

## **Comparison of contrast sensitivity, visual acuity, and the contrast sensitivity function as predictors of gait in glaucoma**

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**Purpose:** To investigate whether the contrast sensitivity function (CSF), a measure combining visual acuity (VA) and contrast sensitivity (CS), is better at predicting gait parameters than CS or VA alone.

**Methods:** 211 patients with varying degrees of glaucoma damage underwent assessment of CSF using the quick CSF method (Adaptive Sensory Technology), CS using the MARS chart, and VA using the ETDRS chart. qCSF, CS, and VA data were converted to area under log CSF (AULCSF), logCS, and logMAR, respectively. Gait measurements were collected as the average of 4 normal walking trials using the GAITRite Electronic Walkway system (CIR System Inc.). R<sup>2</sup> values of linear regression models were used to determine the extent to which vision measures captured variability in the gait parameter of interest, while controlling for age, sex, race, comorbidities, and polypharmacy.

**Results:** AULCSF was significantly associated ( $p < 0.05$ ) with 5 gait measures (step count, stride length, step length, base of support, and step length difference between feet), with R<sup>2</sup> values ranging from 5%-29%. By comparison, logCS was associated with only 3 gait measures (step count, base of support, and step length difference), while logMAR VA was associated 9 gait measures (those mentioned for AULCSF plus swing time, step time, single support time, and cadence). Of the 3 gait measures demonstrating a significant association with both AULCSF and logCS, R<sup>2</sup> values were all similar (within a range of 1%). For the 5 gait parameters demonstrating a significant association for both AULCSF and logMAR VA (step count, stride length, step length, base of support, and step length difference), model R<sup>2</sup> values was more than 1% higher when AULCSF was the visual predictor for base of support, while R<sup>2</sup> values were within 0.8% for the remaining models.

**Conclusions:** CSF, CS, and VA all demonstrate an impact of glaucoma on gait, though different gait parameters show inconsistent associations when different measures of vision are employed. More work is required to understand the specific visual features most likely to account for functional impairments in eye disease.