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Abstract 4338116: FibriCheck Detection Capabilities for Atrial Fibrillation: A Multicenter Validation Study

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Abstract

Background: Atrial fibrillation (AF) is the most common arrhythmia worldwide and is associated with significant morbidity, mortality, and healthcare spending. Despite medical advances, AF remains underdiagnosed and undertreated, leading to preventable complications. FibriCheck © [Qompium NV, Hasselt, Belgium] is a medical analysis platform that uses an end-to-end algorithm to detect AF based on photoplethysmography (PPG) signals recorded on consumer smartphones.

Purpose: The study aimed to validate FibriCheck in a large, multi-center and multi-national cohort on ten popular smartphone devices.

Methods: A total of 236 patients were recruited from five independent, large academic centers in the United States and Europe. The FibriCheck system incorporates several convolutional neural networks to detect individual heartbeats, estimate average heart rate, and classify the rhythm based on PPG signals. Classification is verified by a FibriCheck technician. Classification performance was compared to the standard 12-lead electrocardiogram in the study population. Performance was assessed across clinical subgroups and smartphone devices.

Results: FibriCheck demonstrated high overall accuracy and reliability in detecting AF without technician verification: accuracy 98.5% (95% CI: 98.0%-99.0%); sensitivity 96.3% (95% CI: 94.4%-97.7%); specificity 99.3% (95% CI: 98.8%-99.7%); positive predictive value 98.0% (95% CI: 96.5%-98.9%); negative predictive value 99.8% (95% CI: 99.6%-99.9%). Performance was not affected by smartphone device or the presence or absence of comorbid heart failure, vascular disease, hypertension, diabetes, or stroke. Sensitivity was reduced in those with darker skin tone and higher BMI, but this was mitigated by technician verification.

Conclusions: The study confirms the high accuracy, sensitivity, and specificity of the FibriCheck algorithm in detecting AF across various smartphone models and clinical subgroups. These findings

support the use of FibriCheck as a reliable, low-cost, and easily accessible tool for AF detection in a diverse patient population.

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