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Abstract 10175: An Artificial Intelligence-Based Smartwatch Ecg Analysis Improves the Detection of Atrial Arrhythmia

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Abstract

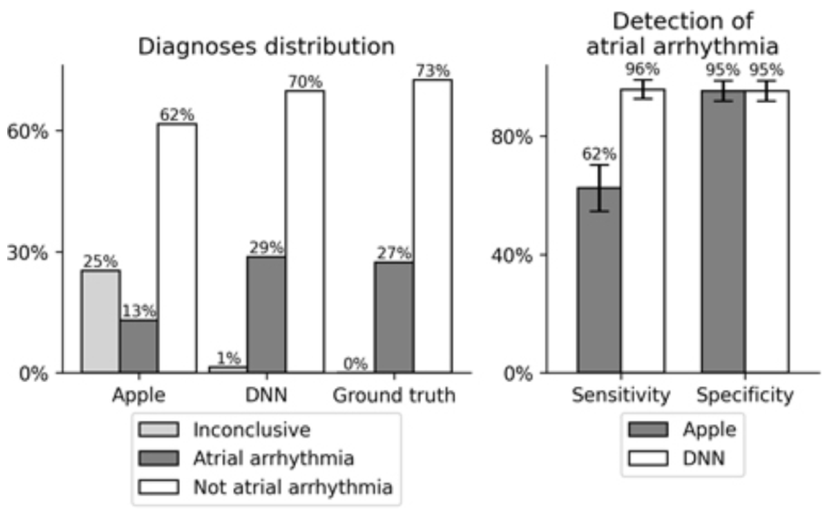
Introduction: Smartwatch ECGs (SW-ECG) have been identified as a noninvasive solution to assess abnormal heart rhythms, especially atrial arrhythmias (AA) which are related to stroke risk. This study assesses the detection of AA with the Apple Watch and compares the accuracy of two algorithms, the original companion application (ECG 1.0 App) and a novel deep neural network (DNN), in a population typical of an electrophysiology department.

Hypothesis/Objective: To determine if a novel DNN can improve the detection of AA on SW-ECGs.

Methods: 146 simultaneous pairs of 12-lead ECGs (GE Mac 2000 or Mindray BeneHeart R12) and SW-ECGs have been collected on 144 patients from the electrophysiology department of one tertiary center. 12-lead ECGs were adjudicated by an expert electrophysiologist as 40 AA and 106 not AA and considered as ground truth. The SW-ECGs were processed by the ECG 1.0 App and the DNN in parallel. The proportions of inconclusive diagnoses returned and the performances were assessed and compared.

Results: Overall, the ECG 1.0 App yielded inconclusive diagnoses for 25% (37/146) of all SW-ECGs while the DNN reduced that number to 1% (2/146). After excluding SW-ECGs with an inconclusive diagnosis (37/146), the ECG 1.0 App and the DNN had a sensitivity of 62% (95% CI, 55%-70%) and 96% (95% CI, 93%-99%) respectively, and both had a specificity of 95% (95% CI, 92%-99%).

Conclusions: A novel DNN improved the performance for the detection of AA. It reduced the burden of inconclusive diagnostics by 24% and improved the sensitivity by 34% with no change in specificity. Routine application of this SW-ECG analysis offers significant promise in arrhythmia diagnosis. Further investigations are needed to assess the classification of atrial arrhythmias more precisely.



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