Background: The mechanisms of immediate (within 2 min) recurrences of atrial fibrillation (IRAF) is unclear. Skin sympathetic nerve activity (SKNA) recorded by surface ECG electrodes can be used to estimate sympathetic tone.

Objective: To test the hypothesis that IRAF episodes are triggered by higher SKNA than non-IRAF episodes.

Methods: Surface ECG Lead I was recorded in 8 patients (average age 66.7 ± 10.3 years; 3 males) with spontaneous AF. We included only AF episodes lasting >10 s, with >10 s of sinus rhythm in between. The signals were bandpass filtered between 500-1000 Hz to display SKNA.

Results: There were 188 paroxysmal AF episodes (24 ± 26 per patient), including 127 IRAF episodes in 6 patients. There were no differences in the AF duration between IRAF and non-IRAF (415.5 ± 833.6 s vs. 586.5 ± 984.7, p = 0.22). Figure shows a typical IRAF episode, with arrows points to elevated SKNA. The average SKNA (aSKNA, μV) 10 s prior to the onset were 1.41 ± 0.41 and 10 s before termination were 1.35 ± 0.37. Both were significantly (p = 0.013 and p < 0.001, respectively) higher than that of non-IRAF episodes (1.26 ± 0.39 and 1.19 ± 0.27, respectively). The sinus heart rate (HR) before onset and after termination were both significantly (p < 0.001 and p < 0.01, respectively) lower in IRAF than in non-IRAF episodes. The number of IRAF episodes per hour strongly correlated with the aSKNA 10 s before termination of AF (r = 0.819, p = 0.013).

Conclusion: Lower HR and higher aSKNA were observed in IRAF than in non-IRAF episodes. These findings suggest that simultaneous sympathetic and parasympathetic activation may play a role in IRAF.

B-PO03-185

VALIDATION OF A DEEP CONVOLUTATIONAL NETWORK FOR DETECTING ATRIAL FIBRILLATION WITH A WRIST-WORN WEARABLE DEVICE

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Background: As wearable fitness trackers and smartwatches equipped with photoplethysmographic (PPG) heart rate sensors increase in popularity, these tools may offer a new approach for early detection of atrial fibrillation (AF) and allow timely anticoagulant treatment to prevent stroke.

Objective: To evaluate the diagnostic accuracy of Cardio Deep Rhythm (CDR), a deep convolutional neural network for detecting AF from pulsatile PPG signals acquired using an off-the-shelf wrist-worn wearable device.

Methods: PPG recordings were obtained from in-patients at rest wearing a wristband device (Empatica E4, Milan, Italy). Three consecutive PPG segments of approximately 17 seconds each (<1 minute in total) were extracted for each patient and classified as AF or Non-AF using CDR (Cardio Inc., USA). The final prediction was labeled as AF if at least two of the three individual PPG segments were classified as AF by CDR; otherwise it was labeled as Non-AF. Concurrent 12-lead electrocardiogram (ECG) recordings were obtained and annotated by a single cardiologist blinded to the CDR labels to provide the reference standard.

Results: A total of 51 patients (69.4 ± SD10.9 years, 68.6% male) were enrolled in this study. AF was present on 12-lead ECG in 29.4% (15/51) patients. Other abnormal non-AF rhythms (9.8%, 5/51) detected in the study population included premature atrial contractions (n=1), premature ventricular contractions (n=3), and sinus arrhythmias (n=1). The diagnostic sensitivity and specificity of CDR for AF detection was 93.3% (95% CI 70.2-98.8%) and 94.4% (CI 81.9-98.5%) with a positive and negative predictive value of 87.5% (CI 64.4-96.4%) and 97.1% (CI 83.6-99.6%) respectively. The area under the receiver operating characteristic (ROC) curve was 0.991; the optimal threshold yielded a sensitivity and specificity of 100% and 94.4% respectively.

Conclusion: Our results demonstrate that detection of AF from wrist PPG signals is feasible. Cardio Deep Rhythm showed high sensitivity and specificity for detecting AF using an off-the-shelf wrist-worn wearable device. Wearables with PPG sensors have promising potential to provide round-the-clock AF monitoring.

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EARLY REPOLARIZATION INHERITANCE PATTERN IN THE CARDIAC ARREST SURVIVORS WITH PRESERVED EJECTION FRACTION REGISTRY (CASPER)

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Background: Early repolarization (ER) has been considered a factor conferring increased risk of sudden death. A monogenic explanation is seldom evident after cascade screening.

Objective: To explore ER prevalence between survivors of unexplained cardiac arrest (UCA survivors) and their first-degree relatives.

Methods: UCA survivors, and their first-degree relatives enrolled in the Cardiac Arrest Survivors with Preserved Ejection Fraction Registry were included. ER was defined as J-point elevation ≥0.1 mV above the isoelectric line in contiguous inferior (II, III,