Important Mechanisms in Blood Pressure Regulation

Background

There is a delicate balance between too high blood pressure, often in the middle-aged and elderly populations, and too low blood pressure, mostly in the very elderly population. The aim of our thesis was to describe and clarify this imbalance, possible mechanisms and its relations to end-organ failure and treatment.

Methods

In order to complete our aim we needed to examine patients with and without hypertension in a middle-aged population [1], do experimental studies on blood vessels from the vascular system in animals [2, 3], study patients with and without hypotension in a very elderly population [4], and finally, examine the inevitable end-result of blood pressure dysregulation in two different cohorts of heart failure patients receiving different treatments [5].

Results

Patients with essential hypertension had significantly reduced microvascular dilator responses to CGRP and to local warming and a tendency of higher plasma levels of NT-proBNP [1]. The results from our rat perfusion models showed significant upregulation of ET- and AT-receptor proteins after high perfusion pressure [2, 3]. There were increased cardiovascular disease, morbidity and mortality in elderly patients with orthostatic hypotension compared to patients without orthostatic hypotension [4]. A standardized manor of heart failure care significantly decreased all-cause mortality, decreased NT-proBNP values and lowered NYHA-class compared to regular heart failure care [5].

Conclusions

The cause or consequence of high blood pressure and early signs of organ damage could be found in relatively young patients without other risk factors than hypertension [1]. Rat perfusion models suggested a shift in the role of the endothelin and angiotensin system towards a worsening of the pathophysiology in the early stages of high blood pressure [2, 3]. Alterations to high blood pressure was seen throughout the vascular bed in both the skin [1], heart [1], stomach [2] and brain [3]. Orthostatic hypotension, a vascular dysfunction in the very elderly often associated with high blood pressure, proved to be a condition with serious consequences for the heart and survival [4]. Treating heart failure, the ultimate end-stage of high blood pressure, effectively and standardized with medications that target vascular receptors that are elevated in hypertension [2, 3], can improve heart failure and survival [5].

References


2. Lindstedt I, Xu CB, Zhang Y, Edvinsson L. Increased perfusion pressure enhances the expression of endothelin (ETB) and angiotensin II (AT1, AT2) receptors in rat mesenteric artery smooth muscle cells. Blood Pressure 2009; 18 (1-2): 78-85.
