

Thermotherapy (Heat Therapy)

Thermotherapy is a method of physical therapy, in which heat is added to or removed from an organism. It is used to alleviate acute or chronic pain, to treat tumors or to strengthen the overall health of the body in general.

Types of thermotherapy

Heat can be supplied to the body (positive thermotherapy) or removed from the body (negative thermotherapy). The article cryotherapy deals with negative thermotherapy.

According to the method of application

Contact heating

- Contact heating usually supplies heat to the whole body (in the form of baths, saunas or steam) or locally (in the form of wraps or tiles).
- High frequency alternating current can also be used to generate heat^[1] (at least 10 kHz).

Heat is then generated according to Joule's law:

$$Q = RI^2$$

Contactless heating does not require direct contact with the patient's body. Thus, even deeper structures can be targeted. Its specificity may also be an advantage.

- **Condenser field heating:** Heating takes place between two capacitor plates with a high AC voltage. As a result, a high-intensity electric field is formed, that is followed by the dielectric (<https://en.wikipedia.org/wiki/Dielectric>) of the body, which thus alternates its polarity very quickly. This generates heat. The feature of this heating is a relatively high specificity.
- **Induction heating:** The applicator is a coil around the body or part of it, in which electromagnetic induction is induced. The so-called eddy currents are responsible for heating.
- **Microwave heating:** Uses microwave radiation. It can be very specific.
- **Infrared radiation:** Used similarly to microwave radiation.

By Use

Physiotherapeutic and nursing use

- This is the most commonly used method of rehabilitation, effective especially in relieving pain related to muscle tension, cramps, inflammation or swelling.
- Ensuring thermal comfort of the patient is one of the basic anti-shock measures.

Oncological use

- It uses heat with respect to some specific properties of tumor cells. This slows down the growth of the tumor or destroys it.

Physiotherapeutic and nursing use

Temperatures between the isothermal thermal point and the tolerance point are applied. These points differ with respect to the heating media. The isothermal point is between 34–36 °C for water and between 24–29 °C for air. The thermal tolerance point is around 42 °C for water and up to 130 °C for air (in a sauna at zero humidity). Different temperatures are given by different heat exchange rates^[2]. During rehabilitation, contact heating is more frequent, of the contactless heating, condenser field heating and induction heating are most often used.^[3]

Physiological effects of thermotherapy

- It allows to increase the blood flow to the skin by widening the blood vessels, i.e., higher supply of oxygen and nutrients to the tissue.
- Muscles near the body surface relax and become more elastic.
- Joint stiffness decreases.
- Internal pain receptors in heated areas of the body are blocked.
- The postacute healing phase accelerates.
- Inflammation and swelling are reduced.

Principles of using heat in therapy

- It is necessary to acquaint the patient with the treatment. With a longer application, it is necessary to check the patient and find out whether there are any problems with the treatment – for example, ineffective application or unpleasant feelings.

Tools used in therapy

- **Electric cushion** – preheats the bed or warms the patient. As heat-producing electric radiation, the cushion can be potentially dangerous and should not be left on overnight.
- **Thermogel pads** – are basically bags filled with a medium with a high specific capacity. Thanks to it, they can maintain the same temperature for a long time.
- **Thermophore** – is a rubber bag with a stopper filled with water.
- Lamps emitting infrared (solux) or ultraviolet (mountain sun) radiation – during application it is necessary to protect especially the eyes from unwanted radiation.
- **A hairdryer** is used in the treatment of children's sores.

Oncological use

Another usage is in the treatment of infections and tumors by heat. Tumor cells and many bacteria have ineffective mechanisms of resisting the physiological effects of heat and are more prone to heat-induced death than normal cells. These mechanisms have not yet been clearly explained. They are referred to as the primary thermosensitivity of the tumor cell. One of the most modern methods is microwave thermotherapy. Its main advantage is the possibility of outpatient treatment without the need for anesthesia and without bleeding. The effect is best on less blood and oxygen-supplied cells because they slow down the heat distribution back to the body. Under the action of heat, enzymes are gradually degraded, the pH of the cell and the lysis gradually change. Many sublethal doses are preferred to conserve the surrounding tissue. ^[2]

Synergies with radiation therapy are used, which, in turn, is most effective on the well-perfused cells.

Links

Related Articles

- The effect of high temperatures on the organism
- The effect of extreme temperatures on organisms
- Cryotherapy

External Links

- Osacká Petronela: Oxygenoterapia, inhalácie, termoterapia. Multimediálna podpora výučby klinických a zdravotníckych disciplín :: Portál Jesseniovej lekárskej fakulty Univerzity Komenského [online] 4.2.2011, posledná aktualizácia 2.12.2011 [cit. 2011-12-23] Dostupný z <<https://portal.jfmed.uniba.sk/clanky.php?aid=139>>. ISSN 1337-7396 (tel:1337-7396)
- Template:Mefanet
- Thermoterapy (anglická Wikipedie)

References

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- 2.
3. HRAZDIRA, Ivo – MORNSTEIN, Vojtěch. *Lékařská biofyzika a přístrojová technika*. 1. edition. 2001. vol. 396. pp. 312-315. ISBN 80-902896-1-4.

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