

Respiratory infections

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Respiratory Impairment in Diabetes: A Therapeutic Target

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Respiratory function in diabetes has been sparingly studied and the issue is contentious. Studies usually demonstrate a respiratory insufficiency (Weisbrod et al. 2005), but there are rare reports of no change (Saiki et al. 2005), or even an increase in ventilation (Calverley et al. 1982). In a previous study we also found a clear suppression of respiration and its stimulatory responses to hypoxia, driven by carotid body chemoreceptors, along with a profound degeneration of CB parenchyma (Pokorski et al. 2015); with a notable pathological remodeling of CB microvasculature, which is reminiscent of hypoxia inducible factor (HIF)-1 α 's action in carcinogenesis. There are other reasons for diminished respiratory function in diabetes such as brain and peripheral neuropathy, which puts a difficult to meet strain on the respiratory muscle effort. In view of impaired function of the respiratory system and simultaneously increased hyperglycemia-driven metabolic demand for oxygen in diabetes, the question arises of whether an improvement in respiration, particularly an invigoration of the hypoxic ventilatory reactivity, could be of therapeutic help. The problem is that the well-working and safe pharmacological tools to increase CB function are yet to be unraveled.

Hyperglycemia and hyperinsulinemia increase oxidative stress, and mesh together with chronic tissue hypoxia and inflammation. Oxidative stress also inversely affects the chemosensing mechanisms by enhancing the stabilization of HIF-1 α in carotid chemoreceptor cells in chronic hypoxia. Herein, we demonstrate and discuss a way to enhance hypoxic ventilatory reactivity, intending to ameliorate the undue effects of disordered "redox" balance in CB in a rat model of streptozotocin-induced diabetes. The therapy consisted of using a chronic supplementation of a nutraceutical mangiferin, a potent non-toxic polyphenol antioxidant and scavenger of free radical. The results were encouraging in that the suppressed hypoxic ventilatory responses reverted to the control level in the healthy condition, along with the normalization of oxidative and inflammatory stress. We conclude that mangiferin seems to hold a therapeutic potential as an adjunct treatment to control diabetes.