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Hypocapnia and increased ventilatory responsiveness in patients with idiopathic central sleep apnea

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We previously demonstrated that central apneas during sleep in patients with idiopathic central sleep apnea (ICSA) are triggered by abrupt hyperventilation. In addition, baseline PCO₂ at the time of augmented breaths which triggered central apneas was lower than for augmented breaths which did not trigger apneas. These observations led us to hypothesize that patients with ICSA chronically hyperventilate maintaining their PCO₂ close to the threshold for apnea during sleep owing to **increased** chemical respiratory drive. To test these hypotheses, we recorded transcutaneous PCO₂ (PtcCO₂) during overnight sleep studies on nine consecutive patients with ICSA and nine sex-, age-, and body-mass-index-matched control subjects. Daytime PaCO₂ as well as rebreathing and single breath ventilatory responses to CO₂ were also measured. Compared with the control subjects, the patients had significantly lower mean PtcCO₂ during sleep (37.8 +/- 1.2 versus 42.7 +/- 10.9 mm Hg, p < 0.01) and lower PaCO₂ while awake (35.1 +/- 1.3 versus 38.8 +/- 0.9 mm Hg, p < 0.05). Furthermore, patients with ICSA had significantly higher ventilatory responses to CO₂ for both the rebreathing (3.14 +/- 0.34 versus 1.60 +/- 0.32 L/min/mm Hg, p < 0.005) and single breath methods (0.51 +/- 0.10 versus 0.25 +/- 0.04 L/min/mm Hg, p < 0.05). We conclude that: (1) patients with ICSA chronically hyperventilate awake and asleep and (2) chronic hyperventilation is probably related to augmented central and peripheral respiratory drive which predisposes to respiratory control system instability.

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- Topor, Z. L., Johansson, L., Kasprzyk, J., Remmers, J. E. (2001). Dynamic ventilatory response to CO₂ in congestive heart failure patients with and without central sleep apnea. *J. Appl. Physiol.* 91: 408-416 [[Abstract](#)] [[Full Text](#)]
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