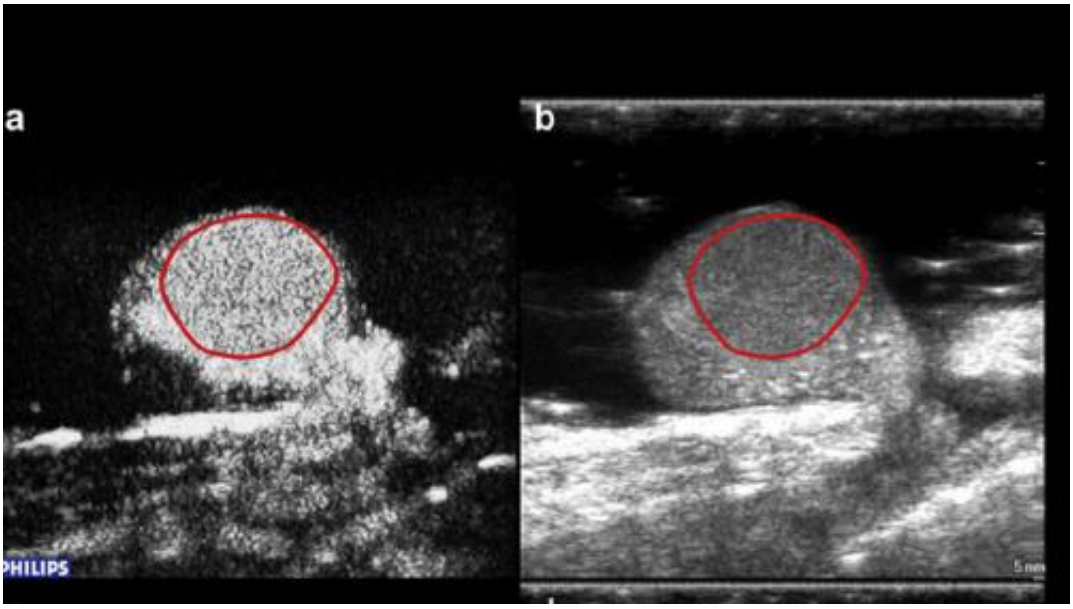
Tumour monitoring: Breakthrough in making cancer detection portable

June 24 2013



Images of corpus luteum.

New ultrasound imaging technology that measures the blood flow through a tumour may hold the key to more tailored care for cancer patients and rapidly shorten the time it takes to assess whether treatment such as chemotherapy is working.

Contrast-enhanced ultrasound technology

The contrast-enhanced ultrasound technology is being developed at

Heriot-Watt by Dr Vassilis Sboros, in partnership with experts from the Centre for Reproductive Health at the University of Edinburgh.

The team has already made significant advances in accurately measuring blood flow to tissues and monitoring its changes. They have also been able to take detailed measurements of tumours, even those that measure just a few millimetres.

Dr Sboros said, "Being able to monitor a tumour's blood flow will enable medical professionals to tell if cancer treatment is being effective.

"Like all tissues, tumours require oxygen and nutrients, carried by blood, to grow. Stopping the blood flow 'suffocates' the tumour, which is the aim of cancer treatment. With cancer, getting the treatment right, or fine-tuning it, as quickly as possible can make a very big difference to patient outcomes."

At the moment, patients' response to treatment using CT or MRI scan imaging is monitored after three months, which may delay the opportunity to change treatment if it is unsuccessful.

"The technology we are developing is highly cost-effective and can also be laptop-based and miniaturised. Advancing this technology could potentially make it available to patients within a few days of their first treatment phase, significantly improving the options for alternative treatment.

"Because it uses standard equipment, it could also be available to patients in their local GP surgery, making it easier for patients and cheaper for the NHS."

Studying the corpus luteum

The technology has been developed by studying a tissue called the corpus luteum (CL), found in the normal ovary. It is a small, spherical-shaped tissue that develops during the menstrual cycle and becomes highly vascularised. At one stage it has a blood supply, per unit mass, that is eight times that of the human kidney. Its predictable growth, development of a blood supply and regression means it mimics a changing tumour and allows testing of the technology. For this reason, a normal process that is required for fertility could hold the key to monitoring tumour growth and subsequent control through treatment.

Dr Colin Duncan, an expert in reproductive medicine from the University of Edinburgh, said, "The corpus luteum is a fascinating structure on the ovary that is formed after the egg is released and is required for normal reproduction. While research into the corpus luteum is important to learn about fertility, it can help us understand other important conditions.

"When it begins to form there is an intense and predictable development of new blood vessels. A better understanding of this process gives us insights which can be applied to treatments for cancer, cardiovascular disease and other illnesses, as well as telling us more about tissue resilience, repair and replacement."

The contrast-enhanced ultrasound techniques developed by Dr Sboros use bubbles to 'stain' the small blood vessels and provide imaging of the blood flow as it happens. Currently, development is focused on automatically turning the pictures into numbers to make recording changes easier, whoever is doing the scan.

Provided by Heriot-Watt University