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 (IR) radiation

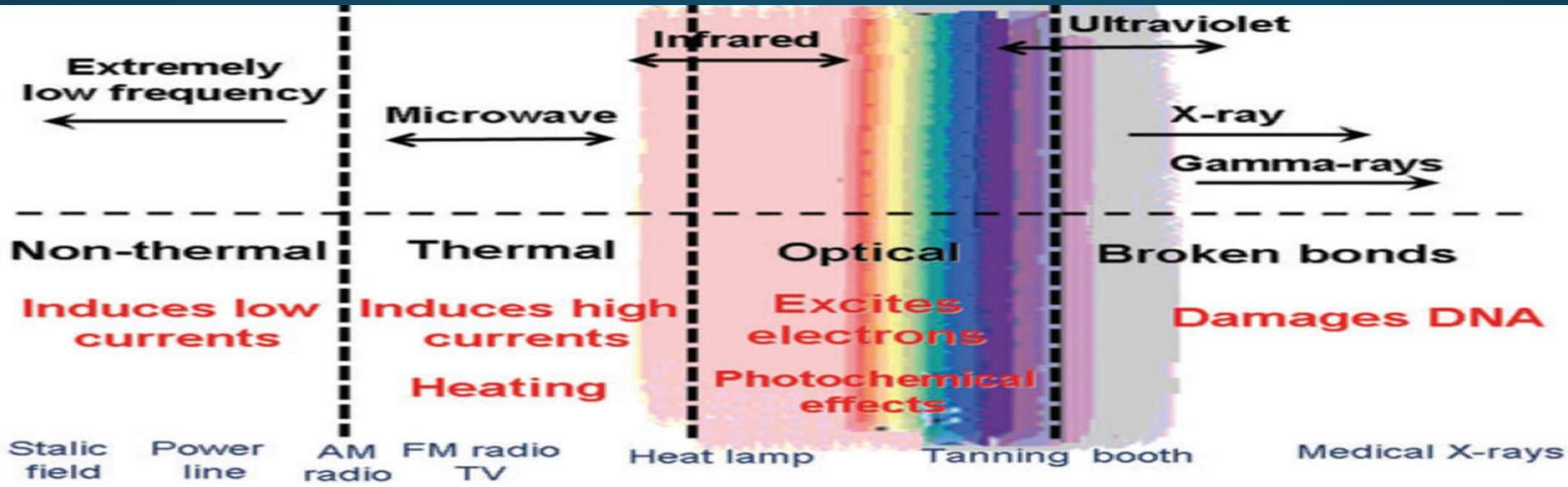
Infrared radiations (IR) are

Electromagnetic radiation with Wavelength of 750nm-1mm, and frequency of $4x10^{14}$ and $7.4x\ 10^{11}$,

-Lies between microwave and visible light in EM spectrum.

IR is superficial Heating modality (penetration depth < 2cm)

IR transfers energy by radiation.



