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Antibodies against retinal antigens as promising options for diagnosis and treatment of neurodegenerative diseases such as Glaucoma

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In glaucoma, the elevated intraocular pressure cannot explain the disease in all patients. Glaucoma is a neurodegenerative disease, leading to the loss of retinal ganglion cells (RGC). Immunoproteomics could play a significant role. Several studies could provide hints for an involvement of autoantibodies in the pathogenesis of the disease. One of those candidates is several heat-shock proteins AAB. The complex profiles of antibodies were analyzed by mass spectrometry based techniques and customized antigen microarrays of 40 different antigens in more than 1000 patients. The resulting profiles were analyzed by different data mining techniques such as artificial neural networks. In all studies we could demonstrate consistent up- and down-regulations of immune reactivities against ocular antigens in glaucoma. The glaucoma could be recognized by a sensitivity and specificity of more than 90%. Furthermore, these antibodies could be useful as an innovative glaucoma treatment option. We analyzed in a glaucoma animal model the effect of an intravitreal injection of anti-synuclein antibodies. Axon density/mm² showed a decay ($p < 0.01$) in controls, ($p < 0.01$) in buffer group, and ($p = 0.19$) in the α -synuclein group. Mass spectrometry revealed changed levels of CCDP93 (-2.6x), cofilin-1 and reticulon 4 (both -2.5x) in IOP elevated eyes and peripherin-2 (2.4x), cofilin-1 (3.5x) and malate dehydrogenase (11.9x) in α -synuclein treated eyes. The results of this study demonstrate clearly that antibody patterns could be useful for diagnosis especially if transferred to a point-of-care device such as lateral flow assays, but also given intravitreal, a promising new approach for neuroregenerative treatment in personalized medicine in glaucoma.

Biography

Franz Grus is the Head of Experimental Ophthalmology, Department of Ophthalmology in Johannes Gutenberg University Medical Center, Germany. His area of interest includes: Glaucoma, age-related macular degeneration and dry eye biomarker research, high-throughput-research methods, proteomics and immunology, diagnostic technologies, antibodies in diagnosis and treatment in personalized medicine. He has been in positions like: Principal investigator for several research projects funded by the German Research Foundation (DFG) and the German Society of Ophthalmology (DOG), as well as other institutions and companies.

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