depolarisation and Extreme anaesthetic effects, lead to pain reduction and relief muscle spasm.

PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

1. heat (superficial and deep)

2. Cold : -

Application Methods: -

- **Ice Packs.**
- **Commercial Cold Packs.**
- **Vapocoolant Spray.**
- **Immersion.**
- **Ice Massage.**
- **Dipstick Method.**
- **Whole Body Cryotherapy.**

PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

1. heat (superficial and deep)
2. Cold : -

<u>Application Methods: -</u>

- Ice Packs: It is the most common method of cryotherapy.

There are different types of ice used in ice packs.

The most common types are ice packs made with cubed, crushed, and wetted ice.

PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

1. heat (superficial and deep)
2. Cold : -

Application Methods: -

- **Ice Packs.**
- **Commercial Cold Packs:**

Commercial cold packs, such as Col Pac and Elastic-Gel, are an efficient and commonly used method of cryotherapy.

PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

1. heat (superficial and deep)
2. Cold : -

Application Methods: -

- **Ice Packs.**
- **Commercial Cold Packs.**
- **Vapocoolant Spray:**

Utilised as a ***superficial, cooling*** agent for reduction of muscle guarding and release of myofascial trigger points.

PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

1. heat (superficial and deep)
2. Cold : -

<u>Application Methods</u>: -

- **Ice Packs.**
- **Commercial Cold Packs.**
- **Vapocoolant Spray.**
- **Immersion:**

Simple immersion, such as an ice bath, can be utilised ***<u>for full concealment of a distal extremity</u>*** (e.g., foot, ankle, hand, or wrist).

PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

1. heat (superficial and deep)
2. Cold : -

Application Methods: -

- **Ice Packs.**
- **Commercial Cold Packs.**
- **Vapocoolant Spray.**
- **Immersion.**
- **Ice Massage:**

Ice massage involves applying ice directly to the skin with slow strokes in *circular motion for 5-10 minutes.*

To achieve the desired cooling effect, move the ice about 5-7 cm/second.

PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

1. heat (superficial and deep)
2. Cold : -

Application Methods: -

- **Ice Packs.**
- **Commercial Cold Packs.**
- **Vapocoolant Spray.**
- **Immersion.**
- **Ice Massage.**
- **Dipstick Method:** A cotton bud is soaked in cryogen, such as liquid nitrogen slush or dry ice, which is placed in a disposable container.

PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

1. heat (superficial and deep)
2. Cold : -

Application Methods: -

- **Ice Packs.**
- **Commercial Cold Packs.**
- **Vapocoolant Spray.**
- **Immersion.**
- **Ice Massage.**
- **Dipstick Method:**

This method is cost-effective as it does not require specialised equipment like a spray or probe.

PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

1. heat (superficial and deep)
2. Cold : -

Application Methods: -

- **Ice Packs.**
- **Commercial Cold Packs.**
- **Vapocoolant Spray.**
- **Immersion.**
- **Ice Massage.**
- **Dipstick Method.**
- **Whole Body Cryotherapy:**

More recently, whole-body cryotherapy has become popular among athletes to help aid recovery. More research is needed to understand the effect on the body and its relation to pain.

PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

1. heat (superficial and deep)
2. Cold : -

<u>Duration of Cryotherapy:</u>

Several factors influence temperature changes during cryotherapy, such as:

1. The type of cooling agent used.
2. The location of application.
3. The inclusion of compression.
4. Individual variations in sensitivity.

Therefore, treatment times may need to be adjusted based on these factors to optimise effectiveness.

PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

1. heat (superficial and deep)
2. Cold : -

Indications: -

Cryotherapy can be utilized as an adjunct to treatment for the following conditions:

1. Acute soft tissue injuries (e.g., ankle sprain, muscular strain, ligament sprain)
2. Myofascial trigger points, muscle spasm and muscle guarding
3. Tendinitis and Tenosynovitis
4. Acute swelling and Bursitis
5. Post orthopedic surgery.
6. Reducing temperature
7. DOMS(Delayed onset muscle soreness)

PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

1. heat (superficial and deep)
2. Cold : -

<u>Contraindications: -</u>

Be aware of conditions in which cryotherapy is contraindicated:

1. CRPS(Complex Regional Pain Syndrome)
2. Hemoglobinuria
3. Cryoglobulinemia
4. Peripheral vascular disease, impaired circulation and Raynaud's disease
5. Urticaria and hypersensitivity to cold
6. Skin anesthesia and over a regenerating peripheral nerve
7. Open wounds

PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

1. heat (superficial and deep)
2. Cold : -

Precautions: -

When applying cryotherapy, be cognisant of the following:

1. Over a superficial nerve.
2. Hypertension.
3. Impaired cognition.
4. Patients who are very young or very old.

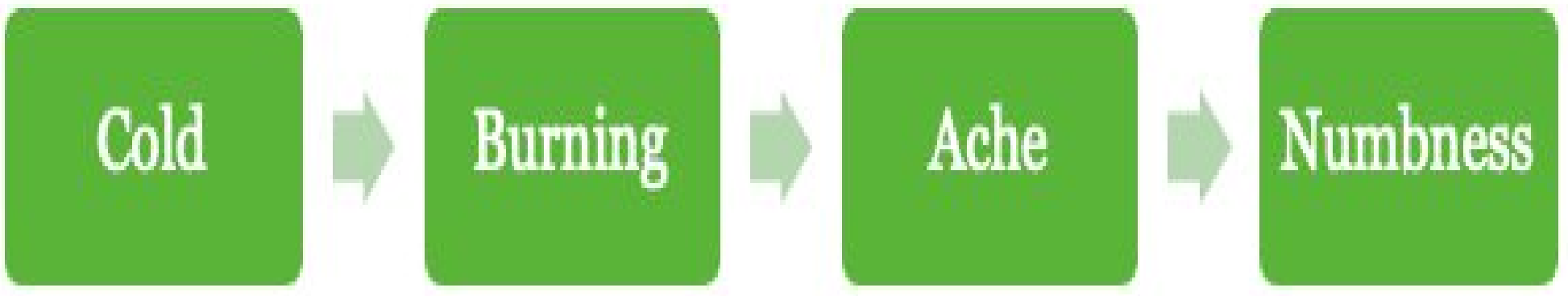
PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

1. heat (superficial and deep)
2. Cold : -

<u>Expected Sensations to Cryotherapy: -</u>

Throughout the duration of treatment, the expected sensations begin with a cold feeling and should reach numbness by the end.



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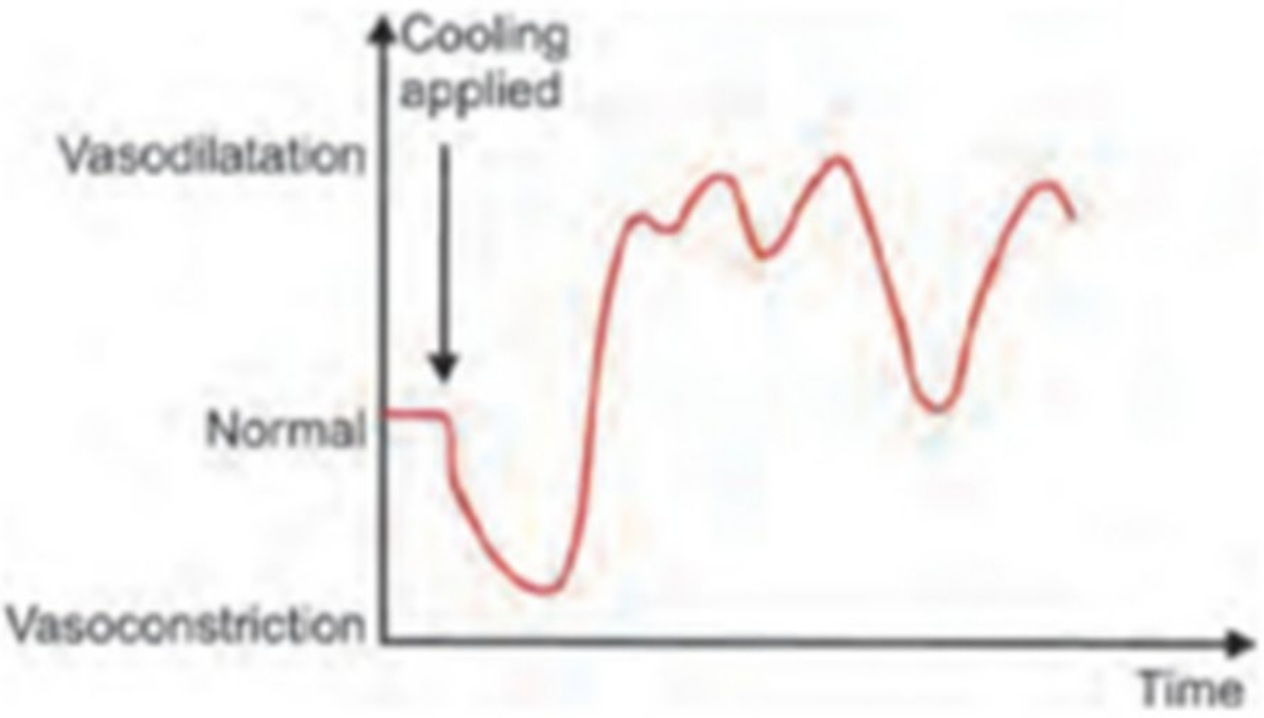

Lewis-Hunting reaction

PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

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PHYSIOTHERAPY EQUIPMENTS

Second year

PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

1. heat (superficial and deep)
2. cold
3. Sound.
4. Electricity.
5. mechanical forces.
6. light.

PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

1. heat (superficial and deep)
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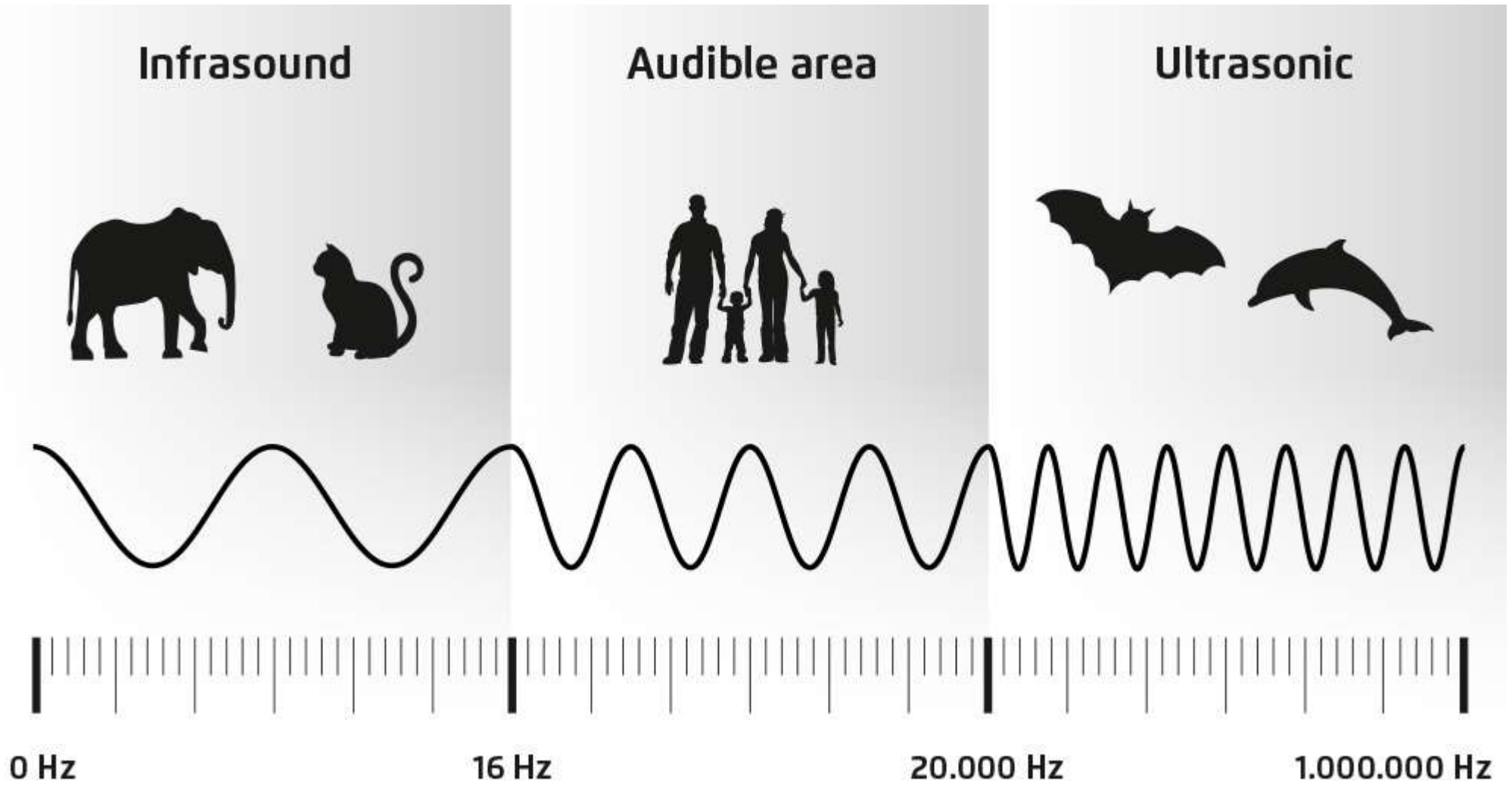
3. Sound:- The normal human sound range is from 16 Hz to something approaching 15-20,000 Hz (in children and young adults).



PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

1. heat (superficial and deep)
2. cold
3. Sound:- ***Ultrasound***

Ultrasound is sound with a frequency above 20,000 Hertz (Hz) and is undetectable by the human ear.

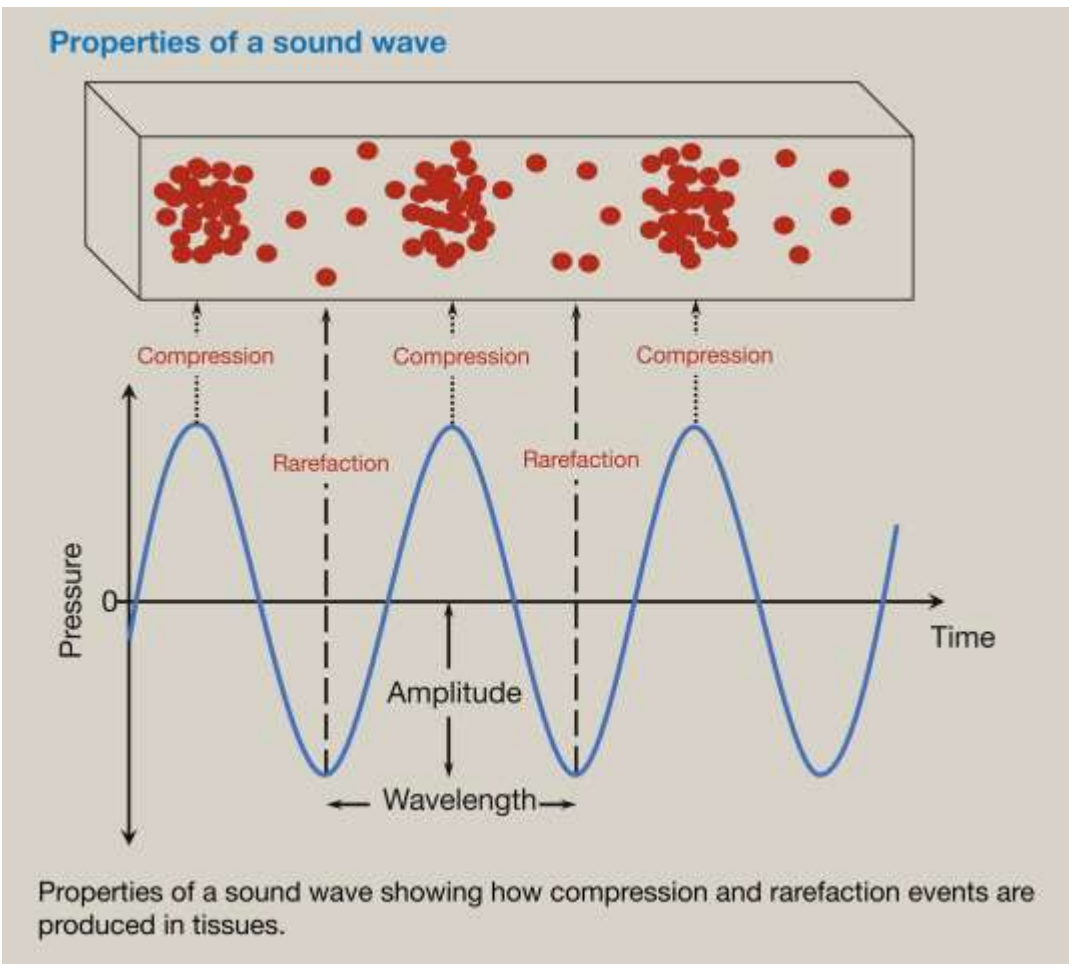
Beyond this upper limit, the mechanical vibration is known as ultrasound.

PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

1. heat (superficial and deep)
2. cold
3. Sound:-Ultrasound

Ultrasound uses sound energy in the form of pressure waves generated by the mechanical vibrations of particles within a medium.



Properties of a sound wave showing how compression and rarefaction events are produced in tissues.

PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

1. heat (superficial and deep)
2. cold
3. Sound:- ***Ultrasound***

Ultrasound is classified as a deep heating modality *capable of producing a temperature* increase in tissues of considerable depth because it travels very well through homogenous tissue (e.g. fat tissue).

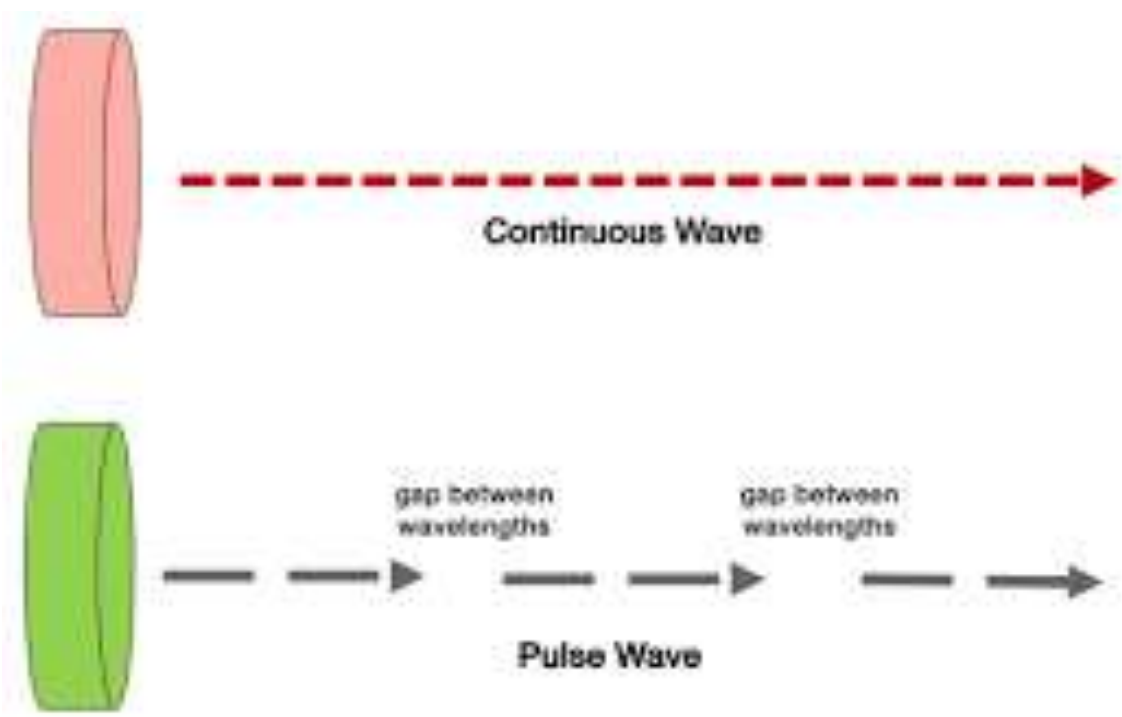
PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

1. heat (superficial and deep)
2. cold
3. Sound:-Ultrasound

In physiotherapy, ***pulsed ultrasound and continuous*** ultrasound differ mainly in how sound waves are delivered and their therapeutic effects.

pulsed *ultrasound* is ideal for *healing and inflammation*, while ***continuous*** *ultrasound* focuses on *pain relief and circulation enhancement.*



PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

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It has been shown to alter all phases of tissue repair:

1. ***stimulates WBCs activity and activate fibroblasts*** to the site of injury, leading to organizational and ultimately functional strength of scar tissue.
2. Ultrasound also aids in ***pain relief*** by interferes with pain transmission as a possible mechanism ***for the analgesic effects.***

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1. stimulates WBCs…….strength of scar tissue.
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PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

1. heat (superficial and deep)
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<u>Contraindications:</u>

- Hemorrhagic conditions
- Eyes, anterior neck, carotid sinus, reproductive organs
- Electronic device
- Deep venous thrombosis or thrombophlebitis (local)
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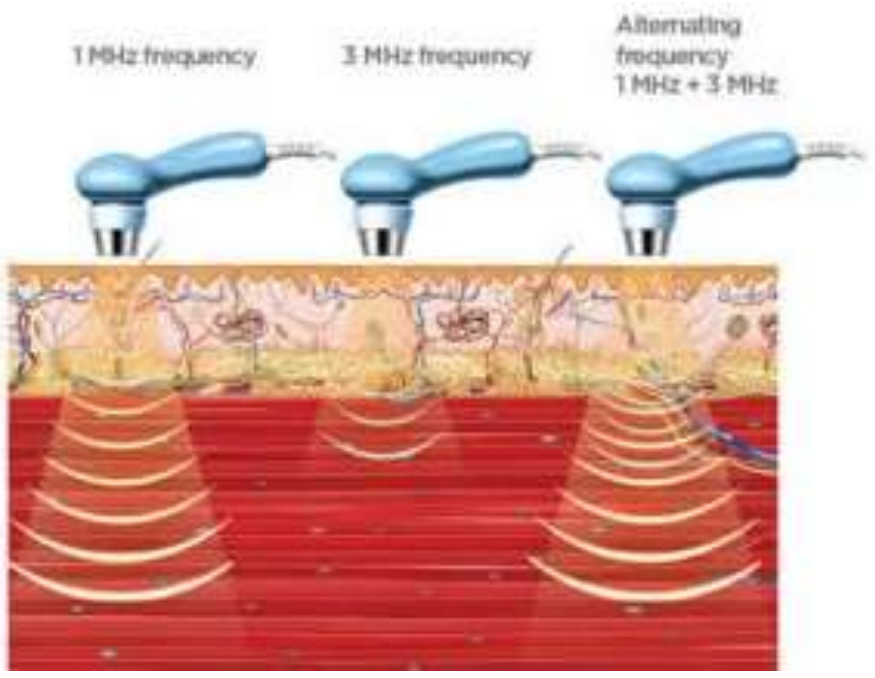

PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

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3. Sound:-

Precautions: -

- Active epiphysis.
- Acute injury or inflammation.
- Skin disease, Damaged or at-risk skin, Infection, and Plastic or cement implants
- Impaired circulation or sensation
- Impaired cognition or communication, and / or Regenerating nerves.


Thank you!

PHYSIOTHERAPY EQUIPMENTS

Second year

PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

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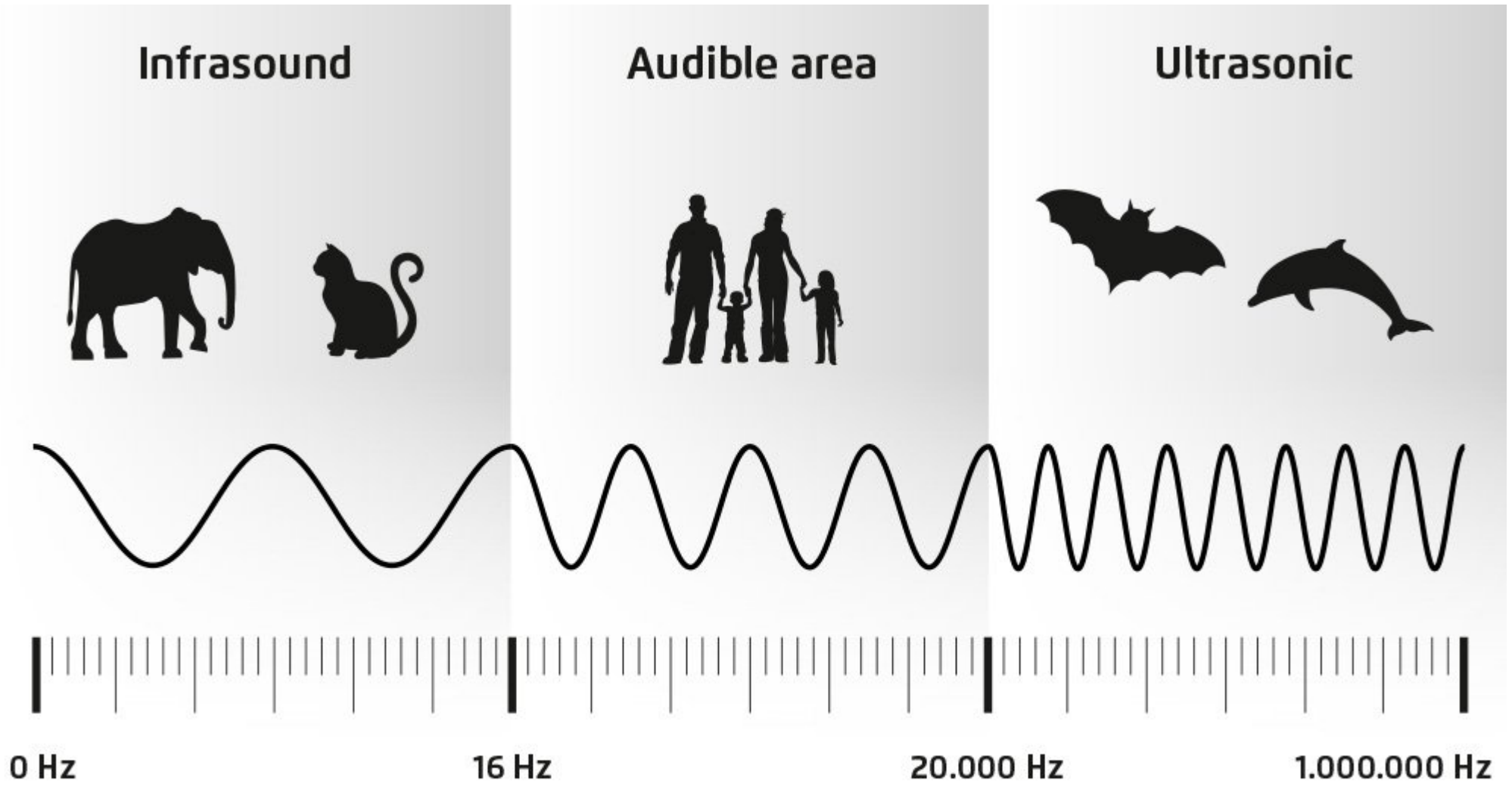

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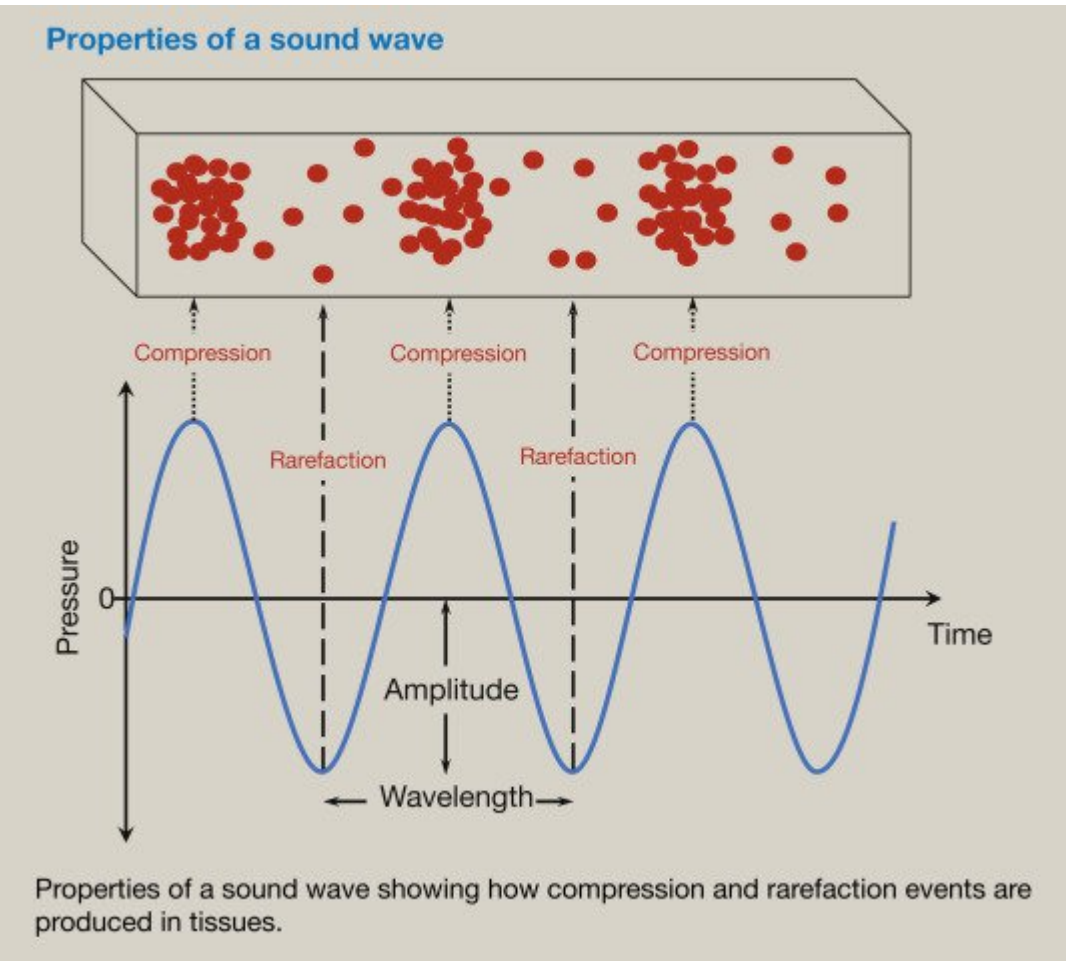

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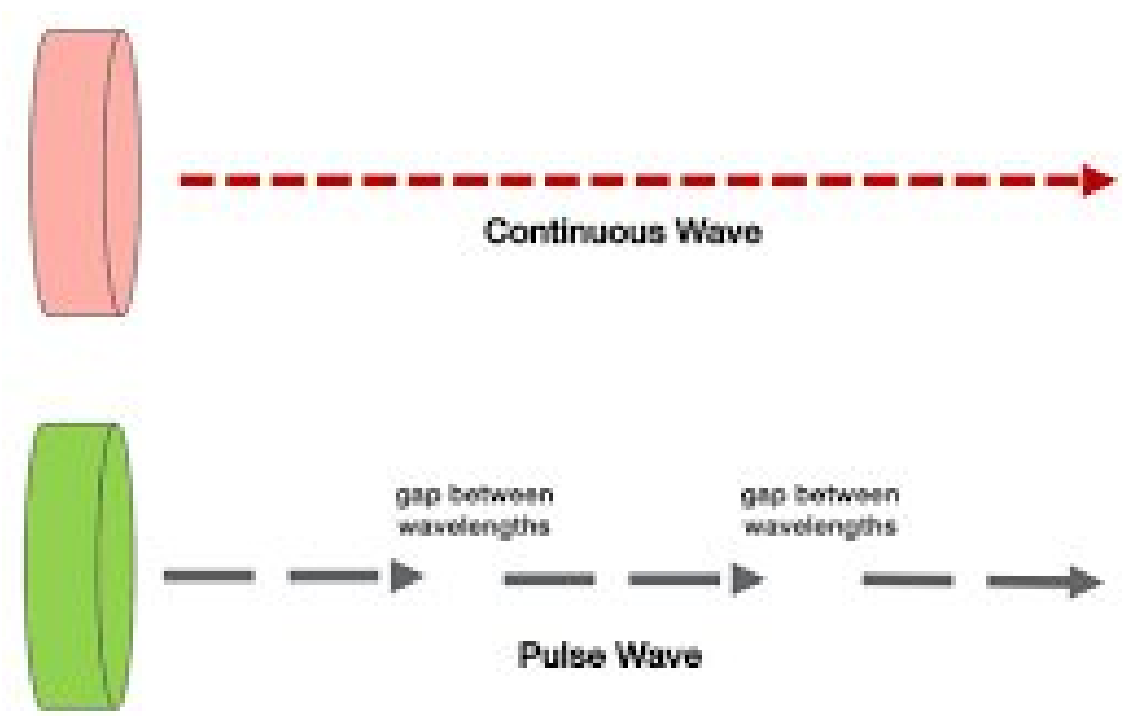

