

Human Breast Milk Enhances Cellular Proliferation in Corneal Wound Healing. SN Seiwald (MD, SOM), MG Pedler, B Shieh, P Lenhart, A Mandava, E McCourt, JM Petrash, Department of Ophthalmology, University of Colorado, Denver, CO.

Purpose: Corneal wounds from ulcers, trauma, or scarring from infections are often treated with debridement of the cornea epithelium, allowing new epithelial cells to grow in their place. Corneal wound healing requires a cascade of signaling molecules, including epithelial growth factor (EGF) and growth modulating cytokines; however, a topical post-operative treatment with these components is not available. With the rise in use of Traditional Eye Medicine (TEM), human breast milk (HBM) offers a potential, novel treatment as it contains growth factors and cytokines that may play a role in epithelial cell migration and proliferation. This study seeks to investigate the role of HBM in enhancing re-epithelialization of the cornea after mechanical wounding.

Methods: Male and female Balb/C mice, 8 to 12 weeks old, were sedated with intraperitoneal ketamine, xylazine and given 0.5% ophthalmic proparacaine prior to creating a 2mm central cornea defect with a 0.5mm Algerbrush. Immediately post epithelial cell layer removal, mice were randomly assigned to one of three treatment groups: HBM, triple antibiotic ophthalmic ointment containing neomycin, polymyxin B, dexamethasone (TAB), or saline. Operated eyes were treated 4 times per day for up to 48hrs. Epithelial defect size was ascertained with fluorescein staining and ImageJ area analyses at 0, 8, 24, and 48 hrs post wounding. Subsets of mice from each treatment group were used for histology and ELISA cytokine analyses.

Results: Wounded corneas treated with HBM demonstrated significantly increased rate of re-epithelialization post wounding at 8hrs and 24 hrs compared to TAB and saline treated eyes. Immunofluorescent staining for cell proliferative marker, Ki-67, on HMB treated eye tissue sections showed significantly higher positive cell numbers over TAB treated eyes ($p=0.0063$ at 8hrs, $p=0.0007$ at 24hrs, and $p=0.0014$ at 48hrs). ELISA IL-1 β levels showed no significant difference between treatment groups.

Conclusions: Human breast milk treatment on mouse corneas with central, mechanical debridement of epithelium demonstrated improved rate of healing and increased cellular proliferation. Future studies will investigate the potential effect of HBM on endogenous limbal epithelial stem cells in the cornea.