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Protective effect of nanoparticle-loaded Aliskiren on aortic structure during hypertension

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Aliskiren is the most recent antihypertensive agent that acts by inhibition of renin, the first step in renin-angiotensin-aldosterone-system. Aliskiren has been shown to exert reno-protective, cardio-protective and anti-atherosclerotic effect independent of its blood pressure (BP) lowering activity. Clinical use of aliskiren is limited, however, by short lifetime of this drug. Therefore, the aim of our study was to determine the effect of nanoparticle-loaded aliskiren, with gradually realized drug, on BP and structural alterations of the heart and aorta developed due to hypertension. 12-week-old male SHR were divided to the untreated group, group treated with powdered aliskiren (25 mg/kg per day), group treated with nanoparticle-loaded aliskiren (25 mg/kg per day) and group treated with nanoparticles only for 3 weeks by gavage. BP was measured by tail-cuff plethysmography. Collagen and elastin contents were determined by Picrosirius red staining in both heart and aorta. Wall thickness (WT), inner diameter (ID) and cross sectional area (CSA) were determined in the aorta. At the end of experiment, BP was lower in both powdered aliskiren and nanoparticle-loaded aliskiren groups with more pronounced effect in the second one. Moreover, nanoparticle-loaded aliskiren was able to decrease collagen content (by 11%) and CSA (by 25%) in comparison to the powdered aliskiren group, while it had no significant effect on the similar parameters in the heart. There were no significant changes in elastin content, WT and ID among aliskiren groups and control group. Polymeric nanoparticles, however, increased collagen and elastin contents and WT of the aorta. In conclusion, nanoparticle-loaded aliskiren seems to be promising drug in large vessels protection, more suitable polymeric nanoparticles, however, are needed for better tissue protection.

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