PURPOSE: We investigated whether retinal branch arteries in healthy subjects, and non-treated and treated primary open-angle glaucoma (POAG) patients show irregular local patterns during dynamic reaction to acute increases of different magnitudes in intraocular pressure (IOP).

METHODS: Nine POAG patients and nine age-matched normal volunteers were examined with the retinal vessel analyser (RVA) using a suprasystolic IOP increase (Study 1). Fourteen POAG patients and 13 age-matched controls were examined using a moderate IOP increase for 100 seconds (Study 2). Longitudinal arterial profiles were obtained for the chosen time intervals. The high-frequency waviness (HFW) of these profiles was analysed quantitatively.

RESULTS: No significant changes in HFW were found in controls in different phases of the arterial reaction. Significant increases in HFW from baseline to dilation (Study 1, P<0.03) and from dilation to constriction (Study 2, P<0.05) were found in POAG patients. High-frequency waviness was higher in POAG patients than in controls during dilation (P<0.05) in both studies.

CONCLUSIONS: Our results indicate a local vessel wall difference in glaucoma patients compared with age-matched controls. Increasing HFW might worsen hydraulic resistance of the vessel segment to blood flow. Significant increase of arterial microirregularities in the POAG retina during vascular dilation might be
an indication for vascular endothelial alterations in glaucoma, leading to impaired perfusion in response to IOP increase.