

Summary

Optical coherence tomography (OCT) has revolutionised the diagnostics process in ophthalmology. In addition to the previously assessed choroidal thickness, a novel parameter was developed in 2016 characterising the choroid in detail. The choroidal vascularity index (CVI) is defined as the ratio of the choroidal luminal area to the total choroidal area.

The aim of the study was to broaden our knowledge of one element of eye pathophysiology in diabetes, namely the relationship between choroidopathy and retinopathy. Having found and characterised such a relationship, we could apply it in the ophthalmological diagnostic process and the individualised qualification of patients for the most appropriate therapeutic approaches. Currently, it is not clear whether choroidopathy precedes, accompanies or follows the development of retinal changes, and whether it is dependent on them.

It was a single-centre retrospective cross-sectional study.

The choroid provides blood supply of the outer retinal layer, thus in the first study we assessed the relationship between choroidal parameters (thickness and CVI) and outer retinal layers in patients with diabetic retinopathy (*DR*), with or without diabetic macular oedema (*DME*), and in the control group. In the second study, we assessed the possible relationship between the degree of damage to the foveal avascular zone (*FAZ*) and choroidal parameters (thickness, volume and CVI) in patients with DR.

We assessed the outer retinal and choroidal parameters of 210 eyes in 139 DR patients. The control group consisted of 76 eyes in 52 healthy subjects. We assessed FAZ in 210 eyes in 152 patients with DR. OCT and fluorescein angiography (AF) were performed with Spectralis HRA + OCT (Heidelberg Engineering, Heidelberg, Germany). Fluorescein angiography was used to assess DR progression, detect clinically significant macular oedema (CSME) and characterise FAZ according to ETDRS criteria. We assessed the FAZ size and outline.

Patients in the control group had significantly thicker choroid and CVI values than patients with DR with/without DME. In comparison to the control group, DR+DME- patients had a lower thickness for both components of the outer retina: the outer retinal layer (ORL) and the outer nuclear layer (ONL). The values of both these parameters in the DR+DME+ patients were significantly higher than in the control group. Significant correlations between outer retinal and choroidal parameters were found only in the DR+DME- group. ORL thickness correlated positively with the subfoveal choroidal thickness and CVI. ONL thickness correlated positively with CVI. Such correlations were not demonstrated in the control group or in the DR+DME+ patients.

In the study evaluating the relationships between choroidal parameters and FAZ, we found that the analysed groups (≤ 2 and ≥ 3 grade of disruption of the FAZ outline according to ETDRS) did not differ in terms of choroidal thickness, volume or other choroidal parameters. We also found no such differences after dividing the groups according to the FAZ size, with a median of 0.355 mm² as the cut-off level. Similarly, we found no significant differences between the groups after including confounders in the model, such as gender, age, CSME, DR progression and previous retinal panretinal photocoagulation. The FAZ area did not correlate significantly with choroidal thickness, volume or other choroidal parameters. Given the significant difference in the FAZ area in the CSME and non-CSME patients, we also performed a subgroup analysis. The analysis showed no significant correlation between the FAZ area and non-CVI choroidal parameters in CSME patients. In general, the FAZ size and outline in DR patients did not correlate with the choroidal parameters (thickness and volume of individual ETDRS fields and with CVI).

In conclusion, we proved that the presence of diabetic retinopathy is accompanied by changes in the choroidal parameters as well as the outer retinal layers and FAZ. The correlation of outer retinal and choroidal parameters only in the DR+DME- group suggests a more complex pathomechanism of the outer retinal changes in the DR+DME+ patients with the influence of additional factors. We did not find a relationship between retinal and choroidal vascular damage within the macula in the DR patients. Consequently, the two processes appear to be parallel but independent.