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# Researchers fine-tune diffuse optical tomography for breast cancer screening

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Clemson University researchers in collaboration with researchers at the University of Bremen, Germany, are working to make the physical pain and discomfort of mammograms a thing of the past, while allowing for diagnostic imaging eventually to be done in a home setting.

The group is fine-tuning Diffuse Optical Tomography (DOT) to create high-resolution images from a scattering of infrared and visible light for the early detection of breast cancer. While the method is less expensive, safer and more comfortable than X-rays used in mammograms, the problem has been generating a strong enough resolution to detect smaller breast cancers.

Mathematical sciences professors Taufiquar "T.K." Khan of Clemson and Peter Maass of the University of Bremen are developing mathematical models to improve resolution.

"The problem with DOT is that it is a 3-D method where photon density waves launched from a source travel in a banana-shaped path due to multiple scattering, whereas X-rays follow straight lines which make the mathematical problem more manageable and the resolution of the image sharper." said Khan.

"With DOT, near-infrared or near-visible photons make the process safer for the body than with the radiation of X-rays, but they are difficult to track because of the scattering and absorption. So we are coming up with equations that will help get us from capturing cancers

that are 4 millimeters in size, down to capturing those as small as 1 millimeter."

Khan says benefits of DOT include the elimination of harmful radiation to the body as well as false positives and negatives caused by mammography X-rays. He adds there are no harmful side effects to DOT, and some version of DOT eventually could be administered in a do-it-yourself setting at home within the next decade. In addition to breast screening, he says it eventually maybe used as part of other diagnostic procedures such as ultrasound.

"Even if it does not replace mammography, the results of our research are applicable across various areas of biomedical imaging. I envision that someday there will be machines based on these methods that everyone can use at home," Khan said.

Source: Clemson University (news : web)