

Relationship between hippocampal subfields and category cued recall in AD and PDD: a multimodal MRI study



¹F. Novellino, ¹R. Vasta, ¹A. Sarica, ²V. Saccà, ¹C. Chiriaco, ²M.G. Vaccaro, ²G. Arabia, ¹M. Salsone, ²M. Morelli, ¹G. Nicoletti, ^{1,2}A. Quattrone



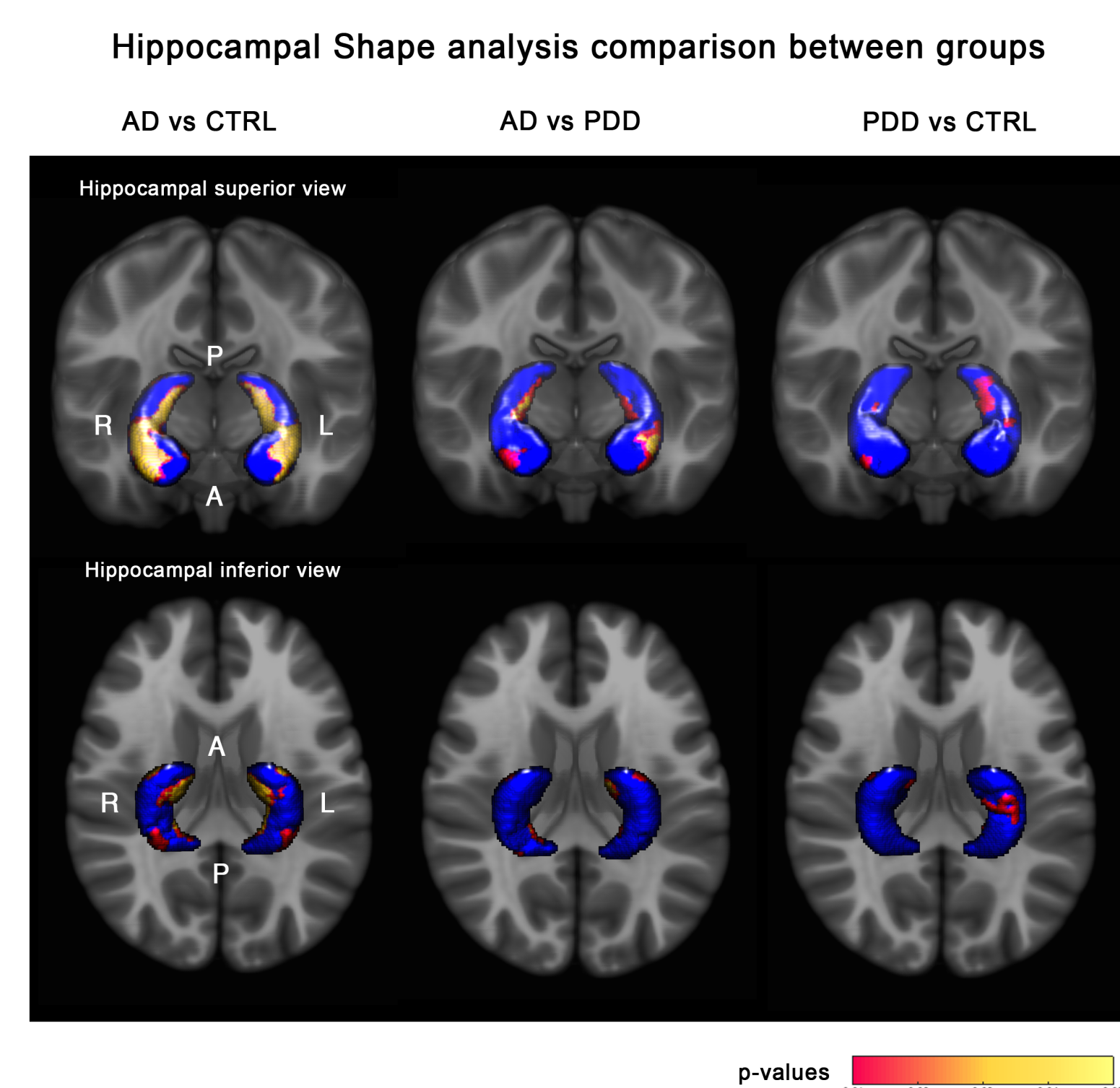
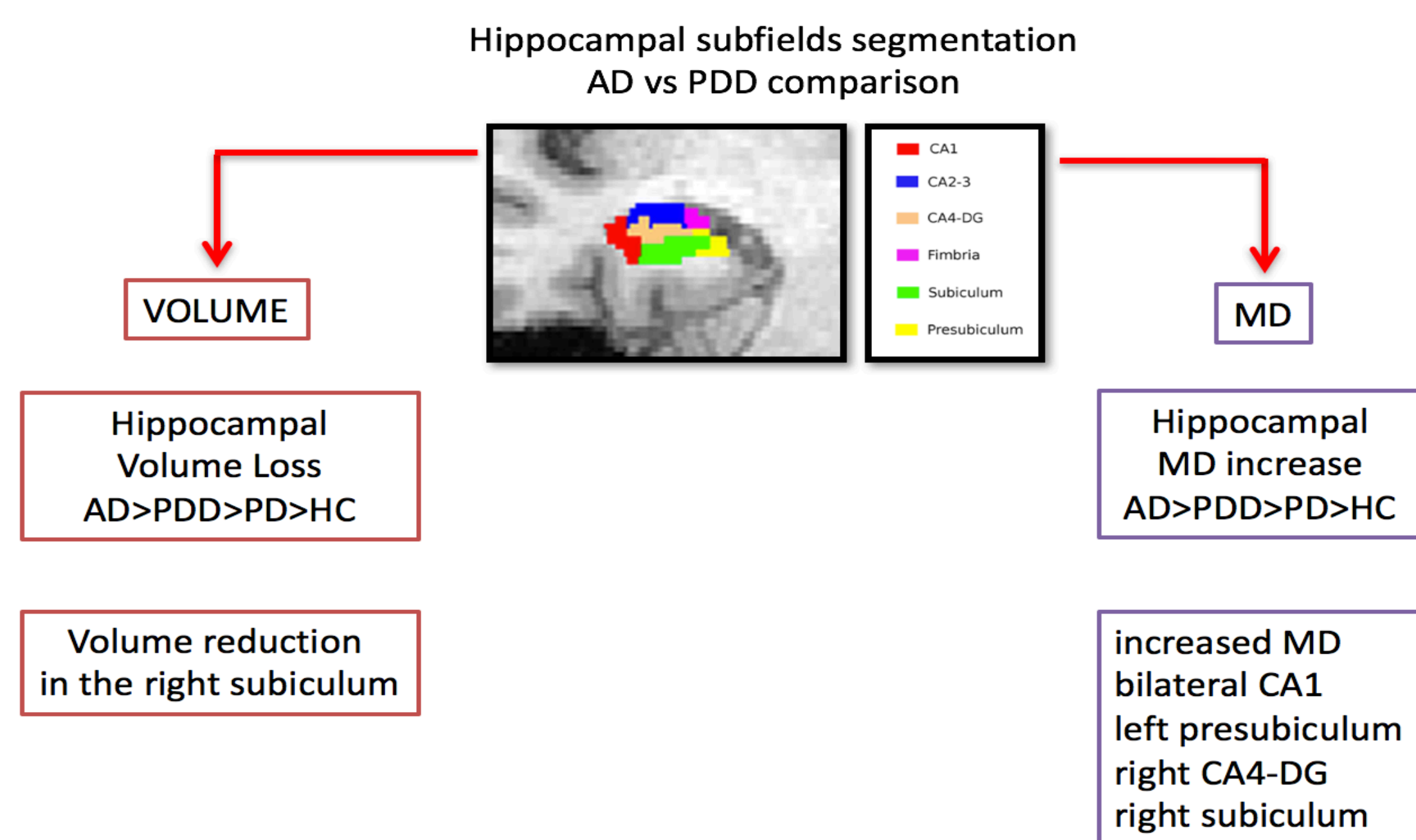
¹Institute of Bioimaging and Molecular Physiology, National Research Council, Catanzaro, Italy

