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Influence of posture and breathing route on neural drive to upper airway dilator muscles during exercise.

Williams JS, **Janssen PL**, **Fuller DD**, **Fregosi RF**.

Respiratory Physiology Laboratory, Department of Physiology, The University of Arizona, Tucson 85721-0093, USA.

Our purpose was to determine the influence of posture and breathing route on electromyographic (EMG) activities of nasal dilator (NDM) and genioglossus (GG) muscles during exercise. Nasal and oral airflow rates and EMG activities of the NDM and GG were recorded in 10 subjects at rest and during upright and supine incremental cycling exercise to exhaustion. EMG activities immediately before and after the switch from nasal to oronasal breathing were also determined for those subjects who demonstrated a clear switch point (n = 7). NDM and GG EMG activities were significantly correlated with increases in nasal, oral, and total ventilatory rates during exercise, and these relationships were not altered by posture. In both upright and supine exercise, NDM activity rose more sharply as a function of nasal inspired ventilation compared with total or oral inspired ventilation ($P < 0.01$), but GG activity showed no significant breathing-route dependence. Peak NDM integrated EMG activity decreased ($P = 0.008$), and peak GG integrated EMG activity increased ($P = 0.032$) coincident with the switch from nasal to oronasal breathing. In conclusion, 1) neural drive to NDM and GG increases as a function of exercise intensity, but the increase is unaltered by posture; 2) NDM activity is breathing-route dependent in steady-state exercise, but GG activity is not; and 3) drive to both muscles changes significantly at the switch point, but the change in GG activity is more variable and is often transient. This suggests that factors other than the breathing route dominate drive to the GG soon after the initial changes in the configuration of the oronasal airway are made.

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