Source and production of IR

Sources of IR

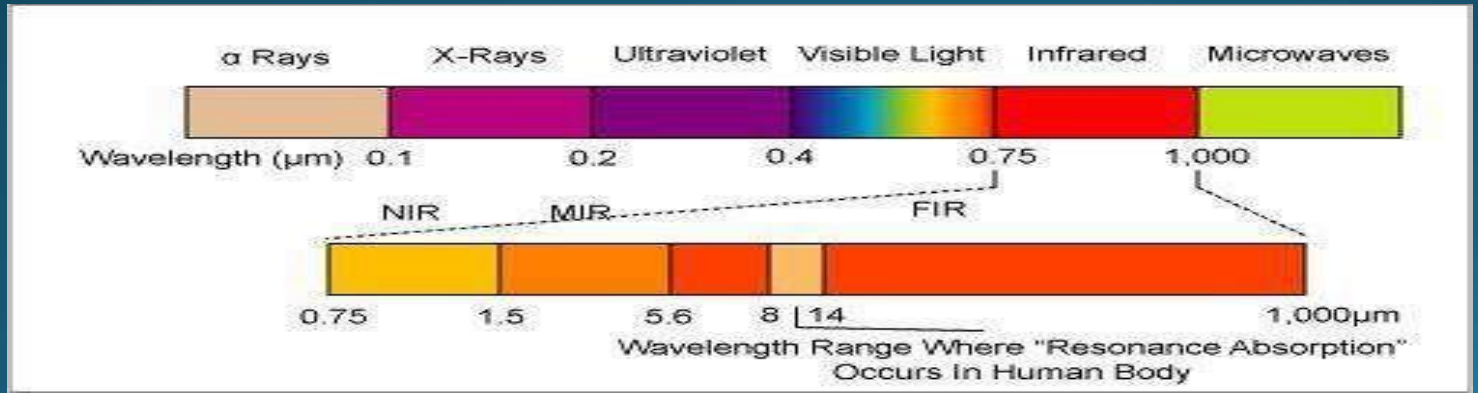
- Artificial
  - Luminous

  - Non-luminous

- Natural
  - Sun (IR=60%)
    - Near IR (NIR)
    - Far IR (FIR)

I-Classification IR

	Near (short) IR	Far (long) FIR
Wavelength	IRA/750-1400nm	IRB=1400-3000, IRC=3000nm-1mm
Source	Luminous heated body -Incandescent bodies -Tungsten	Non-luminous Heated bodies -Hot pack -Electrical heating pads
Penetration	Penetrates to epidermis , dermis & subcutaneous (5-10mm)	Penetrates to the epidermis ≤5mm
Absorption	Deep relative to Far IR	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. electrical 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

Luminous versus non-luminous IR

https://youtu.be/lvRsU-X6_3w

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 /wavelength /intensity of radiation

2-Thermal conductivity of the tissue

3-Thickness of tissue.

4-Cosine law.

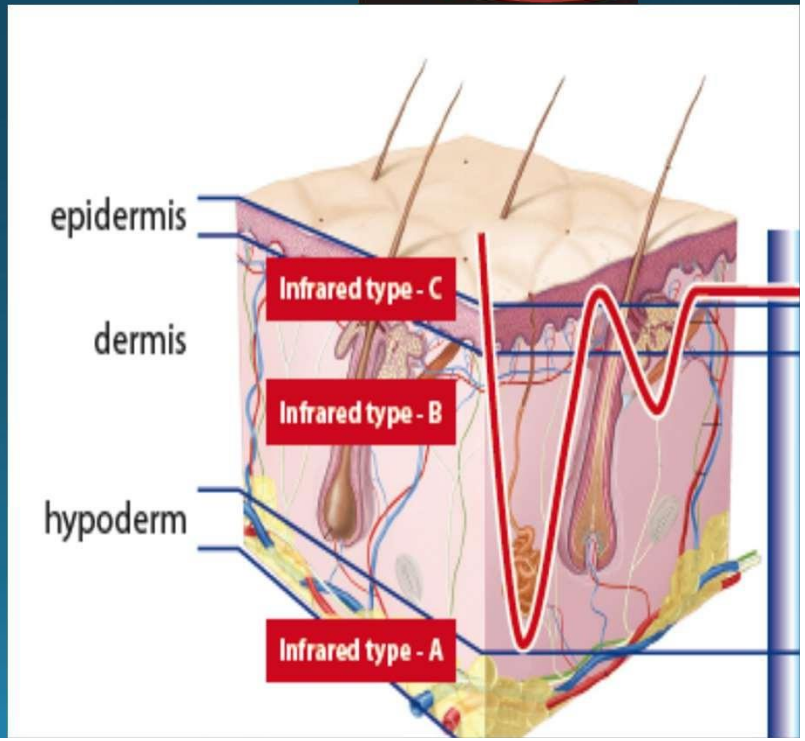
5-Arndt-Schultsz principle

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
- Cutaneous vasodilatation
- Increase blood flow

DECREASE

- Decrease pain perception

Vasodilatation

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

Erythema:

is 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, 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

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

- 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

Tips for Clinical application	Select equipments	Luminous/non-luminous
		IR Google /towels
	condition	Acute 10-15minutes 3time/weeks
		Chronic 20-30minutes,3time/ weeks
	Patients	Indication/Contraindication Positioning /sensation instructions and warnings
	Lamp positioning	50-90cm
	Dosage?	
	Follow-up	

Assignment 1

Please check the attached papers

Student will grouped into 3 group (3 in each)

Open discussion in the next class (20minutes) ,the discussion should cover the following

Documentation including the following

1. Medical conditions (definitions/stages)
2. Area of Body affected and Tissue affected
3. Types of Infrared
4. Treatment parameters including

- Temperature or power of agent (IR)
- Distance of (IR) form patients
- Patient position
- Treatment duration/ frequency
- Response to intervention