



## **Vector generalized linear model applied to cortical thickness in neurodegenerative disease follow-up**

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**INTRODUCTION:** Neurodegenerative disease progressively affects cortical morphology and causes a gradual decline of the cognitive abilities. Our goal was to develop a methodology to estimate a spatio-temporal signature associated with the disease's evolution in terms of cortical areas involved in disease evolution or stabilization. We have tested our approach on a longitudinal study of the cortical thickness (CTh).

**MATERIALS AND METHODS:** The study is based on the ADNI1 (Alzheimer's Disease Neuroimaging Initiative) population composed of normal subjects (HC), progressive MCI (Mild Cognitive Impairment) that will convert during the follow-up (pMCI) and AD patients. Subjects were followed during 36 months and the CTh was calculated from MRI-T1 images at 1.5T thanks to the CortHiZon toolbox developed in the INSERM TONIC laboratory.

Using vector generalized linear model (VGLM), we have focused our analysis on the relations between the pMCI's spatio-temporal evolution of the CTh and the evolution of the pathology, which allowed us to study the pathology's stabilization in various zones of the cortex.

**RESULTS:** The study of the pathology stabilization shows that the left posterior cingulate is the most affected during the transition between normal aging (HC) and early mild cognitive impairment and is very related to the evolution of cognitive disorders towards the conversion.

**DISCUSSION AND CONCLUSION:** The left posterior cingulate is an early marker of Alzheimer's disease, as described in the literature. Thus, we conclude that VGLM is a valid method that would also be used in different neurodegenerative diseases, like Multiple Sclerosis.