95. Correlation Between Cough Sound Characteristics And Specific Airway Resistance In Guinea Pigs

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Human studies have shown that cough sound analysis may be useful for diagnosing pulmonary abnormalities. The purpose of this study was to evaluate an animal model for cough sound analysis. A system was designed to expose guinea pigs to aerosols of citric acid (0.39M) and record resulting coughs at different stages of chemically induced specific airway resistance (SRaw). SRaw changes were determined by comparing the phase differences in the nasal and thorax flows during breathing cycles using dual chamber plethysmography. Coughs were divided into three categories (low SRaw, n = 114; moderate SRaw, n = 164; high SRaw, n =75). 122 cough sound parameters were derived from the analysis of the sound pressure waves recorded during the cough. The signal analysis included filter octave analysis, frequency power analysis, and time dependent spectral analysis. Unacceptable coughs were defined as those having 10% or more parameters exceeding two standard deviations from the mean and were eliminated from each group. A principal component analysis was performed on all of the data, and components describing 99% of the variability in the parameters were chosen to train a single neuron feed-forward back propagation neural network with a bipolar sigmoid output transfer function. The classification system was able to correctly discriminate between members of the high and low airway constriction groups with an accuracy of 0.936 and a sensitivity and specificity of 0.893.

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