

# Accelerometer-assessed physical activity and its association with progression of visual field loss in glaucoma

**Author Block:** Moon Jeong Lee<sup>1</sup>, Jiangxia Wang<sup>2</sup>, David S. Friedman<sup>1</sup>, Michael V. Boland<sup>1</sup>, C Gustavo De Moraes<sup>3</sup>, Pradeep Ramulu<sup>1</sup>

<sup>1</sup> Wilmer Eye Institute, Johns Hopkins School of Medicine, Baltimore, Maryland, United States; <sup>2</sup> Biostatistics Center, Johns Hopkins Bloomberg School of Public Health, Baltimore, Maryland, United States; <sup>3</sup> Department of Ophthalmology, Columbia University Medical Center, New York, New York, United States

**Disclosure Block:** Moon Jeong Lee, None; Jiangxia Wang, None; David S. Friedman, None; Michael V. Boland, None; C Gustavo De Moraes, None; Pradeep Ramulu, None

**Purpose:** Cross-sectional studies have demonstrated lower levels of physical activity (PA) in persons with greater visual field (VF) loss, and that PA can protect against optic nerve damage in animal models of glaucoma. Here, we examined the association between PA levels and the rate of VF loss in a cohort of glaucoma patients under clinical care.

**Methods:** PA was determined using accelerometers worn over 1 week in 141 adults with glaucoma or suspect glaucoma. The primary activity measure was daily steps. VF data were collected within 5 years of PA assessment (prior or after). Linear mixed effects regression models modeled sensitivity over time at each VF test location, accounting for correlation between eyes of the same patient, hemifields of the same VF, points within the same hemifield, and repeated measures of the same point. Covariates and interactions between covariates and time (capturing rates of change) were incorporated given their established importance to disease progression.

**Results:** Mean age was 64.9 years at the time of activity assessment and 43% of subjects were male. In multivariate models, each increment of 1000 steps was associated with a 0.41 dB increase in sensitivity ( $p=0.048$ ). Caucasian race and superior VF region were also associated with greater sensitivity ( $p<0.001$ ). Overall, visual threshold sensitivities decreased by 0.24 dB/year ( $p=0.066$ ). More steps were associated with a slower rate of sensitivity loss over time (+0.006 dB/year per 1000 steps,  $p<0.001$ ). Factors associated with a faster rate of decline in sensitivity included glaucoma surgery ( $b=-0.14$  dB/year,  $p<0.001$ ), cataract surgery ( $b=-0.04$  dB/year,  $p=0.001$ ), age ( $b=-0.001$  dB/year,  $p=0.04$ ), non-Caucasian race ( $b=-0.11$  dB/year,  $p<0.001$ ) and worse baseline severity ( $b=-0.07$  dB/year for patients with baseline MD between -6~-12 dB vs. those with MD>-6,  $p<0.001$ ). VF hemifield and IOP were not significantly associated with rate of progression ( $p>0.05$ ). Similar results were observed when rates of change were assessed over time periods more proximate to the PA assessment.

**Conclusions:** Increased PA was associated with a slower rate of glaucoma-related VF loss in a treated clinic-based population. Controlled studies are needed to prospectively investigate the effect of PA on VF loss in glaucoma, and to determine if lifestyle modifications (i.e. interventions to increase PA) can slow the rate of VF loss in glaucoma.