**Choroid Plexus and Retinal Pigment Epithelium: Two of a kind?**

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Research question and background

Over the last few years, we extensively studied the molecular and functional properties of the retinal pigment epithelium (RPE), and it's involvement in neurodegenerative disease. The RPE is part of the outer blood retina barrier and is one of the key cell layers in retinal disorders like retinitis pigmentosa and age-related macular degeneration (AMD). Recently, we noticed a striking morphological and functional resemblance between the RPE cells and the cells of the choroid plexus epithelium (CPE), and their immediate (a-) cellular environment. As well known, the CPE forms part of the outer blood-brain barrier.
After literature investigations and an initial pilot on 3 choroid plexus samples, kindly provided by the Nederlandse Hersen Bank, we obtained initial immunohistochemical and molecular data (using RT-PCR on LDM derived cellular RNA) which suggests that there may indeed be a strong resemblance between the RPE and the CPE. Among others, we found that the "RPE-specific" RPE65 gene is apparantly also expressed in the CPE.
Next, we started the current research project with the central hypothesis that the CPE has a similar role in a number of neurodegenerative disorders of the brain (Alzheimer, MS, Parkinson, etc) as the RPE has in neurodegenerative disorders of the eye.

Methods and tissues used

In order to test this hypothesis, we analysed human CP samples of healthy control donors and donors diagnosed with A.D. and with Schizophrenia. Samples were analyzed and characterized by standard histology (PAS, von Kossa, Cresyl violet) and by immunohistochemistry. Choroid plexus epithelium cells were obtained from cryo-sections by laser capture microscopy. Next, RNA was isolated for gene expression analysis using microarrays (Agilent). Gene expression data of were analysed using Ingenuity knowledge database software.

Results and conclusion

Gene expression of the healthy control CPE was compared with expression profiles of the neuroepithelia of the eye (RPE, ciliary body) showing indeed a high level of similarity between these neuro-epithelia. In addition, it was found that some candidate glaucoma genes had a higher expression in the CPE than in the ocular epithelia, which suggests a role for the CPE in glaucoma. Analysis of the gene expression profile of AD pointed to a major choroid plexus failure in advanced AD.