Biomarkers in optic neuropathies

The differential diagnosis of optic neuropathies will be presented with particular emphasis on optic neuritis (ON). ON is a rare disease with a incidence of 5/100,000. In most patients ON occurs in the context of multiple sclerosis (MSON), but a small proportion of patients suffer from atypical ON. Atypical optic neuritis presents as single isolated ON (SION), relapsing isolated ON (RION), chronic relapsing inflammatory optic neuropathy (CRION), neuromyelitis optica (NMO) or remains unclassified (UCON). The diagnostic and prognostic value of biomarkers in these conditions will be discussed.

The discovery of auto-antibodies against a protein expressed on astrocytes, aquaporin-4 (AQP4), paved the way for a first laboratory test for NMO. An update will be given on the diagnostic accuracy of currently available AQP4 autoantibody assays.

Autoimmunity against AQP4 causes complement mediated damage to the astrocytes, particular in the AQP4 rich areas such as the optic nerve. Following astrocytic destruction, cellular proteins such as glial fibrillary acidic protein (GFAP) and S100B are released leading to significantly elevated cerebrospinal fluid levels during an acute relapse. In contrast to the high specificity for NMO of cerebrospinal fluid levels of these glial biomarkers, blood values of lesser diagnostic value.

Prognosis of optic neuropathies is related to progressive loss of retinal neurons and their axons. The added prognostic value of neuro-axonal biomarkers such as neurofilaments is that damage may be detected already in the hyperacute phase. Once these biomarkers have been washed out, oedema resolved and retinal atrophy ensued, retinal imaging techniques allow for an estimated of the extend of the damage.