

Effect of Topical Brimonidine Formulations on Retinal Ganglion Cell Survival in a Rat Acute Retinal Ischemia/Reperfusion Model

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Footnotes

Commercial Relationships R.K. Lai, Allergan, Inc., E; T. Chun, Allergan, Inc., E; S. Lee, Allergan, Inc., E; L.A. Wheeler, Allergan, Inc., E.

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Abstract

Purpose: : We previously demonstrated that Brimonidine, a selective α_2 -adrenoceptor agonist, significantly protects retinal ganglion cell (RGC) from pressure-induced retinal ischemia. In this study, we investigated the effect of three different topical brimonidine formulations in the rat acute retinal ischemia/reperfusion model: Brimonidine Tartrate 0.2% (Alphagan), Brimonidine Tartrate in Purite 0.15% (Alphagan P 0.15%) and Brimonidine Tartrate in Purite 0.1% (Alphagan P 0.1%).

Methods: : Male Brown Norway rats were anesthetized with isoflurane. One eye was cannulated and connected to a saline reservoir with adjustable pressure. Ischemia was induced by raising IOP to 110 mm Hg and maintained for 50 minutes followed by reperfusion. After seven days of resting, ERG responses were measured from both the

ischemic and contralateral non-ischemic eye. Optic nerves of these animals were then retrogradely labeled with dextran-tetra methyl rhodamine at a distance of 2 mm from the globe. The retinas were flat mounted 24 hours later and RGC number was counted. The experiment was repeated with animals treated topically (10ul) one hour prior to the ischemic insult with each of the three formulations of brimonidine mentioned above.

Results: : After 50 minutes of ischemia, retinal ganglion cell count decreased from 509 ± 26 RGC/field in the non-ischemic control eyes to 261 ± 23 RGC/field in the ischemic eyes. Topical treatment of all three brimonidine formulations significantly enhanced RGC survival (Alphagan, 316 ± 22 RGC/field; Alphagan P 0.15%, 345 ± 30 RGC/field and Alphagan P 0.1%, 338 ± 24 RGC/field).

Conclusions: : The three topical Brimonidine formulations enhanced retinal ganglion cell survival after retinal ischemia with similar efficacy, suggesting that these formulations delivered similar therapeutic drug concentrations to the retina.

Keywords: ischemia • ganglion cells • retina

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