INFRARED Therapy

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Objectives

Following completion of this lecture the student must be able to;

Understand how the infrared radiation is classified in the electromagnetic spectrum.

Describe the physiological effect of infrared radiation.

Describe the indications and contraindications of infrared radiation.

Explain how the therapist can use the infrared radiation.

Outlines

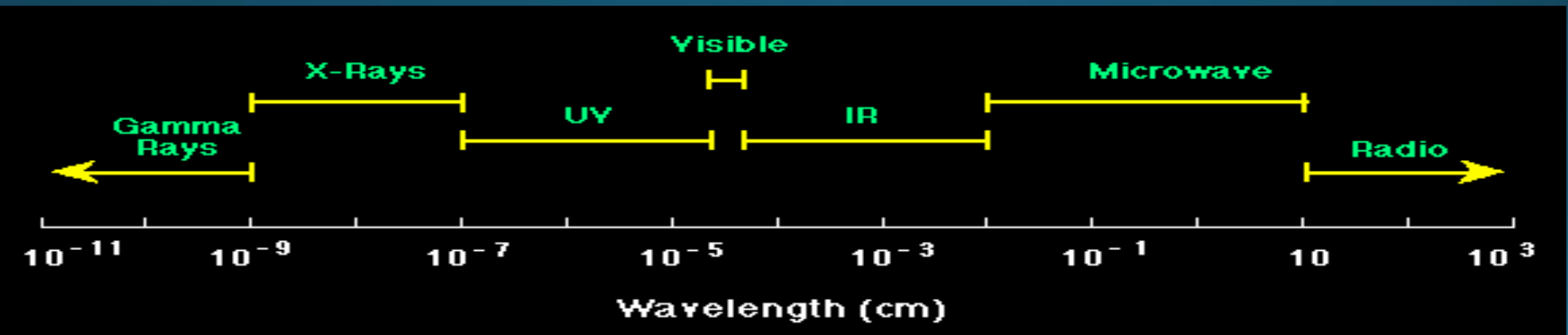
- Definition and classification (types).
- Sources and production.
- Physiological and therapeutic effects.
- Indications and contraindications.
- Dangers/Precautions
- Practical and clinical application

What is Infrared ?

Infrared radiations are part of an electromagnetic spectrum, with wavelength of 750nm-1mm, and frequency of $4x10^{14}$ and $7.4x\ 10^{11}$, and located between microwave and visible light.

Infrared is superficial Heating modality (penetration depth 1- 10mm).

Infrared is radiant heat transmits energy by radiation.



Source and types

- Sources of IR
  - Artificial
    - Luminous
    - Non-luminous
  - Natural
    - Sun (IR=60%)
      - Near IRR
      - Far IRR

I-Classification IR

	Near (short)=750-1500nm	Far (long)=1500-15000nm
Types	IRA=750-1400nm	IRB=1400-3000, IRC=3000nm-1m
Source	Luminous heated body -Incandescent bodies -Sun -Tungsten	Non-luminous Heated bodies -Hot pack -Electrical heating pads
Penetration	Deeper; penetrates to epidermis , dermis & subcutaneous (5-10mm)	Superficial; penetrates to the epidermis ≤5mm
Absorption	Deep	Superficial

Luminous versus non-luminous IR

	Luminous	Non-luminous
Sources &types	Electrically heated filament ·Quartz lamp, ·Tungsten lamp, ·Carbon filament lamp	Electrically heated resistance wire coiled. It takes about 5-15 minutes to be heated and emit their maximum intensity, e.g. Hot pack
wavelength	350-4000nm (maximum 1000nm)	1500-12000nm (maximum 4000nm)
Emission	70% near IRR, 24% far IRR, 5% visible light, & 1% UV	90 % far IRR, and 10% near IRR.
Penetration	Epidermis, dermis & subcutaneous tissue (5-10mm)	Epidermis & superficial dermis (2mm)
Uses	Chronic inflammation	Acute conditions.
Physiological effect	Pain reduction via counter-irritant effect	Pain reduction via sedative effect
Treatment time	15-20minutes	20-30minutes (Why)
Distance	40-60cm from treated area	75-90cm from treated area

Factors Regulating Absorption & Penetration of IR

- Infrared radiations striking the surface of the skin will be reflected, scattered, refracted, penetrate and absorbed in the tissues. The depth of penetration and absorption of IR depends on;

1-frequency of radiation

2-Thermal conductivity of the tissue

3-Thickness of tissue.

4-Cosine law.

5-Arndt-Schultsz principle

6-Grotthous Draper law

7-Inverse square law

8-Vascularity of tissues

9-Types of the skin

Physiological Effects of IRR

INCREASE

- Local temperature superficially
- Local metabolism
- Capillary permeability and blood flow
- Lymphatic and venous drainage
- Vasodilatation of arterioles and capillaries
- Leukocytes& phagocytes activity
- Axon reflex activity
- Stimulation of sensory nerve

Vasodilatation starts after 1–2 minutes and lasts for 30 minutes.

Erythema: is of irregular patchy red appearance of skin (lasts for about 30 minutes) after IR application.

Therapeutic Effects and Indications

1-Relief of pain & muscle spasm.

- Mild heating has a 'sedatory' effect on sensory nerves endings used for the relief of acute pain.

- Strong heating has a 'counter irritant' effect on sensory nerves endings and used for the relief of chronic pain.

2-Prior to other Treatments: (e.g. stretching, mobilization, traction, massage, exercise therapy, electrical stimulation, and biofeedback**).**

3-Increased blood flow and circulation (e.g. reduce chronic edema)

5-Muscles relaxation

6-Increase healing of tissue (no more recommended)

Contraindications and Precautions of IR

- Acute inflammatory conditions
- Impaired cutaneous thermal sensation and circulation
- Peripheral vascular disease
- Markedly loss of consciousness.
- Acute skin disease, e.g., dermatitis or eczema
- Deep X-ray therapy
- Defective blood pressure regulation
- Acute febrile illness (Fever)
- Tumors of the skin
- Hemophilia.

- Unreliable and elderly patients.
- Never apply heat directly to eyes or the genitals.
- Never heat the abdomen during pregnancy (first and last trimester)

Dangers side effects of IR

Burn

- Intensity of radiation is so high
- Loss of sensation,
- Reduce consciousness
- Unreliable patients
- Accidentally touch of hot element
- Metal & Inflammable materials in treated area,

Dehydration
Lowering blood pressure &fainting
Damage to the eyes
Electrical shock

These dangers can be avoided by:

- Follow application principle
- Adequate warnings to the patient
- Checking the skin several times

Advantages vs. disadvantage

Advantages

- Can be used to treat large area, with local effect
- Easy of application (Patients can apply at home)
- Inexpensive

Disadvantages

- Heating only superficial tissue, therefore limited in use.
- Not effective as hot packs and paraffin wax
- Equipment is often unstable.

Practical and clinical application