Role of the Carotid Body Chemoreflex in the Pathophysiology of Heart Failure: A Perspective from Animal Studies

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The treatment and management of chronic heart failure (CHF) remains an important focus for new and more effective clinical strategies. This important goal, however, is dependent upon advancing our understanding of the underlying pathophysiology. In CHF, sympathetic overactivity plays an important role in the development and progression of the cardiac and renal dysfunction and is often associated with breathing dysregulation, which in turn likely mediates or aggravates the autonomic imbalance. In this review we will summarize evidence that in CHF, the elevation in sympathetic activity and breathing instability that ultimately lead to cardiac and renal failure are driven, at least in part, by maladaptive activation of the carotid body (CB) chemoreflex. This maladaptive change derives from a tonic increase in CB afferent activity. We will focus our discussion on an understanding of mechanisms that alter CB afferent activity in CHF and its consequence on reflex control of autonomic, respiratory, renal, and cardiac function in animal models of CHF. We will also discuss the potential translational impact of targeting the CB in the treatment of CHF in humans, with relevance to other cardio-respiratory diseases. © Springer International Publishing Switzerland 2015.

Blood flow

Breathing

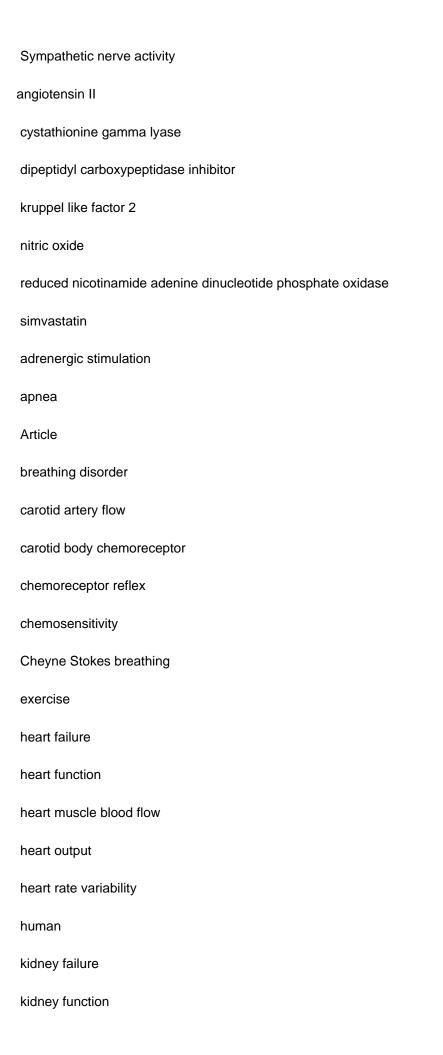
Carotid body

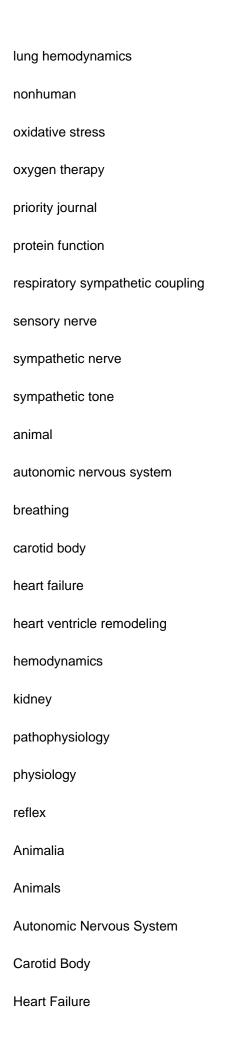
Heart failure

KLF2

Nitric oxide

Oxidative stress





Hemodynamics
Kidney
Reflex
Respiration
Ventricular Remodeling