



A New Approach For Cancer Immunotherapy

Millions of Americans have cancer, and millions of Americans will die from cancer

Cancer is a leading cause of illness and death in Americans. 1 in 2 men will develop cancer in their lifetime, and 1 in 4 will die from it. This number is similar for women, who have a 1 in 3 chance of developing cancer and a 1 in 5 risk of dying from it.

Enhancing the body's immune response to cancer

Cancer is particularly lethal because, unlike viruses and bacteria, cancer cells are not invaders. Rather, they are cells within the body which mutate. Thus, the immune system does not adequately identify and target cancer cells as foreign or harmful, and the cells continue to mutate and proliferate.

Unlike traditional cancer treatments, such as chemotherapy and radiation--which directly kill cancer cells, **cancer immunotherapies** are agents (vaccines, antibodies, and proteins) used to empower the body's immune system to seek out and destroy cancer cells. Cancer immunotherapies have the potential to both launch an immune response, and enable the immune system to continue the battle by adapting to antigen mutations, improving cancer treatment and providing durable, long-term responses.

Studies have shown that when cancer cells are damaged (not necessarily killed) by heat or cold (radiation, radiofrequency, cryo-ablation, or laser) the body is able to kick-start an initial immune response that immunotherapy agents can then enhance. However, these cancer cell-damaging approaches can be invasive, and have dose limitations because of the harmful effects of radiation.

Focused ultrasound may improve cancer immunotherapy

Focused ultrasound is a new and groundbreaking, non-invasive medical treatment which concentrates multiple intersecting beams of ultrasound through an acoustic lens to precisely target areas deep in the body. Based on pre-clinical and clinical findings, focused ultrasound could be a precise method of enhancing immunotherapy without ionizing radiation or invasive surgery.

Focused ultrasound can elicit an immune response through three different mechanisms of action. These include heating and killing targeted cancerous tissue, uniform low level heating of cancerous tissue, and mechanical disruption due to expanding and contracting microbubbles within tissue. Each of these mechanisms is capable of initiating an immune response by releasing natural antigens and danger signals from cancer cells. In addition, focused ultrasound might be able to increase the permeability of cancer cell membranes and the blood brain barrier to deliver immunotherapy agents.

The Focused Ultrasound Foundation is now creating a pathway to accelerate research into the safety and efficacy of using focused ultrasound for cancer immunotherapy.

We are seeking \$1,000,000 to fund this research over the next three years.

Building a roadmap for research

In February of 2015, the Focused Ultrasound Foundation partnered with the Cancer Research Institute (CRI) to convene scientists and clinicians to discuss the current status and future directions of focused ultrasound research as it relates to

cancer immunotherapy. The workshop enabled participants to develop a roadmap to prioritize future research and develop collaborations that will maximize the impact of pre-clinical and clinical research. The Foundation is now encouraging investigators heading FUS oncology trials to add immunotherapy data-collection to their studies where possible, and is prepared to help facilitate this process

Conducting Research

The Foundation is supporting pioneering clinical trials and pre-clinical studies to explore the safety and efficacy of using focused ultrasound to harness the immune system to fight breast cancer, prostate cancer, melanoma and glioblastoma.

You can make a difference

We need your support to fund this groundbreaking research. **Why give?**

- This is a once-in-a-lifetime opportunity to be involved in a noble cause – improving the lives of millions of people.
- You will be standing shoulder to shoulder with leading clinicians, scientists, engineers and entrepreneurs in academia and industry in advancing the development of a new, revolutionary therapeutic technology that has the potential to transform the management of a wide range of cancers and other serious medical conditions.
- Your gift can catalyze additional investment from industry, government and other philanthropies to carry the technology forward.

For more information:

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