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3. Sound:- ***Ultrasound***

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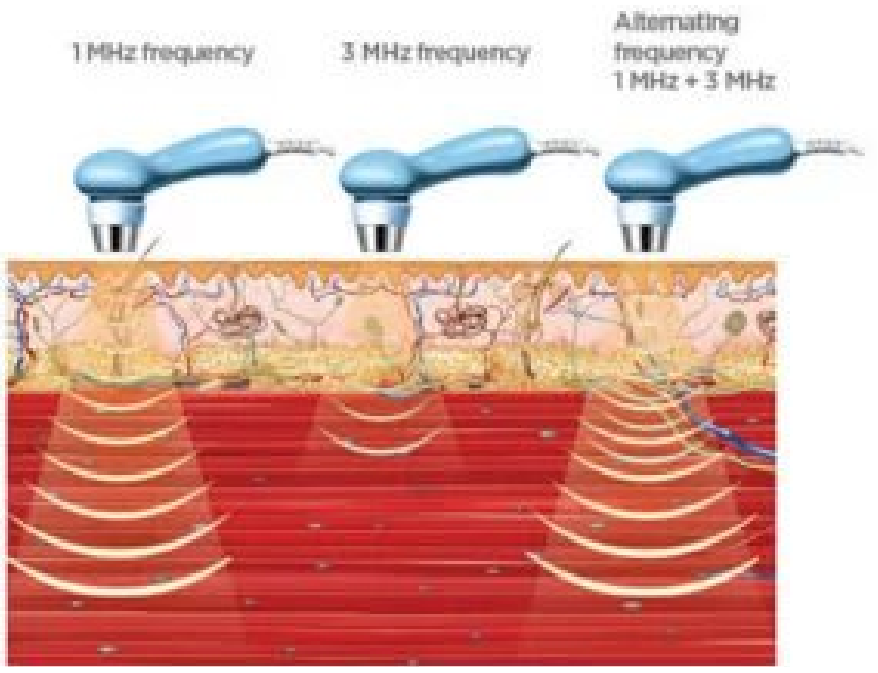

PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

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2. cold
3. Sound:-

Precautions: -

- Active epiphysis.
- Acute injury or inflammation.
- Skin disease, Damaged or at-risk skin, Infection, and Plastic or cement implants
- Impaired circulation or sensation
- Impaired cognition or communication, and / or Regenerating nerves.


Thank you!

PHYSIOTHERAPY EQUIPMENTS

Second year – Lecture 5

PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

1. heat (superficial and deep)
2. cold
3. Sound.
4. Electricity.
5. mechanical forces.
6. light.

PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

1. heat (superficial and deep)
2. cold
3. Sound.
4. Electricity.

Electrotherapy is a branch of Physiotherapy that deals with non-surgical management of various disorders using electrical currents or electricity

PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

1. heat (superficial and deep)
2. cold
3. Sound.
4. Electricity. (Electrotherapy)

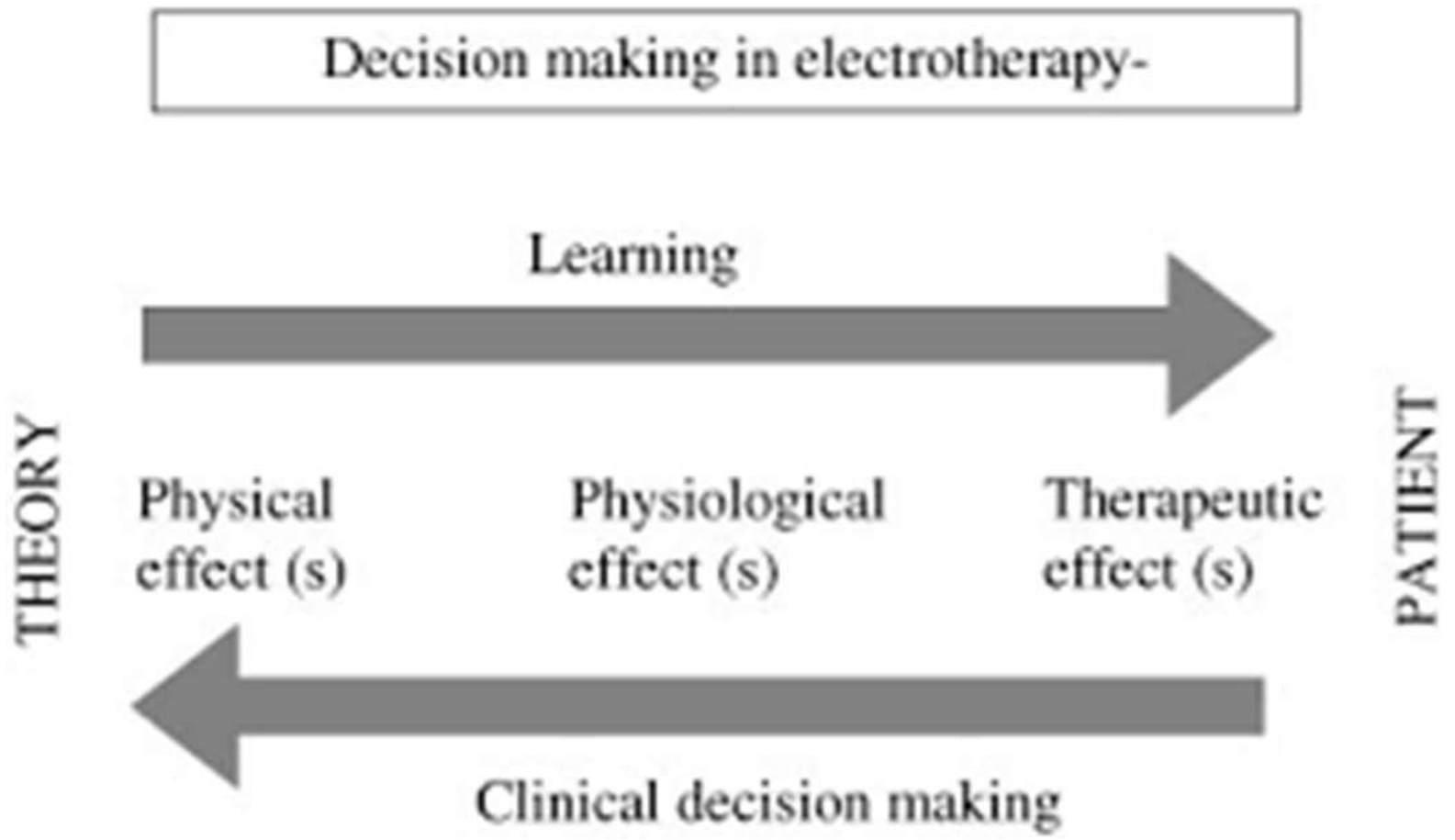
All electrotherapy modalities (with the exception of biofeedback) involve the introduction of some physical energy into a biologic system.

PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

1. heat (superficial and deep)
2. cold
3. Sound.
4. Electricity.

Electrotherapy brings about one or more physiological changes, which are used for therapeutic benefit.



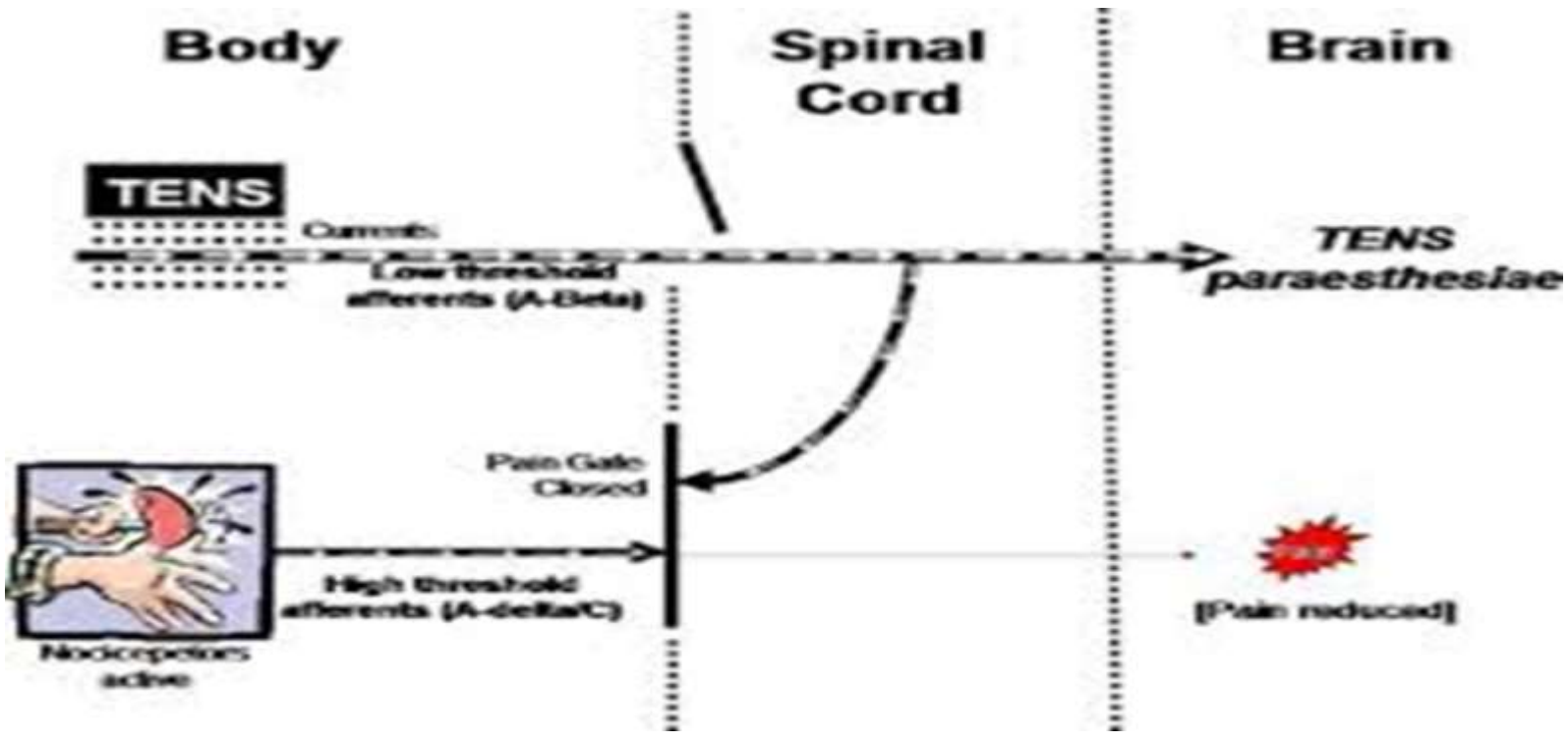
PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

1. heat (superficial and deep)
2. cold
3. Sound.
4. Electricity.

Electrotherapy play roles in:-

1. Inflammatory stage management.
2. Restore body functions.
3. Preventive measures.



PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

1. heat (superficial and deep)
2. cold
3. Sound.
4. Electricity.

<u>Electrotherapy play roles in:-</u>

1. Inflammatory stage managements:- pain management, reduce oedema, improving blood circulation, tissue repair, and enhance wound healing.

PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

1. heat (superficial and deep)
2. cold
3. Sound.
4. Electricity.

Electrotherapy play roles in:-

1. Inflammatory stage managements.
2. Restore body functions: - manage neuromuscular dysfunction, joint mobility and muscle spasm.

PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

1. heat (superficial and deep)
2. cold
3. Sound.
4. Electricity.

<u>Electrotherapy play roles in:-</u>

1. Inflammatory stage management.
2. Restore body functions.
3. Preventive measures: -
    - prevention of disuse atrophy.
    - prevention of venous thrombosis post operatively.

PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

1. heat (superficial and deep)
2. cold
3. Sound.
4. Electricity.

Therapeutic Currents Classification :-

1. classification on the *basis of direction, frequency, voltage, amperage, and biophysical effects.*
2. classification on the ***electrotherapeutic approaches***, electrotherapy can be divided into ***thermal, electrical, electromagnetic and sonic.***
3. classification on the ***basis of frequency.***

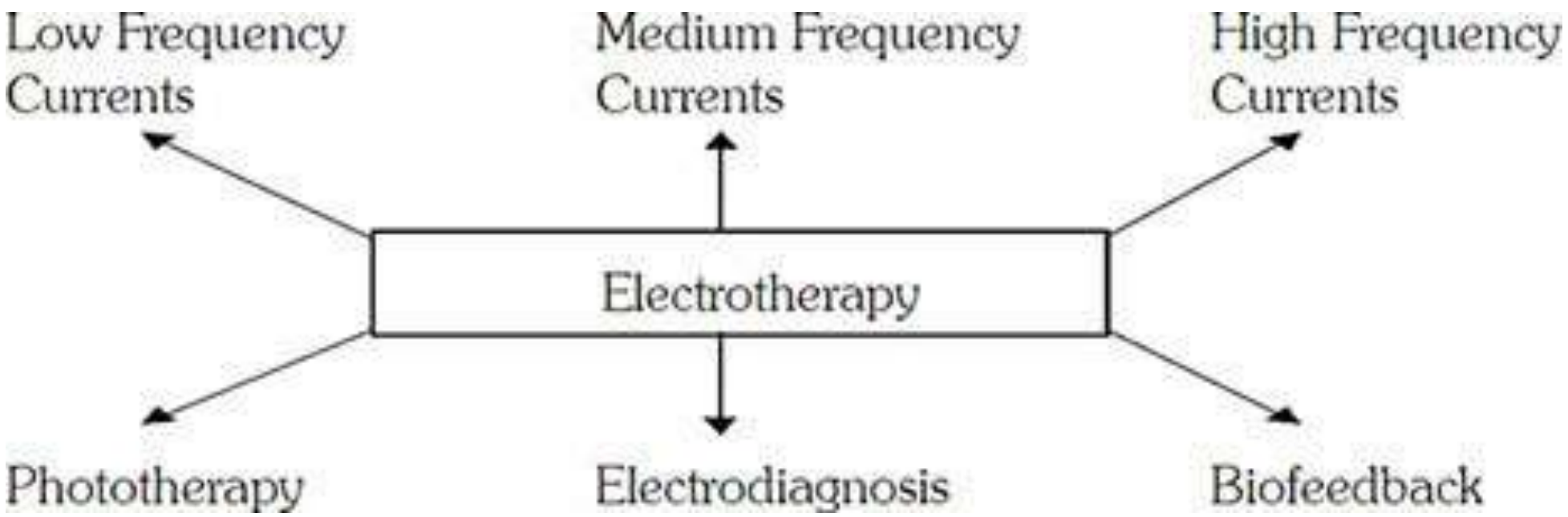
PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

Therapeutic Currents Classification :-

The most commonly accepted classification is on ***the basis of frequency*** where therapeutic currents are classified as: -

1. Low frequency currents.
2. Medium frequency currents.
3. High frequency currents.



PHYSIOTHERAPY EQUIPMENTS

Therapeutic Currents Classification :-

1. ***Low frequency currents.***

- ***Frequency Range:*** 0-1000 Hertz
- ***Mechanism of Action:*** Pain Suppression System (in Direct Current) and Nerve and Muscle Stimulation (in Interrupted Direct Current).
- ***Uses:*** in Pain Relief, maintain and improve Muscle power and tissue Healing.

