Alzheimer’s disease is characterized by progressive cognitive decline and neuronal loss. The changes associated with this neurodegenerative disease start years before the clinical diagnosis can be made. So far no single diagnostic modality or biomarker is available with high enough sensitivity and specificity to establish an accurate diagnosis in the individual patient. Furthermore, there is need for prognostic factors that can accurately track disease progression.

Magnetic Resonance Imaging offers the possibility to visualize structural changes associated with neurodegenerative disease in vivo. Nevertheless, the diagnostic accuracy leaves room for improvement, partly because cross-sectional analysis has the disadvantage of confounding influence of inter-individual variability in brain structure and ageing.

This thesis aspires to expand insights in the use of longitudinal whole-brain and regional MR imaging in the early detection, diagnosis and prognosis of AD. Moreover, it explores the association of these atrophy markers with clinical, genetic and cerebrospinal fluid biomarkers, aiming to develop a better understanding of the course of the disease, eventually improving the effectiveness of patient management.