

INNOVATIVE RADIOFREQUENCY ELECTROTHERAPY SIGNIFICANTLY REDUCES CORNEA PERFORATION IN AN ALKALI BURN MURINE MODEL

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PURPOSE

- An innovative treatment for ocular surface diseases, based on the administration of a radiofrequency electrical current containing a specific spectrum of frequencies (QMR), was recently shown to be effective in the dry eye syndrome [1].
- We investigated the effectiveness of this treatment in reducing the perforation rate in alkali burned corneas.

METHODS

- Forty 6-week old C57Bl/6 mice underwent 1N alkali burn to induce a severe cornea inflammation.
- The QMR treatment (Rexon-Eye, Resono Ophthalmic, Italy) was started immediately after the model induction and consisted in 2 sessions per week for 3 weeks. Each session included a 20 min treatment, where the QMR radiofrequency current was applied (following a 30 seconds ON / 30 seconds OFF protocol) to one eye of 20 animals (treated group) using a small metal electrode touching the cornea.
- The remaining 20 animals (control group) underwent a fake treatment, where the electrode was positioned over the cornea but no current was administered.
- All the animals were monitored during the 3-week treatment and for 1 additional week; the presence of cornea perforations was assessed clinically with a slit-lamp by an ophthalmologist.
- CD45⁺ cell infiltration was quantified in the two groups by means of whole mount immunofluorescence staining.
- Significance of the differences in infiltrating CD45⁺ cells in control vs. treated animals was checked by means of Student's t test. Differences between the perforation rate in control vs. treated animals was tested with the Gehan-Breslow-Wilcoxon test.

RESULTS

- No significant difference was found in the number of CD45⁺ infiltrating cells (P=0.4427), although a trend was observed showing a reduction in treated animals, as reported in Fig. 1.
- Percentage of corneas without perforations over 4 weeks was significantly higher in treated vs. non treated animals (P <0.0001).

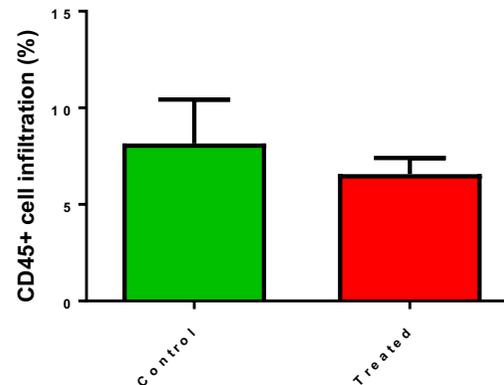


Figure 1. No significant difference in the number of CD45⁺ infiltrating leukocytes in control vs treated animals.

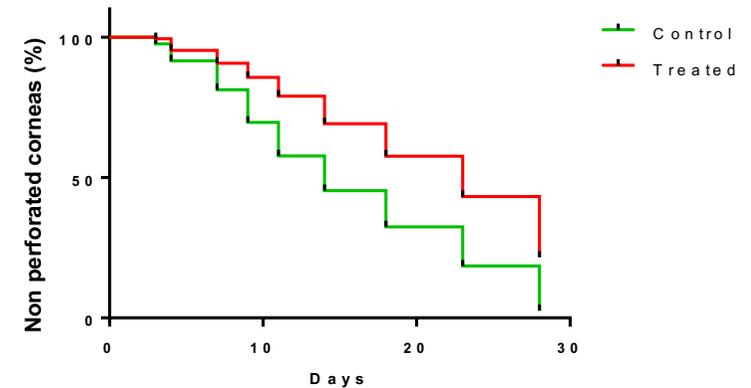


Figure 2. Percentage of corneas without perforation as a function of time, for treated (red line) and control (green line) animals.

CONCLUSIONS

- The use of the QMR treatment was highly effective in reducing the incidence of corneal perforations in alkali burn mice.
- The finding that CD45⁺ cell infiltration is reduced in treated animals, although not significantly, calls for further experiments to better understand the mechanism(s) underlying the reduced perforation rate we observed in treated corneas.

[1] E. Pedrotti, F. Bosello, A. Fasolo, A.C. Frigo, I. Marchesoni, A. Ruggeri, G. Marchini. Transcutaneous periorbital electrical stimulation in the treatment of dry eye, *Br J Ophthalmol* 101:814-9, 2017.