

Voxel-Based Morphometry study in patients with amnesic Mild Cognitive Impairment and Alzheimer's Disease: population-based data from the Zabùt Aging Project

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Aims and objectives

Compare the preliminary results of a voxel-based morphometry (VBM) analysis performed in patients with amnesic Mild Cognitive Impairment (aMCI) and Alzheimer's disease (AD) in comparison to a control group with normal aging brain (NAB).

Methods and materials

83 brain MRI scans were obtained using a 1.5T unit (3D T1w-FSPGR IR prep ASSET sequence acquired on the sagittal plane was used for the VBM analysis performed with FSL's SIFT tool [1-2]) during the Zabùt Aging Project (ZAP), a population-based, cohort study regarding aging and dementia conducted in Southern Italy. After the exclusion of subjects with severe leucoaraiosis, silent cerebral infarcts or any other findings that could affect the results 58 subjects (27 males and 31 females, mean age 72.95/SD 6.66 (range 61-85); aMCI = 21, AD = 19, NAB = 18) were included. The results were compared using t-test ($p = 0.05$).

Images for this section:

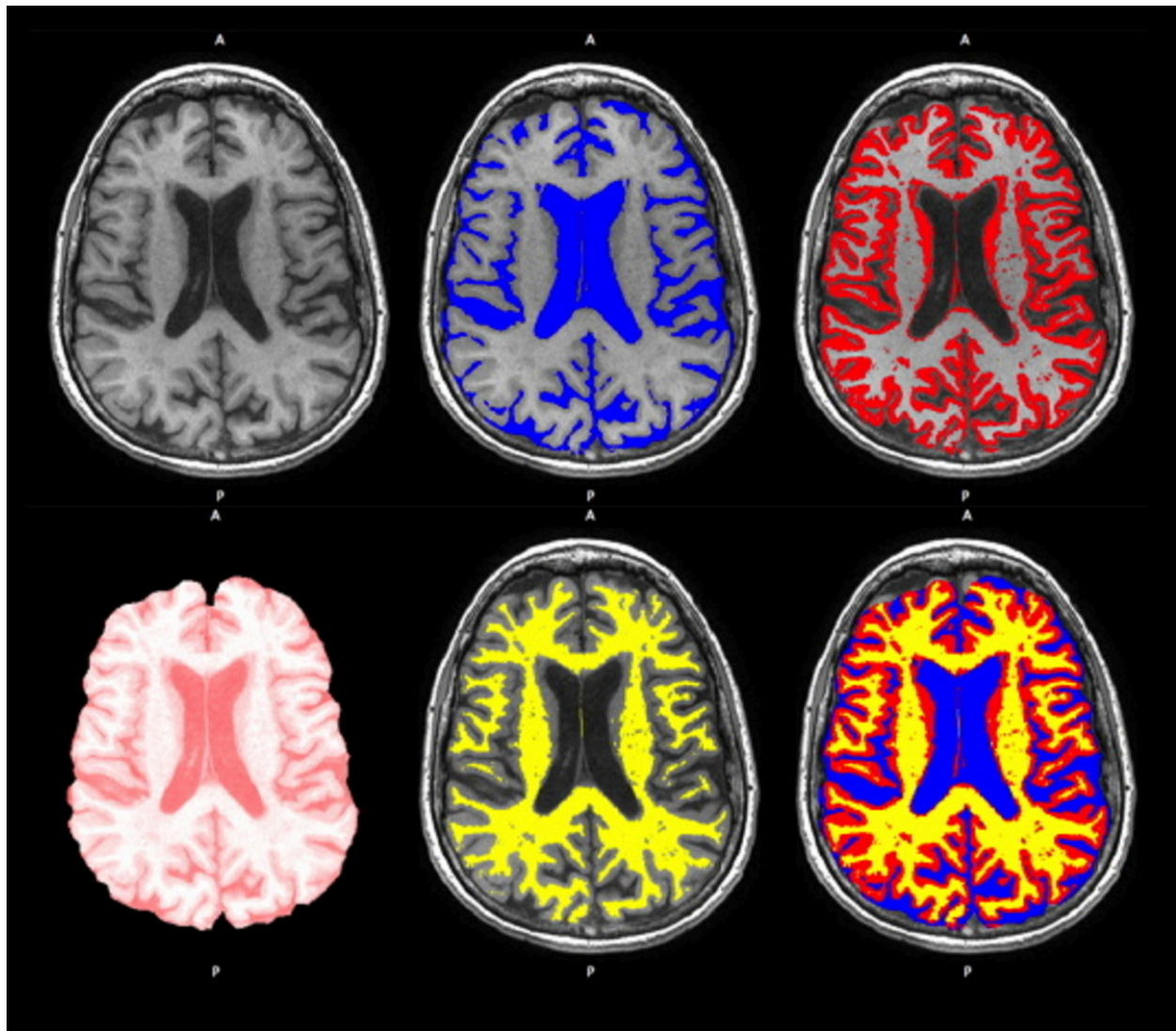


Fig. 1: Examples of VBM analysis results; Multi-Planar Reconstruction (MPR) on the axial plane of the T1 volumetric sequence used for the VBM study (upper left), liquor segmentation data in blue (upper center), gray matter in red (top right), white matter in yellow (bottom center) and all three components superimposed (bottom right). Bottom left (pink) the result of FSL's brain extraction process (BET).

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Results

Statistically significant differences were found between total gray matter volumes (TGMv) ($p = 0.002$) and total brain volume (TBv) ($p = 0.004$) in AD vs NAB; between TGMv ($p = 0.005$) and TBv ($p = 0.004$) in aMCI vs AD. No statistically significant differences were observed in VBM data between aMCI and NAB or between the white matter volumes within groups.

Images for this section:

