Temporal clustering of skin sympathetic nerve activity bursts in acute myocardial infarction patients

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Abstract

Introduction: The acute myocardial infarction (AMI) affecting the autonomic nervous system (ANS) function has been affirmed in clinical and basic research. We hypothesize that a high level of ANS regulation in AMI patients could cause synchronized neural discharge (clustering phenomenon) detected by non-invasive skin sympathetic nerve activity (SKNA). Methods: Forty subjects, including 20 AMI patients and 20 non-AMI controls, participated in the study. The wide-band bioelectrical signals (neuECG) were continuously recorded on the body surface for 5 minutes. The SKNA were signal processed to depict the envelope of SKNA (eSKNA). By labeling the clusters, the subjects were separated into non-AMI, non-cluster appearing (AMINCA) and cluster appearing (AMICA) groups. Results: The average eSKNA was significant correlated with HRV low frequency power (rho=-0.336) and high frequency power (rho=-0.372). The cross-comparison results demonstrated the eSKNA is a credible indicator to assess ANS in AMI patients. The frequency of cluster occurrence was 0.01-0.03 Hz and the amplitude about 3 μV. The LF/HF ratio of AMINCA (Median:3.959; Q1-Q3:1.840-6.562) revealed significantly higher than AMICA (Median:1.877; Q1-Q3:1.483-2.413). The results exhibited the SKNA clustering is a unique temporal pattern of ANS synchronized discharge, which could regulate and help maintain the ANS balance in AMI patients. Conclusion: This is the first study to identify the SKNA clustering phenomenon in AMI patients. Such a synchronized nerve discharge pattern could be detected with non-invasive SKNA signals. The SKNA temporal clustering could be a novel biomarker to classify the ANS regulation ability in AMI patients.

