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BACKGROUND

- In chronic treatments, BAK exerts short- and long-term toxic effects that reduce patient's quality of life and treatment compliance.^{1,2}
- Topical use of BAK solutions alters the ocular surface and corneal nerve plexuses density in animal models after only 9 days of treatment.³
- It was recently shown that sodium hyaluronate (SH) presents a specific protective mechanism against BAK-induced toxicity.⁴
- SH protective action is positively correlated with the concentration, reaching the highest protective effects with the concentration of SH 0.4%.⁵

PURPOSE

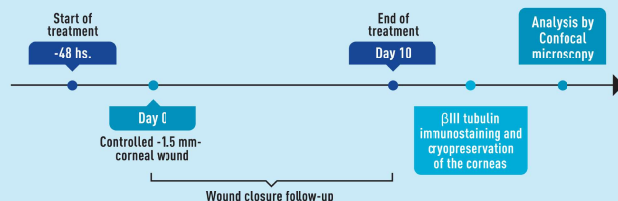
To evaluate the protective effect of 0.4% sodium hyaluronate on benzalkonium chloride-induced toxicity using an *in vivo* model.

METHODS

88 Balb/c mice from 6 to 8 weeks old of both sexes were divided into 4 groups:



All groups received 3 daily instillations (8 AM, 2 PM, and 8 PM). For the SH+BAK group, SH was administered first and BAK was administered 10 minutes later. At day 0, a 1.5-mm corneal wound was created with a burr in the right eye of the anesthetized mice (ketamine/xylazine).



Wound healing over time and corneal nerve regeneration using Sholl analysis were assessed. Data were analyzed by two-way ANOVA and presented as mean ± SD.

RESULTS

Wound closure:

There were statistically significant differences in wound closure between treatment groups over time ($p < 0.0001$). Mice treated with BAK showed slower healing than those treated with SH+BAK ($p = 0.0124$).

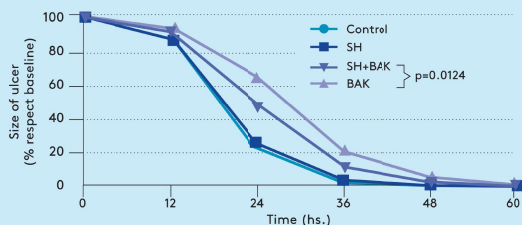


Figure 1. Percentage of corneal ulcer closure as a function of time by treatment group.

The area under the curve (AUC) of corneal cicatrization for Control group was 19.7 ± 2.5 ; for SH 20.1 ± 2.7 ; for BAK 28.0 ± 4.6 , and for SH+BAK 24.4 ± 5.0 ($p < 0.001$).

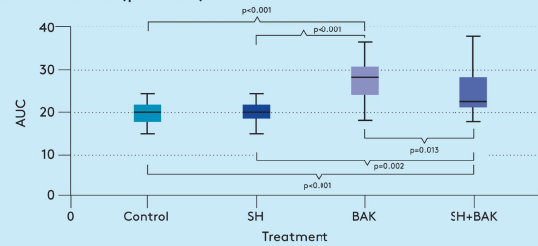


Figure 2. Area under the Curve by group of treatment.

All wounds closed within 72 hours. The mean time of wound closure (in hours) was: 41.5 ± 9.6 for control group; 39.3 ± 7.6 for SH group; 51.3 ± 9.9 for BAK group, and 45.8 ± 8.8 for SH+BAK group ($p < 0.001$).

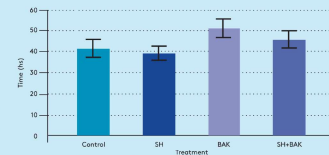


Figure 3. Time (hs) of wound closure by group of treatment.

Corneal nerve generation:

The neural network presented an increasing complexity in the groups: $BAK < BAK+SH < Control < SH$. Considering the largest radius analyzed ($100 \mu m$), the number of intersections was: 11.5 ± 2.6 in Control group; 15.8 ± 2.1 in SH; 5.1 ± 2.2 in BAK, and 8.05 ± 2.2 in SH+BAK ($p < 0.05$).

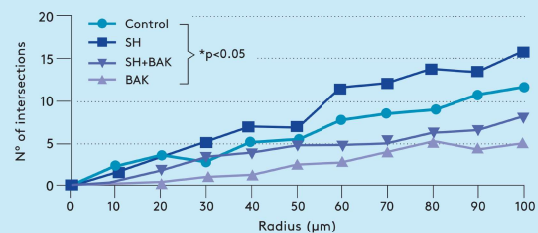


Figure 4. Number of intersections by radius under analysis by group of treatment.

* two-way ANOVA (treatment & radius).

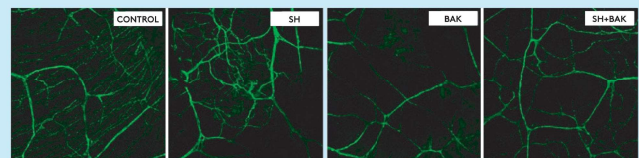


Figure 5. Images of confocal microscopy by group of treatment.

CONCLUSIONS

- ✓ BAK has a toxic action on both corneal epithelial cells and corneal subbasal nerves.
- ✓ The concomitant addition of SH protects against the toxic action of BAK, promoting epithelial healing and corneal nerve regeneration.

BIBLIOGRAPHY:



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POSTER DOWNLOAD:



DISCLOSURE:

This study was sponsored by Poen Laboratories.