# 24-Hour IOP Telemetry in the Non-human Primate: Implant System Performance and Initial Characterization of IOP At Multiple Timescales

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PURPOSE: IOP is the most common independent risk factor for development and progression of glaucoma, but very little is known about IOP dynamics. We used continuous IOP telemetry in three non-human primates to characterize IOP dynamics at multiple time scales for multiple 24-hour periods.

METHODS: We adapted an existing implantable telemetric pressure transducer system to monitor anterior chamber IOP. The system records 500 IOP, ECG and body temperature measurements per second and compensates for barometric pressure in real time. The continuous IOP signal was digitally filtered for noise and dropout, and reported using time window averaging for nineteen, eighteen, and four 24-hour periods in three animals, respectively. Those data were analyzed for a nycthemeral pattern within each animal.

RESULTS: 10-minute time window averaging for multiple 24-hour periods shows that IOP fluctuates from 7-14 mmHg during the day, and those changes occur frequently and quickly. 2-hr time window averages of IOP for multiple 24-hour periods in 3 animals show a weak nycthemeral trend but IOP is not repeatable from day-to-day within animals.

CONCLUSIONS: We have successfully measured IOP continuously using a new, fully implantable IOP telemetry system. IOP fluctuates as much as 10 mmHg day-to-day and hour-to-hour in unrestrained non-human primates, which indicates that snapshot IOP measurements may be inadequate to capture the true dynamic character of IOP. The distributions, magnitudes, and patterns of IOP are not reproducible from day to day within animals, but IOP tends to be slightly higher at night when IOP data are averaged across multiple 24-hour periods within animals.

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