The term “hyperthermia” has developed many connotations over the centuries and is no wonder that people get confused about what it really means and what it can do to the human body. In modern days, we consider hyperthermia as the process of moderately raising the body’s (or part of the body’s) temperature to attain a scientifically established therapeutic effect, or at least one that can be rationalized. At the Hope4Cancer Institute in Baja California Mexico, we use advanced hyperthermia techniques to treat cancer, demonstrating results that are effective and synergistic to many of our other natural cancer therapies. It is therefore relevant to discuss the importance of hyperthermia in the realm of natural cancer treatments.

A Historical View of Hyperthermia

Bierman has written an informative history of fever therapy that was published back in 1942. Much of the history described here is taken from his work. Heat or Fever Therapy is an ancient practice that can be traced back to the Greeks. Many of us have heard the quotation ascribed to Hippocrates more than two millennia ago, “Give me the power to produce fever, and I will cure all disease”.

Fever therapy, over the centuries, has spanned the gamut of folklore-based medicine to the highly scientific realm of disease control and management. Many natural treatment methods have employed tactics that inherently raise the body’s temperature, whether inadvertently or otherwise, in an attempt to obtain a therapeutic effect. Historically, there are many examples of the application of heat to treat disease, some scientific and, indeed, some decidedly outlandish.

As modern science started to grow its roots in the world, many of the new world scientists embraced what became known as “the scientific method”. Some of the initial experiments may seem incredulous to our more modern minds. For example, in the 18th century, Boerhaave, Prevoost and Fahrenheit tried to understand the tolerance limits to heat by putting animals into heated ovens at 73 °C (163 °F). They observed that a dog and a cat died within 28 minutes and a sparrow took 7 minutes to perish. The fact that death is a potential side effect of excessive heat should have been reasonably obvious. However, experiments of this nature gradually told us about the selective effects of heat in different living environments.

As science progressed to the 19th century, thermometry was discovered and the knowledgebase regarding infectious diseases started to grow. The fact that infectious disease and fever were related became clearly obvious. Two schools of thoughts diverged at this point. The first were those who believed that fever was connected to the

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infection itself and needed to be reduced. Methods such as cool packs gave way eventually to naturally derived antipyretics (fever reducing drugs). A deluge of research and discovery resulted in the discovery of many antipyretic substances that supported this thinking, a trend that continues to this day.

A second and much smaller group of medical researchers, who could not be heard over the din of the others, believed that fever had a positive purpose. Welch, for instance, stated in 1888, “fever-producing agents light the fire which consumes them.” But nobody heard him.

The dawn of the 20th century saw the rise of a greater understanding of how pathogens interact with the body. Scientific minds such as those of Pasteur, Koch and Behring established the concept that the body fights for itself and fever is one of its tools, and the purpose of medicine was realigned to fighting the invader rather than suppress the body’s fight back mechanism that was manifested as a fever.

Today we know that “a fever will takes its course”, which usually means that for those who have a strong immune system, the fever is often enough to create an unfriendly environment for the invading pathogen to self-destruct.

Interestingly, even in the case of severe infection accompanied by high fevers, we observe that healthy cells in the body are resilient enough to resist the elevated temperatures while the pathogens eventually die. That gives us a reference point that we can selectively target the invader that has infiltrated the body, while not affecting normal cells, tissues and organs.

**Hyperthermia and Cancer Cells**

Heat is cytotoxic. But how can the heating process be modulated to obtain selective health benefits? Let us look at some established research on this subject. Temperatures above 42 °C have been shown to kill cancer cells in a time and temperature-dependent manner.\(^2\) The pathways that affect cancer cells over healthy cells is still not clear, but based on current research, at a general level, hyperthermia is known to cause changes that lead to an altered cellular homeostasis. Events such as protein denaturation and aggregation, inactivation of protein synthesis, inhibition of the DNA repair process, damage to cellular membrane result in cell death through the processes of apoptosis and necrosis. Processes such as increased cellular metabolism with elevated temperatures are expected to be accompanied by elevated oxidative stress. It was shown that levels of

reactive oxygen species (ROS), which can result in irreversible oxidative damage to cellular proteins, were significantly raised at higher temperatures.\textsuperscript{3,4}

In addition to its cytotoxic effect, hyperthermia has many physiological consequences. These include the overall levels of tissue oxygenation, pH levels and vascularity (blood flow). The differences in physiology of cancer cells and normal cells could be the driving force behind the greater susceptibility of cancer cells to excessive heat. For example, tumor tissues are known to be very poorly vascularized compared to more ordered, normal tissues. This difference in vascular physiology may make cancer blood flow more prone to destabilization by heat than regular blood vessels. Cancer cells are also seen to be inherently more susceptible to direct exposure to heat than normal cells.

For deep-seated, large tumors when it is difficult to bring up the temperature of the core of the tumor to a high enough level, hyperthermia is still effective by destabilization of the poor tumor blood supply, blocking the delivery of nutrients and oxygen to the deeper areas of the tissue.

Milder hyperthermia has an interesting effect by improving the efficiency of the immune system, and improved recruitment and migration of immune cells into the tumor target zones.

Is there anything called too much hyperthermia? Yes. Cells develop thermotolerance by exposure to high temperatures for short periods or even low temperature hyperthermia for prolonged period of times (greater than 3 hours). How long and an appropriate temperature for hyperthermia is important to ensure that heat shock proteins, known to protect cells from cell death, are not activated in cancer cells.

**Hyperthermia in Alternative Cancer Treatments**

Hyperthermia is used in conventional medicine in combination with chemotherapy and radiation and has found its place in the treatment of chemotherapy and radiation resistant tumors, by improving their sensitivity to the therapies. However, hyperthermia can be used very effectively in conjunction with other non-toxic treatments.

