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The Essential Role of Fat-Specific Ptotein in the Development of Hypertension

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Summary

Patients with obesity are susceptible to hypertension. We have reported that the plasma adiponectin levels are decreased in obesity and that adiponectin has many defensive properties against obesity-related diseases, such as type 2 diabetes and coronary artery disease. The aim of this study was to determine the relationship between adiponectin and hypertension in mice.

We measured blood pressure and heart rate directly by a catheter in the carotid artery and indirectly by automatic sphygmomanometer at the tail artery. Obese KKAy mice had significantly lower plasma adiponectin levels and higher systolic blood pressure than control C57BL/6J mice at 21 weeks of age. Adenovirus-delivered adiponectin significantly decreased blood pressure in KKAy mice. The direct role of adiponectin on blood pressure regulation under insulin resistance-free state was investigated in adiponectin-knockout (KO) mice. Adiponectin KO mice developed hypertension when maintained on a high-salt diet (8% NaCl) without insulin resistance. The hypertension of salt-fed adiponectin KO mice was associated with reduced mRNA levels of endothelial NO synthase (eNOS) and prostaglandin I_2 synthase in aorta and low metabolite levels of endothelial NO synthase and prostaglandin I_2 synthase in plasma.

Adiponectin therapy lowered the elevated blood pressure and corrected the above mRNA levels to those of the wild type. Our results suggest that hypoadiponectinemia contributes to the development of obesity-related hypertension, at least in part, directly, in addition to its effect via insulin resistance, and that adiponectin therapy can be potentially useful for hypertension in patients with the metabolic syndrome.