Background: Peripapillary retinal nerve fiber layer (RNFL) thickness was shown to be consistently decreased in diabetic patients with no evidence of Diabetic Retinopathy (DR) on fundus examination. We hypothesize that thinning of the RNFL is due to early compromise of the superficial radial peripapillary capillary (RPC) network.

Purpose: To study how RNFL thickness correlates with changes in superficial RPC density in the early stages of DR, using optical coherence tomography angiography (OCT-A).

Methods: A cross-sectional evaluation of RNFL thickness and RPC density was performed with OCT-A (Avanti RTVue XR 100, Optovue Inc, Fremont, CA). Parameters were calculated using automated software. Both diabetic and control patients were included. Diabetic eyes were divided into two groups: diabetic patient without DR (noDR) and nonproliferative DR (NPDR). Seven-field photographs of the fundus were taken for DR staging according to the modified Airlie-House ETDRS grading scheme. Data was tested for normality. Univariate and multivariate linear regression models were used for analysis; mixed-effects models allowed to account for correlated outcomes between the two eyes of the same subject.

Results: We included 101 eyes (n=40 control; n=17 noRD; n=44 NPDR) from 56 subjects (mean[SD] age 62.82[9.84] years; 64.36% female). When compared to controls, we found a significant decrease in RNFL thickness in the noDR (β=−7.77, P=0.011) and in the NPDR group (β=−8.11, P<0.001). Furthermore, we detected a significant decrease in RPC density in both groups (NoDR: β=−2.88, P=0.005; NPDR: β=−2.22, P=0.003), even after adjusting for age and gender. RNFL thickness was found to strongly correlate with RPC density in the entire sample (β=0.16, P<0.001).

Conclusions: Our results suggest that peripapillary vascular changes occur prematurely in the course of DR. Whether the reduction in RPC density is a significant pathophysiological hallmark of DR progression warrants further research.