

---

# THE ROLE OF CEREBROSPINAL FLUID PRESSURE IN THE DEVELOPMENT OF GLAUCOMA IN PATIENTS WITH ALZHEIMER'S DISEASE

KIEKENS S.K., DE GROOT V., DE DEYN P.P., TASSIGNON M.J.

---

**Affiliation institution:** Antwerp University Hospital, Antwerp University

**Promotors of the Project:** DE GROOT V., MD, PhD; DE DEYN P., MD, PhD; TASSIGNON M.J., MD, PhD

## BACKGROUND AND AIM OF THE PROJECT

Alzheimer's disease (AD) patients have a higher prevalence of glaucoma with optic nerve degeneration and retinal ganglion cell loss (1). It is suggested that a high trans-lamina cribrosa pressure gradient might be associated with glaucomatous degeneration (2). The cerebrospinal fluid (CSF) pressure is equivalent to IOP in its influence on the trans-laminar pressure gradient and optic disk surface movement (3). Changes in intracranial pressure lead to changes in the trans-laminar pressure gradient and exposes the retinal ganglion cells to increased levels of mechanical stress (2). CSF pressure also affects axonal transport, which is known to be important in glaucoma aetiology and retinal venous outflow. If indeed the CSF plays a role, this would be a new insight in the pathogenesis of glaucomatous optic neuropathy.

## DEVELOPMENT OF THE PROJECT

Our objective is to compare the CSF pressure and the trans-lamina cribrosa pressure gradient in a group of AD patients with glaucoma versus a group of AD patients without glaucoma. Our hypothesis is that a low cerebrospinal fluid (CSF) pressure and a high translaminar pressure gradient may be correlated with the

presence of glaucoma. The correlation of the two parameters will be investigated in this prospective study.

Newly diagnosed AD suspects, seen at the department of Neurology, will be included in this study after informed consent by the patient or his relative. During neurological work-up for AD, patients undergo a lumbar puncture with CSF manometry.

Ophthalmological evaluation will consist in a routine examination with recording of medical history, best corrected visual acuity, slit lamp biomicroscopy, gonioscopy, funduscopy, and pachymetry. Diagnosis of glaucoma or ocular hypertension will be made on the basis of visual field examination, optic disc evaluation and IOP measurement.

## REFERENCES

- (1) BAYER A.U., FERRARI F., ERB C. – High occurrence rate of glaucoma among patients with Alzheimer's disease. *Eur Neurol.* 2002, 47(3): 165-8.
- (2) WOSTYN P., AUDENAERT K., DE DEYN P.P. – An abnormal high trans-lamina cribrosa pressure difference: a missing link between Alzheimer's disease and glaucoma? *Clin Neurol Neurosurg.* 2008 Jul, 110(7):753-4.
- (3) MORGAN W.H., YU D.Y., BALARATNASIGAM C. – The role of cerebrospinal fluid pressure in glaucoma pathophysiology: the dark side of the optic disc. *J Glaucoma.* 2008 Aug, 17(5):408-13.