Medical Xpress

First heart operations performed using a novel software platform

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Professor André Ng, Professor of Cardiac Electrophysiology at the University of Leicester and Consultant Cardiologist and Electrophysiologist at Leicester's Hospitals carrying out UK's first heart operations using a novel software platform to pinpoint the source of the heart condition. Credit: University of Leicester

The UK's first heart operations using a novel software platform to pinpoint the source of the heart condition have been carried out in

Leicester thanks to research at the University of Leicester.

Professor André Ng, Professor of Cardiac Electrophysiology at the University of Leicester and Consultant Cardiologist and Electrophysiologist at Leicester's Hospitals, has carried out three operations since November 2015.

The patients suffered from a condition known as atrial fibrillation (AF) – the commonest heart rhythm disturbance affecting more than 1 million people in the UK.

All three patients have now returned home following the operations which were completed successfully.

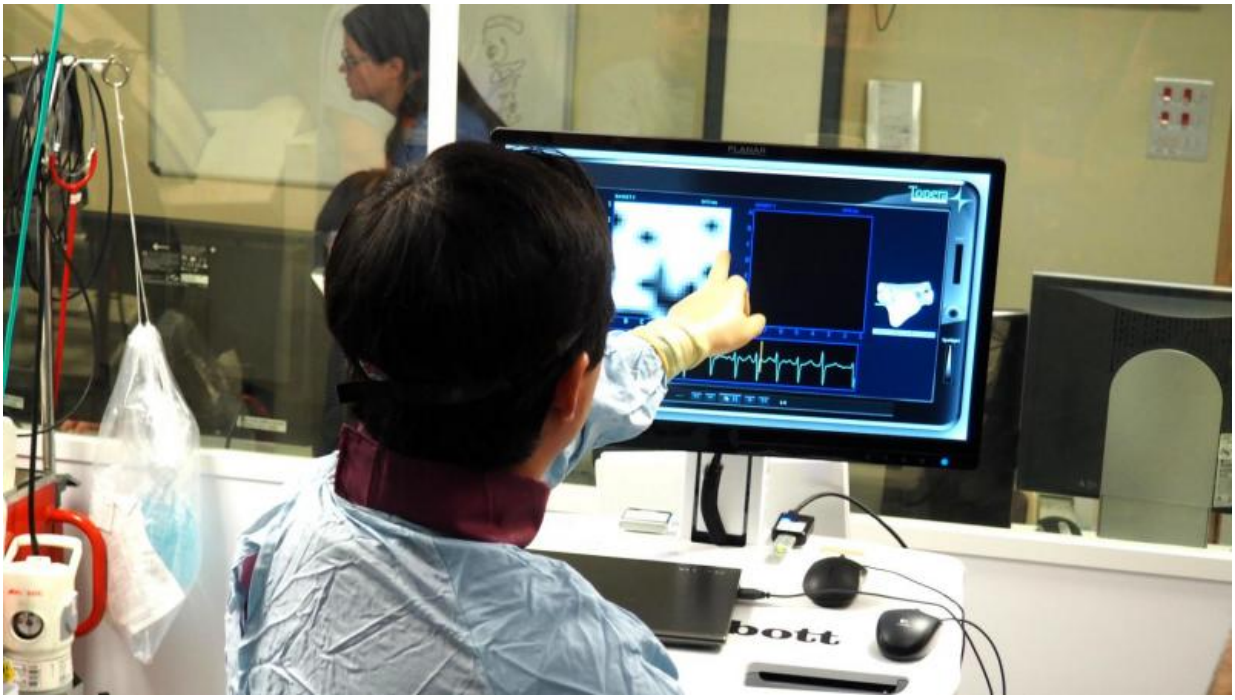
AF is a condition that causes the upper chambers of the heart (atria) to beat very fast and irregularly due to chaotic electrical activity. As a result the atria do not beat in an organised way and pump less efficiently, increasing the likelihood of stroke and heart failure.

Electrical activity in the heart is an area of specialist research at the University of Leicester, spearheaded by Professor Ng and his research team in the University's Department of Cardiovascular Sciences. Professor Ng has been researching this field for several years and this latest technique that he is applying on a patient will help to further enhance his research.

Professor Ng said the UK first at Leicester exemplifies how research at the University of Leicester was providing benefits for patients thanks to the partnership between the University and Leicester's Hospitals and the support of the NIHR Leicester Cardiovascular Biomedical Research Unit.

Commenting on the heart condition known as AF, Professor Ng said:

"Initial treatment for AF is with medication to control the heart rate or reduce AF episodes using drugs. In many patients, AF fails to be controlled by medication and continues to cause debilitating symptoms.



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"Catheter ablation has been increasingly used in patients with AF over the past decade or so. The procedure involves inserting electrical wires called catheters into the heart to ablate (or 'burn') the abnormal areas in the heart that are causing or sustaining AF. In patients who are in an early phase of the condition, this procedure has been shown to be

reasonably effective requiring limited burning in well-defined heart regions (e.g. pulmonary veins).

"However, the results of AF ablation in patients with more advanced form of the condition is less than ideal with variable results and patients often need to undergo several procedures with suboptimal long term outcome. The conventional approach involves extensive ablation on many different atrial locations due to the seemingly chaotic electrical activity seen. More recent data support the presence of focal or rotational sources (or rotors) which may be driving the chaotic process."

Describing his research and the technique that he deployed for the first time in the UK, Professor Ng added: "Topera is a new software platform developed to "decode" the chaotic electrical signals and represent the activity in the form of rotor maps – allowing us to see the rotors and the centres of rotation analogous to the "eye of the storm".

"The location of these rotors are different in different patients and hence this new software platform allows a personalised or precision approach to target localised sources for ablation rather than having to ablate over a wide area in the atrial chambers. The initial results from studies conducted in USA and some European centres e.g. Germany are promising and suggest better efficacy than the conventional approach with extensive ablation.

"We are very pleased to have used this new system at Leicester for the first time in UK. We managed to use the Topera system to analyse the electrical activity during AF in our patients. We are very pleased that AF stopped when we did the ablation and the patients returned to normal rhythm, which was the best possible result and desired procedural outcome for our patients.

"This approach is related to our ongoing research at the University of

Leicester aimed at understanding the substrate underlying recurrent persistent atrial fibrillation. The map generated with the Topera system is quite unique and there is much research to be done to fully understand the different behaviour of these maps in different patients. Having access to this new software algorithm allows us to examine the response to AF ablation using this approach in our patients first hand. It is hoped that we will achieve better results with more focussed targets and therefore less ablation required.

"At the University of Leicester and Leicester's Hospitals, we are very pleased to be the first UK centre, based at Glenfield Hospital, with access to this new technology. AF ablation in patients with more advanced form of the condition is challenging using the current approach, often needing extensive ablation.

"This new software platform uses mathematical processing techniques to 'decode' the chaotic behaviour to reveal the underlying focal or rotational activity which are believed to be the driver of the rhythm disturbance. Hence it is hoped that targeting these localised critical circuits would lead to better results and less ablation required which should be translated to better patient outcome.

"The variable results from the current approach to AF ablation highlights that there is a significant component of individual difference between patients which needs a personalised or precision medicine approach to identify the unique characteristics in the particular patient that we are treating. This new platform appears to be able to go some way towards this aim and we are very keen to be able to establish more evidence with future specific research studies at the University."

Provided by University of Leicester