Using AI in electrocardiogram analysis can improve diagnosis and treatment of hypertrophic cardiomyopathy

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Hypertrophic cardiomyopathy (HCM) is a leading cause of sudden death in adolescents and initial detection is often difficult. A new UC San

Francisco study finds that Artificial Intelligence-enhanced (AI)-Electrocardiograms (ECG) may help identify the condition in its earliest stages and monitor important disease-related changes over time.

The research led by Geoffrey Tison, MD, MPH, in the UCSF Division of Cardiology, was a collaboration between UCSF, the Mayo Clinic and Myokardia Inc. In their study, published in the March 7 issue of the Journal of the American Academy of Cardiology, the authors demonstrated that AI analysis of ECGs can not only accurately predict the diagnosis of HCM, but also that AI-ECG correlates longitudinally with cardiac pressures and lab measurements related to HCM.

This study shows that AI analysis can capture far more information from ECGs related to obstructive HCM pathophysiology than is currently gained by manual ECG interpretation and is the first study to show that AI analysis of ECGs can potentially be used to monitor disease-related physiologic and hemodynamic measurements.

The researchers applied two separate AI-ECG algorithms from UCSF and Mayo Clinic to pre-treatment and on-treatment ECGs from the phase-2 PIONEER- OLE clinical trial (a clinical trial for treatment with the HCM drug Mavacamten in adults with symptomatic obstructive HCM). After showing that both algorithms accurately detected HCM in clinical trial data without additional training, they then showed that AI-ECG HCM scores correlated longitudinally with disease status as measured by decreases over time in left ventricular outflow tract gradients and natriuretic peptide (NT-proBNP) levels in these patients.

The longitudinal associations of the AI-ECG HCM score were significant and likely reflected changes in the raw ECG waveform that were detectable by AI-ECGs and correlated with HCM disease pathophysiology and severity. AI-ECG's potential is broadened by the fact that ECGs can now be measured remotely via smartphone-enabled

electrodes and may permit remote assessment of disease progression as well as drug treatment response.

The authors suggest that future studies are needed to determine whether AI-ECGs can track disease status and be used as a guide for drug measurement to enhance safety.

More information: Geoffrey H. Tison et al, Assessment of Disease Status and Treatment Response With Artificial Intelligence–Enhanced Electrocardiography in Obstructive Hypertrophic Cardiomyopathy, *Journal of the American College of Cardiology* (2022). DOI: 10.1016/j.jacc.2022.01.005

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