

## Assessment of central chemosensitivity and cardiac sympathetic nerve activity using I-123 MIBG imaging in central sleep apnea syndrome in patients with dilated cardiomyopathy

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**Objective:** Iodine-123 MIBG imaging has been used to study cardiac sympathetic function in various cardiac diseases. Central sleep apnea syndrome (CSAS) occurs frequently in patients with chronic heart failure (CHF) and is reported to be associated with a poor prognosis. One of the mechanisms of its poor prognosis may be related to impaired cardiac sympathetic activity. However, the relationship between chemosensitivity to carbon dioxide, which is reported to correlate with the severity of CSAS, and cardiac sympathetic activity has not been investigated. Therefore, this study was undertaken to assess cardiac sympathetic function and chemosensitivity to carbon dioxide in CHF patients. **Methods:** The oxygen desaturation index (ODI) was evaluated in 21 patients with dilated cardiomyopathy (male/female: 19/2, LVEF < 45%, 65 ± 12 yr). Patients with an ODI > 5 times/h underwent polysomnography. Patients with an apnea hypopnea index > 15/h but without evidence of obstructive apnea were defined as having CSAS. Early (15 min) and delayed (4 hr) planar MIBG images were obtained from these patients. The mean counts in the whole heart and the mediastinum were obtained. The heart-to-mediastinum count ratio of the delayed image (H/M) and the corrected myocardial washout rate (WR) were also calculated. The central chemoreflex was assessed with the rebreathing method using a hypercapnic gas mixture (7% CO<sub>2</sub> and 93% O<sub>2</sub>). **Results:** Ten of the 21 patients had CSAS. The H/M ratio was similar in patients both with and without CSAS (1.57 ± 0.18 vs. 1.59 ± 0.14, p = 0.82). However, the WR was higher in patients with CSAS than in patients without CSAS (40 ± 8% vs. 30 ± 12%, p < 0.05). ODI significantly correlated with central chemosensitivity to carbon dioxide. Moreover, there was a highly significant correlation between WR and central chemosensitivity (r = 0.65, p < 0.05). However, there was no correlation between ODI and the WR (r = 0.36, p = 0.11). **Conclusions:** Cardiac sympathetic nerve activity in patients with CHF and CSAS is impaired. However, central sleep apnea might not directly increase cardiac sympathetic nerve activity. We suggest that central chemosensitivity, which is considered to be one of the mechanisms of CSAS, is correlated with cardiac sympathetic nerve activity.

**Key words:** central chemosensitivity, I-123 MIBG imaging, cardiac sympathetic nerve activity, sleep apnea syndrome