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Title: Configuration of coughs and sneezes during their mutual mechanical stimulation

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Body: Modulation of coughing by nasal mechanical stimulation and mutual interactions of cough and sneeze were studied on 11 spontaneously breathing pentobarbitone anesthetized cats (3.5 ± 0.2 kg). Sneezing was induced mechanically in the nose, coughing in the tracheobronchial airways. The amplitude of styloglossus muscle electromyogram (EMG) moving average during the expulsive phase of sneeze was about 16-fold higher than that during cough expulsion ($p < 0.01$; 9 cats that sneezed). Higher inspiratory efforts occurred during coughing (amplitudes of inspiratory esophageal pressure and the diaphragm EMG; $p < 0.01$) vs. those in sneeze. Mechanical nasal stimulation (when no sneeze was evoked) had no significant effect on tracheobronchial cough (7 cats). However, in the combined trials, where cough and sneeze were both executed (7 cats), the responses were classified as either sneeze or cough (practically no hybrid responses occurred) and they were potentiated comparing to control reflexes. We found higher expiratory maxima of esophageal pressure and the amplitudes of abdominal muscles EMG moving averages compared to control coughs and sneezes ($p < 0.05$). In sneeze during combined trials also amplitudes of inspiratory esophageal pressure and diaphragm EMG moving average and the number of sneezes were increased ($p < 0.05$). We conclude that mechanosensitive nasal afferents have limited effect on the tracheobronchial cough response. However, co-expression of coughing and sneezing results in a variety of enhanced cough and sneeze responses supposedly representing improved airway defense. This work was supported by the Slovak Research and Development Agency under the contract No. APVV-0189-11 and by VEGA No. 1/0126/12.