

MEASUREMENT OF THE RETENTION TIME OF TWO DIFFERENT CARBOMER- BASED OPHTHALMIC GELS WITH AND WITHOUT HYALURONIC ACID IN ANESTHETIZED DOGS USING ULTRAHIGH- RESOLUTION OPTICAL COHERENCE TOMOGRAPHY

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Eye Lube Pro, a carbomer gel combined with sodium hyaluronate, maintained central tear film thickness (CTFT) longer than Ocry-gel, a carbomer-only formulation, in 20 anesthetized dogs. CTFT remained measurable in 14/20 eyes treated with Eye Lube Pro versus 2/20 eyes treated with Ocry-gel after 60 minutes. These results indicate that adding sodium hyaluronate prolongs pre-corneal retention of protective ophthalmic gels.

● Purpose

To evaluate the corneal retention of two ophthalmic gels—Ocry-gel (carbomer alone) and Eye Lube Pro (carbomer with sodium hyaluronate)—in anesthetized dogs.

● Methods

Twenty healthy, client-owned dogs undergoing non-ophthalmic procedures were enrolled in a randomized controlled study to compare the corneal retention of Ocry-gel (0.2% carbomer) and Eye Lube Pro (0.45% carbomer with 0.3% hyaluronic acid). Each dog received one gel in each eye, assigned randomly, and anesthesia was standardized to minimize movement. Central tear film thickness (CTFT) was measured using ultrahigh-resolution spectral-domain OCT before and after gel instillation, then at multiple time points up to 60 minutes. No ocular complications were observed post-procedure. Data analysis assessed gel retention over time and evaluated potential effects of sex, age, or brachycephalic morphology on CTFT.

● Results

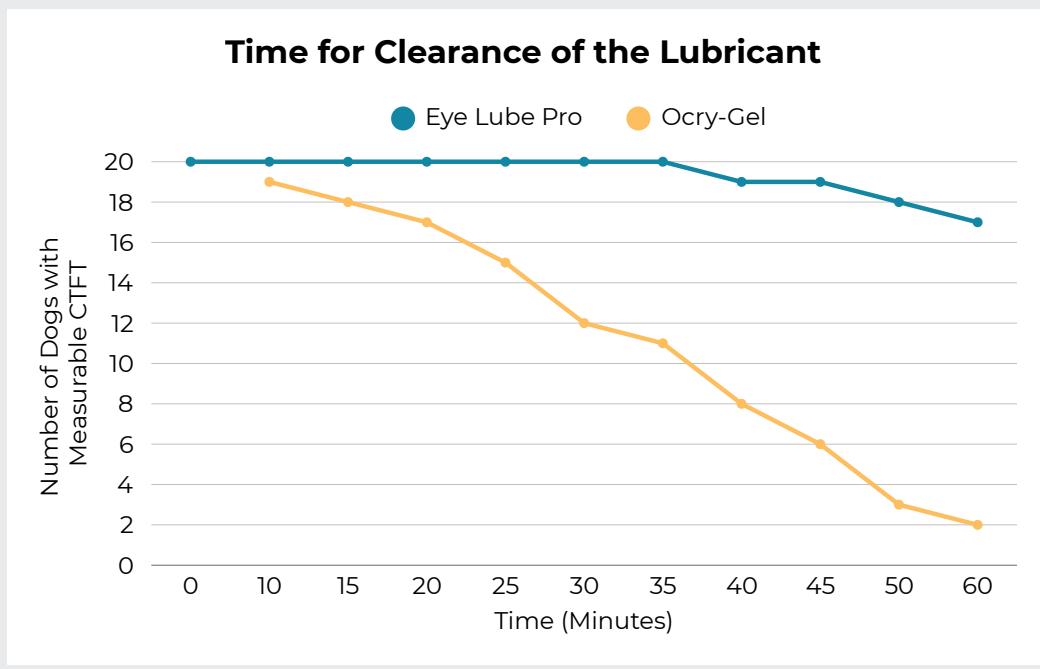
All 20 dogs completed the study, and OCT measurements showed that Eye Lube Pro maintained central tear film thickness (CTFT) significantly longer than Ocry-gel. CTFT decreased rapidly after Ocry-gel instillation, dropping below 20 µm by 30 min and near the limit of detection by 60 min, whereas Eye Lube Pro remained measurable in 17/20 eyes at 60 min, with a mean CTFT of $32.8 \pm 20.1 \mu\text{m}$ versus $3.2 \pm 3.9 \mu\text{m}$ for Ocry-gel ($p < 0.000001$). The prolonged retention of Eye Lube Pro was consistent across sex, age, and brachycephalic phenotype.

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● Discussion

The study demonstrates that ophthalmic gels combining carbomer with hyaluronic acid provide significantly longer and more stable ocular surface lubrication in dogs compared to carbomer alone. Eye Lube Pro maintained measurable tear film thickness in most eyes up to 60 minutes, reflecting improved precorneal retention likely driven by the viscoelastic, mucoadhesive, and hydrophilic properties of hyaluronic acid. The combination of hyaluronic acid with carbomer appears to create a synergistic effect that enhances tear film stability and residence time, consistent with findings in both veterinary and human ophthalmology. These results support the clinical use of dual-polymer gels for sustained ocular surface protection, particularly in situations where prolonged lubrication and reduced application frequency are desired.

● Results Continued



The graph shows how long each ophthalmic gel remains detectable on the ocular surface over time, with Eye Lube Pro demonstrating slower clearance and prolonged retention compared to Ocry-gel, as evidenced by a greater number of eyes maintaining measurable tear film thickness up to 60 minutes. **Adapted from Bertrand Michaud, Ines Desquiens, Sophie Amirantz, 2025**

CONCLUSIONS

The incorporation of sodium hyaluronate into a carbomer-based gel markedly increases pre-corneal retention time in healthy anesthetized dogs. These findings indicate that the choice of ocular protective gel should account for the expected duration of anesthesia and may help inform adjustments to dosing frequency.