Abstract:

Purpose. Image analysis by the retinal vessel analyzer (RVA) observes retinal vessels in their dynamic state online noninvasively along a chosen vessel segment. It has been found that high-frequency diameter changes in the retinal artery blood column along the vessel increase significantly in anamnestically healthy volunteers with increasing age and in patients with glaucoma during vascular dilation. This study was undertaken to investigate whether longitudinal sections of the retinal artery blood column are altered in systemic hypertension. Methods. Retinal arteries of 15 untreated patients with essential arterial hypertension (age, 50.9 +/- 11.9 years) and of 15 age-matched anamnestically healthy volunteers were examined by RVA. After baseline assessment, a monochromatic luminance flicker (530-600 nm; 12.5 Hz; 20 s) was applied to evoke retinal vasodilation. Differences in amplitude and frequency of spatial artery blood column diameter change along segments (longitudinal arterial profiles) of 1 mm in length were measured and analyzed using Fourier transformation. Results. In the control group, average reduced power spectra (ARPS) of longitudinal arterial profiles did not differ when arteries changed from constriction to dilation. In the systemic hypertension group, ARPS during constriction, baseline, and restoration were identical and differed from ARPS during dilation (P<0.05). Longitudinal arterial profiles in
both groups showed significant dissimilitude at baseline and restoration (P< 0.05). Conclusions. The retinal artery blood column demonstrates microstructural alterations in systemic hypertension and is less irregular along the vessel axis during vessel dilation. These microstructural changes may be an indication of alterations in vessel wall rigidity, vascular endothelial function, and smooth muscle cells in this disease, leading to impaired perfusion and regulation.