

Selective carotid body ablation in experimental heart failure: A new therapeutic tool to improve cardiorespiratory control

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New Findings: What is the topic of this review? This review summarizes the physiological role played by the carotid body in the autonomic dysregulation and breathing disturbances during the progression of chronic heart failure and the therapeutic potential of carotid body ablation to control cardiorespiratory imbalance and improve survival in heart failure. What advances does it highlight? Carotid body ablation markedly improves breathing stability and normalizes autonomic function in chronic heart failure. More importantly, if carotid body ablation is performed early during the progression of the disease it significantly improves animal survival. Chronic heart failure (CHF) is a leading medical problem worldwide. Common hallmarks of CHF include autonomic imbalance and breathing disorders, both of which are closely related to the progression of the disease and strongly predict mortality in CHF patients. The role played by the carotid body (CB) chemoreceptors in the progression of CHF has received attention because enhanced carotid chemoreflex drive is thought to contribute to autonomic dysfunction, abnormal breathing patterns and increased mortality in CHF. Therefore, therapeutic tools intended to normalize CB-mediated chemoreflex drive could have the potential to improve quality of life and decrease mortality of CHF patients. In experimental CHF, an enhancement of the CB chemoreflex drive, elevated sympathetic outflow, increased resting breathing variability, increased incidence of apnoea and desensitization of the baroreflex have been shown. Notably, selective elimination of the CB reduced central presympathetic neuronal activation, normalized sympathetic outflow and baroreflex sensitivity and stabilized breathing function in CHF. More remarkably, CB ablation has been shown to be a valuable therapeutic tool that significantly reduced aberrant cardiac remodelling, improved left ventricular ejection fraction and reduced

cardiac arrhythmogenesis. Most importantly, animals with CHF that underwent CB ablation showed a marked improvement in survival rate. Interestingly, a case report from a heart failure patient in whom unilateral CB ablation was performed showed promising results, with significant improvement in autonomic balance and breathing variability. Together, the CHF data from experimental animals as well as humans unveil a major role for the CB chemoreceptors in the progression of heart failure and support the notion that CB ablation could represent a novel therapeutic strategy to reduce cardiorespiratory dysfunction and improve survival during heart failure. © 2014 The Physiological Society.