



An artificial intelligence program developed by investigators in the Smidt Heart Institute and their Cedars-Sinai colleagues can detect a type of abnormal heart rhythm that can go unnoticed during medical appointments, according to a new study.

The study's findings, [published](#) in *npj Digital Medicine*, suggest AI could one day be employed to analyze images from a common imaging test called an echocardiogram, which uses sound waves to capture pictures of the heart.

Abnormal heart rhythms are often caused by—and also lead to—heart structure abnormalities. Researchers hypothesized that an AI program trained to analyze echocardiograms might help clinicians detect early, subtle changes in the hearts of patients with undiagnosed arrhythmias.

"We were able to show that a [deep learning algorithm](#) we developed could be applied to echocardiograms to identify patients with a hidden abnormal heart rhythm disorder called atrial fibrillation," said Neal Yuan, MD, a staff scientist with the Smidt Heart Institute and first and corresponding author of the study.

"Atrial fibrillation can come and go, so it might not be present at a doctor's appointment. This AI algorithm identifies patients who might have atrial fibrillation even when it is not present during their echocardiogram study."

During atrial fibrillation, the heart's upper chambers sometimes beat in sync with the lower chamber and sometimes they do not, making the arrhythmia often difficult for clinicians to detect. In some people, atrial fibrillation causes no symptoms. In others, it can cause heart palpitations, fatigue, shortness of breath, dizziness, and other symptoms that interfere with daily life. Left untreated, atrial fibrillation can cause stroke and [heart failure](#).

An estimated 12.1 million people in the United States will have atrial fibrillation in 2030, according to the Centers for Disease Control and Prevention (CDC). Deaths related to atrial fibrillation have been increasing for more than two decades, according to CDC data.

"We're encouraged that this technology might pick up a dangerous condition that the human eye would not while looking at echocardiograms," said David Ouyang, MD, a cardiologist in the Department of Cardiology in the Smidt Heart Institute and a researcher in the Division of Artificial Intelligence in Medicine, and a senior author of the study.

"It might be used for patients at risk for atrial fibrillation or who are experiencing symptoms associated with the condition."

The team trained a program to study more than 100,000 [echocardiogram](#) videos from patients with atrial fibrillation. The program distinguished between echocardiograms showing a heart in sinus rhythm (a period of normal heart beating) and echocardiograms showing a heart in an irregular heart rhythm. The program predicted which patients in sinus rhythm had experienced or would develop atrial fibrillation within 90 days.

The model evaluating the images performed better than estimating risk based on known risk factors.

"The fact that this program predicted which patients had active or hidden atrial fibrillation could have immense clinical applications," said Christine M. Albert, MD, MPH, chair of the Department of Cardiology in the Smidt Heart Institute and a study author. "Being able to identify patients with hidden [atrial fibrillation](#) could allow us to treat them before they experience a serious cardiovascular event."

**More information:** Neal Yuan et al, Deep learning evaluation of echocardiograms to identify occult atrial fibrillation, *npj Digital Medicine* (2024). [DOI: 10.1038/s41746-024-01090-z](https://doi.org/10.1038/s41746-024-01090-z)

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