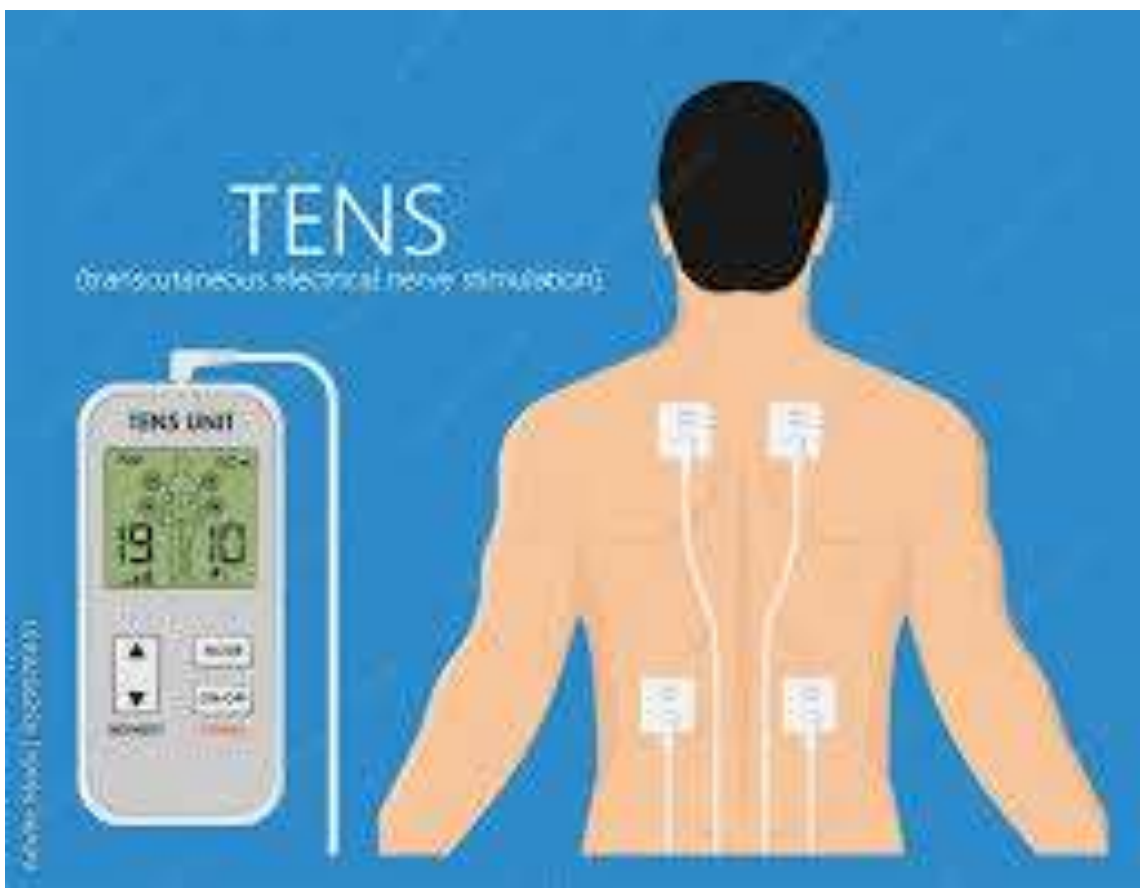
PHYSIOTHERAPY EQUIPMENTS

Therapeutic Currents Classification :-

1. Low frequency currents.

Example:

- Trans Cutaneous Electrical Nerve Stimulation (TENS).
- High Voltage Pulsed Galvanic currents (HVGC).
- Micro currents Diadynamic Currents.

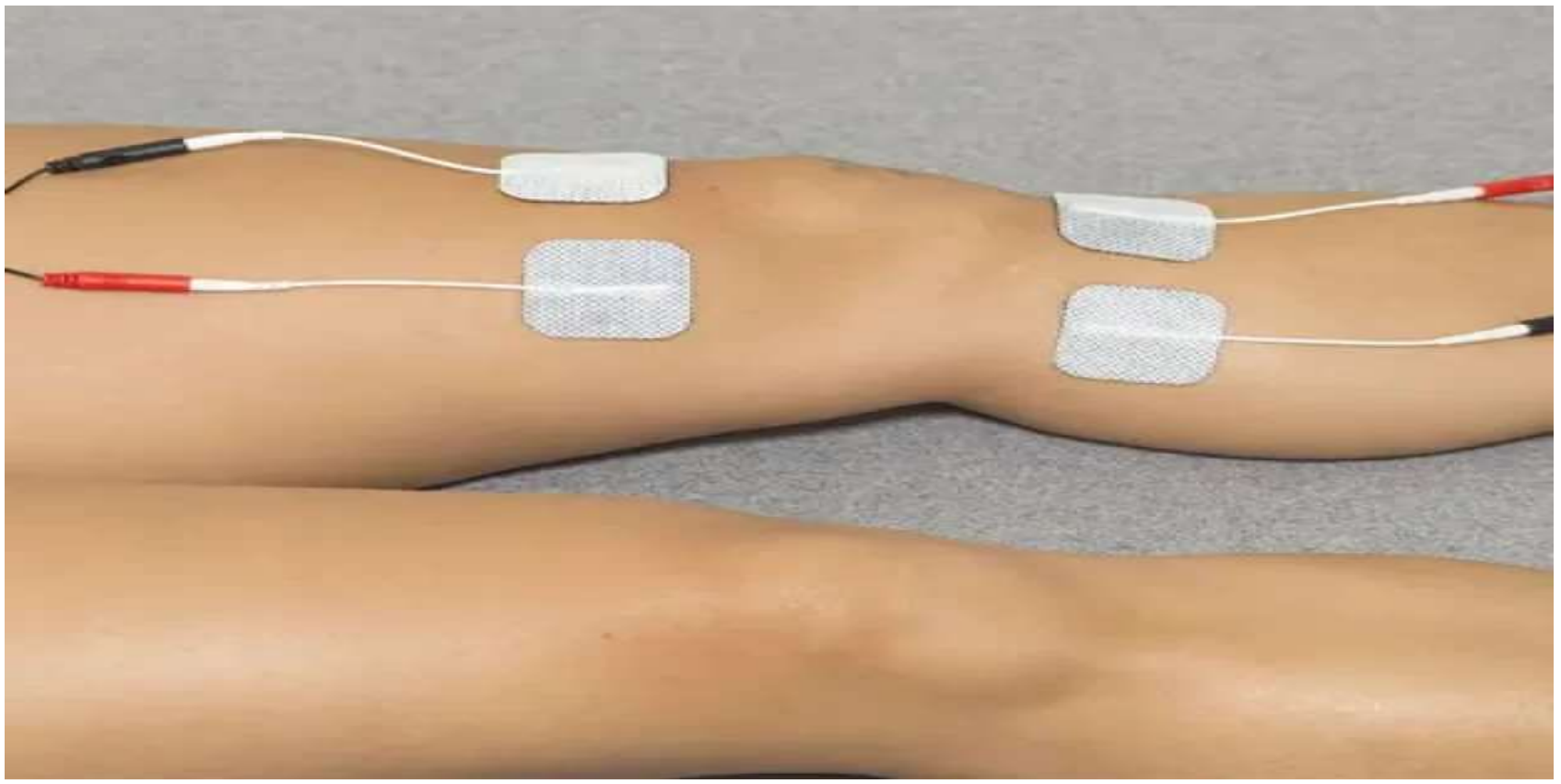


PHYSIOTHERAPY EQUIPMENTS

Therapeutic Currents Classification :-

1. ***Low frequency currents.***
2. ***Medium frequency currents.***

- ***Frequency Range:*** 1000-10000 Hertz
- ***Mechanism of Action:*** Stimulation of deeply situated nerves, muscles and pain suppression System.
- ***Uses:*** Pain relief muscle re-education retard the rate of muscle atrophy and drainage of oedema



PHYSIOTHERAPY EQUIPMENTS

Therapeutic Currents Classification :-

1. ***Low frequency currents.***
2. ***Medium frequency currents.***

Example:

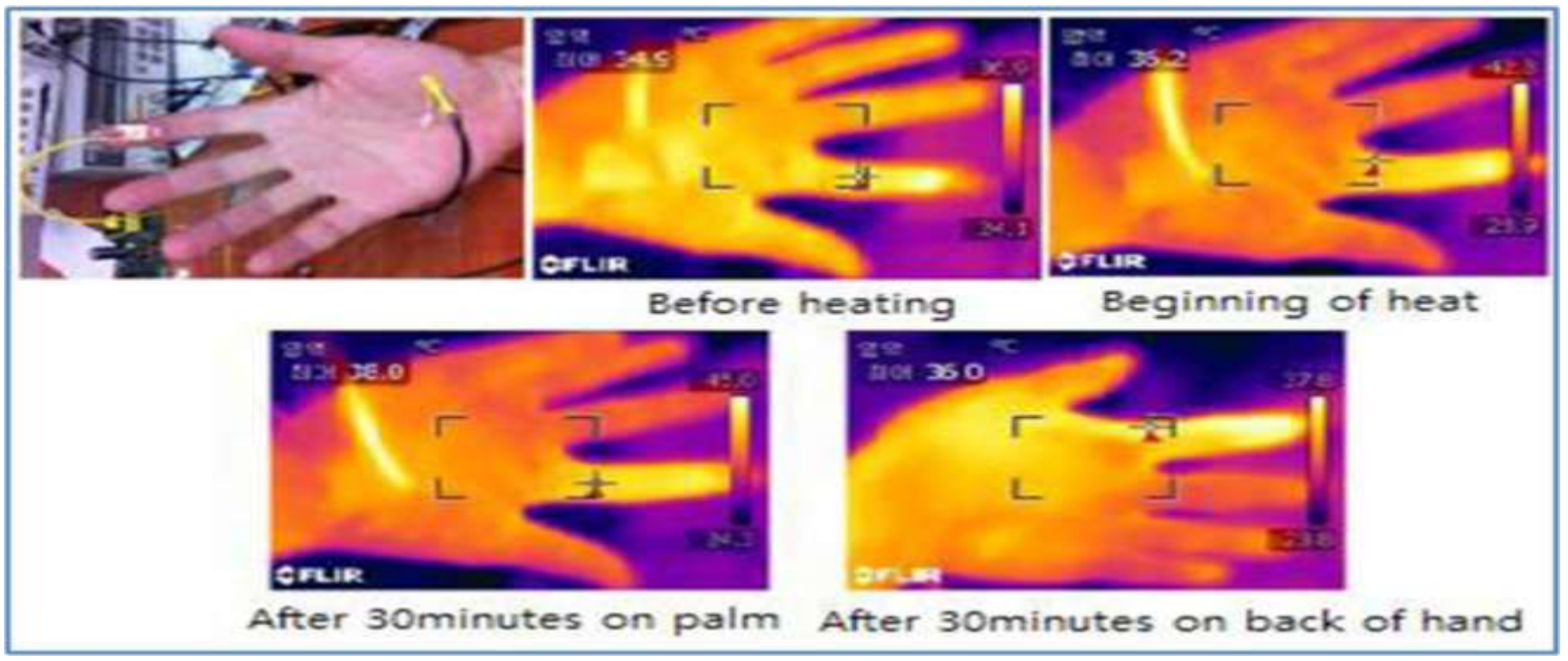
- Interferential Current Therapy (ICT)
- Functional Electrical Stimulation (FES)
- Rebox Currents.

PHYSIOTHERAPY EQUIPMENTS

Therapeutic Currents Classification :-

1. Low frequency currents.
2. Medium frequency currents.
3. ***High frequency currents.***

- ***Frequency Range:*** More than 10000 Hertz
- ***Mechanism of Action:*** Produce heat deep in the tissues depending upon their frequency, Endogenous heating and Vasodilatation
- ***Uses:*** Pain relief and tissue Healing.



PHYSIOTHERAPY EQUIPMENTS

Classification :-

1. Low frequency currents.
2. Medium frequency currents.
3. ***High frequency currents.***

Example:

a) Short wave Diathermy SWD.
b) Microwave Diathermy MWD.
c) Longwave Diathermy.
d) Therapeutic Ultrasound.
e) Shockwave therapy.
f) Therapeutic LASER.


Thank you!

PHYSIOTHERAPY EQUIPMENTS

Second year – Lecture 5

PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

1. heat (superficial and deep)
2. cold
3. Sound.
4. Electricity.
5. mechanical forces.
6. light.

PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

1. heat (superficial and deep)
2. cold
3. Sound.
4. Electricity.

Electrotherapy is a branch of Physiotherapy that deals with non-surgical management of various disorders using electrical currents or electricity

PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

1. heat (superficial and deep)
2. cold
3. Sound.
4. Electricity. (Electrotherapy)

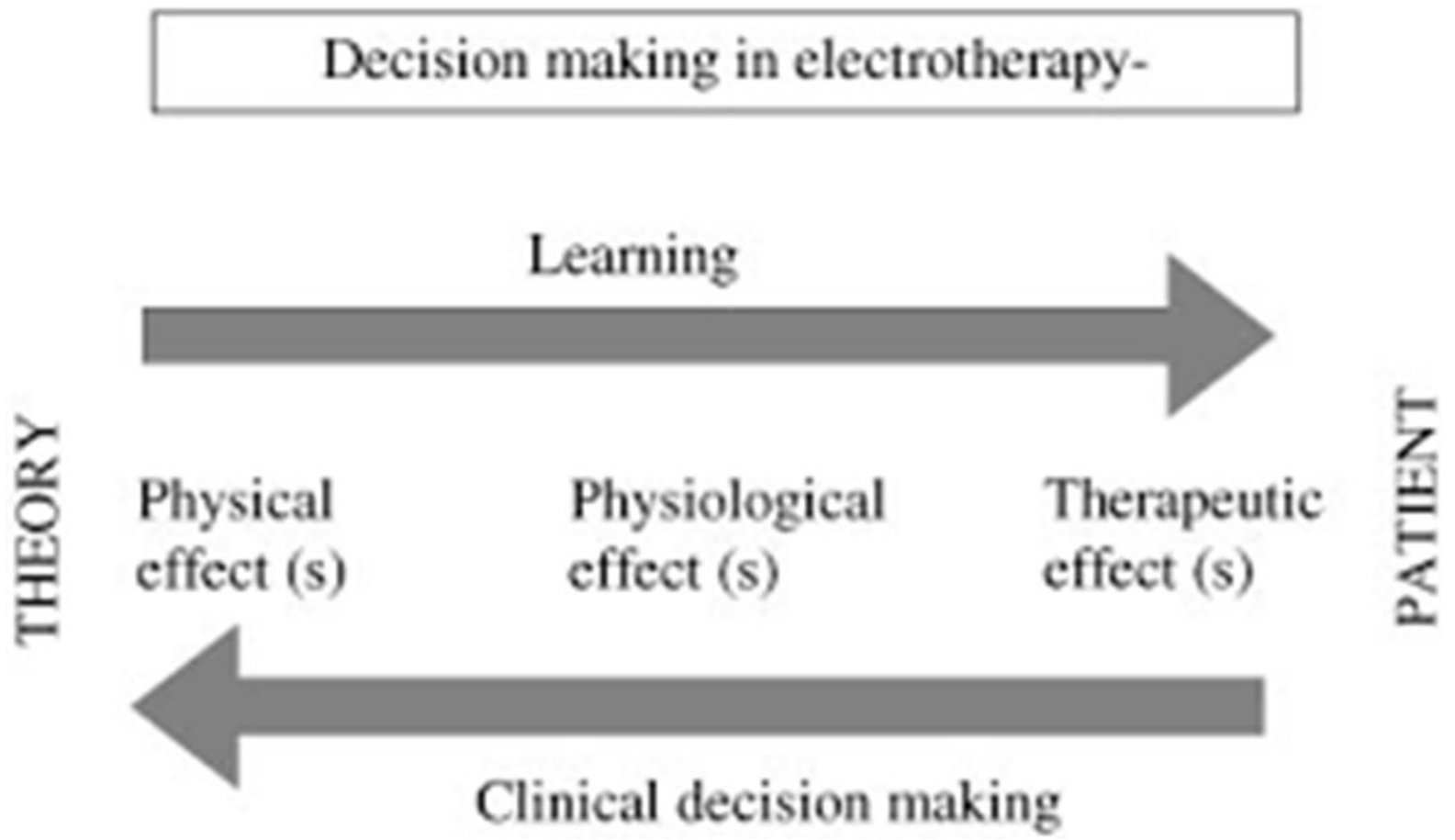
All electrotherapy modalities (with the exception of biofeedback) involve the introduction of some physical energy into a biologic system.

PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

1. heat (superficial and deep)
2. cold
3. Sound.
4. Electricity.

Electrotherapy brings about one or more physiological changes, which are used for therapeutic benefit.



