α1D-adrenoceptors are responsible for maintenance of the cardiovascular structure and function independently of blood pressure

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Hypertension is the main risk factor for cardiovascular diseases. The sympathetic nervous system significantly regulates vascular tone and blood pressure via the catecholamines, adrenaline and noradrenaline, by activating α 1-adrenergic receptors (α1-ARs); these receptors have been associated with the regulation of processes like cardiac and arterial smooth muscle contraction, and have been implicated in pathological processes like cardiac and smooth muscle hypertrophy. We described that the α1D-AR participates in the genesis and/or maintenance of hypertension. The evidence allowed us to generate α1D-AR KO mice as a model to evaluate hypertension, showing that these mice are hypotensive and the contractile response of the aorta and the pressor response of isolated perfused mesenteric bed to α1-AR stimulation were markedly reduced. We aimed to determine the cardiovascular structure of the α1D-AR KO mouse. Male C57Black/6J (WT) and α1D-AR KO mice, aged 10-12 weeks, were killed and several arteries and heart were excised and treated for histology examination. Results showed that α1D-AR knockout mice had significantly lower basal systolic and mean arterial blood pressure, relative to WT mice. In addition, the histology and morphometry show that in each conductance or resistance vessels, all arteries of the α1D-AR KO mice were thinner than the WT; the same finding was observed in heart slices of the KO mice. Data suggest that the reported lower functional response is due, in part, to the diminished vascular muscle mass, and that α1D-AR is involved in muscle mass regulation, despite that the heart/arteries do not have α1D-AR as predominant.

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