Crosslinked Hyaluronic Acid (CMHA-S), Ocular Bandage Gel-based Delivery of Small Molecules

Hee-Kyoung Lee, Shirley Luo, Brenda Mann
EyeGate Pharmaceuticals, Inc. Salt Lake City, UT

**PURPOSE**

Corneal ulcers, an ocular emergency and a leading cause of blindness globally, require compounded off label topical antibiotics, often at an inconvenient hourly round-the-clock multiple day administration. To overcome this challenge, a topical CMHA-S gel (Figure 1), Ocular Bandage Gel (OBG), was evaluated as a vehicle for delivering small molecules in a more sustained-released manner compared to antibiotic solutions.

![Figure 1](image1.png)

**INTRODUCTION**

- CMHA-S has proven safety and efficacy for treating corneal abrasion and alkali burns, dry eye, and corneal ulcers in animals.
- CMHA-S has demonstrated accelerated corneal epithelial wound closure after photorefractive keratectomy (PRK) surgery compared to standard of care BCL.

**METHODS**

Two small molecule antibiotics, Moxifloxacin and Besifloxacin, were used in this study. The molecules were dissolved (10 mg/ml) in either PBS or OBG. The sample was transferred to a dialysis chamber with a molecular weight cutoff of 50 kDa. The dialysis chamber was placed in a tube, which contained 10 ml of PBS. The dialysis chamber was transferred to a new tube at each time point. The dialysate was analyzed by UV absorption, and the released amount of drug was calculated (Figure 2). The physical properties of OBG+Moxi, such as viscosity, pH, and refractive index (RI), were measured to ensure the drug does not change the properties of OBG (Figure 3, Table 1). The bioactivity of released Moxifloxacin was evaluated by the zone of inhibition (ZOI) assay (Figure 4).

**RESULTS**

Figure 2. OBG slowed down the release of both Moxifloxacin and Besifloxacin, compared to PBS controls. In the case of Moxifloxacin, at 4 h, approximately 100% of the antibiotics had been released from the PBS, whereas only about 60% had been released from OBG. By 24 h, 80% of the Moxifloxacin was released from the OBG. Despite the very poor water solubility of Besifloxacin compared to Moxifloxacin, the similarity in release rates indicates that the release may be more dependent on molecular weight than solubility.

Figure 3. Rheology of OBG+Moxifloxacin (1 mg/ml) was similar to OBG for both shear thinning and viscosity values.

**REFERENCES**

2. Williams and Mann *PLOS One* 2014;9:e99766
3. Williams et al. *IOVS* 2017;58:4616