Clinical evaluation of experimentally induced choroidal neovascularizations in pigmented rabbits by subretinal injection of lipid hydroperoxide and consecutive preliminary photodynamic treatment with Tookad.

PURPOSE: Up to date several approaches have been undertaken to achieve an 'easy-to-handle' animal model of choroidal neovascularizations (CNVs) in rabbits; however, so far in none of the studies could healthy retinal tissue be maintained, which is mandatory to further investigate the effects of photodynamic therapy (PDT) or anti-vascular-endothelial-growth-factor treatments. It was our aim to reevaluate and verify the method of inducing experimental CNVs in rabbits using subretinally injected linoleic acid hydroperoxide (LHP) as proposed by Tamai et al. and to use it for experimental PDT.

MATERIAL AND METHODS: In 33 eyes of Chinchilla breed rabbits LHP of two different concentrations (25 and 100 microg/50 microl) was injected into the subretinal space via a transvitreal approach under guidance of an operation microscope. Ophthalmoscopic and angiographic examinations were performed on days 3, 7, 14 and 28 after surgery. Preliminary PDT with different experimental parameter sets was performed in 3 eyes using the new photosensitizer Tookad.

RESULTS: Using LHP in the higher concentration, an angiographically determined CNV induction was observed in 27% of all injection sites (n = 34) on days 14 and 28 revealing early well-demarcated and progressive leakage. No CNV was
detected at the lower LHP concentration (60 injection sites). Subretinal CNV was verified histologically revealing vessel formation above the retinal pigment epithelium level. Herein, a significant damage to the outer retinal layers was always observed; however, the general structure of the choriocapillary layer was maintained. Tookad PDT was clinically able to completely stop leakage in 1 case and reduce leakage in 2 cases. Histologically the choriocapillary layer was occluded. CONCLUSION: Subretinal injection of LHP induces angiographically well-demarcated classic CNVs in rabbits; however, the CNV rate was low, and histology revealed severe damage of the outer retinal layers but not of the choriocapillary layer, which is important for studying PDT interactions. Preliminary experimental PDT could clinically stop or reduce leakage from angiographic CNV. Due to the small CNV rate and the significant collateral retinal tissue damage, this model seems to be only of partial suitability for investigating new treatment modalities in CNV.