There are three types of hyperthermia that are normally used: Local (Regional), Whole Body and Perfusion Hyperthermia. Perfusion hyperthermia involves heating the body’s


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fluids to cause a rise in temperature throughout the body. This is not a very usual form of hyperthermia, so we will limit ourselves to the description of Local and Whole Body hyperthermia.

Local (Regional) Hyperthermia: As the name implies, local hyperthermia involves focused heating of the tumor tissue while avoiding as much of the contiguous normal tissue as possible. This gives an allowance to increase the temperature to much higher levels than would be accomplished by a general heating of the entire body (whole body) or through the heating of body fluids (perfusion).

The heating is accomplished through many different methods such as the use of heated wires, hot water containing tubes, microwave radiation, ultrasound etc. For the purpose of safety and increased efficiency, we prefer to use radio-frequency electrodes where the tumor area is placed between two electrodes and heated to a tolerable temperature. The more advanced the instrumentation and method for regional heating, the more uniform and deeper the penetration of the heat into the tumor site. In this technology, the patient serves as the dielectric material between the two electrodes, essentially, the equivalent of a capacitor, becoming part of a resonant oscillation circuit. Through capacitive thermodynamic effects in the tissue, a flowing pattern of heat is produced.

At Hope4Cancer Institute, our patients receive a daily 45-60 minute treatment with our Indiba hyperthermia device, a highly efficient system that accomplishes deep, penetrative internal heating. We have also recently acquired arguably the world’s most advanced Celsius 42 TCS system. These systems provide two benefits: the first is of course related to local heating. The second involves exploiting the differences in cellular and extracellular composition with specific electromagnetic frequencies, an interesting phenomenon that is explained below.

A crucial difference between normal and regular cells lies in their charge distribution. The charge distribution in healthy cells is positive outside the cell membrane, and negative within the cell. A healthy cell usually bears a charge difference of 70 millivolts, while for compromised cells, such as cancer cells, this voltage difference can be as low as 30 millivolts. Because of this different, the ionic composition of the cell internally and the extracellular fluid externally, becomes quite unique for cancer cells. Because of these differences, the extracellular fluids surrounding healthy cells vs. cancer cells can respond quite differently to electromagnetic frequencies. The extracellular fluid surrounding the normal cells absorbs primarily frequencies in the range of 100 MHz. The extracellular fluid surrounding cancer cells absorbs frequencies in the range of 10 MHz. By providing frequencies in the range of 10 MHz, we can match the preferred frequencies for cancer cells, causing higher levels of vibration, and consequently selective heating around the tumor areas. These raised local temperatures can selectively destroy cancer cells, and their poorly developed vasculature.
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The Celsius 42 TCS system delivers radiofrequency of 13.56 MHz, which can be modulated to any specific individual frequency. According to Celsius 42 manufacturers, a temperature difference of as low as 0.01 °C across the cell membrane is enough to affect or block the metabolic processes or denature proteins.

The voltage differences across the cell membranes also result in differences in osmotic pressures because of the differential flow of ions in and out of the cells. In cancer cells, the effective osmotic pressure is high enough to destabilize and destroy the cell membrane.

How does all this reflect in effectiveness in the clinic? Our clinical experience shows that parallel use of local hyperthermia along with our other non-toxic cancer fighting agents provides a synergistic effect that results in significant drops in tumor blood flow commonly observed between 30 to 80 percent, as evidenced by Power Color Doppler ultrasound.

Whole Body Hyperthermia: Not all cancers are localized, and many patients are also dealing with metastatic spread of their original tumor. In situations like that, regional hyperthermia is good to treat the visible tumors, but not the metastatic areas, many of which may still be invisible at the seed stage. Cancer patients are also often dealing with circulating tumor cells (CTCs) in the blood and in the tissues that need to be attacked with a more generalized heating technique.

In whole body hyperthermia, the patient is placed in an enclosure that is heated. The temperatures attainable for whole body hyperthermia are significantly lower than that for regional hyperthermia for the reasons discussed above. However, the low heat can successfully destabilize cancer cells, and at the same time helps to activate the immune system and assists in pain relief from arthritis, fibromyalgia, muscle spasms, backaches and more – issues that often accompany our patients along with their cancer.

At Hope4Cancer Institute, we use carbon fiber heating elements that deliver infra-red based heat to the patient. A typical alternate day schedule for about 60 minutes is recommended. It is extremely important that the patient is well hydrated through the process. Remineralization following the treatments helps in restoring minerals back to the normal levels, taking away the possible feeling of exhaustion.

Conclusion

Hyperthermia is a highly relevant treatment methodology that applies as much for alternative medicine, as well as integrative conventional medicine. Our clinical experience has shown amazing synergy between hyperthermia and non-toxic treatment methods. For example, the ability of Sono-Photo Dynamic Therapy to generate intracellular reactive oxygen species in cancer cells can be theoretically accentuated by
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the stirring up of oxidative stress caused by hyperthermia. This theory is something we observe in practice everyday at our clinic. Given the benefits described in this article, we thoroughly recommend hyperthermia as an important adjuvant therapy to a non-toxic cancer treatment protocol.

For more information, please visit the Hope4Cancer Institute website at www.hope4cancer.com.

Dr. Antonio Jimenez, M.D. is the Founder and Medical Director of the Hope4Cancer® Institute (established 2001) located in Baja California, Mexico. As a physician with 25 years of experience treating cancer and other chronic diseases with alternative, non-toxic methods, Dr. Jimenez is known internationally for his “Seven Key Principles for Cancer Therapy” and the clinical introduction of pioneering treatment methods such as Sono-Photo Dynamic Therapy and the BX Antitoxin Protocol. Dr. Jimenez has been an active member of ACAM in good standing since 2009.