

DISCRIMINATION BETWEEN VOLUNTARY COUGH SOUND AND SPEECH IN VOLUNTEERS BY SPECTRAL AND COMPLEXITY ANALYSIS

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Background: Cough is the most common and important symptom in many respiratory diseases. The objective monitoring of cough sound for extended period is an important step towards better understanding of this symptom. To-date, methods used to monitoring of cough sound were primarily subjective. Because ambulatory cough monitoring systems are not commercially available we have prepared own monitoring system, which is able to distinguish between voluntary cough sound and speech in healthy volunteers. **Methods:** The 18-min sound records (reading of the book with voluntary coughs marked at fixed places in the text) were obtained using portable digital voice recorder (Sony ICD-MX20, Sony Corporation, China) and stored to the digital recorder memory card. Sound records were transferred into PC, converted to 11 kHz 16-bit mono digital wave file (WAV format) and stored to PC memory. The non-sound (silent) segments of recording were excluded from further analysis. Parameters of sound events have been calculated using the time-domain, spectral and non-linear analysis (parameter sample entropy - SampEn). Based on these parameters, classification regression tree was constructed for classification of cough and non-cough sound events. We have validated the usefulness of our developed algorithm against manual counts of the cough sounds obtained by a trained observer in 18 sound recordings obtained from healthy volunteers (13 female - median age 24.7 yrs, range 18 – 56 yrs; 5 male - median age 47.2 yrs, range 26 - 66 yrs). **Results:** All assessed cough sound characteristics were different between cough and non-cough sound events. The median sensitivity of our classification tree value was 100% (the interquartile range is from 98 to 100) and the median specificity was 95% (the interquartile range is from 90 to 97). **Conclusion:** We have developed algorithm to distinguish between voluntary cough sound and speech with a very high degree of accuracy, which is comparable with recently published studies based only on the sound analysis.

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