

Focused ultrasound reduces cancer pain

May 5 2014

When cancer progresses and spreads to the bone, patients often suffer debilitating pain. Now, a new phase III clinical trial shows that non-invasive magnetic resonance guided focused ultrasound treatment that heats the cancer within the bone, relieves pain and improves function for most patients when other treatment options are limited. The results were published in the *Journal of the National Cancer Institute (JNCI)*.

Magnetic resonance guided focused ultrasound surgery (MRgFUS) is a technique that's been safely used to treat thousands of women with uterine fibroids. However, "this is the first phase III study to use this technology in the [treatment](#) of cancer, " says the study's principal investigator and lead author Mark Hurwitz, M.D., Vice Chairman of Quality, Safety and Performance Excellence and Director of Thermal Oncology in the department of Radiation Oncology at Thomas Jefferson University.

Although [radiation](#) therapy is commonly used to treat bone-related pain and effective for most [patients](#), not all patients experience [pain relief](#) and over time those who do may have recurrence of pain. In addition, it's possible for a patient to receive the maximum radiation dose that can be safely delivered without fully controlling the pain. In situations where [radiation therapy](#) is not an option, alternative treatments are required.

A total of 147 patients from 17 centers in the U.S., Canada, Israel, Italy, and Russia were enrolled in the study and randomized to undergo MRgFUS or a sham treatment. Patients in the treatment group received focused ultrasound precisely targeted to their bone tumors to heat the

tumor tissue to between 65 and 85 degrees Celsius, resulting in its destruction. During each treatment, the patients were monitored real-time via [magnetic resonance](#) imaging (MRI) to ensure the right tissue was targeted and the right temperatures were reached while ensuring heat in surrounding normal tissues and organs remained at safe levels. The control group underwent the same procedure but without the ultrasound device turned on. Finally, patients who did not respond to the placebo treatment within two weeks were allowed to be unblinded and offered MRgFUS.

Patients responded well to treatment, with 64 percent experiencing either no pain or a significant reduction in their pain at three months as measured by a 2 point or greater decrease in the numeric rating score (NRS) for pain, a clinically validated measurement tool. Many patients were able to reduce or stop use of opioid medications. Notably, most patients experienced pain relief and improved functioning within several days of treatment.

"It's clear that for many of these patients, pain has a major impact on their everyday lives," says Dr. Hurwitz. "This approach offers a new way to help alleviate that pain via an out-patient non-invasive procedure."

The next steps in this line of research, says Hurwitz, is to refine the treatment technique to get an even greater response rate, and to apply radiation and thermal therapy together in treatment of bone metastases noting the established clinical benefits for other malignant conditions with this combination. To that end, Jefferson has opened a new program for thermal oncology within its Department of Radiation Oncology in order to provide patients with access to thermal therapies that have been shown to augment radiation treatment.

"The work provides cancer patients with more options for [treatment of cancer pain](#) and the opportunity for patients to reduce opioid use, which

has significant side effects," says Adam Dicker, M.D., Ph.D., Chair of Jefferson's department of [radiation oncology](#), and not involved in the paper.

More information: M.D. Hurwitz et al., "Magnetic Resonance–Guided Focused Ultrasound for Patients With Painful Bone Metastases: Phase III Trial Results," *J Natl Cancer Inst*, [DOI: 10.1093/jnci/dju082](#), 2014.

Provided by Thomas Jefferson University

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