²Institute of Neurology, University Magna Graecia, Catanzaro, Italy

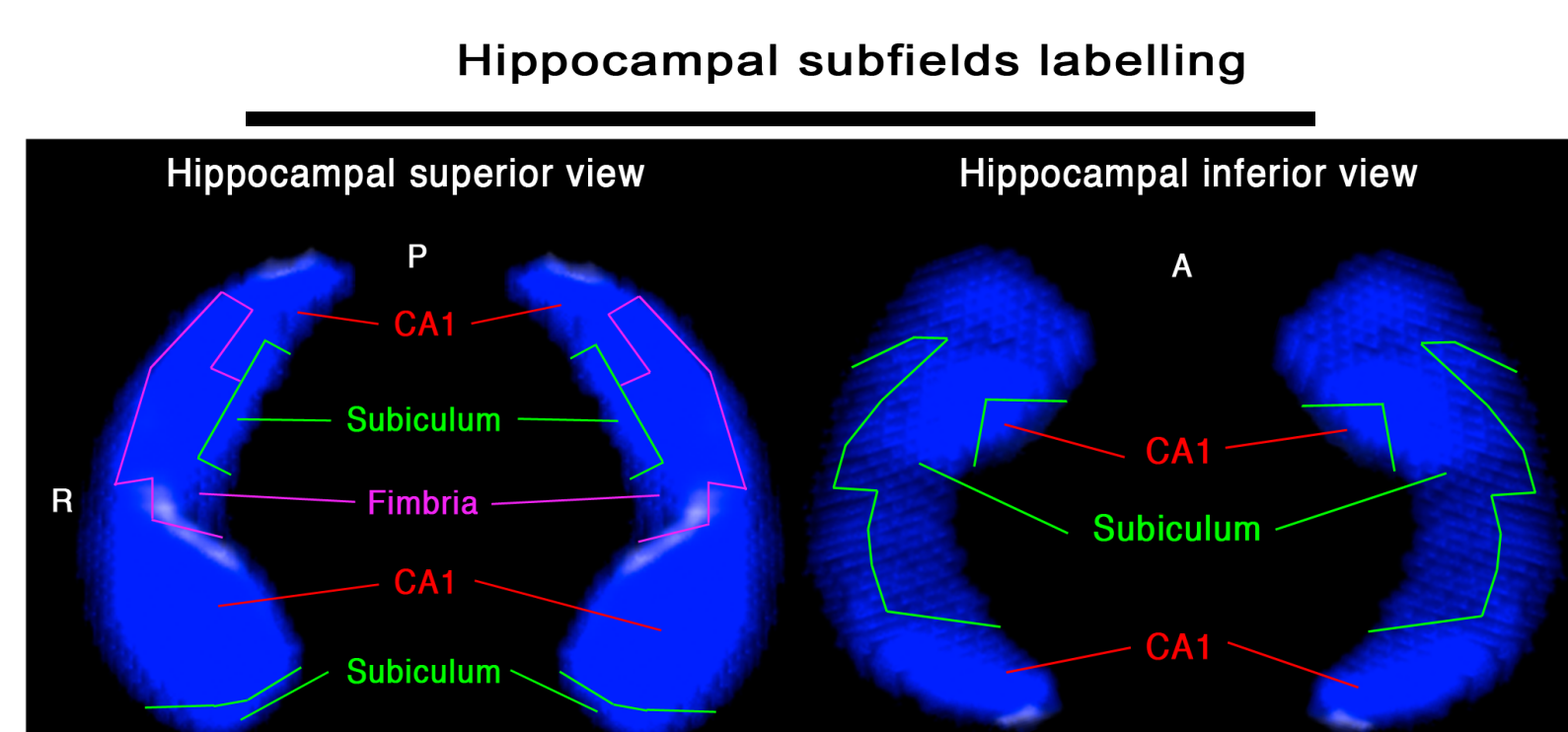
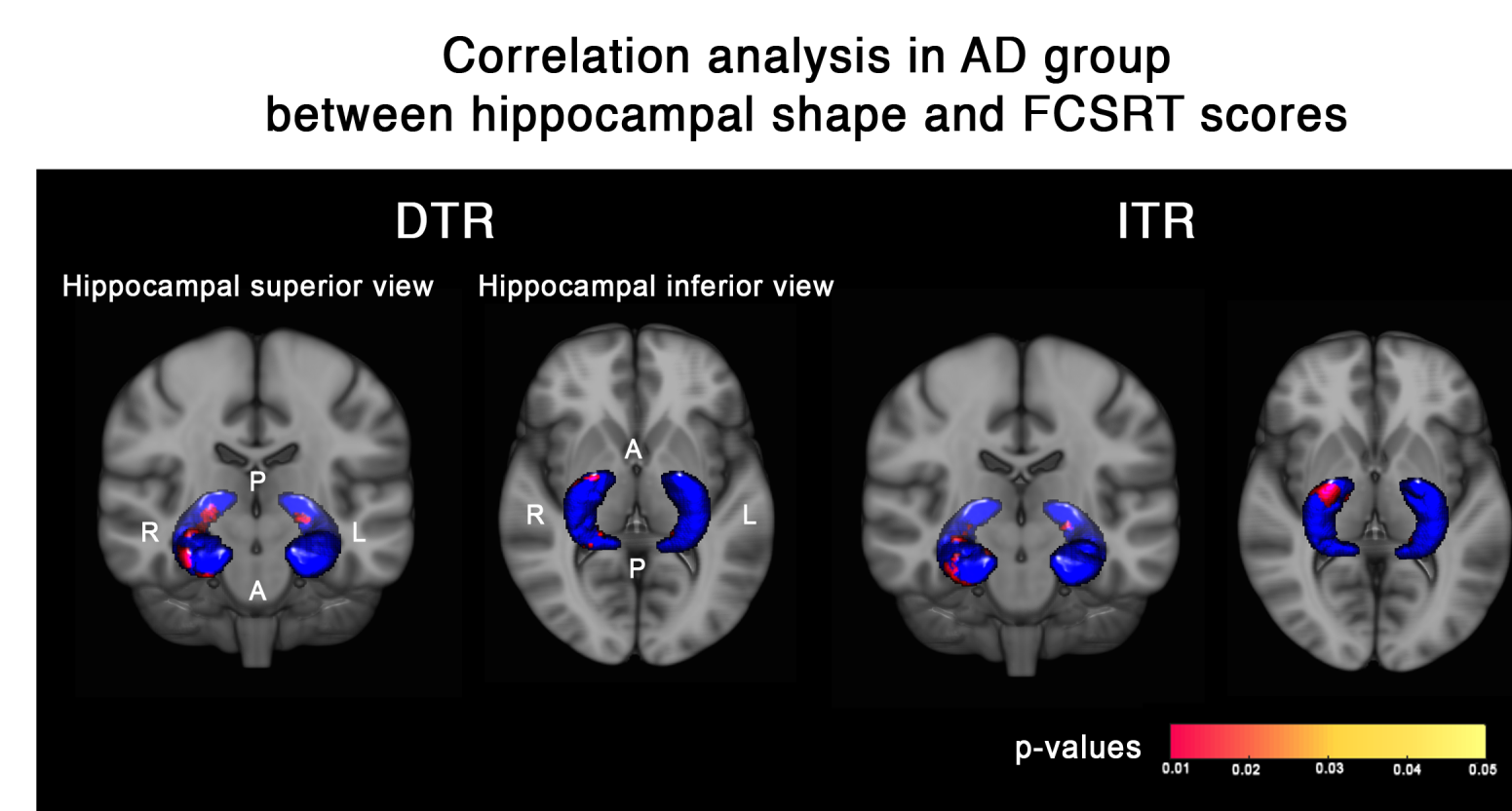
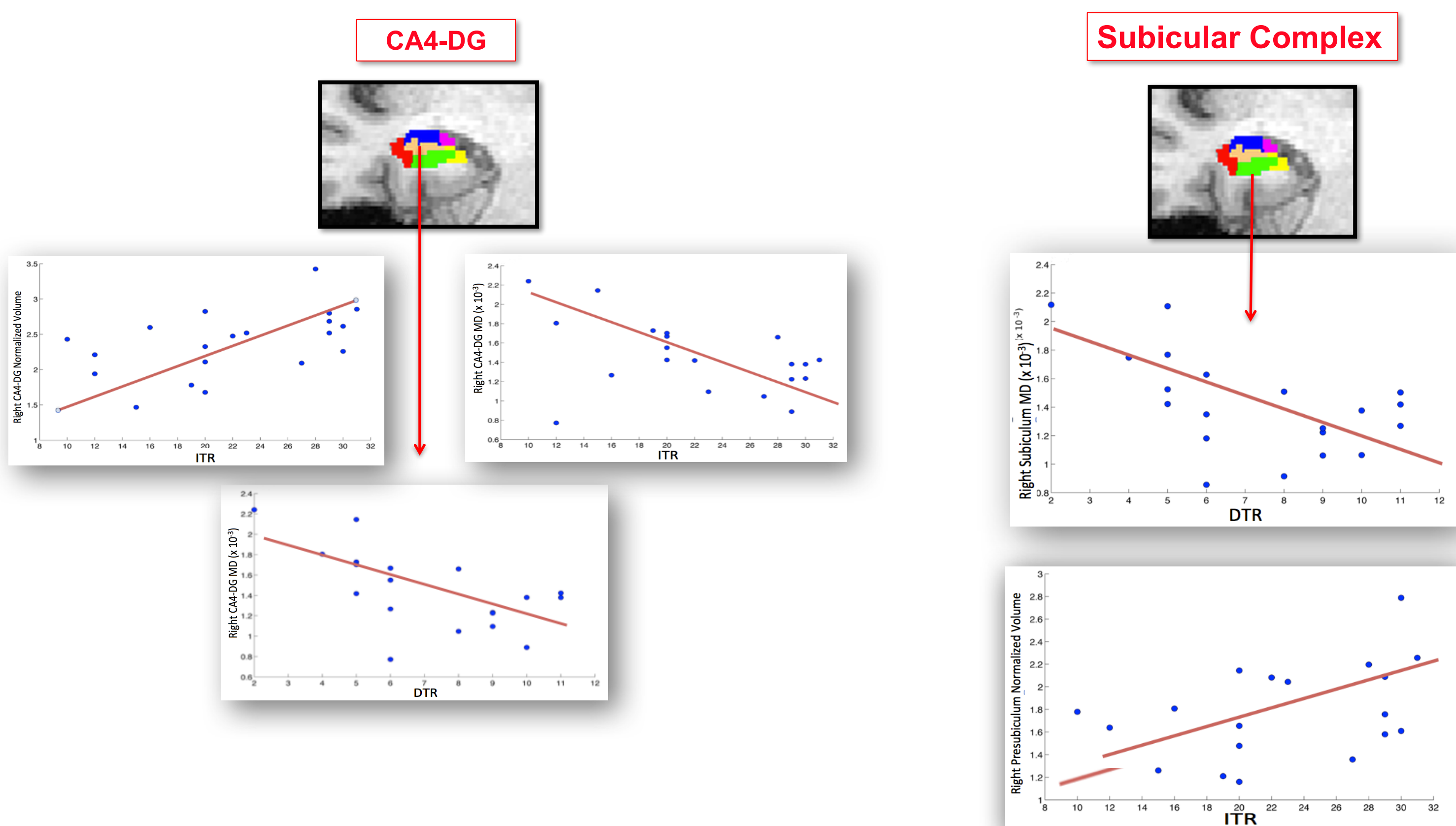
OBJECTIVE: We investigate how changes in whole hippocampus and hippocampal subfields relate to memory recall in different forms of dementia, as Alzheimer's Disease (AD) and Parkinson's Disease with Dementia (PDD)

