eBRAIN-Health

eBRAIN-Health is a Horizon Europe-funded research project that was launched in July 2022, with a total budget of almost 13 million EUR. Involving 20 partners including Alzheimer Europe, the project will run for four years, until July 2026. Alzheimer Europe is leading the public involvement activities and contributes to communications and outreach work for the project.

Interview with Project Coordinator Prof. Petra Ritter, Berlin Institute of Health at Charité University Hospital, Germany

Petra Ritter

What is the problem you are aiming to address with eBRAIN-Health?

Brain health costs in Europe are estimated to exceed EUR 800 billion per year. However, we still lack effective, disease-modifying treatments for Alzheimer's disease (AD) and dementia, which affect over 10 million people in Europe alone. There are many factors that contribute to this. Firstly, there are still gaps in knowledge about the specific biological processes in the brain that cause these diseases, which often affect people with multiple health problems. In addition, we lack precise, highly-accurate tools and systems for modelling, diagnosing and monitoring the progress of AD, which may take decades to develop. Together, these and other factors mean that people with AD can wait years to be diagnosed, and lack effective treatments that could change the course of the disease.

Many research studies have been collecting data and information to better understand the biological basis of AD, assess diagnostic and monitoring biomarkers and test potential treatments. These individual studies can be limited by the range of tests and assessments used, and by the number and diversity of participants that are included. In addition, while large investments in dementia research have been made over the last decade, there are technical barriers that hinder progress: such as a lack of integration, and insufficient computational exploitation and re-use of research data. In eBRAIN-Health, we are aiming to address these barriers, by developing a secure research platform for accurate "digital twins" of the brain, created by assembling a large range of data sources. Using these digital versions of individuals to model disease progression could accelerate brain research, and improve clinical decision-making for patients with Alzheimer's and other neurodegenerative diseases.

What are the concrete objectives and actions which will be undertaken by eBRAIN-Health?

As mentioned above, our project is built around the concept of "digital twins". Digital twins are virtual representations of individuals, created based on vast quantities of clinical data and scientific knowledge. Using artificial intelligence, this information can be integrated into a "digital twin", personalised to resemble the clinical characteristics of individual people. As our real-time, virtual representations, digital twins have the potential to support more accurate and personalised decision-making, for example by allowing doctors to simulate the future outcomes of different treatment options.

In eBRAIN-Health, a large variety of data sources will be brought together in a GDPR-compliant research platform, to support the development of digital representations of the brain. These data sources will include brain scans, behavioural studies and lifestyle surveys, as well as clinical data from thousands of patients and healthy peers. The data will be combined with biological information from scientific research on the brain, helping to build complete and highly-detailed simulations of the brain.

These simulations can then be personalised to resemble individual people, creating a brain "digital twin". These "digital twins" will allow a large number of researchers to conduct innovative brain research within a powerful digital platform that keeps patient data secure and confidential. In addition, the digital twins have the potential to improve our understanding of brain function and disease at an individual level; improve diagnosis and risk prediction and optimise potential therapies.

> "Digital twins that simulate individual brains have the potential to accelerate research, and improve clinical decision-making for patients with AD. In eBRAIN-Health, we are working together to realise this potential, by developing a powerful digital platform that will keep patient data secure whilst driving innovation."

eBRAIN-Health

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Acknowledgement

eBRAIN-Health has received funding from the European Union's Horizon Europe research and innovation programme, under grant agreement No. 101058516.