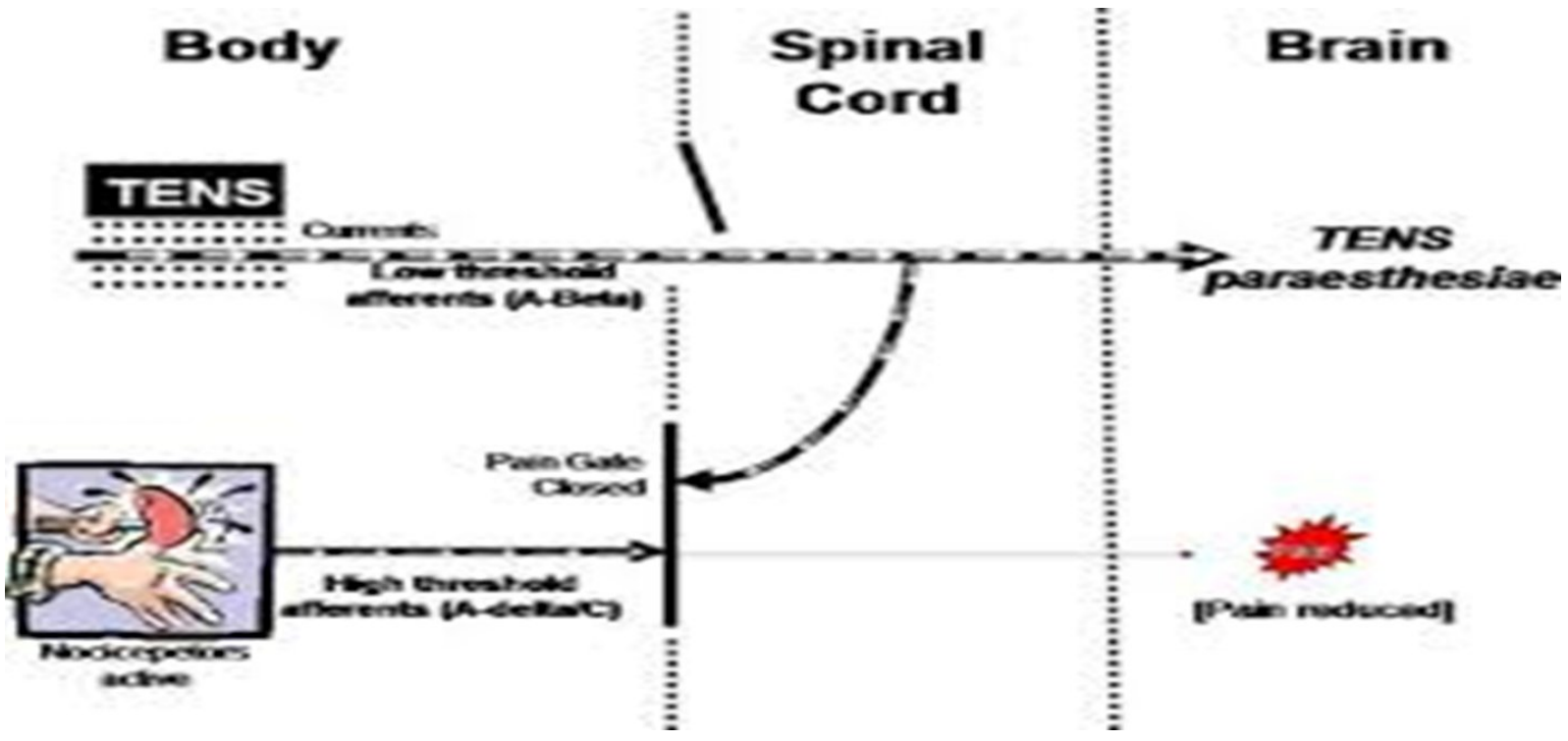
PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

1. heat (superficial and deep)
2. cold
3. Sound.
4. Electricity.

Electrotherapy play roles in:-

1. Inflammatory stage management.
2. Restore body functions.
3. Preventive measures.



PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

1. heat (superficial and deep)
2. cold
3. Sound.
4. Electricity.

<u>Electrotherapy play roles in:-</u>

1. Inflammatory stage managements:- pain management, reduce oedema, improving blood circulation, tissue repair, and enhance wound healing.

PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

1. heat (superficial and deep)
2. cold
3. Sound.
4. Electricity.

<u>Electrotherapy play roles in:-</u>

1. Inflammatory stage managements.
2. Restore body functions: - manage neuromuscular dysfunction, joint mobility and muscle spasm.

PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

1. heat (superficial and deep)
2. cold
3. Sound.
4. Electricity.

<u>Electrotherapy play roles in:-</u>

1. Inflammatory stage management.
2. Restore body functions.
3. Preventive measures: -
    - prevention of disuse atrophy.
    - prevention of venous thrombosis post operatively.

PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

1. heat (superficial and deep)
2. cold
3. Sound.
4. Electricity.

Therapeutic Currents Classification :-

1. classification on the *basis of direction, frequency, voltage, amperage, and biophysical effects.*
2. classification on the ***electrotherapeutic approaches***, electrotherapy can be divided into ***thermal, electrical, electromagnetic and sonic.***
3. classification on the ***basis of frequency.***

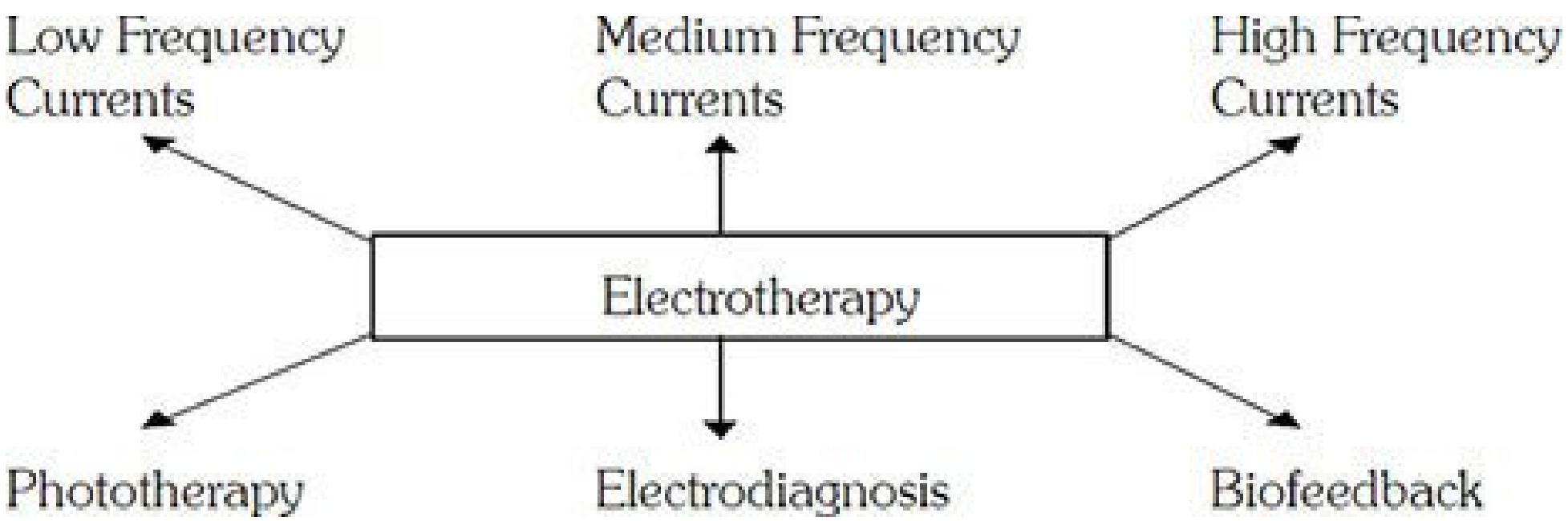
PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

Therapeutic Currents Classification :-

The most commonly accepted classification is on ***the basis of frequency*** where therapeutic currents are classified as: -

1. Low frequency currents.
2. Medium frequency currents.
3. High frequency currents.



PHYSIOTHERAPY EQUIPMENTS

Therapeutic Currents Classification :-

1. ***Low frequency currents.***

- ***Frequency Range:*** 0-1000 Hertz
- ***Mechanism of Action:*** Pain Suppression System (in Direct Current) and Nerve and Muscle Stimulation (in Interrupted Direct Current).
- ***Uses:*** in Pain Relief, maintain and improve Muscle power and tissue Healing.

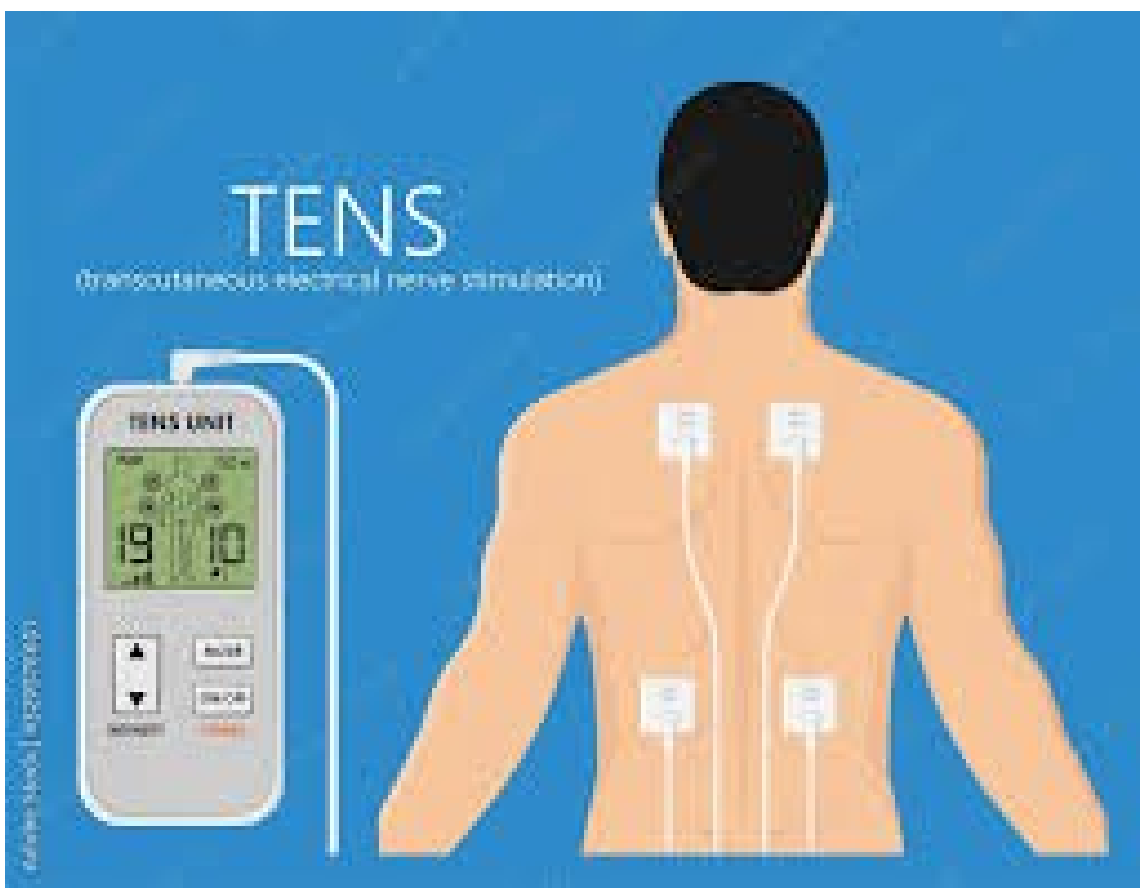
PHYSIOTHERAPY EQUIPMENTS

Therapeutic Currents Classification :-

1. ***Low frequency currents.***

Example:

- Trans Cutaneous Electrical Nerve Stimulation (TENS).
- High Voltage Pulsed Galvanic currents (HVGC).
- Micro currents Diadynamic Currents.

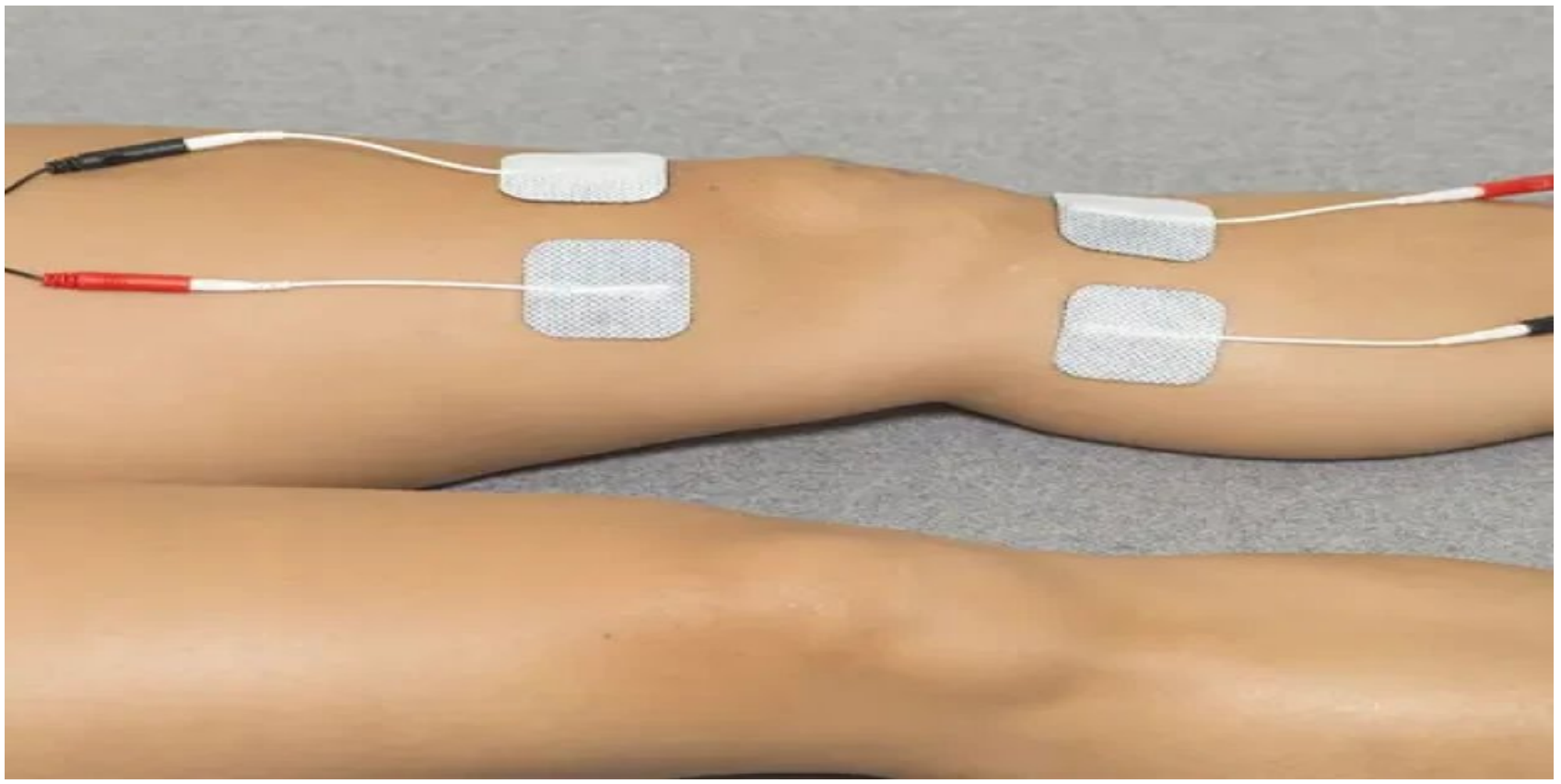


PHYSIOTHERAPY EQUIPMENTS

Therapeutic Currents Classification :-

1. ***Low frequency currents.***
2. ***Medium frequency currents.***

- ***Frequency Range:*** 1000-10000 Hertz
- ***Mechanism of Action:*** Stimulation of deeply situated nerves, muscles and pain suppression System.
- ***Uses:*** Pain relief muscle re-education retard the rate of muscle atrophy and drainage of oedema



PHYSIOTHERAPY EQUIPMENTS

Therapeutic Currents Classification :-

1. ***Low frequency currents.***
2. ***Medium frequency currents.***

Example:

