

# SEX DIFFERENCES IN THE VENTILATORY RESPONSE ARISING FROM THE INTERACTION BETWEEN THE CAROTID CHEMOREFLEX AND THE MUSCLE MECHANOREFLEX IN HEALTHY HUMANS

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**Introduction:** Recently our group demonstrated a hyperadditive ventilatory response in face of concomitant activation of the carotid chemoreflex and the muscle mechanoreflex in humans (i.e., the response to combined stimuli was greater than the sum of the responses yielded by each stimulus in isolation). However, we did not analyze sex differences, and it is possible that men present augmented ventilatory response to combined activation of both reflexes, but not women, because the ventilatory response to inhalation of hypoxic air during active mild-intensity exercise is greater in men than women.

**Objective:** To test whether ventilatory response arising from combined carotid chemoreflex and muscle mechanoreflex activation is hyperadditive in men and additive in women.

**Methods:** Fourteen young healthy subjects participated in the study (8 men). The carotid chemoreflex was activated by hypoxia and the muscle mechanoreflex was activated by passive movement. Subjects inhaled, randomly, in separate visits, either 1) 12% of O<sub>2</sub> to stimulate the carotid chemoreflex (i.e., hypoxia), 2) 21% of O<sub>2</sub> as control (i.e., normoxia). Isocapnia was obtained via a rebreathing circuit. Administration of gases lasted ~2 min. Within this period, subjects either remained at rest (i.e., normoxic rest or hypoxic rest) or the mechanoreflex was activated (i.e. normoxic movement or hypoxic movement), in random order. The passive movement consisted of passive knee flexion and extension of the nondominant limb, at 0.5 Hz, for 30 s, using an isokinetic dynamometer. Muscle electrical activity was measured to confirm the absence of active contractions. Each procedure was repeated at least four times. Data were interpolated and time-aligned, and then, analyzed as 10-s averages. Data are presented as mean  $\pm$  SEM. The last 10 s of each experiment were used in t-tests or repeated measures ANOVA. The study was approved by the Ethics Committee of the Federal University of Sao Paulo (process number: 74619517.5.0000.5505).

**Results:** The ventilatory response to hypoxic rest was similar between men and women (men:  $0.8 \pm 0.9$  vs women:  $1.9 \pm 1.1$  L/min,  $P = 0.40$ ). The ventilatory response to normoxic movement was also similar between men and women (men:  $1.0 \pm 0.7$  vs women:  $0.4 \pm 0.4$  L/min,  $P = 0.75$ ). The ventilatory response to hypoxic movement was higher than the sum of hypoxic rest and normoxic movement ventilatory responses in men (hypoxic movement:  $4.2 \pm 1.3$  vs. sum of hypoxic rest and normoxic movement:  $1.8 \pm 1.2$  L/min,  $P < 0.01$ ), but not in women (hypoxic movement:  $2.9 \pm 0.6$  vs sum of hypoxic rest and normoxic movement:  $2.3 \pm 1.0$  L/min,  $P = 0.34$ ).

**Conclusion:** The interaction between the carotid chemoreflex and the muscle mechanoreflex yielded a hyperadditive ventilatory response in men, but an additive ventilatory response in women.

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## References:

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