Effects of Travoprost on Aqueous Humor Dynamics in Patients with Elevated Intraocular Pressure. *Toris, C.B., PhD; Zhan, G., MD; Fan, S., MD; Dickerson, J.E., PhD; Landry, T.A., PhD; Bergamini, M.V.W., PhD; and Camras, C.B., MD.* ***Journal of Glaucoma, Volume 16(2), March 2007.***

This study was designed to investigate the mechanism of travoprost 0.004% in reducing the intraocular pressure (IOP) in humans with previously documented elevated IOP. Twenty-six patients with either ocular hypertension (OHT) or primary open angle glaucoma (POAG) were enrolled in the study, and 24 completed it. Most patients were white, except for three African Americans and one Hispanic. The study was randomized, double-blind, and placebo-controlled, and all testing was carried out at one center.

To determine the effect of travoprost on aqueous humor dynamics in these patients, clinical data sets from three separate visits were evaluated. The first visit consisted of a baseline evaluation of IOP via pneumatonometry at 8:00 AM. Following this visit, each patient was given drops labeled "Right Eye" and "Left Eye" and was instructed to administer them accordingly at 8:00 PM each night. One of these drops was travoprost 0.004% and one was a placebo. Prior to the Day 15 visit, they were instructed to instill fluorescein into each eye. On the second visit (Day 15), IOP was checked, central corneal thickness and anterior chamber depth were measured, and a fluorophotometer was used to calculate baseline aqueous flow. Episcleral venous pressure was also measured. The patients were then given timolol (or oral acetazolamide if timolol was contraindicated) in order to estimate trabecular outflow facility. At the third visit, two days later, IOP was checked at 5:00 PM and beginning at 10 PM, every two hours until 4 AM, then hourly until 6 AM. Nocturnal IOP was taken in both seated and supine positions, in dim lighting. Oral acetazolamide was given to determine estimated trabecular outflow facility at night. If acetazolamide did not lower the IOP in a particular patient, this data was not included for the outflow facility calculations.

This study found that travoprost 0.004% reduced IOP at the 8:00 AM visit by 22–26%. There was a 6% lowering that occurred in the control group. In addition, the nocturnal IOP measurements were found to be at least 21% lower than baseline at all times. However, supine IOP measurements were consistently higher than seated IOPs in all patients, in both treated and control eyes. Although control eyes had lower IOP at night, treated eyes did not, which is probably due to flat diurnal curves typically noted with PGAs. Travoprost was found to increase fluorophotometric outflow facility during the day, but not at night. Aqueous flow (production) was found to be lower at night versus daytime in both treated and control eyes.

Travoprost 0.004% was found to be most effective during the day, but still effective at night. The finding of increased outflow facility following regular travoprost administration was consistent with results of other prostaglandin analog drugs that have been shown to increase outflow facility. It is known that this drug class activates FP receptors in the trabecular meshwork. The trabecular meshwork is a very dynamic tissue, affected by accommodation, pharmacological intervention, cyclical hormones, and its own smooth muscle contractions. Since this study was unable to show a significant effect of outflow facility during the night, more research is needed in this area. Uveoscleral outflow was low for all patients in this study, which indicates that both trabecular and uveoscleral pathways may contribute to increased IOP in OHT and POAG patients. The current method of fluorophotometry for calculating outflow facility is unable to completely differentiate trabecular from uveoscleral outflow. In this study and other studies, prostaglandin analogs have been shown to affect both trabecular and uveoscleral outflow. In summary, the mechanism of IOP lowering produced by travoprost is the increasing of outflow facility, primarily via the trabecular meshwork. A secondary effect of increased uveoscleral ouflow may also contribute.

Reviewed by Glenn S. Corbin, OD