

Hyperthermia

There are many studies that support the idea that local and body hyperthermia can be a great complementary therapy to support immune therapy. Preclinical and clinical results show a great anti-tumor response when adding hyperthermia sessions. These studies are revealing a great activation of natural killers, lymphocyte T (T-cells) and dendritic cells that present the tumor antigens to the other immune cells in order to recognize the cancer cells enhance the antigen presentation when the body subjected to heat shock. Therefore, the located heat improves the immune response.

This idea is not new and this mechanism was recognized since Hippocrates times since he discovered that temperature is a natural mechanism to fight many kinds of infections. Nevertheless, thermotherapy or hyperthermia is being considered as another type of cancer therapy in the last few decades. Now the effects of this therapy are being studied carefully as a coadjuvant technique to improve the chemotherapy and radiotherapy results.

The first studies about hyperthermia were focused on the cytotoxic effects of high temperatures which induce directly tumor cells death (apoptosis). But apart from this direct effect, there is an indirect one which it comes to the effect that hyperthermia can carry out on the immune system cells.

How does?

Hyperthermia strengthen the immune system

Moderate hyperthermia between 39-41 ° Celsius has been targeted as an object of study because of its effects on the immune system cells, and concretely on the improvement of the performance of proteins (HSPs, APCs) as mediators to bio-inform immune system cells and activate them to attack tumor cells or pathogenic microorganisms. These types of proteins are being studied in the field of the immunology. Many studies in immunology are designed to define the key role of these proteins regarding cancer cells.

For example, some tests were done in relation to a specific HSP, HSP70 which can inhibit apoptosis mechanism in cancer cells in pancreas, prostate and stomach, and even these proteins can protect tumor cells from the heat shock induces by hyperthermia. So, if we can affect these types of proteins and deactivate them combining immunotherapy with hyperthermia, it would be a great combination to be consider in cancer fighting strategy.

We can use the activity of these proteins as “danger signs” recognized by the immune system cells and therefore generating a proper immune response. Using heat shock or stress we can induce the expression or secretion of these proteins by the stressed tumor cells and then the immune system cells properly activated can recognized these signals and use them as a target to generate an attack.

According to studies conducted by the Biotherapy Institute of Japan in April 2008, there is a significant augmented immunological effect as a consequence of hyperthermia sessions, reporting serious injury in the malignant tumors. Natural Killers and T-cells activity has been significantly increased after performing regional or local hyperthermia sessions during the 7 days post-treatment period.

What is Hyperthermia treatment?

Hyperthermia is a non-invasive, non-toxic treatment which induces a controlled feverish state in the body with temperatures ranging up to 40 degrees celsius.

Knowledge of the benefits of heat treatments date back thousands of years to the ancient Greeks, Romans and Egyptians, as well as ancient civilizations in India, China and Scandinavia.

This treatment raises the body temperature like a fever. This helps to enhance the activity of the immune system and may also improve performance of some drugs by increasing cellular uptake.

- During this therapy, we keep the patients always awake, sometimes we provide medicines to make them calm whilst.

What does it do?

Whole Body Hyperthermia

On a cellular level the feverish state stimulates release of heat-shock proteins, boosting the body's immune defense.

This benefit has been known since ancient times, but now with controlled whole-body hyperthermia treatment we use advanced state-of-the-art technology which can artificially create this desired immune system boost without feeling unwell.

This use of the body's natural mechanism to reclaim and enhance a healthy state can be applied to aid recovery or treatment of a number of conditions.

It is particularly advantageous for patients suffering from chronic conditions or malignant processes.

Benefits of Hyperthermia

- Stimulates self-healing
- Increases blood flow, doubling perfusion in tumors
- Enhances the delivery of medications
- Enhances immune response
- Decreases inflammation
- Decreases pain
- Enhances IV therapy
- Increases oxygen to the tumor making radiation therapy more effective
- Promotes repair and regenerative processes in each individual cell

Side Effects

- Agitation or anxiety
- Diarrhea
- Nausea
- Vomiting

Medications can be given to control these side effects or the rate of increase in body temperature can be slowed or interrupted.

