Funded by Innoviris and scheduled from December 1, 2024 to December 1, 2027, a study on Alzheimer’s disease entitled “Translate AD” brings together three academic partners (UCLouvain, ULB, VUB), involved in collecting patient data, and three “industrial” partners Cliniques universitaires Saint Luc (CuSL), Erasme Hospital, UZ Brussel), responsible for creating the common database. Its objective: to pool patient data, evaluate new diagnostic and prognostic methods and thus improve their overall management.

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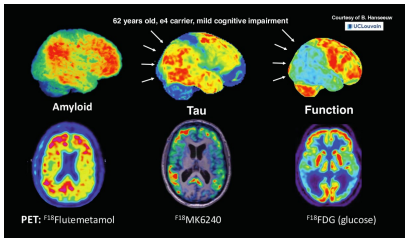
At the beginning were three neurologists: Prof. Bernard Hanseeuw (ULouvain), Prof. Sebastiaan Engelborghs (UZ Brussel) and Professor Xavier De Tiège (ULB). They shared the same basic observation: the difficulty of collaborating in the “small world” of Brussels. It must be said that the acquisition of very different data on similar patients does not facilitate the sharing of said data. The fault lies in different expertise from different technologies, not to mention the ban on sharing data between colleagues. “It was urgent to come together to improve the clinical care of patients,” emphasizes Prof. Hanseeuw. This involves sharing processes, expanding patient recruitment and combining cutting-edge technologies to perform examinations that differ from standard clinical practices – technologies whose relevance and complementarity should be assessed. It is also a question of developing an IT system for exchanging research data and clinical data to enable hospitals to comply with the GDPR. Hence the involvement of the IT departments of the three partner hospitals.

At ULB, the project is led by Prof. Xavier De Tiège, director of the laboratory of translational neuroanatomy and neuroimaging. Two cutting-edge pieces of equipment are used there: the MEG (magnetoencephalography), unique in Belgium, and the PET-MRI, which combines positron emission tomography (PET) and 3-Tesla magnetic resonance imaging (MRI). Added to this is cutting-edge expertise in terms of sleep disorders, electrophysiology (long-term EEG – 24 hours) and magnetoencephalography (MEG) for in-depth analyses, including that of the hippocampus, with a view to predicting how patients are likely to progress. Patient’s recruitment will involve Dr Jean-Christophe Bier, while sleep investigations will involve Pr Mélanie Strauss.

Prof. De Tiège highlights the two challenges to be met. The first challenge concerns the collection of a large number of patient samples to gain efficiency and avoid the problems inherent in small groups. “The second challenge is linked to the difficulty of mastering the large number of possible markers of Alzheimer’s disease”, he adds. The three partner hospitals are therefore pooling their respective expertise. Alongside the ULB, UCLouvain brings its mastery of neuroimaging (tau protein imaging, amyloid imaging, brain MRI) while the VUB brings its know-how in neurochemistry (analysis of cerebrospinal fluid and blood plasma samples) and genetic analyses.

These technologies have a significant advantage: they represent an alternative to the diagnosis of certainty established by biomarker using a PET scanner, which is not very widespread in Brussels and even Belgian hospitals. “This alternative corresponds to a diagnosis of probability and should allow development on larger masses of more accessible indicators” Prof. Hanseeuw stresses. This is an opportunity for the three partner universities and hospitals to accumulate massive data while developing IT tools for their ethical analysis. The solution: aggregate the data of several patients into anonymized metadata. Hence the ongoing development of the OMOP (Observational Medical Outcomes Partnership) common data model to promote the exchange of hospital data that previously existed in different formats. “Each hospital transforms its data into the same format, the same vocabulary, the same standard, the same coding,” explains Dr. Joëlle Thonnard, Data capability project coordinator at CuSL. In doing so, the language barrier is abolished. Once standardized, these data remain within the three hospitals: only the aggregated data of at least 5 patients according to given variables (age group, monthly mortality rate, etc.) are distributed. At this stage, the GDPR does not apply since it is no longer personal data.



© Bernard Hanseeuw - UCLouvain - Illustration of three medical imaging techniques

“With this new study, we are using federated learning (algorithms on data from different sources) to determine the best predictive markers for the evolution of Alzheimer’s disease at all stages of development, from the early phase to the acute phase,” adds Yves Thorrez, data project lead at UZ Brussel. This hospital brings the expertise of its IT department, which manages clinical data for research and innovation. Two previous projects have been driving forces in this area: “SPECTRE-HD Data Capabilities”, designed to improve data sharing in the hospital landscape, and “Dimentia”, which already used data from neuroscience and machine learning to predict the progression of Alzheimer’s disease in patients.

A total of 90 participants will be recruited from December 1, 2024 to December 1, 2027. They will be perfectly characterized from a clinical point of view – a rare feat, making this cohort particularly interesting. But the study will go much further. ULB has obtained additional funding from the Fonds Erasme to increase the patient population by 60. The aim is to include healthy people as a comparison group. “There are genetic mutations that increase the risk of developing Alzheimer’s disease,” recalls Prof. De Tiège. “Federate learning can therefore use this information to strengthen the effectiveness of prognostic and diagnostic markers.”

In addition, the OMOP standard will allow data from several thousand patients from the three hospitals to be shared in a federated way over 3 years. Of course, the study protocol has been validated by an ethics committee and the 90 patients recruited will sign a consent form for the clinical management and research components. By comparing the new diagnostic and prognostic methods and applying them to make them more standard methods, the three partner hospitals will eventually be able to benefit more patients.

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