

A WAVELET ANALYSIS OF VOLUNTARY COUGH SOUND IN PATIENTS WITH RESPIRATORY DISEASES

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Objective: Changes in the characteristics of the cough sound may refer to some specific pathological processes and their evolution. In this pilot study we analyzed voluntary cough sound properties in subjects with pathological conditions, such as asthma bronchiale (AB), chronic obstructive pulmonary disease (COPD) and discriminated them from the control cough sound in healthy subjects. **Methods:** The wavelet transform was used due to a non-stationarity present in the sound of cough. Duration of the sound, maximal power in the time and frequency domain, distribution of the power in different wavelet scale (frequency) bands and their ratio to the total spectral power were determined. Several discrete wavelet transform measures (up to 5th level of decomposition) were computed. Spectral characteristics were computed also for the sample (time instant) with maximum of wavelet coefficients. **Results:** The duration of the cough sound was longer during pathological conditions. The longest duration and the highest power of the cough sound were found in COPD. In AB patients, the higher frequencies were detected compared to chronic bronchitis and the power of cough sound was shifted to higher frequency range compared to control coughs. According to the selected parameters, cough sounds were classified using discriminant analysis with correct classification rate of about 85-90 %. **Conclusion:** Acoustic properties of a voluntary cough sound differ among all analyzed groups. Described method of analysis enables objective quantification of voluntary cough sound characteristics with potentially useful diagnostic and prognostic value.

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