The FASEB Journal Meeting Abstracts; April, 2011. 25:1111.16)

Increasing respiratory dead space improves sleep disordered breathing and hypoxemia in patients with chronic mountain sickness

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Chronic mountain sickness (CMS) is a major public health problem characterized by chronic hypoxemia and erythrocytosis. The underlying mechanism is unknown. Sleep disordered breathing (SDB) is frequent at high altitude. We recently found that increasing the respiratory dead space markedly improves SDB in mountaineers. We speculated that this procedure also has beneficial effects in CMS patients.

To test this hypothesis, in 17 male Bolivian high-altitude dwellers (56±9 y) suffering from CMS full night sleep recordings were obtained in random order during one night spent with and one without a 500 ml increase in respiratory dead space through a custom designed full face mask. Recordings were also obtained in 6 control subjects.

The major new findings were two-fold; a) CMS patients present markedly more severe SDB and hypoxemia ($P<.01$) than control subjects; and b) added dead space dramatically improved SDB in CMS patients, as evidenced by a decrease of the apnea/hypopnea ($P<.01$), hypopnea ($P=.01$) and oxygen desaturation ($P<.01$) indexes, and an increase of the nocturnal oxygen saturation ($P=.01$). The procedure was well tolerated.

Here, we show for the first time that increasing respiratory dead space dramatically improves SDB in patients with CMS. We speculate that its long-term use will improve erythrocytosis and pulmonary hypertension and offer an inexpensive treatment for this major public health problem.