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The superficial white matter in Alzheimer's disease

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White matter abnormalities have been shown in the large deep fibers of Alzheimer's disease patients. However, the late myelinating superficial white matter comprised of intra-cortical myelin and short-range association fibers has not received much attention. In order to investigate this area, we extracted a surface corresponding to the superficial white matter beneath the cortex, and then applied a cortical pattern-matching approach which allowed us to register and subsequently sample diffusivity along thousands of points at the interface between the gray matter and white matter in 44 patients with Alzheimer's disease (Age: 71.02+5.84, 16M/28F) and 47 healthy controls (Age 69.23+4.45, 19M/28F). In patients we found an overall increase in the axial and radial diffusivity across most of the superficial white matter ($p < 0.001$) with increases in diffusivity of more than 20% in the bilateral para-hippocampal regions and the temporal and frontal lobes. Furthermore, diffusivity correlated with the cognitive deficits measured by the Mini-Mental State Examination scores ($p < 0.001$). The superficial white matter has a unique microstructure and is critical for the integration of multimodal information and during brain maturation and aging. Here we show that there are major abnormalities in patients and the deterioration of these fibers relates to clinical symptoms in Alzheimer's disease.

Biography

Margherita Di Paola is currently Lecturer at LUMSA University in Rome (Italy) and Researcher at IRCCS Santa Lucia Foundation in Rome (Italy). She is Principal Investigator for a Grant of the Italian Ministry of Health on "Degenerative Disease and Neuro-Imaging". Neuro-Imaging is indeed her field of Research, with many International publications on impacted peer-journals. She has a background as Neuropsychologist. She graduated in Psychology at University of Palermo, (Italy). She specialized in "Neuropsychology" at University of Rome "La Sapienza" (Italy). She obtained her PhD at Policlinico Agostino Gemelli Rome (Italy).

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