Study identifies 'clinical risks' and biomarkers to screen patients with heart condition

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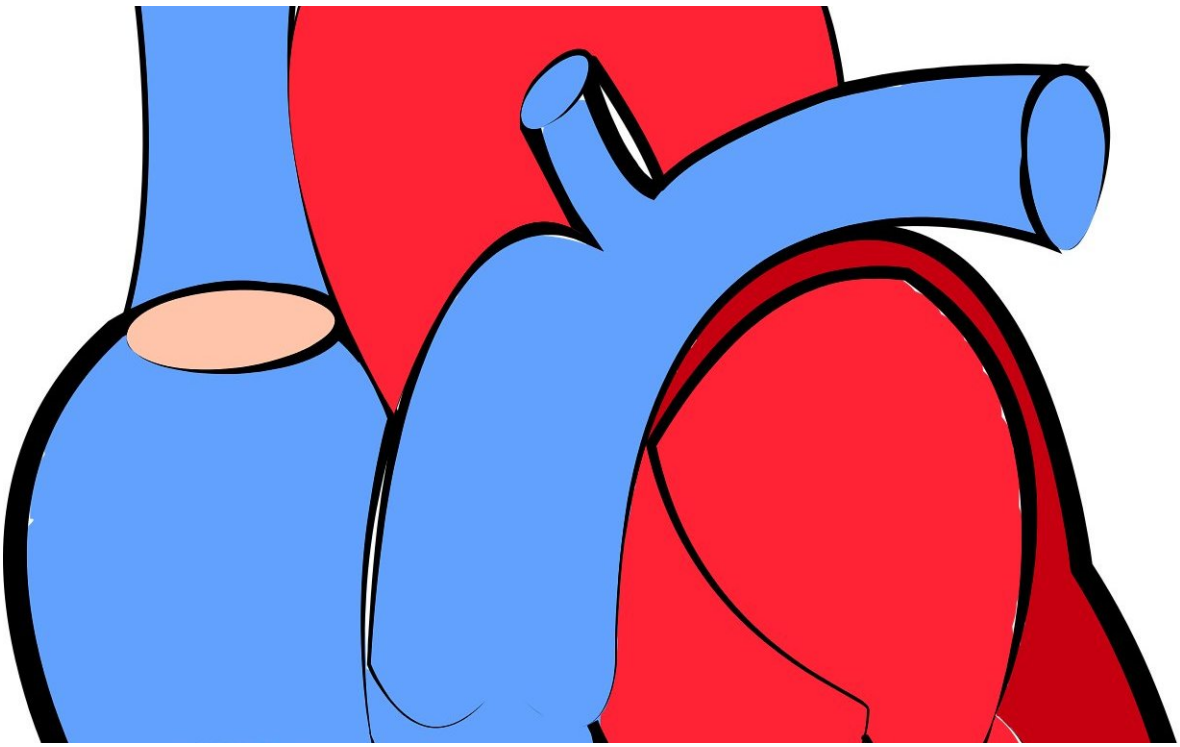

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Researchers at the University of Birmingham have found two biomarkers that could be used to identify a heart condition known as atrial fibrillation in patients who have three 'clinical risks'.

Atrial fibrillation is the most common heart rhythm disturbance, affecting around 1.6 million people in the UK. Those with atrial fibrillation may be aware of noticeable heart palpitations, when their heart feels like it is pounding, fluttering or beating irregularly. Sometimes atrial fibrillation does not cause any symptoms and a person who has it is completely unaware that their heart rate is irregular.

Now scientists have identified patients are more at risk of atrial fibrillation if they have three 'clinical risks' - they are older aged, male and have a high Body Mass Index. These patients, say the scientists, could be screened for atrial fibrillation by testing their blood to see if they have elevated levels of two biomarkers—a hormone secreted by the heart called brain natriuretic peptide (BNP) and a protein responsible for phosphate regulation called fibroblast growth factor-23 (FGF-23).

The research was carried out by scientists from the Institute of Cardiovascular Sciences and the Institute of Cancer and Genomic Sciences at the University of Birmingham's College of Medical and Dental Sciences and is published today (Jan 7th) in *European Heart Journal*.

First author Dr. Winnie Chua said: "People with atrial fibrillation are much more likely to develop blood clots and suffer from strokes. To avoid strokes it is important for them to take anticoagulant drugs to prevent blood clotting. However, atrial fibrillation is often only diagnosed after a patient has suffered a stroke.

"Therefore it is important that patients at risk are screened so that they can begin taking anticoagulants to prevent potentially life-threatening complications."

Joint First author Yanish Purmah added: "An electrocardiogram (ECG), a test which measures the electrical activity of your heart to show

whether or not it is working normally, is usually used to screen patients for atrial fibrillation.

"ECG screening is resource-intensive and burdensome for patients therefore it is important that the right patients are selected for this type of screening

"The biomarkers we have identified have the potential to be used in a blood test in community settings such as in GP practices to simplify patient selection for ECG screening."

Until now, most studies identifying biomarkers in patients with atrial fibrillation have been hypothesis-driven and involved the analysis of a single or small selection of blood biomarkers. In this study, the scientists analysed 40 common cardiovascular biomarkers in a cohort of 638 hospital patients who were recruited between September 2014 and August 2016.

To obtain the results, the scientists combined traditional statistical analysis with completely new and innovative machine learning techniques.

Senior author Dr. Larissa Fabritz said: "The research outcomes were surprising. While BNP is already a known and widely used in clinical practice biomarker, the results around the effectiveness of the FGF-23 biomarker was an unexpected and new finding. FGF-23 is only currently used in a research based environment, but we have shown how its use could be invaluable in a clinical setting."

Corresponding author Professor Paulus Kirchhof, Director of the University of Birmingham's Institute of Cardiovascular Sciences, said: "We hope that, as the result of our findings, more people with what can often be a silent disease are diagnosed so that any complications can be

prevented."

Funded by the University of Birmingham, the research was supported by CATCH ME, an EU-funded consortium led by the University of Birmingham, the British Heart Foundation and Leducq Foundation. The research was carried out in collaboration with Sandwell and West Birmingham Hospitals NHS Trust, University Hospitals Birmingham NHS Foundation Trust, the European Society of Cardiology, The German Atrial Fibrillation NETwork (AFNET), and Health Data Research UK.

Professor Metin Avkiran, Associate Medical Director at the British Heart Foundation (BHF), added: "Atrial fibrillation increases the risk of stroke, a serious condition that causes over 36,000 deaths in the UK each year, but is often detected too late. This research has used sophisticated statistical and machine learning methods to analyse patient data and provides encouraging evidence that a combination of easy-to-measure indices may be used to predict atrial fibrillation.

"The study may pave the way towards better detection of people with AF and their targeted treatment with blood-thinning medicines for the prevention of stroke and its devastating consequences."

The research, which began in 2013, is ongoing and next steps will involve follow-up appraisals of the patients recruited to the study in order to further improve the prevention and treatment of atrial fibrillation.

More information: Winnie Chua et al, Data-driven discovery and validation of circulating blood-based biomarkers associated with prevalent atrial fibrillation, *European Heart Journal* (2018). DOI: 10.1093/eurheartj/ehy815

Provided by University of Birmingham