

Application of IR light in medicine

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1. Introduction

Infrared light (IR) - type of spectroscopy.

The most widely used technique is IR is the IR absorption spectroscopy used for obtaining oscillatory spectra (though observes far infrared also rotational transitions).

Using IR spectroscopy can determine what groups functional ones are present in the analyzed relationship.

Infrared spectroscopy allows for analysis of both the structure of molecules and their interactions with the environment. This is one of the basic methods used in the study of hydrogen bonds.

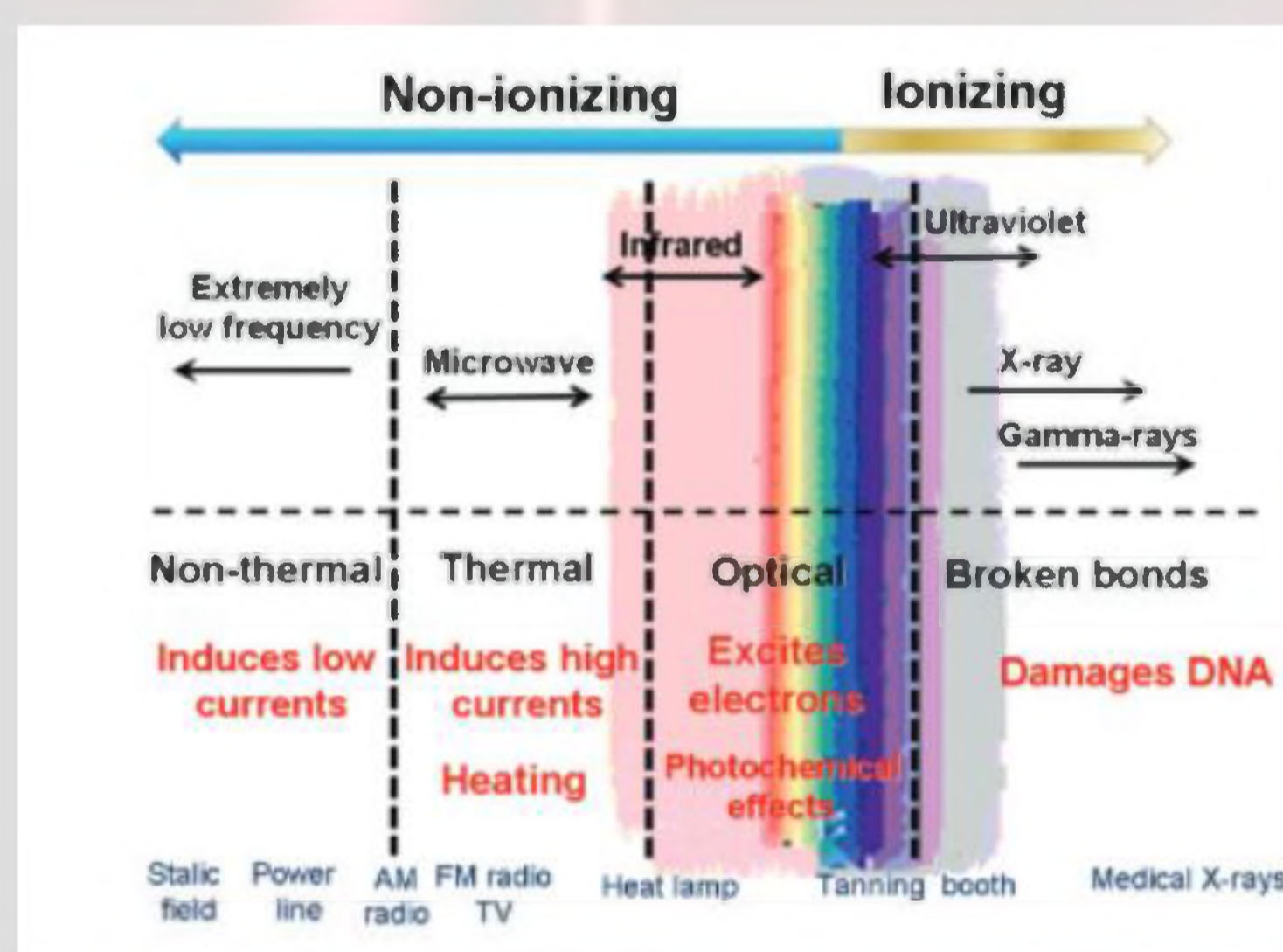
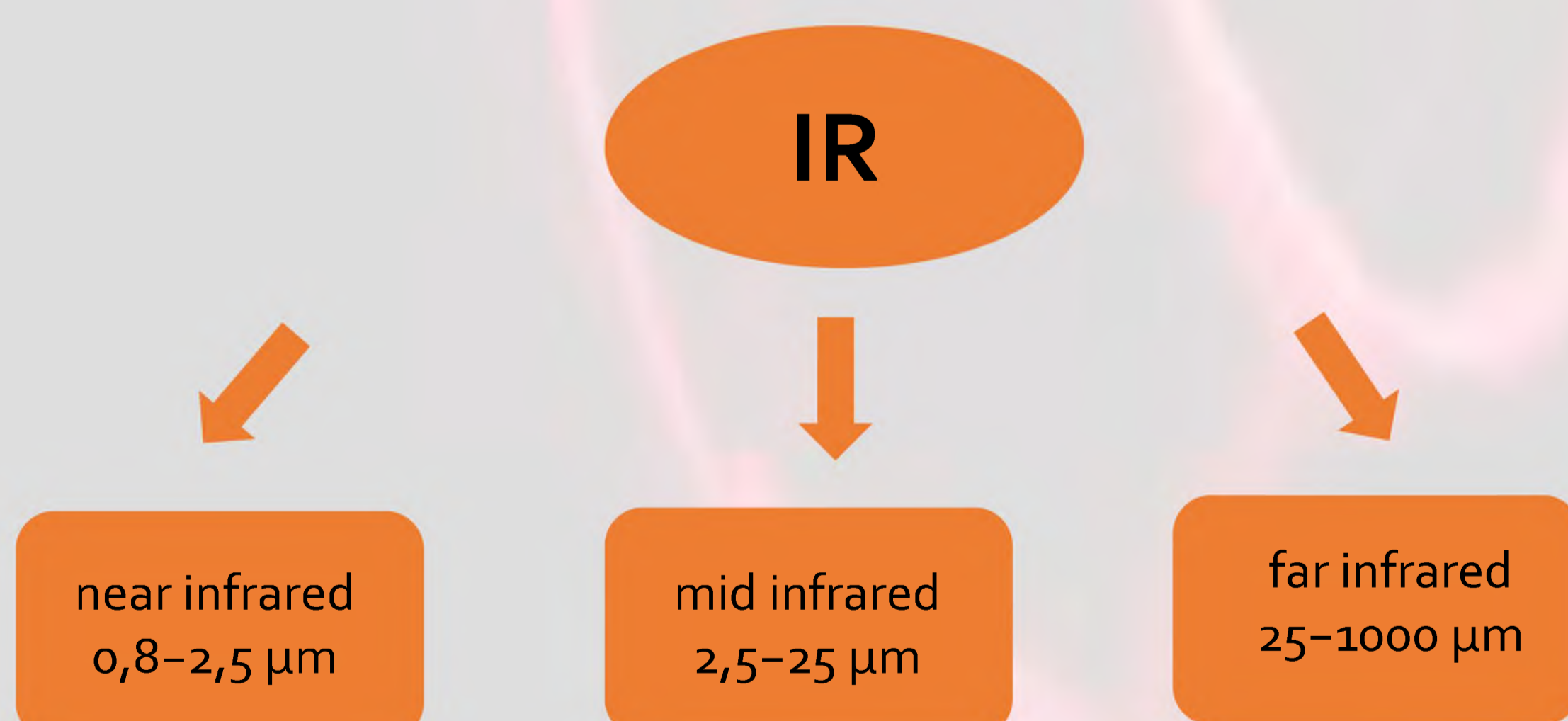