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FIGURE 1

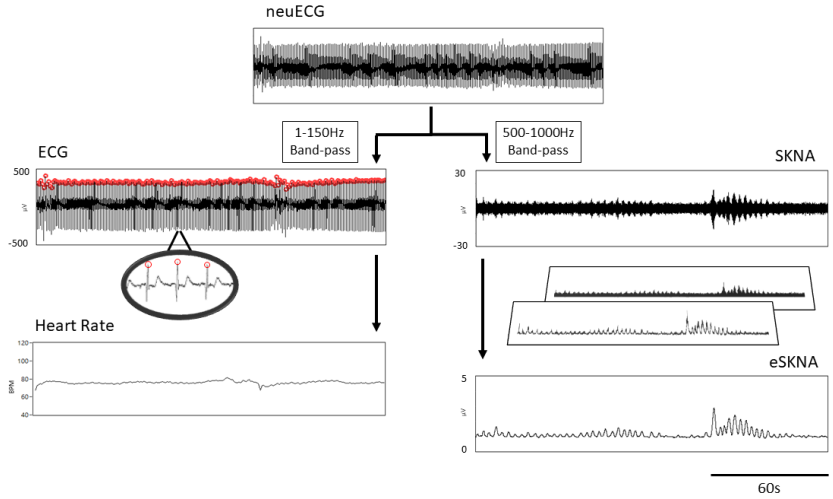


FIGURE 2

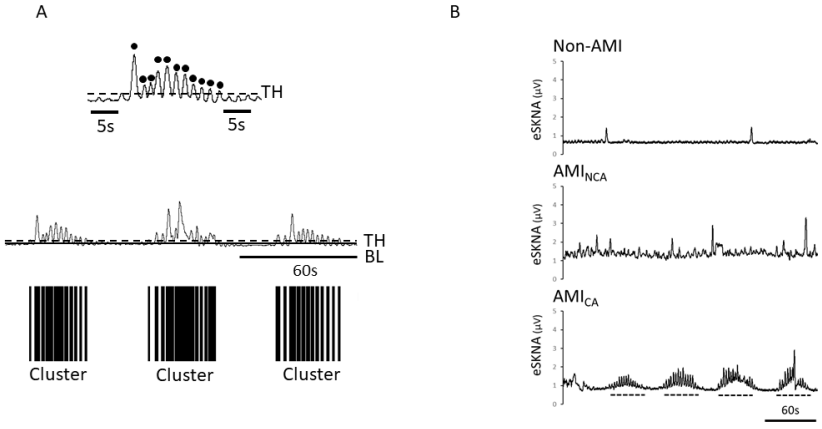
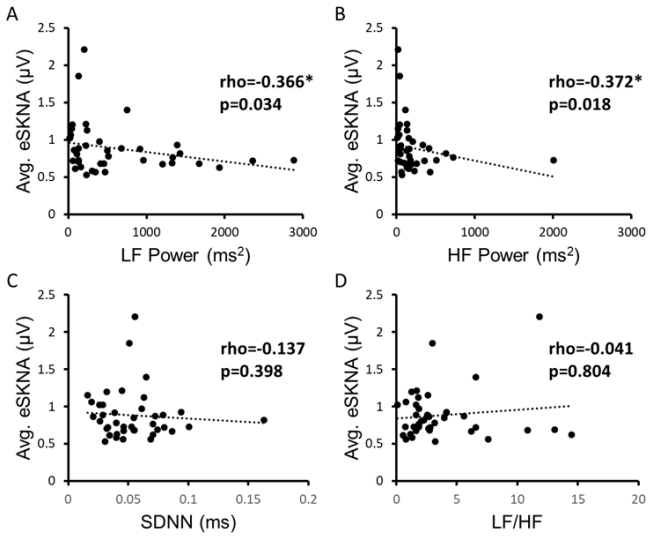


FIGURE 3



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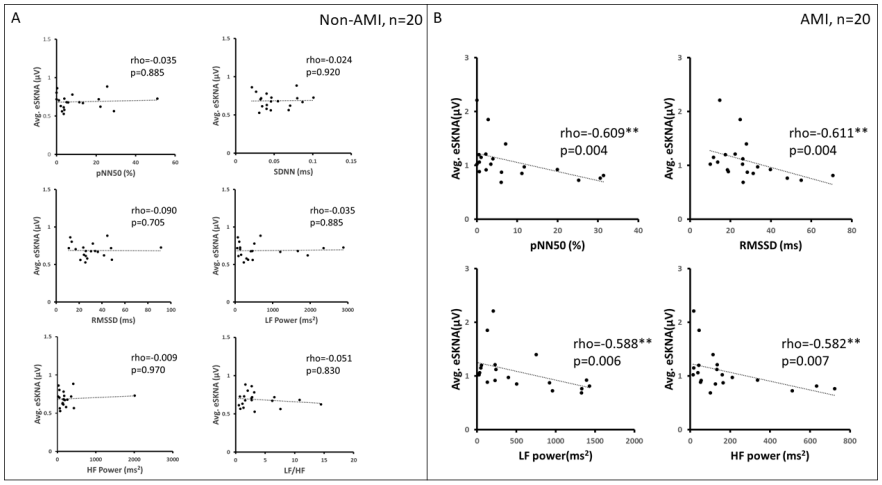

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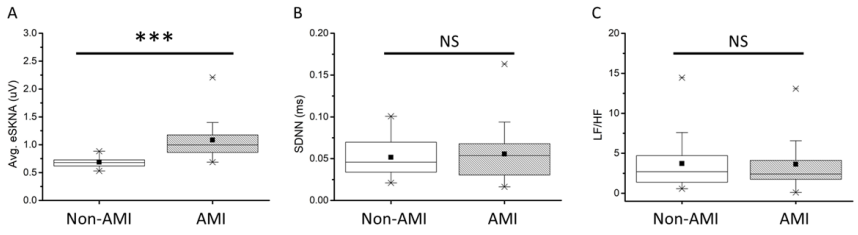

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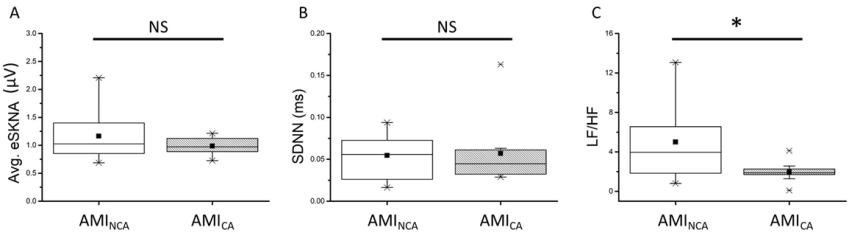

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