

Detection of Pre- and Post-Trigger Atrial Fibrillation in Long-Term Photoplethysmogram Signals Acquired in Free-Living

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Introduction: Modifiable factors, such as alcohol or physical exertion, may trigger atrial fibrillation (AF) episodes. Identifying and eliminating triggers can lead to effective strategies which reduce risk of AF recurrence. This study aims to evaluate pre- and post-trigger AF in long-term photoplethysmogram (PPG) signals obtained during daily living from patients with paroxysmal AF.

Methods: Thirty-seven patients were enrolled and instructed to wear a wrist-worn device for a week. They were also asked to log suspected triggers using a smartphone app. Of these patients, 15 experienced AF episodes, resulting in an average AF burden of 0.15.

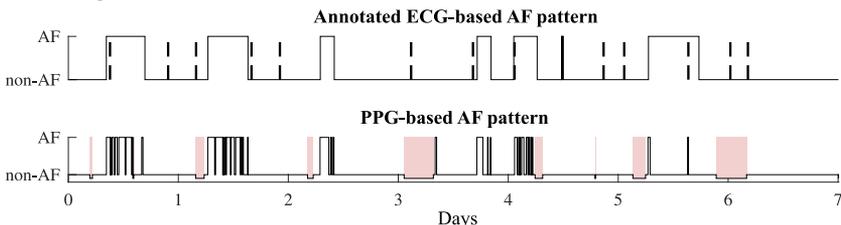


Fig. 1. Example of an annotated and a PPG-based AF patterns. Black dashed lines show suspected triggers logged by the patients. A red area indicates an interval of non-wear time when the wrist-worn device was not used.

Results: The results indicate that longer post-trigger analysis time intervals resulted in better performance of PPG-based AF detection. The sensitivity was highest for the 16-h post-trigger interval (0.76) and lowest for the 4-h interval (0.43). In contrast, the specificity slightly decreased with an increasing longer post-trigger analysis time interval, being 0.98 and 0.95 for the 4-h and 16-h intervals, respectively. The PPG-based post-trigger AF burden was approximately half of that determined by the annotated ECG-based AF pattern.

Conclusion: The study suggests that long-term PPG-based monitoring is a suitable alternative for detecting post-trigger AF instead of ECG-based. However, the accuracy of AF burden estimation using PPG-based technology still calls for improvement.