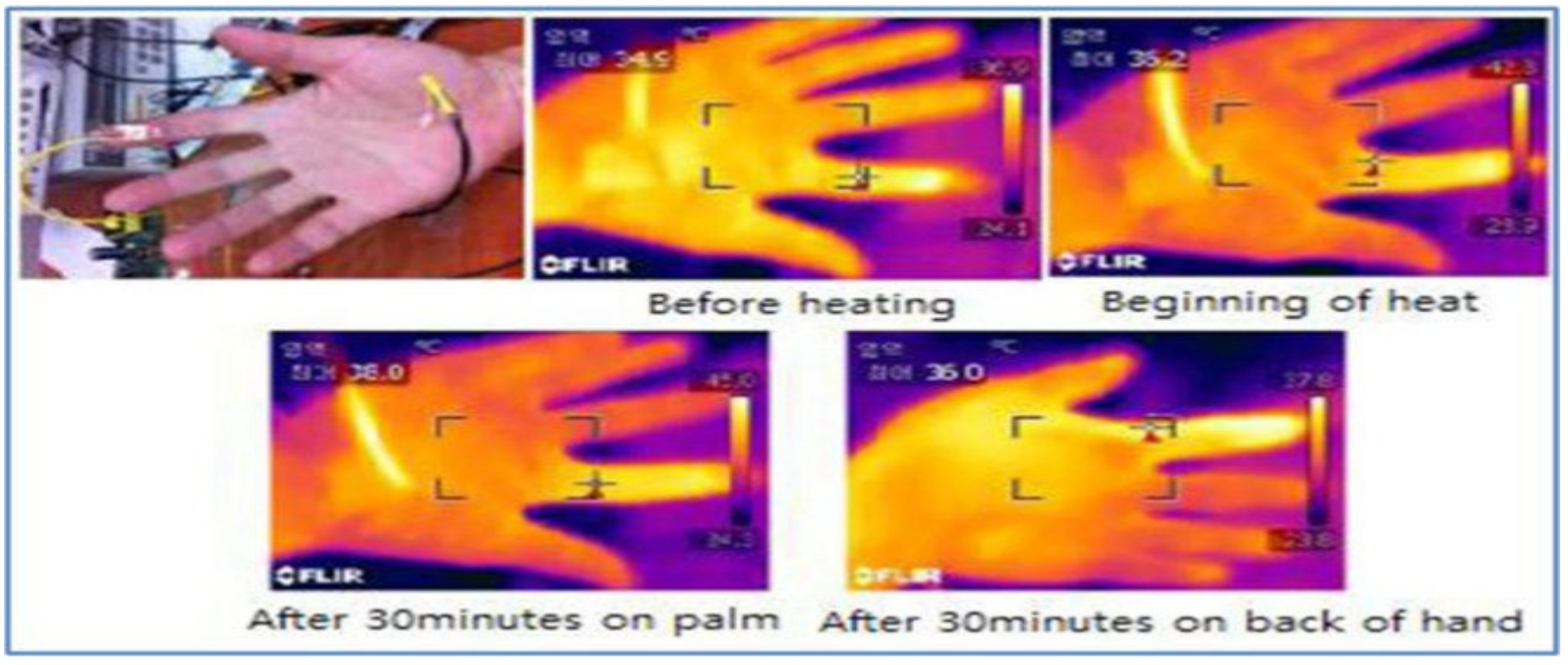
- Interferential Current Therapy (ICT)
- Functional Electrical Stimulation (FES)
- Rebox Currents.

PHYSIOTHERAPY EQUIPMENTS

Therapeutic Currents Classification :-

1. Low frequency currents.
2. Medium frequency currents.
3. ***High frequency currents.***

- ***Frequency Range:*** More than 10000 Hertz
- ***Mechanism of Action:*** Produce heat deep in the tissues depending upon their frequency, Endogenous heating and Vasodilatation
- ***Uses:*** Pain relief and tissue Healing.



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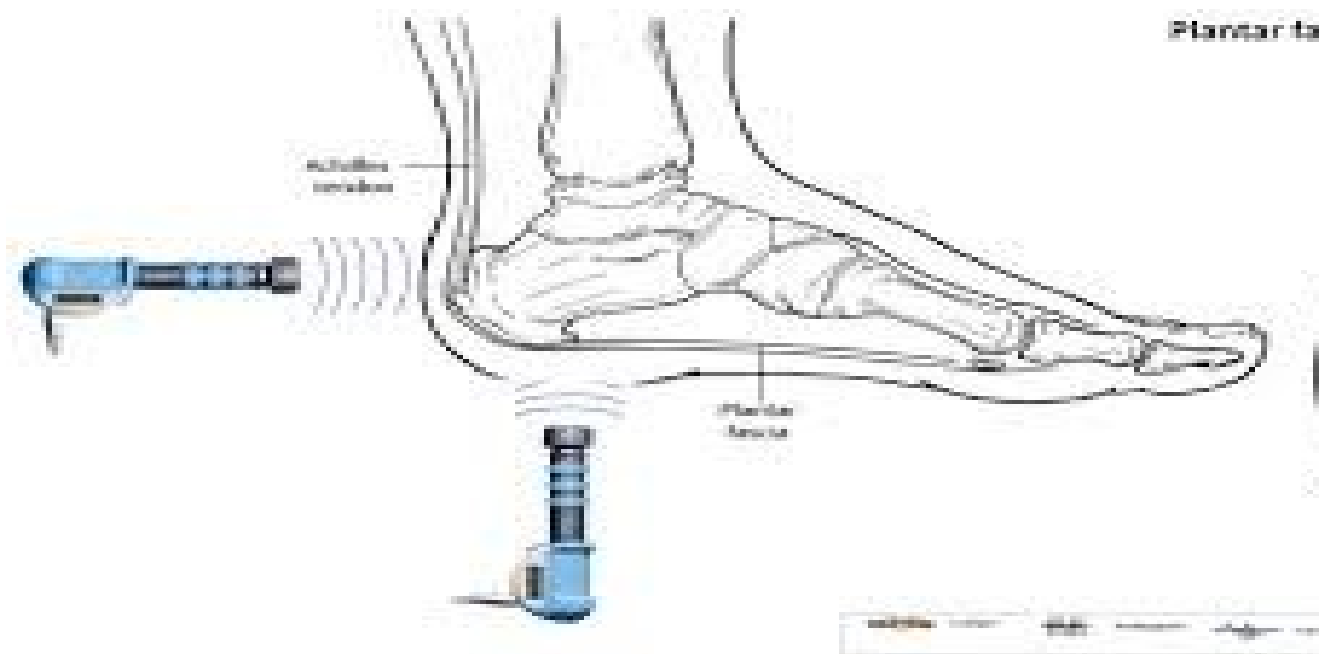



Thank you!

PHYSIOTHERAPY EQUIPMENTS

Second year – Lecture 6

PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

1. heat (superficial and deep)
2. cold
3. Sound.
4. Electricity.
5. mechanical forces.
6. light.

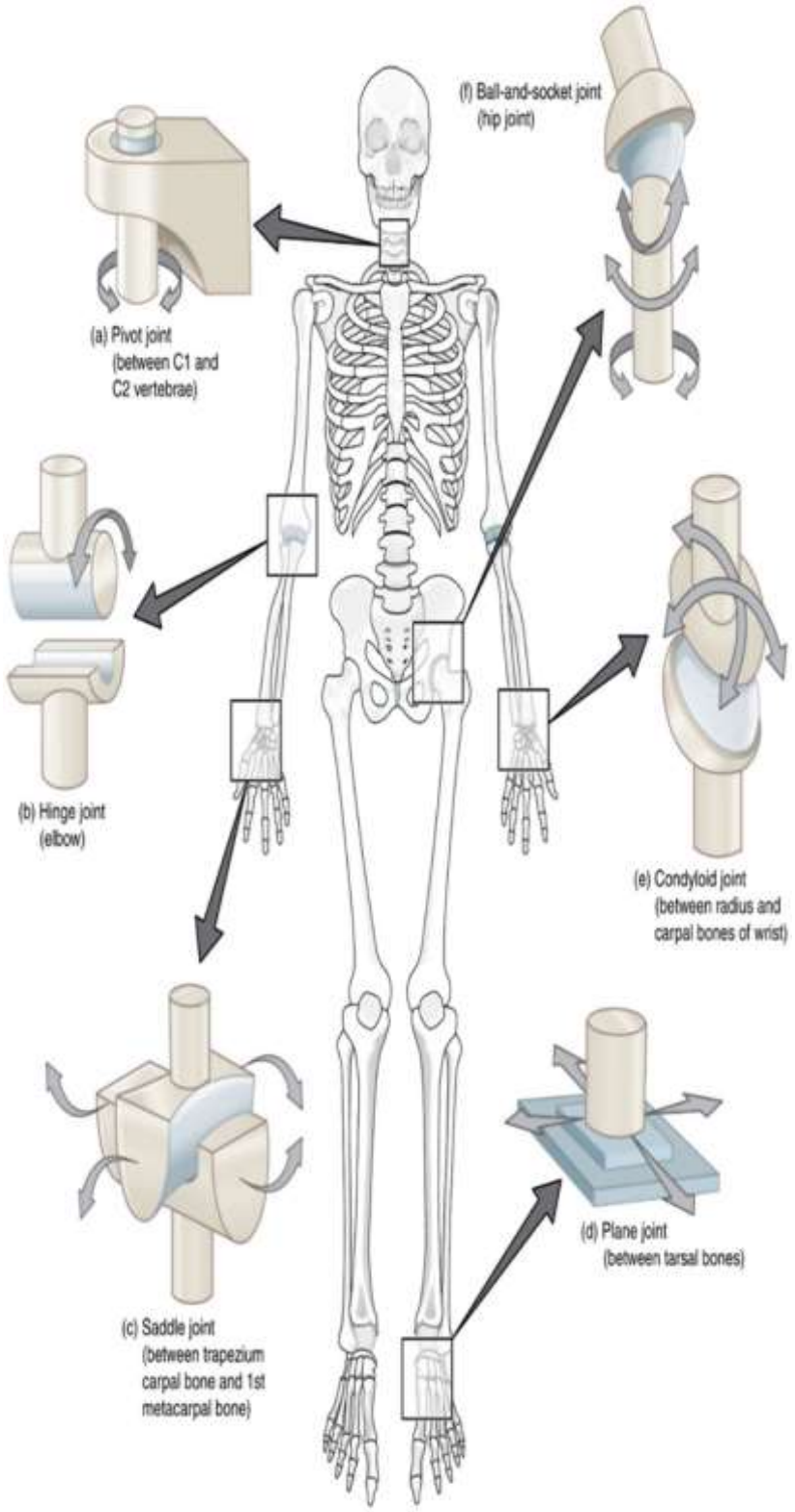
PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

mechanical forces:-

- ***<u>The locomotive function</u>***

  is the ability of humans to produce a variety of postures and movements that enable them to move from one place to another.



PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

mechanical forces:-

- ***Human biomechanics*** is the study of the principles that govern human movement, focusing on how the musculoskeletal system *supports body loads and enables the movement of body segments*.
- It focuses on ***how*** forces ***act*** on the musculoskeletal system and ***how*** the body tissue ***responds*** to these forces.

PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

mechanical forces:-

Body mechanics refers to the way in which we use our bodies to perform physical tasks, such as lifting, pushing, and pulling.

The kinetics : deals with body motion and the forces that cause it to move.

The Kinematics:- describe body motion without regard to the forces that produce that motion.

The kinetic and kinematic concepts are important in understanding human movement and the implication of force on body segments while moving.

PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

mechanical forces:-

Good body mechanics involves using the correct posture, alignment, and movement patterns to *reduce the risk of injury and strain* on the muscles, joints, and other body structures.

Biomechanics major applications areas:

1. improving movement performance.
2. Reduction of movement impairment.
3. Intervention in movement-related injuries or conditions.

PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

mechanical forces:-

In *kinematics*, there are five variables of interest:

1. Type of motion or displacement.
2. The location.
3. The direction.
4. The magnitude.
5. Rate of the motion or displacement.

PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

mechanical forces:-

There are only three simple machines in the human musculoskeletal system, *the lever, the wheel and axle, and the pulley.*

This simple machine enables three functions, including amplification of force , motion and a change in the direction of the applied force.

PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

mechanical forces:-

biomechanics can be viewed in the context of either external or internal biomechanics.

External biomechanics describes external forces on body segments and their effect on body movement.

Internal biomechanics are forces generated by the body tissues and their effect on movement.

Both of them included the *muscle forces and the forces in bones and joints* that result from *transmission* of the muscle forces through the skeleton".

PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

mechanical forces:-

External Forces (External Biomechanics)

There are two domains of mechanics (biomechanics):

Static: describes mechanics that analyze the bodies at rest or in uniform motion

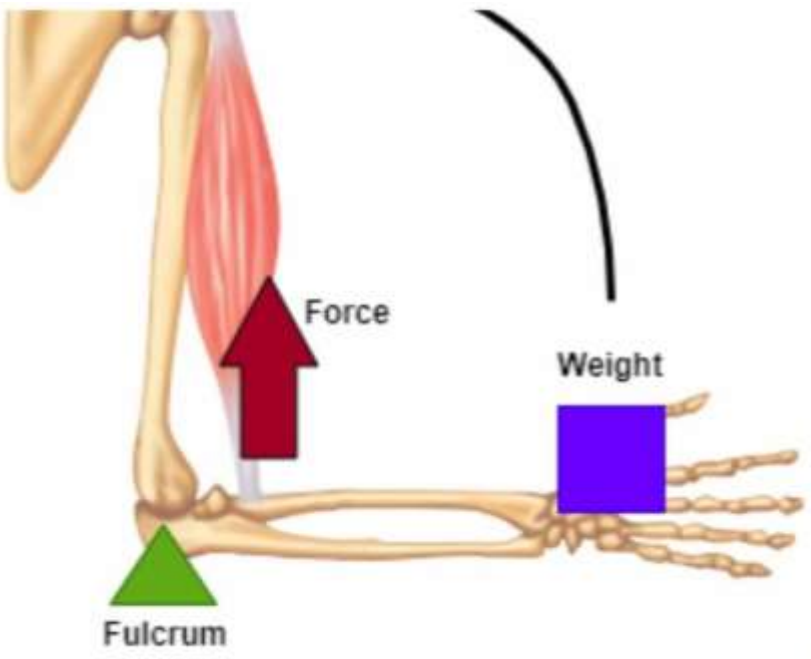
Dynamics: the study of conditions under which an object moves (kinematics and kinetics).

PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

mechanical forces:-

However, most of these simple machines in the musculoskeletal system, are designed to *amplify motion rather than force*.



PHYSIOTHERAPY EQUIPMENTS

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In designing devices and equipment (supportive and adaptive) there is a need to consider:

- The biomechanical concept of force.
- The Friction.
- The machines for the device *to aid or improve* human motion.

PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

mechanical forces:-

- Traction tables.
- Compression pumps.


Thank you!

