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Neural gating of respiratory sensations in patients with self-reported dysfunctional breathing and healthy controls

Background. Self-reported dysfunctional breathing (SDB) involves dyspnea without known underlying respiratory pathophysiology. We investigated whether neural gating of respiratory sensations is altered in this patient group.

Methods. 10 DB patients (Nijmegen total score 31±11) and 10 healthy controls underwent three levels of resistive load-induced dyspnea with concurrent electroencephalography measurement. The levels (each 2x4 minutes in counterbalanced order) were individually calibrated to induce “no”, “mild”, and “strong” dyspnea. Dyspnea intensity and unpleasantness were rated on a modified Borg scale for each level. Paired inspiratory occlusions evoked the respiratory-related evoked potential (RREP). Neural gating of respiratory sensations (NGRS) was calculated as the ratio of the RREP N1 peak amplitude of the second (S2) over the first (S1) occlusion.

Results. Mixed design ANOVAs showed significant increases in the Borg ratings with increasing dyspnea levels (all p’s<.001). Furthermore, the Borg ratings were significantly higher in the SDB group (p’s<.05) for each dyspnea level. Both, the S1 N1 and S2 N1 peak amplitudes significantly decreased with increasing dyspnea levels (both p’s<.001) and a significant dyspnea level x group interaction effect was found for S2 N1. NGRS did not significantly change across the different levels (p=.08), and did not significantly differ between the SDB and control group (p=.65).

Discussion. The results suggest that SDB patients perceive dyspnea as more intense and unpleasant across different levels. While this difference in experience was not paralleled by different NGRS, the S2 N1 peak amplitude more strongly decreased with increasing dyspnea in patients with SDB in this preliminary sample.