

19th International Conference on

Neurology and Neurological Disorders

November 04-05, 2019 | Melbourne, Australia



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Autoimmune Biomarkers and AI algorithms could lead to new diagnosis and treatment options in Neurodegenerative diseases such as Glaucoma

Glaucoma is a chronic neurodegenerative disease and one of the leading causes of blindness. The elevated pressure cannot explain the disease in all patients. In glaucomatous human retinae, we could demonstrate some significant proteomic biomarkers by LC-ESI-MSMS and antibody microarrays. Several of those markers provide hints for an involvement of the immune system. Therefore, we used several bead-based mass spectrometric approaches for immunoproteomics. We could show alterations in serum antibody profiles of glaucoma patients against optic nerve and retinal antigens, upregulations (e.g. anti-HSP60, anti-MBP) and downregulations (e.g. anti-14-3-3) have been described. These markers were validated by antigen microarrays and are consistent in independent study populations. Additionally, the changes in antibody profiles could be used as highly sensitive and specific marker for diagnostics purposes. Using algorithm approaches from artificial intelligence and connections of different neural networks including deep learning approaches, we could demonstrate a sensitivity and specificity of more than 93%. Early diagnosis and intervention in risk patients would

offer the chance of early treatment and to slow down the progression of disease. Furthermore, it could be shown that the intravitreal injection of some of these antibodies shows a neurorecovery in glaucoma animal models. We hypothesize that the homeostasis of the autoimmune system plays an important role in recovering and protecting those RGS in early damage. Using these markers could allow a beneficial translation into clinical routine for diagnosis and personal treatment.

Speaker Biography

Franz Grus is the Head of Experimental and Translational Ophthalmology. Currently, he is working at the Department of Ophthalmology, University Medical Centre Mainz, Germany. He is doing Research in Ophthalmology, Bioinformatics and Immunology. Furthermore, the research is focused on proteomics and immunoproteomics in ocular fluids and tissues acting as proteomics core unit with mass spectrometry and customized microarrays. He is also Consultant for pharma and start-ups. He Founded several companies e.g. focused on development of point-of-care devices for diseases such as glaucoma. He has several patent applications and approved patents.

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