

New imaging technique could help physicians ease the aftermath of breast cancer

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A new study of breast cancer survivors may help physicians ease a common side effect of cancer treatments. The collaborative research by Eva Sevick, Ph.D., Director of the Center for Molecular Imaging at the University of Texas Health Science Center in Houston (UTHSC), and Caroline Fife, M.D., Director of the Memorial Herman Wound Care Clinic at UTHSC, could bring relief to millions.

Their paper appears in the inaugural issue of *Biomedical Optics Express*, an online, open-access journal published by the Optical Society (OSA). The papers featured in the journal will encompass theoretical modeling and simulations, technology development, biomedical studies and clinical applications.

A substantial number of [breast cancer](#) survivors suffer from [lymphedema](#) in the aftermath of their cancer surgeries. In lymphedema, fluids accumulate in the arms, potentially causing disfiguring and debilitating swelling that can impact quality of life.

Treatments vary, but they generally consist of using manual and pneumatic therapies to "push" or stimulate the body to remove excess fluid and reduce tissue swelling. Finding out whether a treatment is working can take months. That's because the current method of assessing progress is to measure the circumference or volume of a limb and check for changes in swelling -- and a size change big enough to be measured takes time.

During this time, the condition might improve - or it might worsen.

The UTHSC research team has developed what promises to be a more sensitive and more immediate way to monitor the effectiveness of a treatment. Their new near-infrared fluorescence imaging technique examines the root cause of lymphedema: blockages or damages in the lymphatic system that prevent fluid from circulating through the body and cause it to pool in the limbs.

"The lymphatics are like the sewer system of your body," says Sevick. "If they get all plugged up, then there's a flood."

Nine women - six with lymphedema and three controls - were injected with a near-infrared fluorescent dye that has been used safely for 50 years at much higher dosages. The dye is taken up by the lymphatic system. When tissue surfaces are exposed to a dim, near-infrared laser - harmless to the human body - the dye within fluoresces, revealing its transit through the lymphatic system.

"This is the only method that can directly check for improvements in lymphatic function in one sitting, before and after a treatment," says Sevick.

Physicians have several treatment options for controlling lymphedema. They may use compression bandages and massage limbs to manually encourage fluids to drain from the arm. Pneumatic compression devices, sleeves made of segmented chambers that inflate and squeeze, may provide a similar benefit at home, but they may not always be covered by Medicare reimbursements because of lacking direct evidence of their benefit.

"The problem is that there has been no good way to measure direct evidence of benefit," says Sevick. "Hopefully we can use near-infrared

fluorescence [imaging technique](#) to show improved lymphatic function from these treatments."

The NIR fluorescence technique detected statistically significant improvements in fluid flow through the [lymphatic system](#) immediately after the use of pneumatic compression devices. A larger follow-up study will be needed to confirm the results of this pilot study, says Sevick.

More information: The paper "Direct evidence of lymphatic function improvement after advanced pneumatic compression device treatment of lymphedema" by Kristen E. Adams et al. can be accessed at: www.opticsinfobase.org/boe/abs/.../cfm?uri=boe-1-1-114

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