Effects of topical adrenergic agents on prostaglandin E2 induced aqueous flare and intraocular pressure elevation in pigmented rabbits
Yoshiaki Kiuchi, Momoko Shibasaki, Jiae Ko, Kunihiko Funaishi
Department of Ophthalmology and Visual Science, Hiroshima University, Hiroshima - Japan

Purpose: To evaluate the effect of topical instillation of adrenergic agents on experimental aqueous flare and intraocular pressure (IOP) elevation induced by prostaglandin E2 (PGE2) in pigmented rabbits.

Materials and methods: Six eyes of 6 Dutch rabbits weighing 2.5-3.0 kg each were used for experiments. All studies were conducted in accordance with the ARVO Statement for Use of Animals in Ophthalmic and Vision Research, and all experimental procedures were approved by the Institutional Animal Care and Use Committee. An adrenergic agents, combination of brimonidine and phenirephrine, or NaCl 0.9% as a control was topically administered to pigmented rabbits, and PGE2 was then applied to produce elevation of aqueous flare and IOP. Aqueous flare was measured with a laser flare meter, with elevation expressed as the area under the curve (AUC) for each eye. Inhibition rate was estimated from the following equation: inhibition (%) = 1−[(AUC with treatment)/AUC without treatment)] × 100. Statistical analysis was performed using Kruskal-Wallis test and Dunnett’s post-hoc procedure. And IOP was measured with rebound tonometer at each time point.

Results: Instillation of apraclonidine 1.15%, brimonidine 0.1% and combination of brimonidine 0.1% and phenirephrine 5% eye drops significantly inhibited elevation of PGE2-induced aqueous flare by 69.8%, 53.8%, 47.7% and 68.2% respectively. Dipivefrine 0.1%, phenirephrine 5% tend to inhibit aqueous flare elevation, but not significantly. Isoproterenol 0.005% and NaCl 0.9% eye drops did not inhibit flare elevation. Apraclonidine 1.15%, brimonidine 0.1%, Dipivefrine 0.1% and combination of brimonidine 0.1% and phenirephrine 5% eye drops significantly inhibited PGE2-induced IOP elevation. Beta-adrenergic stimulant could not inhibit the IOP and aqueous flare elevation caused by PGE2 at all.

Conclusions: Although the combination of both alpha 1 and 2 stimulants is necessary to prevent the flare changes caused by PGE2, individual action of alpha 1 and alpha 2 can inhibit the IOP rise. The mechanism of IOP elevation and flare changes caused by PGE-2 may be different.