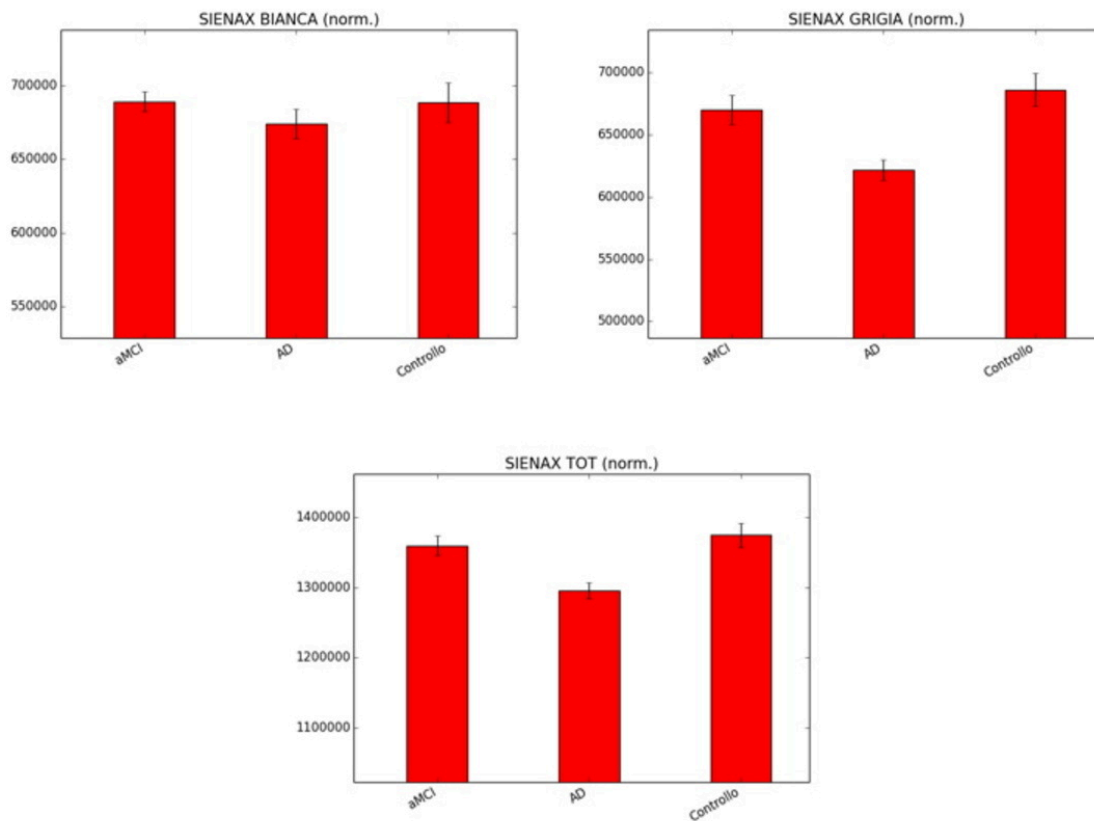


Fig. 2: Sienax VBM analysis results (normalized data) for white matter (SIENAX BIANCA, top left), gray matter (SIENAX GRIGIA, top right) and total brain volume (SIENAX TOT, bottom).

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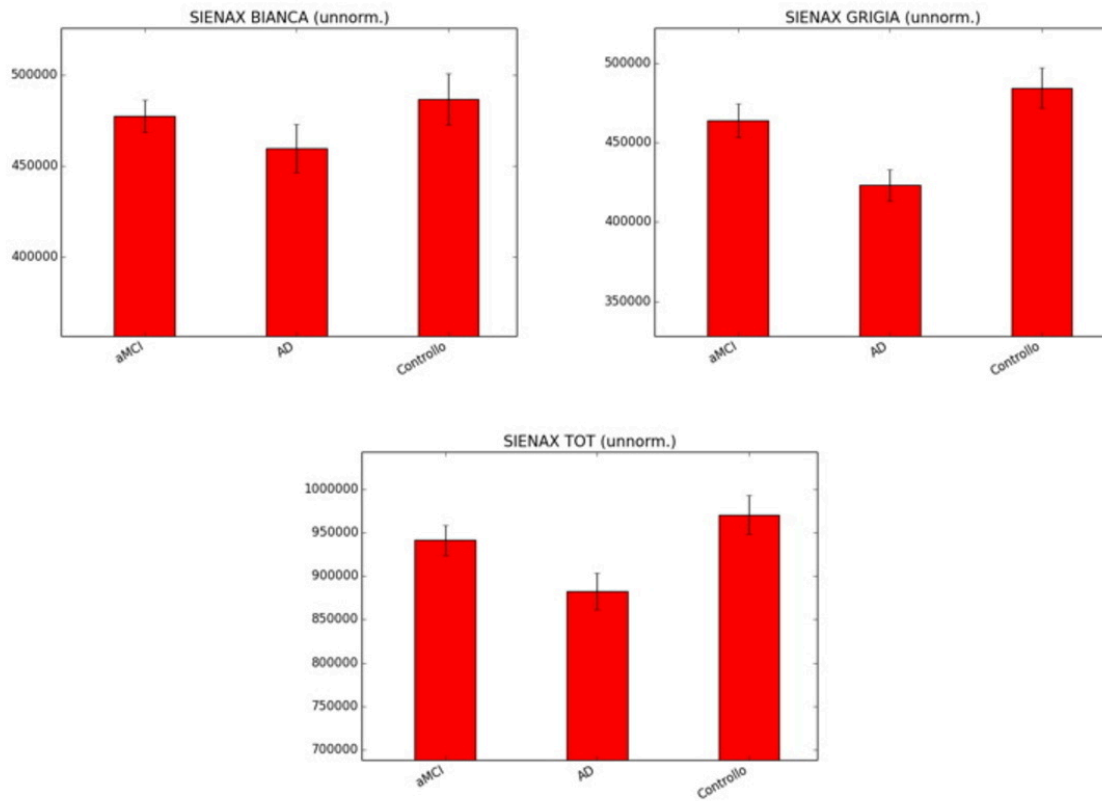


Fig. 3: Sienax VBM analysis results (unnormalized data) for white matter (SIENAX BIANCA, top left), gray matter (SIENAX GRIGIA, top right) and total brain volume (SIENAX TOT, bottom).

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Conclusion

Our results, reflect what already reported the scientific literature and confirm the importance of VBM for the quantitative assessment of brain atrophy in subjects with cognitive impairment. The VBM prospective evaluation of aMCI subjects will help to clarify specific areas involved in AD-type neurodegenerative progression.

Personal information

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