MATERIALS AND METHODS: Twenty-two AD subjects, 18 PDD and 17 healthy controls were recruited for a study protocol in which a multimodal 3T-MRI hippocampal evaluation (whole-brain T1-weighted and Diffusion Tensor Imaging [DTI]) was combined with a hippocampal targeted neuropsychological assessment (Free and Cued Selective Reminding Test [FCSRT]). Macro- and micro-structural features (volume; shape; mean diffusivity [MD]; fractional anisotropy [FA]) of bilateral hippocampi (whole and subfields) were obtained. Correlations between MRI-derived parameters and neuropsychological evaluations were performed

RESULTS: Compared to controls, AD showed a reduction in total hippocampal volume and in almost all subfields, with a MD increase in the same regions, whereas PDD displayed a volume loss, less severe than AD, more evident in the CA2-3 and presubiculum subfields, without a clear consensual MD increase. In the comparison between AD and PDD, the multimodal analysis allowed us to identify that subiculum, CA1 and CA4-DG were the subfields differently involved in these diseases. Interestingly the same subregions correlated with immediate and delayed total recall items (ITR and DTR) of FCSRT, thus suggesting that these subfields play a role in the total cued recall



Correlation analysis



CONCLUSIONS: Our study provides compelling new evidence that hippocampal subregions had different vulnerability to damage related to different forms of dementia. Moreover, the combination of the *in vivo* analysis of hippocampal subfields with the FCSRT paradigm provided important insights into whether changes within specific hippocampal subfields are related to the different mnemonic profile in AD and PDD patients

REFERENCES:

- Frasson P, Ghirelli R, Catricalà E, Pomati S, Marcone A, Parisi L, Rossini PM, Cappa SF, Mariani C, Vanacore N, Clerici F (2011) Free and Cued Selective Reminding Test: an Italian normative study. *Neurol Sci* 32:1057-1062
- De Flores R, La Joie R, Chételat G (2015) Structural imaging of hippocampal subfields in healthy aging and Alzheimer's disease. *Neuroscience* 309:29-50
- Carlesimo G, Piras F, Assogna F, Pontieri FE, Caltagirone C, Spalletta G (2012) Hippocampal abnormalities and memory deficits in Parkinson disease: A multimodal imaging study. *Neurology* 78:1939-1945