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Morphology of cardiac and renal microvasculature in spontaneously hypertensive rat. Activity of thioctic acid

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Accumulation of intimal vascular smooth muscle cells is a trait of atherosclerosis. Endothelial cells lining vascular luminal surface represent an important site of signalling and development of damage induced by reactive oxygen species (ROS) during ischemia, inflammation and other pathological conditions. Targeted delivery of ROS modulating enzymes conjugated with antibodies to endothelial surface molecules provides site-specific interventions leading to endothelial damage. Excessive ROS production causes pathological activation of endothelium including exposure of cell adhesion molecules.

The intercellular adhesion molecule-1 (ICAM-1) is a member of the immunoglobulin (Ig) superfamily which is present on the surface of several other cell types, including endothelial cells. Adhesion molecules [e.g., ICAM-1, vascular cell adhesion molecule 1 (VCAM-1) and platelet-endothelial cell adhesion molecule-1 (PECAM-1)] if in contact with an activated endothelium could represent attractive targets for delivery of drugs and imaging probes to vascular pathological sites.

The present study was designed to investigate, with immunochemical and immunohistochemical techniques, the effect of treatment with thioctic acid enantiomers on heart and kidney endothelium in spontaneously hypertensive rats (SHR) used as a model of hypertensive end organ damage. Normotensive Wistar-Kyoto rats were used as a reference group. Arterial hypertension was accompanied by an increased oxidative stress status in the kidney and heart. ICAM, VCAM and PECAM expression was significantly greater in the renal endothelium of SHR. In the heart VCAM expression was higher than ICAM and PECAM and increased in SHR. (+/-)-Thioctic acid and (+)-thioctic acid treatment prevented adhesion molecules expression in renal and cardiac vascular endothelium.

Based on these data, it is possible to conclude that endothelial molecules investigated can be used for studying vascular injury on target organs of hypertension. The effects observed after treatment with thioctic acid could open new perspectives for countering heart and kidney microvascular injury, quite common in several diseases affecting these organs.

Key words

Antioxidants, alpha lipoic acid, rat kidney, immunohistrochemistry.