Researchers develop new lab-on-a-chip technique

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Scientists at the University of Toronto have developed a new "lab-on-a-chip" technique that analyses tiny samples of blood and breast tissue to identify women at risk of breast cancer much more quickly than ever before.

"The concentration of the hormone estrogen and its metabolites — the products of metabolized estrogen — in breast tissue are known to be significantly increased in breast cancer patients compared to healthy women, and is therefore believed to increase the risk of breast cancer. Despite this, breast estrogen levels in women at risk are not routinely measured because conventional techniques require large tissue samples obtained through invasive biopsies," says Dr. Noha Mousa, a Canadian Institute of Health Research fellow at Samuel Lunenfeld Research Institute and a clinical fellow in the Department of Obstetrics and Gynecology at the University of Toronto.

In response to this challenge, an interdisciplinary group of U of T scientists have used a new technology called digital microfluidics — where instead of moving electrons across tiny wires, minute droplets of fluid are manipulated electrically on the surface of a microchip. Because these devices can be used to integrate multiple different laboratory functions, this type of technology is sometimes called a "lab-on-a-chip."

"We applied this technique for the first time to analyze hormones in tiny clinical samples — we looked at blood, serum and breast cancer tissue," says Aaron Wheeler, director of the Wheeler Microfludics lab in the

Department of Chemistry. "We developed methods to move droplets of several different kinds of reagents — a substance consumed during a chemical reaction — to extract hormones and purify them — all on a device that can fit into the palm of a hand."

"The new methods we've developed may someday facilitate routine screening of clinical samples for analysis of hormones. This may be useful in many applications, including screening for risk of developing breast cancer, especially in high-risk populations, and monitoring the response to antiestrogen breast cancer therapies such as aromatase inhibitors. It could also help in monitoring hormone levels in infertility treatments and in detecting illegal doping in athletes," added Wheeler.

The work will be the cover story in the inaugural issue of *Science Translational Medicine*.

Source: University of Toronto (news : web)