Central role of carotid body chemoreceptors in disordered breathing and cardiorenal dysfunction in chronic heart failure

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Oscillatory breathing (OB) patterns are observed in pre-term infants, patients with cardio-renal impairment, and in otherwise healthy humans exposed to high altitude. Enhanced carotid body (CB) chemoreflex sensitivity is common to all of these populations and is thought to contribute to these abnormal patterns by destabilizing the respiratory control system. OB patterns in chronic heart failure (CHF) patients are associated with greater levels of tonic and chemoreflex-evoked sympathetic nerve activity (SNA), which is associated with greater morbidity and poor prognosis. Enhanced chemoreflex drive may contribute to tonic elevations in SNA by strengthening the relationship between respiratory and sympathetic neural outflow. Elimination of CB afferents in experimental models of CHF has been shown to reduce OB, respiratory-sympathetic coupling, and renal SNA, and to improve autonomic balance in the heart. The CB chemoreceptors may play an important role in progression of CHF by contributing to respiratory instability and OB, which in turn further exacerbates tonic and chemoreflex-evoked increases in SNA to the heart and kidney.

Cardiorenal syndrome

Carotid body chemoreceptors

Cheyne-Stokes respiration

Heart failure

Sympathetic nervous system

Article

autonomic dysfunction

autonomic nervous system

breathing disorder

cardiorenal syndrome

carotid body chemoreceptor

chemoreceptor reflex

Cheyne Stokes breathing

disease association

heart failure

heart muscle oxygen consumption

human

nonhuman

renin angiotensin aldosterone system

respiratory sympathetic coupling

respiratory tract parameters

sodium retention

sympathetic nerve activity

tidal volume

vascular resistance

water retention