Human Corneal Stromal and Epithelial Concentrations of Moxifloxacin and Gatifloxacin Following Topical Dosing with VIGAMOX® and ZYMAXIR®

T. Kim1, S. Lane2, H. Blumenthal1, W. Reinman3, S. Duyer4, J. Erkelan5, H. Knaur4, R. Hoffer6, D. Davidson7, J. Isberg1, J. Heilman1


Purpose: To evaluate the corneal penetration of moxifloxacin and gatifloxacin following topical administration of VIGAMOX® or ZYMAXIR by measuring the concentrations of moxifloxacin in the corneal stroma and epithelium of patients undergoing penetrating keratoplasty.

Methods: In a controlled, randomized, open-label, parallel, multiple-dose study, corneas from 46 patients undergoing penetrating keratoplasty were analyzed following administration of either VIGAMOX (moxifloxacin 0.5%) or ZYMAXIR (gatifloxacin 0.3%) every 4 hours for a total of 3 days. The corneas were harvested 2 hours after the last topical dose. Stromal and epithelial tissue was analyzed for both medications. For the eyes treated with VIGAMOX, the sample was immediately placed in a storage container on dry ice and shipped for analysis. Samples were analyzed using a simultaneous high-performance HPLC-fluorescence method.

Results: Peak stroma levels of moxifloxacin 165.9 µg/g were 4-fold higher than those for gatifloxacin (37.1 µg/g). A 7.5-fold higher peak epithelial level was obtained for moxifloxacin (97.5 µg/g) versus gatifloxacin (12.3 µg/g). Mean Cmax MRA for the most common and keratitis pathogens (including mycobacteria) were considered to be higher for moxifloxacin than for gatifloxacin.

Conclusions: The superior corneal penetration and greater antimicrobial activity of moxifloxacin suggest that moxifloxacin would provide enhanced prophylaxis against endophthalmitis and keratitis pathogens.

Comparing the Healing Times of Corneal epithelium after Phototherapeutic Keratectomy While Using Topical Gatifloxacin or Moxifloxacin

Brett D. Brimhall, MD, Eric Dudeahoefer, MD, Charles Reilly, MD, Robert Smith, MD, Wilford Hall Medical Center

Purpose: To compare the effectiveness of commercial topical preparations of gatifloxacin and moxifloxacin on epithelial healing following phototherapeutic keratectomy (PRK).

Methods: Prospective blinded double study evaluated 68 patients and 128 eyes after standard PRK surgery. All 5 ml alcohol soaked alcohol was used to create consistently steady epithelial defects in both eyes prior to cryalination. Post-surgical patients received randomized commercial preparations of topical gatifloxacin or moxifloxacin four times daily for 3 days. Patients were grouped by whether their post-surgical epithelial closure was fast or slow. The study also concludes both agents appear safe and efficacious for use in PRK patients.

Results: Average time to epithelial closure for all eyes was 2.3 days. Eyes treated with gatifloxacin took an average of 3.2 days to close while eyes treated with moxifloxacin took 1.7 days to close. A comparison of mean Cmax:MIC ratio was also performed. The mean Cmax:MIC ratios for commercial formulations of topical gatifloxacin and moxifloxacin did not differ significantly.

Conclusions: Our larger sized study failed to demonstrate any significant difference in epithelial healing times of post PRK patients when using topical preparations of either gatifloxacin or moxifloxacin. In the short term, neither treatment appears to be associated with clinically significant delay in epithelial healing rates.

Disclosures: F. Alcon, Allergan

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A Comparison of Ocular Penetration and Microbiological Efficacy of Fourth Generation Fluoroquinolones in Cataract Surgery Patients

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Purpose:
To correlate the ocular penetration and the microbiological activity of the fluoroquinolones moxifloxacin 0.5% ophthalmic solution (VIGAMOX®, Alcon Laboratories, Inc.) and gatifloxacin 0.3% solution (ZYMAR®, Allergan, Inc.) following topical administration prior to routine cataract surgery.

Methods:
The penetration study was a prospective, randomized, double masked, clinical study involving 50 patients (moxifloxacin 0.5% n = 25, gatifloxacin 0.3% n = 25) undergoing routine cataract extraction at the Wilmer Eye Institute. Patients were administered one drop of antibiotic every ten minutes for four doses beginning one hour prior to surgery. Samples of aqueous humor were obtained via paracentesis at the time of the incision antibiotic concentrations were determined using standardized high performance liquid chromatography (HPLC) procedures. Comparative in vitro activity testing was performed on a recent clinical Staphylococcus aureus ocular isolate. Standard disk diffusion and broth dilution testing methods were used as recommended by CLSI (formerly NCCLS). Disk diffusion testing was performed by applying 80 µl of moxifloxacin - 1.8 µg/ml and gatifloxacin - 0.48 µg/ml to a 13 mm disk.

Results:
Aqueous humor concentrations for moxifloxacin were 1.80 (± 1.21) µg/ml while those achieved with gatifloxacin were 0.48 (± 0.34) µg/ml. This 3.8-fold concentration difference was statistically significant (P= 0.00003). MIC determinations revealed a moxifloxacin MIC of 0.06 µg/ml compared with 0.13 µg/ml for gatifloxacin. The disks soaked with moxifloxacin resulted in a 24 mm zone of inhibition whereas gatifloxacin demonstrated no activity against the test organism of S. aureus.

Conclusions:
Moxifloxacin demonstrated greater penetration into the aqueous humor than gatifloxacin. This difference in concentration resulted in a marked differentiation in observed microbiological activity between moxifloxacin and gatifloxacin that may have clinical relevance in the prevention of Staphylococcus infections post-cataract surgery.

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