

Detecting blood clots with portable device

June 10 2015, by Victoria Hollick

Blockages in lung arteries could be diagnosed safely in real-time helping as many as 20,000 respiratory patients in Australia each year with emerging technology being developed by electrical engineering researchers at the University of Sydney.

Results of a 3 year ARC funded project investigating an alternate method for diagnosing [pulmonary embolism](#) (PE) that combined Electrical Impedance Tomography (EIT) and saline based contrast was published as a feature article in the *Journal of Physiological Measurement* and followed up on [Medical Physics Web](#), the number one online resource for medical physicists this week.

PhD candidate Trang Nguyen, an Australian Research Council Postgraduate Award recipient and lead author on the paper says the team was focussed on developing a portable, radiation-free and non-toxic device to replace the current invasive procedure which relies heavily on methods such as CT pulmonary angiograms.

Nguyen says:

"This approach exposes a patient to [ionizing radiation](#) and nephrotoxic contrast agents. It also requires a patient to be moved to a dedicated imaging chamber, which is far from ideal for [critically ill patients](#)."

"EIT is an emerging clinical tool. It is a non-invasive medical imaging technique that uses electrical currents to probe impedance changes within the body," explains Nguyen.

"Ventilation and perfusion are two sides of the same coin. We started from the premise that in order to understand the physiological state of the patient's lungs, both ventilation and pulmonary perfusion information are required. We were particularly motivated by the possibility of using EIT for diagnosis of PE," she explains.

With assistance from Westmead Cardiology Research Group, the team concluded that EIT can reliably detect the difference between normal and embolized lungs with a one-sided perfusion defect, pointing out that a larger trial is required before the method can be used clinically for diagnosis of PE.

Pulmonary embolism is a sudden blockage in a lung artery. The blockage usually is caused by a blood clot that travels to the lung from a vein in the leg.

"While PE can lead to severe and possible long-term damage of the cardiovascular system, its symptoms are highly unspecific," says senior author Dr Alistair McEwan and Nguyen's PhD Supervisor.

"As EIT is less invasive and does not use radiation, we are hopeful that it can be used as a first-stop imaging diagnosis for PE before a CT pulmonary angiogram is prescribed, to reduce radiation and contrast exposure in patients," says Dr McEwan who leads a research team dedicated to researching the electrical properties of biological tissue.

"Understanding these properties will enable us to better address a range of major health challenges relating to cardiovascular disease, cancer and nutrition," he says.

Provided by University of Sydney

Citation: Detecting blood clots with portable device (2015, June 10) retrieved 26 April 2024 from <https://medicalxpress.com/news/2015-06-blood-clots-portable-device.html>

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