Serum and Antibodies of Glaucoma Patients Lead to Changes in the Proteome, Especially Cell Regulatory Proteins, in Retinal Cells

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Previous studies show significantly specifically changed autoantibody reactions against retinal antigens in the serum of glaucoma and ocular hypertension (OHT) patients in comparison to healthy people. As pathogenesis of glaucoma still is unknown the aim of this study was to analyze if the serum and antibodies of glaucoma patients interact with neuroretinal cells.

Methods
R28 cells were incubated with serum of patients suffering from primary open angle glaucoma (POAG), normal tension glaucoma (NTG) or OHT, POAG serum after antibody removal and serum from healthy people for 48 h under a normal or an elevated pressure of 15000 Pa (112 mmHg). RGC5 cells were additionally incubated with POAG antibodies under a normal pressure. Protein profiles of the R28 cells were measured with Seldi-Tof-MS, protein identification was performed with Maldi-Tof-Tof-MS. Protein analysis of the RGC5 cells was performed with ESI-Orbitrap MS. Statistical analysis including multivariate statistics, variance component analysis as well as calculating Mahalanobis distances was performed.

Results
Highly significant changes of the complex protein profiles after incubation with glaucoma and OHT serum in comparison to healthy serum were detected, showing specific changes in the cells (e.g. Protein at 9192 Da (p<0.001)). The variance component analysis showed an effect of the serum of 59% on the cells. The pressure had an effect of 11% on the cells. Antibody removal led to significantly changed cell reactions (p<0.03). Furthermore, the incubation with POAG serum and its antibodies led to pro-apoptotic changes of proteins in the cells.

Conclusions
These studies show that the serum and the antibodies of glaucoma patients significantly change protein expressions involved in cell regulatory processes in neuroretinal cells. These could lead to a higher vulnerability of retinal cells towards stress factors such as an elevated IOP and eventually could lead to an increased apoptosis of the cells as in glaucoma.


Image: Cross-sectional view in grayscale of right human eye

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