Figure 1. The spectrum of electromagnetic radiation and some biological changes it may induce.

Specialty lamps and saunas, delivering pure FIR radiation (eliminating completely the near and mid infrared bands), have become safe, effective, and widely used sources to generate therapeutic effects. Fibers impregnated with FIR emitting ceramic nanoparticles and woven into fabrics, are being used as garments and wraps to generate FIR radiation, and attain health benefits from its effects.

Infrared radiation is a subdivision of the electromagnetic spectrum that has been investigated for a medical purposes. We can distinguish some divisions of the IR:



Sources of IR:

- heated saunas - in these cabins, the heating elements are typically heated to about 300 – 400 °C and the emission is in the FIR range, that is, the heat exchange between the body and the environment is almost purely radiative (radiant heating) with cabin air temperature being at around 40 °C or less. Heating of the skin with FIR warming cabins is faster (in comparison with the conventional saunas) but higher irradiance of the skin must be applied in order to produce noticeable sweating.

- heat lamps,
- garments made up of filaments impregnated with FIR emitting nanoparticles,
- sollux lamps

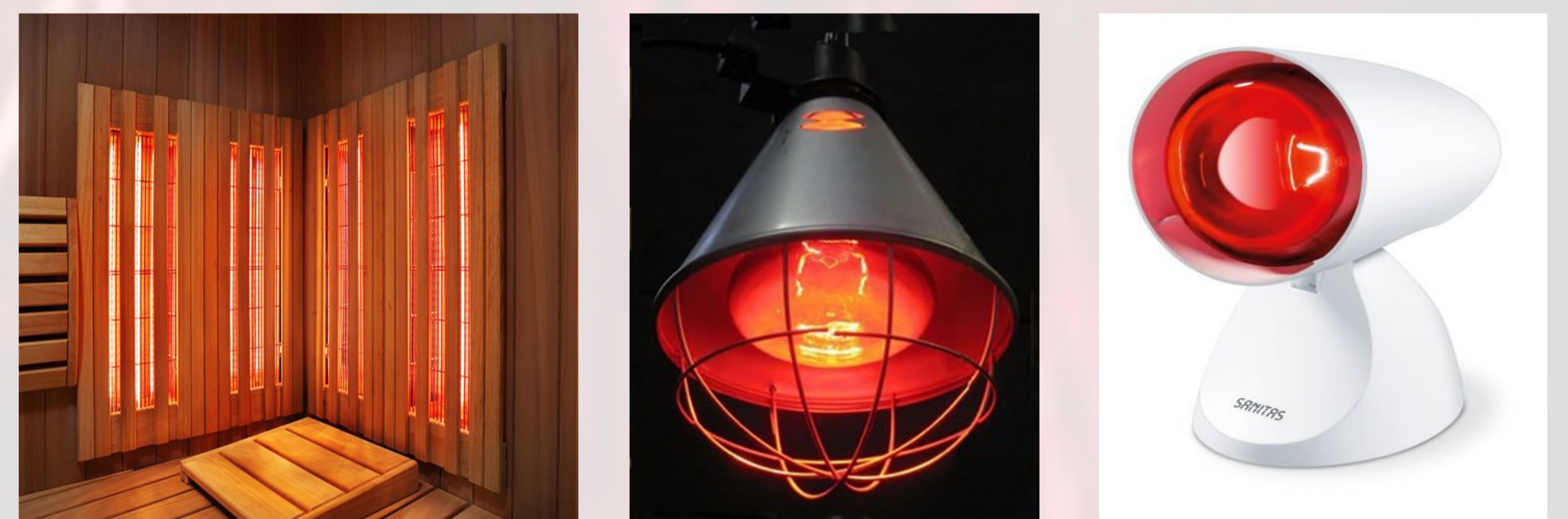


Figure 2. Source of IR

2. Therapeutical effect

- Local hyperemia and the positive heating impact which reduces muscle tension,
- Due to increase of endorphin secretion lowers pain perception,
- Interacts immunological reactions,
- Acceleration of metabolism,
- Regulates activity of autonomic nervous system in the aspect of controlling muscle tension

Changes in the cellular level are based on interactions with water molecules.

3. Interesting part of IR

Biogenetic radiation: mechanism of action is related with pure heating effect by stimulation of thermoreceptors. That allows to penetrate up to 4 cm beneath the skin. It's used in therapy of such diseases as protect heart failure or peripheral arterial diseases

4. Conclusion

If it can be proved that non-heating FIR has real and significant biological effects, then the possible future applications are wide ranging. Not only could bandages and dressings made out of NIR emitting fabrics be applied for many medical conditions and injuries that require healing, but there is a large potential market in lifestyle enhancing applications. Garments may be manufactured for performance enhancing apparel in both leisure activities and competitive sports areas. Cold weather apparel would perform better by incorporating FIR emitting capability and sleeping environments could be improved by mattresses and bedding emitting FIR.