PHYSIOTHERAPY EQUIPMENTS

Second year – Lecture 6

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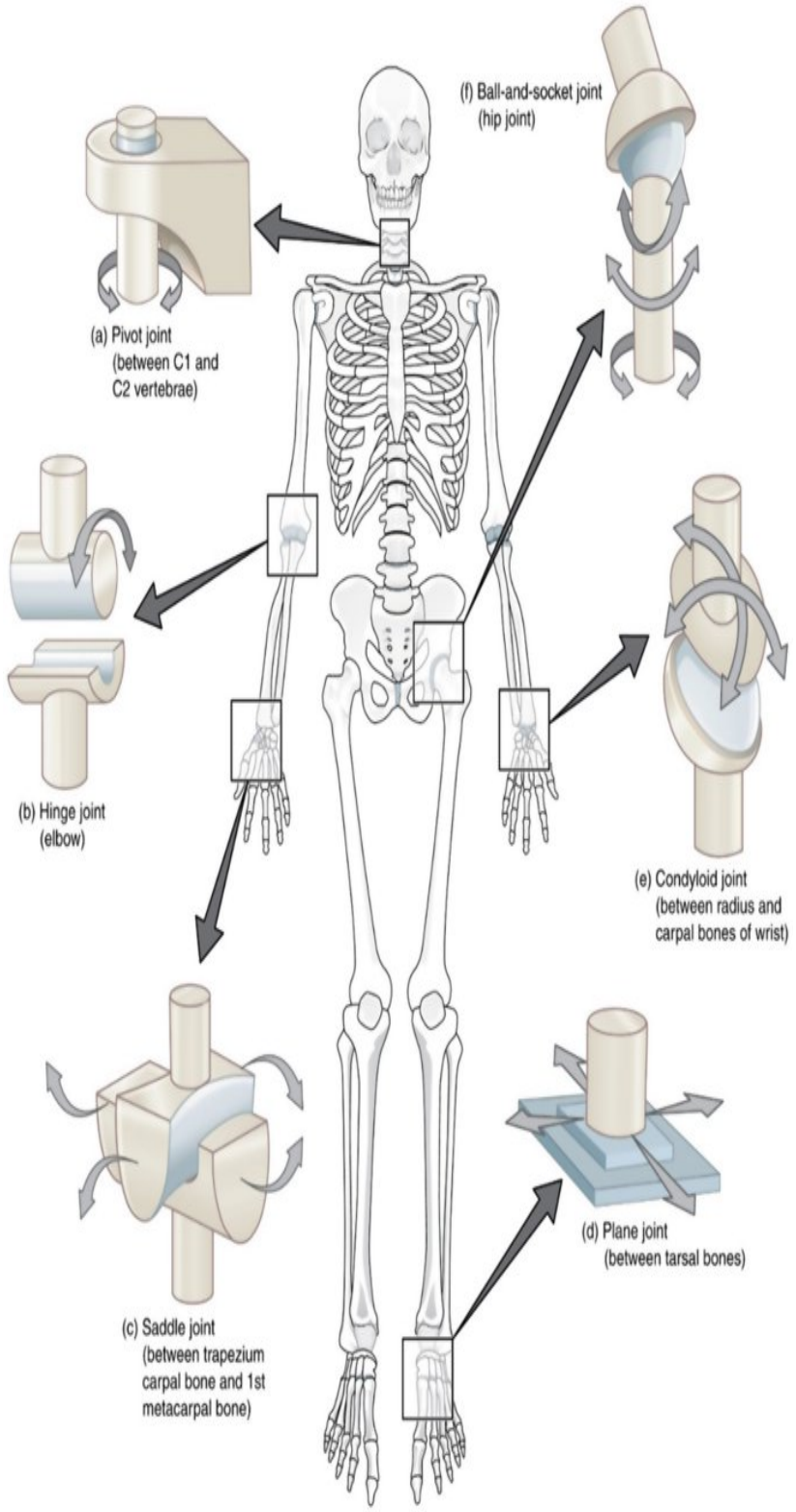

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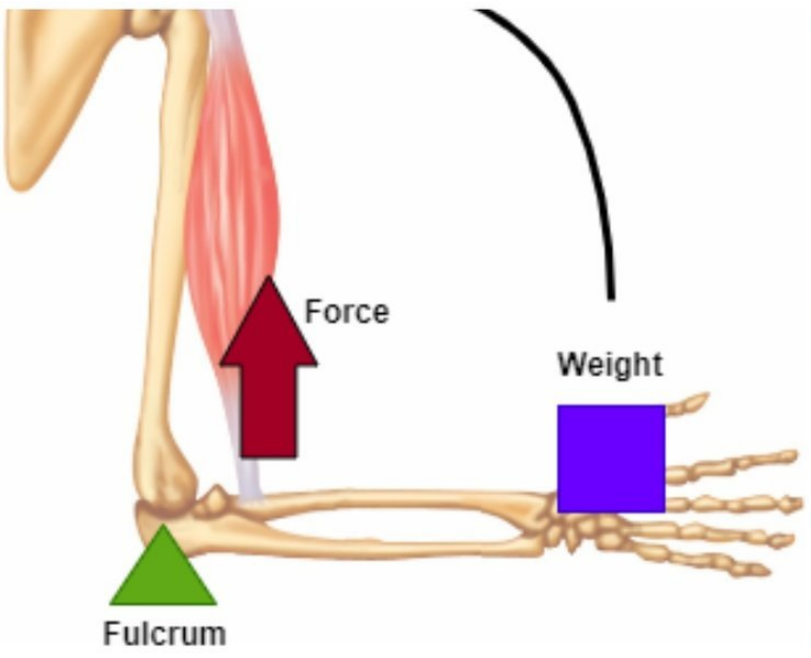

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PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

mechanical forces:-

- Traction tables.
- Compression pumps.


Thank you!

PHYSIOTHERAPY EQUIPMENTS

Second year

PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

1. heat (superficial and deep)
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PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

mechanical forces:-

- Traction tables.

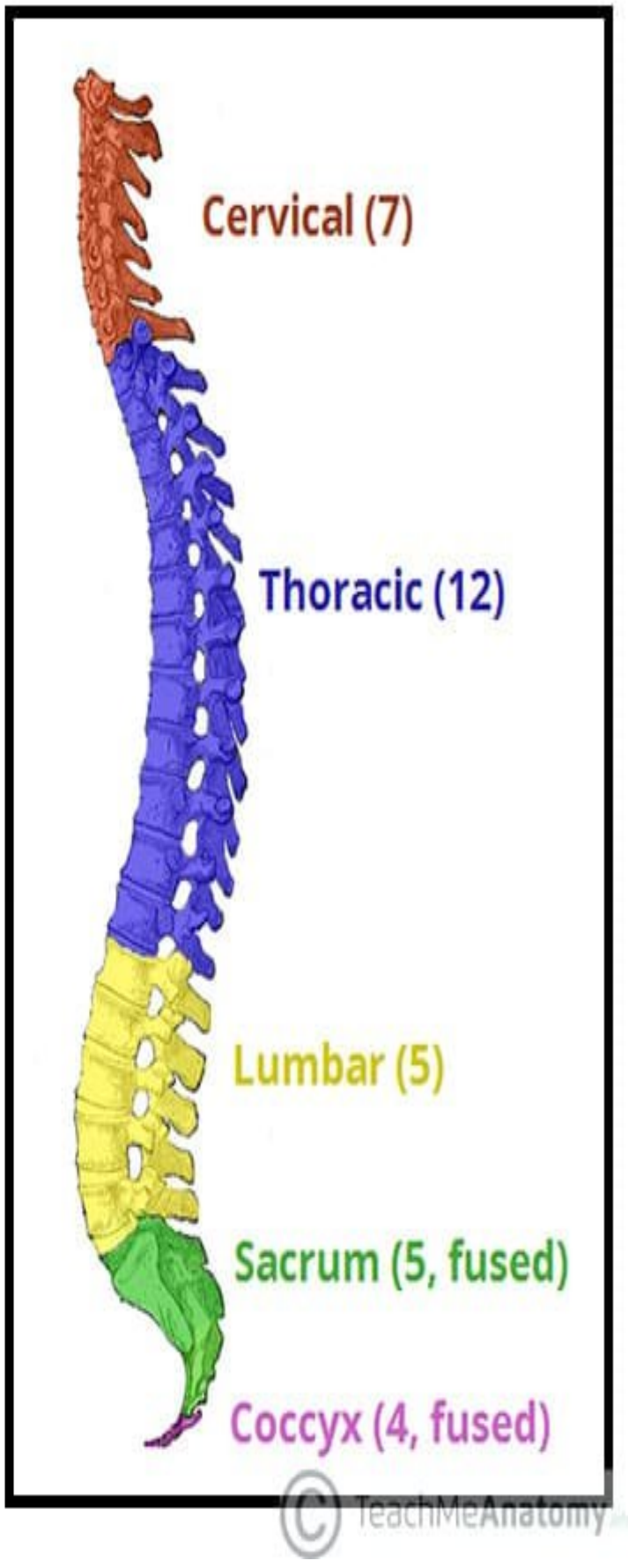
- Compression pumps.

PHYSIOTHERAPY EQUIPMENTS

Mechanical Forces:-

traction principles:

- The vertebrae and accompanying intervertebral discs are the basic skeletal components that make up the back.
- Intervertebral discs maintain the spaces between the vertebrae.
- These discs act like shock absorbers throughout the spinal column to cushion the bones as the body moves.
- Ligaments hold the vertebrae in place, and tendons attach the muscles to the spinal column.



PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

mechanical forces:-

traction tables

These vertebrae carry all of the upper body's weight while providing flexibility and movement to the trunk region.

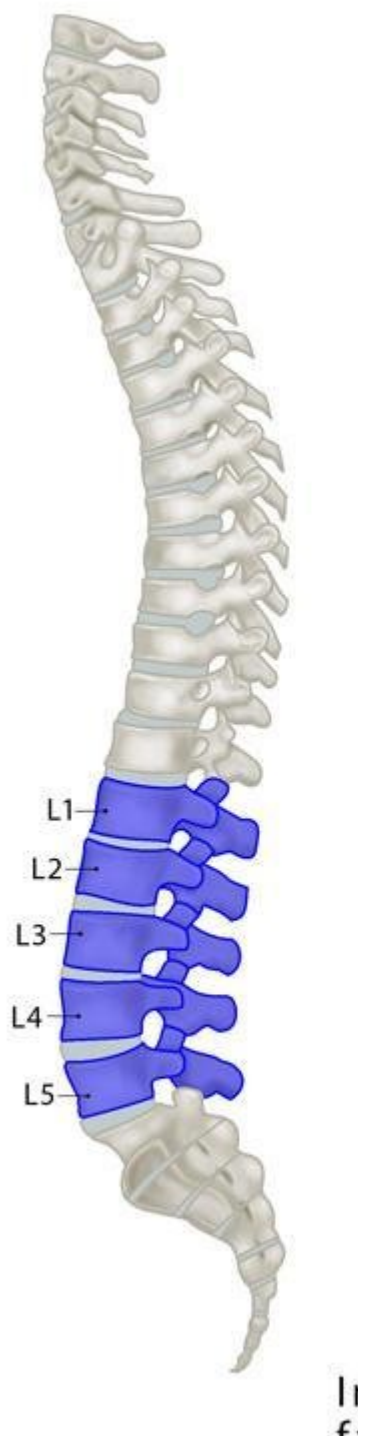
They also protect the delicate spinal cord and nerves within their vertebral canal.

PHYSIOTHERAPY EQUIPMENTS

mechanical forces:-

Traction tables: -

The lumbar vertebrae found along the body's midline in the lumbar (lower back) region.



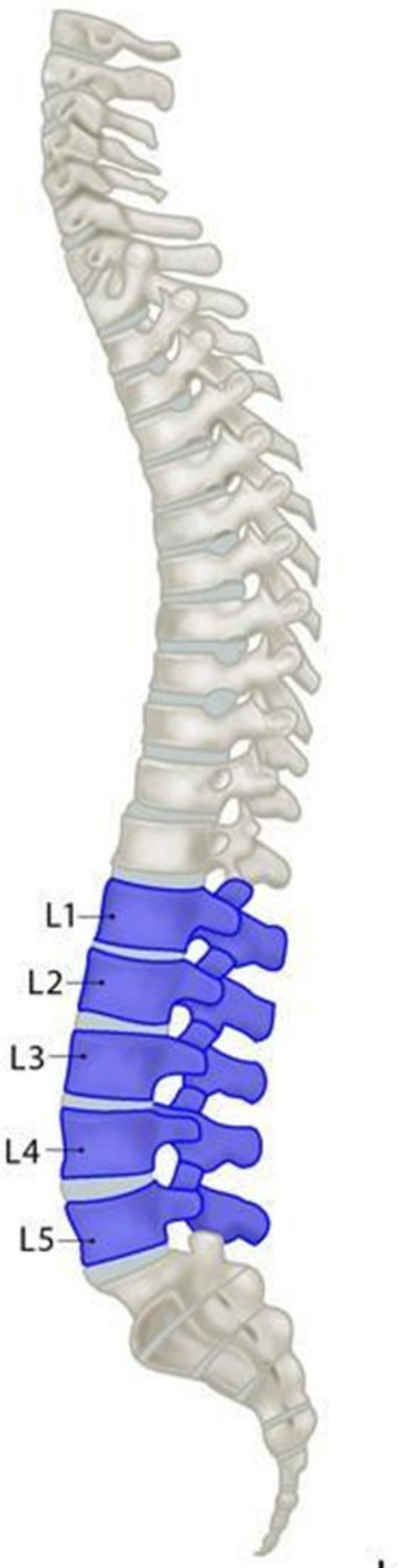
The ***lumbar vertebrae*** make up the region of the spine inferior to the thoracic vertebrae in the thorax and superior to the sacrum and coccyx in the pelvis.

PHYSIOTHERAPY EQUIPMENTS

mechanical forces:-

Traction tables: -

The lumbar spine is made up of five individual vertebrae which are *numbered L1 to L5* and together they create the *concave lumbar curvature* in the lower back.

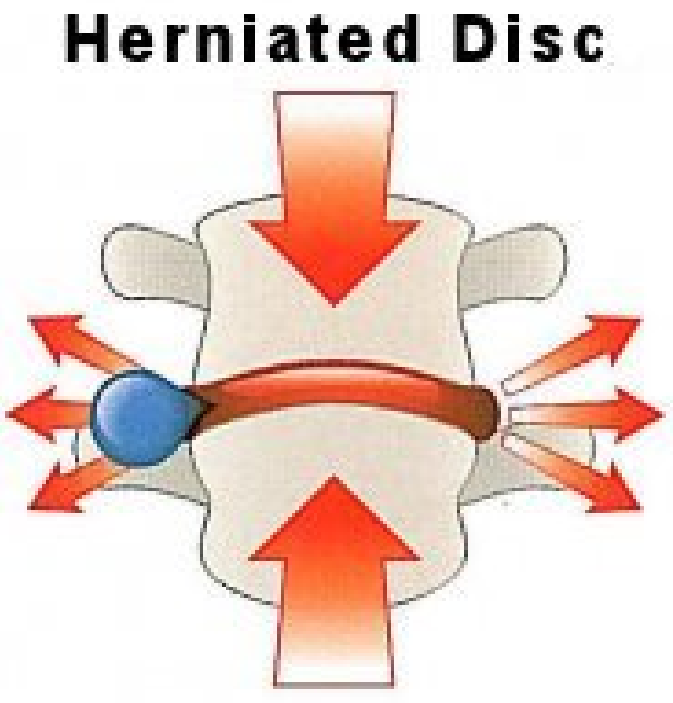


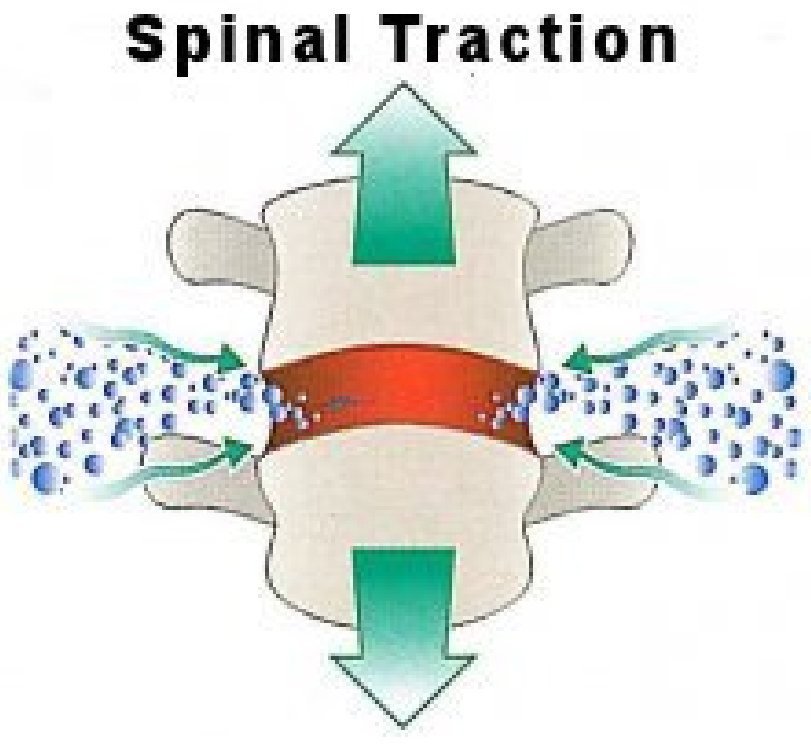
PHYSIOTHERAPY EQUIPMENTS

mechanical forces:-

Traction tables: -

Lumbar traction is the process of applying a stretching force to the lumbar vertebrae through body weight, weights, and/or pulleys to distract individual joints of the lumbar spine.





PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

mechanical forces:-

Several types of lumbar traction are described in literature but the most used include:

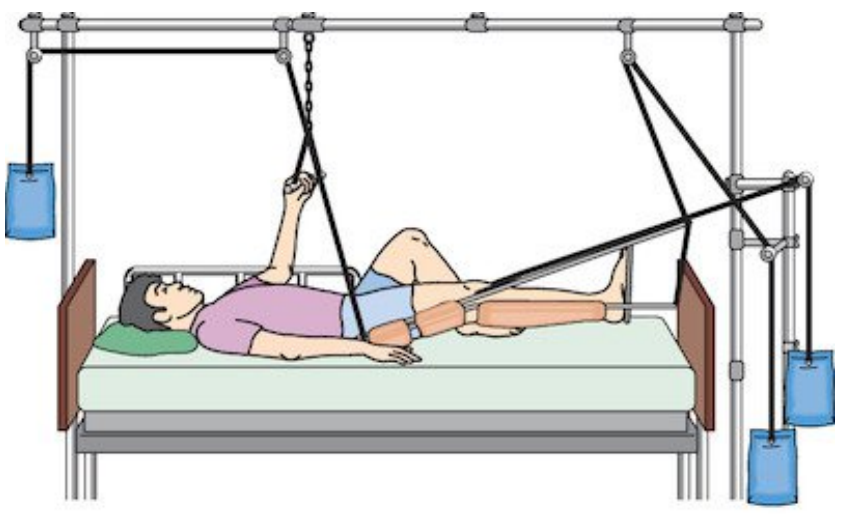
1. Continuous Traction.
2. Sustained Traction.
3. Intermittent Mechanical Traction.
4. Manual Traction.
5. Autotraction.
6. Positional Traction .
7. Gravity lumbar traction .

PHYSIOTHERAPY EQUIPMENTS

Mechanical Forces:-

Lumbar traction :

1. ***Continuous Traction -*** Continuous or bed traction uses low weights for ***extended periods*** of time (up to several hours at a time).
2. ***Sustained Traction (static traction) -*** This type of traction involves heavier weights applied steadily for *short periods* of time (***periods from a few minutes up to 1 hour).***



PHYSIOTHERAPY EQUIPMENTS

Mechanical Forces:-

Lumbar traction :

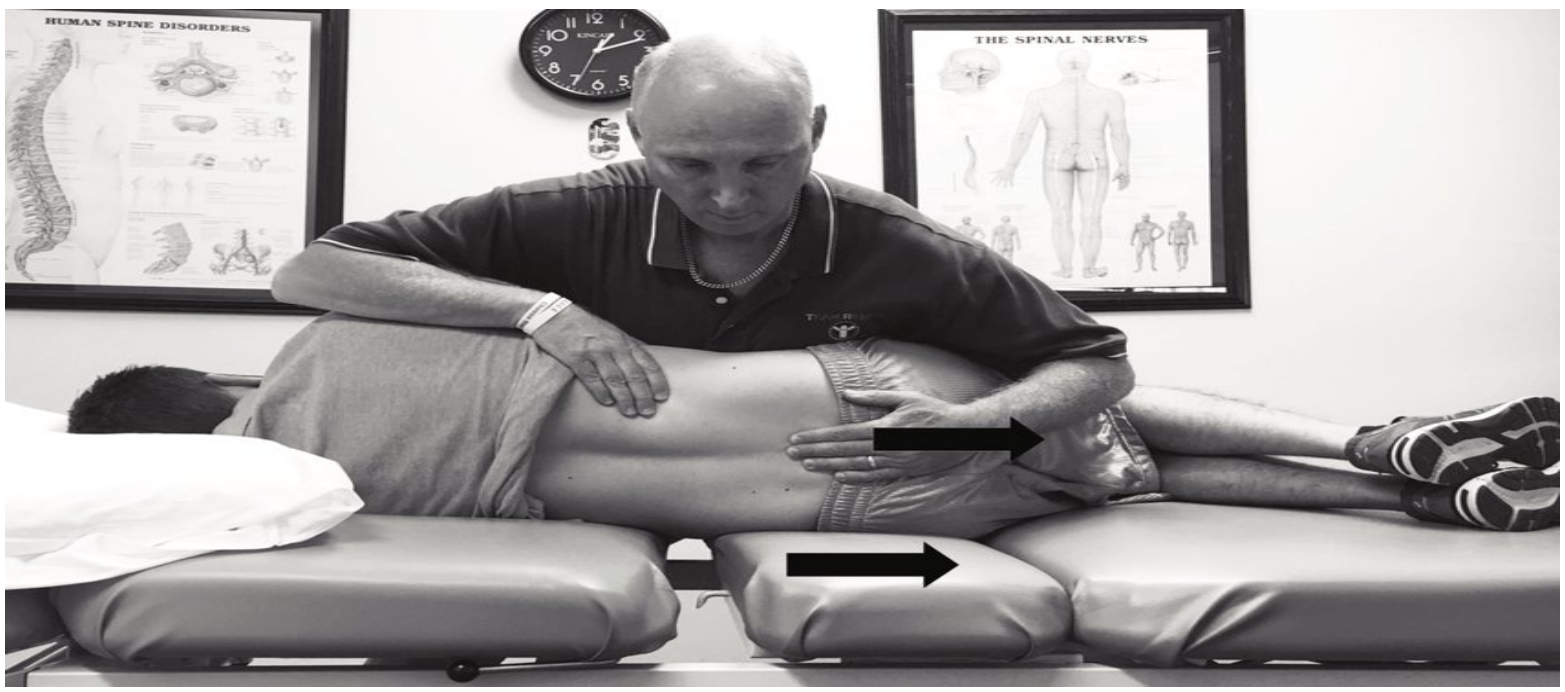
1. ***Continuous Traction –***
2. ***Sustained Traction –***
3. ***Intermittent Mechanical Traction -*** Intermittent traction is similar to sustained traction in intensity and duration but utilises a mechanical unit to alternately apply and release the traction force at preset intervals.

PHYSIOTHERAPY EQUIPMENTS

Mechanical Forces:-

Lumbar traction :

1. ***Continuous Traction.***
2. ***Sustained Traction.***
3. ***Intermittent Mechanical Traction.***
4. ***Manual Traction -*** Manual traction is applied as the clinician's hands and/or a belt are used to pull on the patient's legs. It is usually applied for a few seconds duration or can be applied as a sudden, quick thrust.



PHYSIOTHERAPY EQUIPMENTS

Mechanical Forces:-

Lumbar traction :

1. ***Continuous Traction.***
2. ***Sustained Traction.***
3. ***Intermittent Mechanical Traction.***
4. ***Manual Traction.***
5. ***Autotraction –***

utilises a specially designed table that is divided into two sections that can be individually tilted and rotated.

The patient provides the traction force by pulling with the arms and/or pushing with the feet.

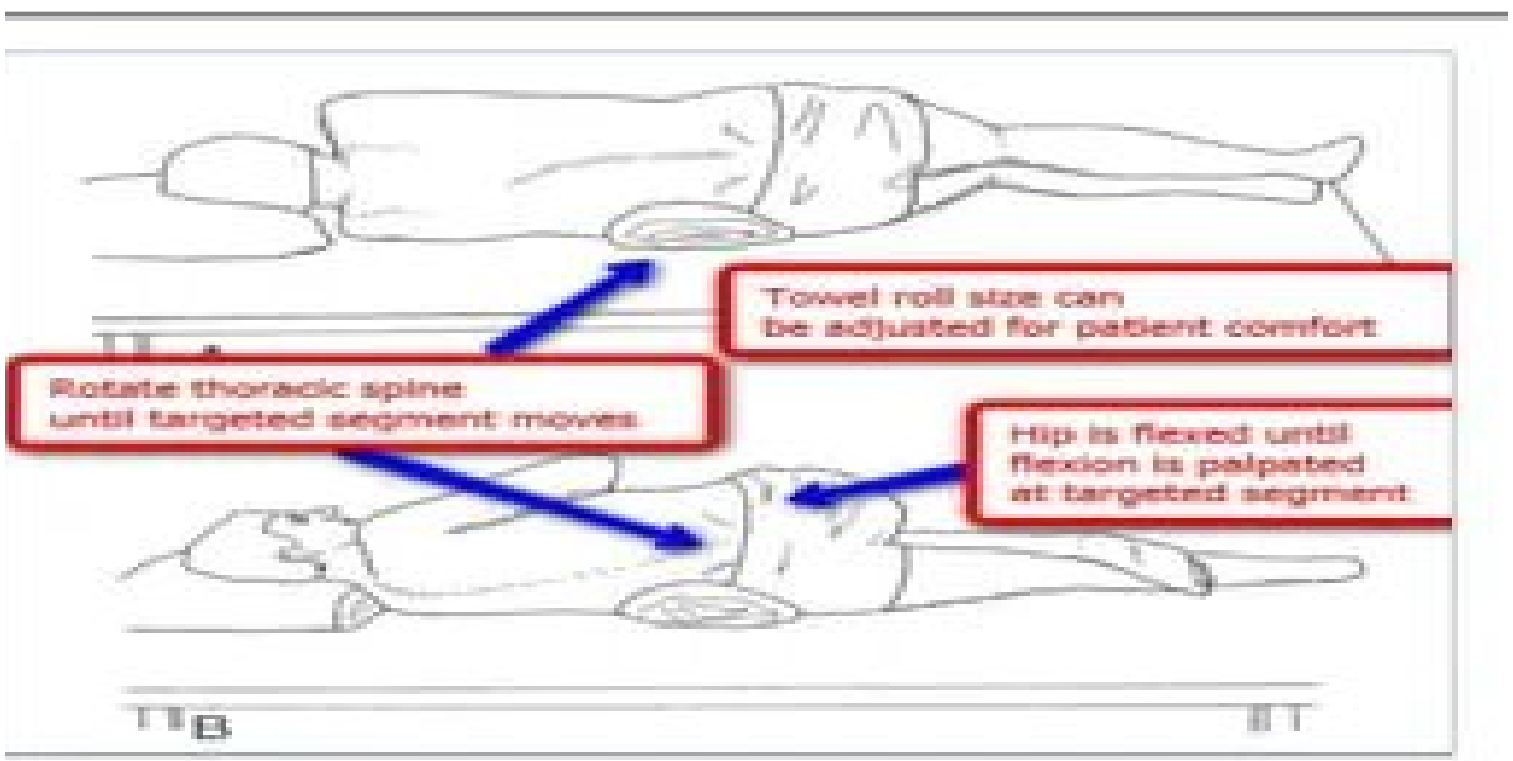
PHYSIOTHERAPY EQUIPMENTS

Mechanical Forces:-

Lumbar traction :

1. **Continuous Traction –**
2. **Sustained Traction –**
3. **Intermittent Mechanical Traction -**.
4. **Manual Traction –**
5. **Autotraction –**
6. **Positional Traction –**

By placing the patient in various positions using pillows, blocks, or sandbags to effect a longitudinal pull on the spinal structures. It usually incorporates lateral bending and ***is only affected to one side*** of the spinal segment.



PHYSIOTHERAPY EQUIPMENTS

Mechanical Forces:-

Lumbar traction :

1. **Continuous Traction.**
2. **Sustained Traction.**
3. **Intermittent Mechanical Traction.**
4. **Manual Traction.**
5. **Autotraction.**
6. **Positional Traction.**
7. **Gravity lumbar traction -** This involves using a chest harness to secure the patient as the treatment table is ***tilted to a vertical position***, thereby using the weight of the lower half of the body to provide a traction force.

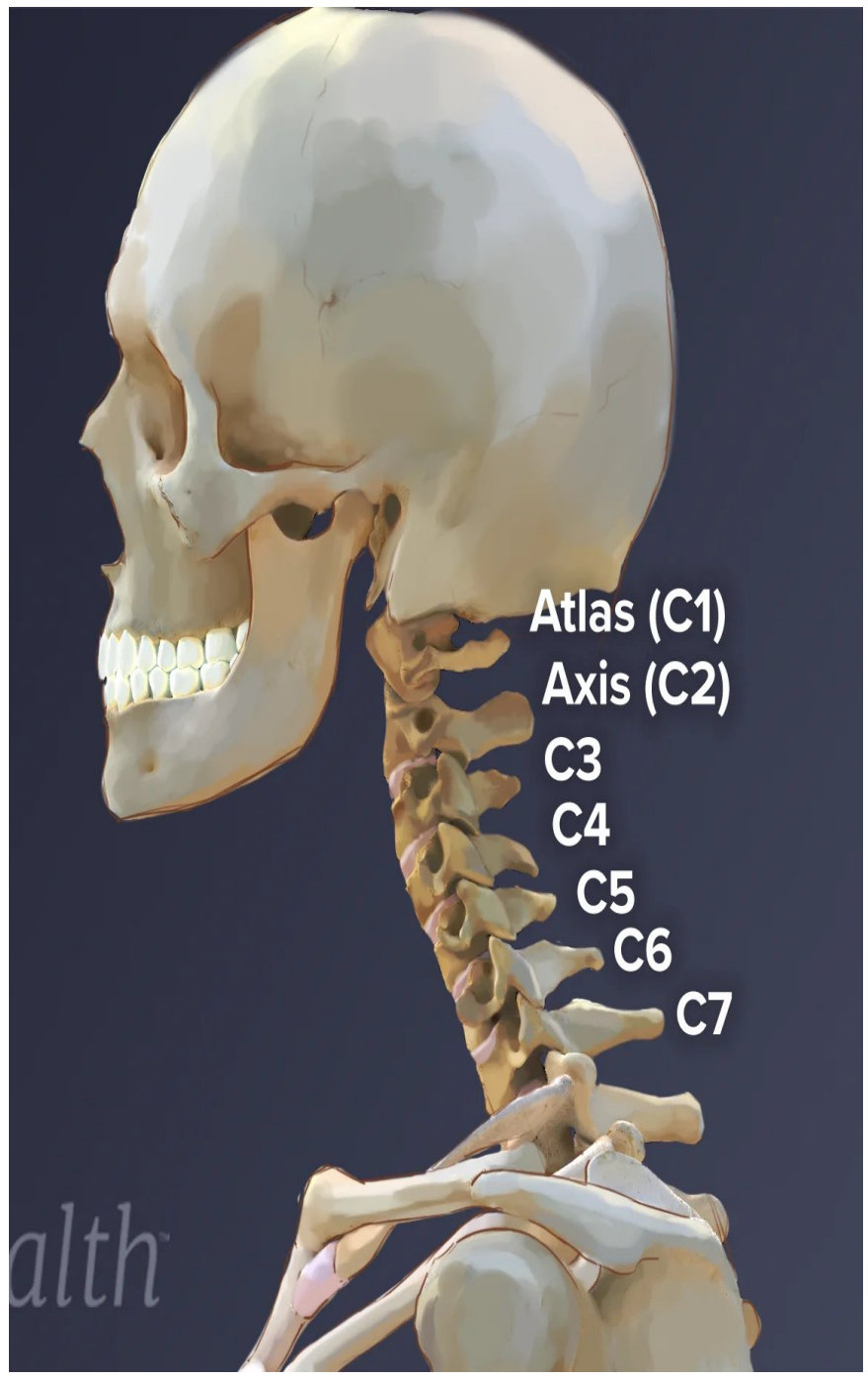
PHYSIOTHERAPY EQUIPMENTS

mechanical forces:-

Cervical Traction: -

The cervical spine ***supports*** the weight of the head and enables head and neck movement.

The cervical spine is ***subjected to a range of extrinsic factors*** such as repetitive movements, whole-body vibrations and static load.



PHYSIOTHERAPY EQUIPMENTS

mechanical forces:-

Cervical Traction: -

Traction is frequently used with the intent of symptom centralization particularly in radicular pain.

PHYSIOTHERAPY EQUIPMENTS

Mechanical Forces:-

Intermittent pneumatic compression (IPC)

- Veins are the blood vessels that bring oxygen-poor blood and waste products back to the heart.
- Arteries are the blood vessels that bring oxygen-rich blood and nutrients from the heart to the body.
- Deep vein thrombosis (DVT) is a blood clot that forms in a vein deep inside the body.
- In most cases, this clot forms inside one of the deep veins of the thigh or lower leg.

PHYSIOTHERAPY EQUIPMENTS

physical modalities including:

mechanical forces:-

Intermittent pneumatic compression (IPC) devices are used to help prevent blood clots in the deep veins of the legs.

The devices use *cuffs around the legs* that fill with air and *squeeze* your legs.

This *increases* blood flow through the veins of your legs and helps *prevent blood clots*.


Thank you!