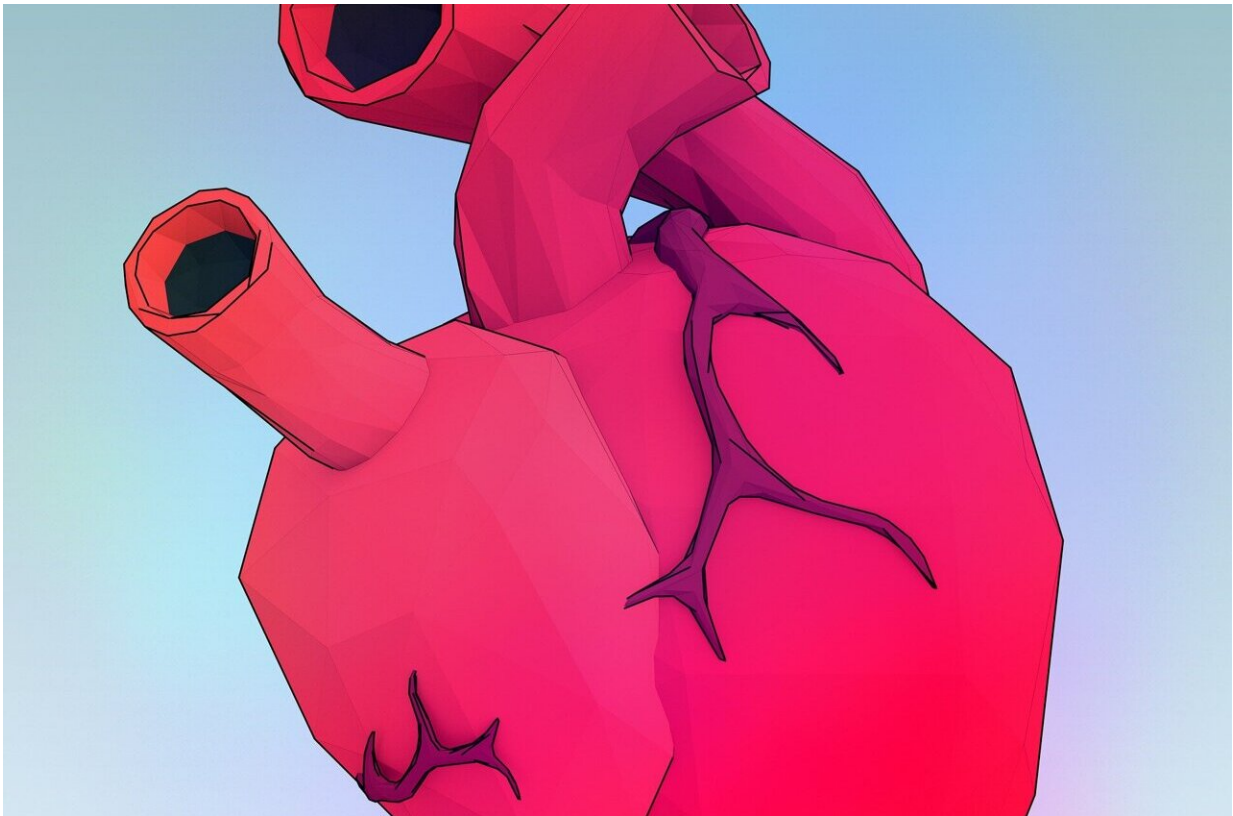


Investigators automate mitral regurgitation detection and diagnosis

August 20 2024



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Investigators with the Smidt Heart Institute at Cedars-Sinai have developed an artificial intelligence (AI) program to detect the presence and severity of mitral valve regurgitation, the most common heart valve

disorder.

The program's findings, [published](#) in *Circulation*, may help clinicians identify patients whose mitral valve regurgitation is manageable with medication as well as patients with more severe cases who would benefit from a minimally invasive valve repair procedure or surgery.

"Mitral regurgitation is a common but often missed [valvular heart disease](#). It can be challenging to precisely assess the disease severity, which is critical to know which patients can take a watch-and-wait approach and which should proceed to an intervention," said David Ouyang, MD, a cardiologist in the Department of Cardiology in the Smidt Heart Institute, an investigator in the Division of Artificial Intelligence in Medicine, and corresponding author of the study.

"The program we developed may one day be used by doctors when considering the best treatment approach for individual patients."

"This could improve how we identify patients with mitral regurgitation, which is becoming more prevalent in our [aging population](#), and to personalize treatment even more so than we already do," said Raj Makkar, MD, associate director of the Smidt Heart Institute and vice president of Cardiovascular Innovation and Intervention for Cedars-Sinai.

The heart has four valves that open and close to move blood throughout the body. In some people, the mitral valve, located on the left side of the heart, does not close properly, which allows blood to flow backwards, a condition called mitral valve regurgitation. The condition prevents enough blood from circulating throughout the body and, over time, can lead to shortness of breath, arrhythmia and heart failure.

"At Cedars-Sinai we are pursuing the use of AI as a complementary tool

in diagnosing and treating conditions such as mitral valve regurgitation," said Sumeet Chugh, MD, director of the Division of Artificial Intelligence in Medicine and the Pauline and Harold Price Chair in Cardiac Electrophysiology Research.

In developing the new program, investigators used more than 58,000 transthoracic echocardiograms from Cedars-Sinai. Echocardiograms are video images of patients' hearts taken by ultrasound and is the most common way to assess mitral regurgitation. The investigators tested the program on echocardiograms from 1,800 patients at Cedars-Sinai as well on echocardiograms from 915 patients from Stanford Healthcare in Northern California.

The model was able to automatically identify moderate and severe mitral valve regurgitation with high precision.

"Our [deep learning model](#) analyzed videos from more than 50,000 echocardiogram studies and can pinpoint the most relevant and important videos to assess mitral regurgitation severity," said first author Amey Vrudhula, a fellow at Cedars-Sinai.

To treat severe [mitral valve regurgitation](#), experts at the Smidt Heart Institute at Cedars-Sinai rely on either the minimally invasive TEER procedure or minimally invasive surgery. All [patients](#) meet with an interventional cardiologist as well as a cardiac surgeon before making their treatment decision.

More information: Amey Vrudhula et al, High-Throughput Deep Learning Detection of Mitral Regurgitation, *Circulation* (2024). [DOI: 10.1161/CIRCULATIONAHA.124.069047](https://doi.org/10.1161/CIRCULATIONAHA.124.069047)

Provided by Cedars-Sinai Medical Center

Citation: Investigators automate mitral regurgitation detection and diagnosis (2024, August 20) retrieved 31 August 2024 from <https://medicalxpress.com/news/2024-08-automate-mitral-regurgitation-diagnosis.html>

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