A novel imaging technique could enable biopsy-free breast screening

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Breast cancer is the most common form of cancer in women and accounts for 28 % of the total in the World Health Organization European region. Among women, breast cancer represented 3.7 % of all

deaths in the EU in 2016, according to Eurostat. It's widely recognized that early diagnosis is essential to ensure a high chance of survival. As such, it's crucial to have diagnostic tools with high sensitivity for early detection and high specificity to avoid false positive results. This is exactly what the EU-funded SOLUS project has set out to do.

As explained in a news item, the scientists involved in the project "have developed a non-invasive, multi-modal, imaging system that uses ultrasound and light technologies to easily differentiate between benign or malignant lesions—without having to perform a biopsy." The new technology resembles a pregnancy ultrasound procedure, "whereby a clinician scans the breast with a handheld 'smart optode' pen probe that combines light and sound to collate blood parameters and tissue constituents." The same news item states: "The scientists use a technique called 'diffuse optical imaging' – a method that has provided breakthroughs in neuroscience, wound monitoring, and cancer detection. The scientists can then monitor changes in concentrations of oxygenated and deoxygenated hemoglobin, collagen, lipids and water present in a suspected tumor against a pre-programmed set of results."

Fewer false positive results

The same news item emphasizes that despite its accuracy in detecting breast lesions, mammography could also lead to false positive results—a positive detection of a lump but with no malignant cancer present. To determine whether a lesion is cancerous or harmless, clinicians end up using invasive procedures like biopsies to make an accurate diagnosis. This causes the health system significant costs. "The SOLUS scanner reads a number of different parameters to create a thorough characterization of tissue, enabling the device to provide a malignant or benign diagnosis," the news item adds. "Aiming for 95 % sensitivity and 90 % specificity, the project has combined commercial ultrasound imaging and elastography with novel diffuse optical imaging

approaches."

SOLUS project partners believe their new system will revolutionize breast cancer diagnosis. Prof. Paola Taroni from project coordinator Polytechnic University of Milan says: "Women may have to wait days or weeks for a malignant or benign result to come back, which causes distress, as well as great discomfort from an invasive biopsy." She adds: "Astonishingly, millions of unnecessary biopsies are currently carried out across the world at a cost of millions of Euros in Europe, and potentially billions worldwide."

The SOLUS team has conducted extensive laboratory trials and hopes to validate the system in real clinical settings at the end of 2020 and through into 2021, according to Prof. Taroni.

SOLUS (Smart optical and ultrasound diagnostics of breast cancer) was launched "to develop an innovative non-invasive, point-of-care, low-cost, easy-to-operate, multi-modal imaging system (diffuse optics and ultrasounds/shear wave elastography) for high-specificity diagnosis of breast cancer," as stated on CORDIS. Thanks to improved and faster in-depth diagnoses provided by SOLUS, unnecessary biopsies will be avoided.

More information: SOLUS project website: www.solus-project.eu/

Provided by CORDIS