

## Brief Note on Advance Techniques in Hyperthermia for Cancer Treatment

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### DESCRIPTION

Cancer is a disease that results from the uncontrolled division of abnormal cells in a body area. It is a leading cause of death, and its prevalence is rising by the day. Chemotherapy, radiography, surgical removal of the tumor, and other procedures were used. However, these procedures have several adverse effects that cause patients to experience unbearable pain and worry. There has been a battle in recent decades to identify new cancer-fighting strategies. Hyperthermia is an old treatment method that offers new hope and, when combined with engineering techniques, proved to be one of the most effective cancer treatments.

Hyperthermia has been used as a complement to chemotherapy and radiation therapy over the past two decades, with the benefit of reducing drug resistance and radio resistance malignant cells. Hyperthermia in combination with radiation or chemotherapy has been studied in clinical trials for a variety of cancers, including sarcoma, melanoma, brain, lung, breast, bladder, rectum, cervix, esophagus, liver, and others. Many various hyperthermia treatment approaches are now being researched, including local, regional, and total body temperature. Hyperthermia is an excellent complement to radiation and many cytotoxic medicines, as well as a potent sensitizer.

### Hyperthermia techniques

**Ultrasonic hyperthermia:** Treatment of superficial and deep region cancers, including surface lesions, head and neck, is possible with ultrasonic hyperthermia. Heating is feasible up to 5-10 cm deep with a single transducer and up to 20 cm depth with numerous transducers using this technology.

**Hyperthermia with external radio frequency devices:** Although the approaches are non-specific for tumor cells, hyperthermia with external radio frequency devices is a suitable choice for the treatment of prostate cancer. The procedures employed are fairly simple and involve transmitting electromagnetic energy as close to the tumor site as possible.

**Hyperthermic perfusion:** A procedure that involves bathing or passing a warmed solution containing anticancer medications through the blood vessels of the tissue or organ hosting the tumor. Hyperthermic perfusion is a treatment for cancer in the arms, legs, or other bodily organs. Frequency enhancers and catheters are used to improve therapeutic responsiveness and reduce negative effects.

**Hyperthermia uses frequency enhancer:** A method for treating both localized and metastatic cancers with local heat has been presented. The addition of biocompatible fluids and solutions improves the absorption of RF energy and microwave radiation in living tissues.

**Hyperthermia using a catheter:** The invention is a catheter comprising fluid dry passageways through which microwave antenna applicators and temperature sensors can be placed to measure the temperature of prostate tissue.

**Microwave hyperthermia:** The treatment of superficial cancers in the breast, limbs, prostate, and brain with microwave hyperthermia. It is a cutting-edge technology that allows for large-scale heating using specialized antennas. Temperature measurement is problematic at high penetration localized heating.

**Hyperthermia with the injection of super paramagnetic and magnetic nanoparticles:** By reaching precise target dosages, paramagnetic and magnetic Nanoparticles have the ability to lessen or eliminate harmful negative effects.

### CONCLUSION

With the advantage of specific heat deposition to tumor cells, nanotechnology-based cancer therapy is also known as special form of interstitial thermotherapy. This mediated thermal therapy has the potential to completely transform cancer detection, treatment, and prevention. In the coming years, more research into targeting techniques, delivery systems, and radiation dose enhancement is likely to energize this field. Clinical studies still require technique modification in order to achieve more promising outcomes and boost efficiency.

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