21 MECHANISMS OF THE ANTIGLAUCOMA EFFECT OF ANGIOTENSIN CONVERTING ENZYME INHIBITORS

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Introduction. Angiotensin converting enzyme inhibitors (ACE inhibitors) have recently attracted attention as a new class of drugs for the treatment of glaucoma. ACE inhibitors have been shown to lower intraocular pressure (IOP) in patients with intraocular hypertension or open-angle glaucoma due to both systemic and local haemodynamic effects.

Aim of study. Aim of study was to analyse the beneficial effects of ACE inhibitors in the treatment of glaucoma and the mechanisms to prevent the progression of retinal ganglion cell degeneration.

Methods and materials. The articles in the PubMed database were selected and analysed according to the keywords "renin-angiotensin system", "glaucoma", "angiotensin-converting enzyme". Possible mechanisms for the influence of ACE inhibitors on the evolution and progression of glaucoma have been specified.

Results. The hypothesis of the involvement of prostaglandins in the ocular hypotensive effect of ACE inhibitors has been proposed. It has been found that inhibiting prostaglandin synthesis has blocked the IOP-lowering effect. ACE inhibitors are inhibitors of kininase II and thus prevent the inactivation of bradykinin, elevated levels of which promote prostaglandin synthesis, and some prostaglandins, especially PGF2α, increase the uveoscleral flow of aqueous humour. Bradykinin has a protective action against the neurotoxicity of glutamate by bradykinin B2 receptors in retinal neurons. Thus, ACE inhibitors are able to prolong the half-life of bradykinin, and long-term treatment with ACE inhibitors has increased plasma levels of bradykinin. Inhibition of bradykinin breakdown may increase superoxide dismutase activity and may modulate nitric oxide production by inactivating reactive oxygen species and inhibiting various pro-oxidative mechanisms in the vascular system. Decreased angiotensin II, observed during ACE inhibitor therapy, may have beneficial effects on vascular function by decreasing vascular production of superoxide anions. Angiotensin converting enzyme inhibitors by lowering Ang II levels had beneficial effects on vascular tone and influenced other pathophysiological actions such as proliferation and migration of smooth muscle cells and pericytes, glucose uptake in retinal pericytes, expression and potency of endothelial growth factor on angiogenic activity, stopping or delaying damage to the blood-retinal barrier and preventing retinal neovascularization.

Conclusion. Angiotensin converting enzyme inhibitors can influence the progression of glaucoma by decreasing the level of angiotensin II and increasing that of bradykinin with favourable hemodynamic changes in the retina, inhibiting pro-oxidative mechanisms and activating antioxidants, preventing endothelial and vascular dysfunction, preventing angiogenesis.