During hyperthermia treatments, some tissues such as scars may become very hot being denser. This can be avoided by careful management but very rarely lead to discomfort or pains, minor burns and blisters.

What it is used for?



Immune stimulation

Heat Shock Proteins (HSPs) and the immune system. The immune system has evolved to take advantage of the ability of HSPs to act as 'danger signals', thus allowing the generation of an amplified immune response. HSPs released from stressed or dying cells activate dendritic cells (DCs), transforming them into mature cells potentiating immune recognition of antigens.

Mature DCs can program lymphocyte effector cells in an antigen-restricted manner, thus limiting collateral damage to normal healthy tissues. The HSPs can potentially broaden the spectrum of the immune response.

Oncology

By raising the patient's body temperature as though they have a fever, this treatment helps chemotherapy work better to treat cancer that has spread (metastasized).

Fever-range hyperthermia can also induce heat shock proteins. Hyperthermia uses heat to damage and kill cancer cells without harming normal cells

References to research on whole body hyperthermia in modern medical literature date back to 1950 but the principle of fever temperature aiding in disease healing was mentioned in ancient Greek, Chinese and Egyptian medical writings.

In theory, fever-range hyperthermia may take advantage of tumor cell heat shock proteins by inducing their release from tumor cells and improving dendritic cell priming against tumor antigens. It has also been reported that hyperthermia alone can enhance antigen display by tumor cells, thus rendering them even more susceptible to programmed immune clearance.

Thus, Hyperthermia treatment is used as an immune modulator for cancer patients

Hyperthermia treatment has become a mainstream form of adjunctive therapy in many countries in Europe and Asia. It is not used as a sole therapy and is not a cure for cancer. It is usually combined with chemotherapy, radiotherapy, intravenous therapy or other therapies in varying combinations.

Hyperthermia achieves an increase of the temperature in the extracellular liquid of the tumor tissue that leads to a destabilizing thermal stress on the membrane of the tumor cells, accelerating decline in the life cycle of cancerous cells (apoptosis).

Hyperthermia may make some cancer cells more sensitive to radiation or harm other cancer cells that radiation cannot damage. When hyperthermia and radiation therapy are combined, they are often given within hours of each other.

Hyperthermia treatment is most effective when provided within 4 to 24 hours of the radiation.

Numerous clinical trials have studied hyperthermia in combination with radiation therapy and/or chemotherapy. These studies have reviewed the treatment of many types of cancer, including: sarcoma, melanoma, and cancers of the head and neck, brain, lung, esophagus, breast, bladder, rectum, liver, appendix, cervix, and peritoneal lining (mesothelioma). Many of these studies, but not all, have shown a significant reduction in tumor size when hyperthermia is combined with other treatments.

The Efficacy of Hyperthermia



The efficacy of hyperthermia treatment is related to the temperature achieved during the treatment, as well as the length of treatment and cell and tissue characteristics. When combined with radiation, hyperthermia is particularly effective at increasing the damage to acidic, poorly oxygenated parts of a tumor, and cells that are preparing to divide.

Whole body hyperthermia is an effective supportive and adjunctive treatment more for widespread (i.e. metastatic) cancers, than other types of cancers.

“Of all methods that save life, moxibustion (heat therapy) is number 1, mineral concoction is number 2 and herbal medicine is number 3.”

*Bian Que
Great Chinese Physician, 400BC*

“For those (diseases) that can’t be cured by medication, and for those that can’t be cured by the needles (acupuncture), then they must be treated with moxibustion (heat).”

*Huangdi Neijing
(Huangdi’s Classic of Internal Medicine)
Published more than 2000 years ago*

“Give me the power to produce fever and I will cure all diseases.”

*Parmenides
Great Greek philosopher, 500BC*