Research project aims at early diagnosis of memory disorders

March 18 2014

The PredictND project, started by European research organisations, aims at developing and validating new procedures for the earlier diagnosis of memory disorders and for detecting individuals at high risk of developing memory disorders. Millions of Europeans who are at risk for experiencing any kind of memory loss would benefit from such a solution. The novel approach will be tested on 800 patients in four hospitals in Finland, Denmark, the Netherlands and Italy. The PredictND project is coordinated by VTT Technical Research Centre of Finland and funded by the EU.

Diagnostics of memory disorders is complicated, as multiple reasons can explain the degeneration of cognitive capacity. Alzheimer's disease is the most common reason explaining 60-70% of cases. Today no single test or biomarker can predict whether a particular person will develop Alzheimer´s disease.

On top of that, clinicians experience an overload of information: they need to combine information from multiple tests and biomarkers in order to find the correct reason and name for the disease.

The PredictND research project, co-funded under the European 7thFramework Programme, will not only develop new, cost-efficient methods for enabling earlier and more reliable diagnostics of different memory disorders in clinical practice; PredictND will also provide computer-based tools that help clinicians form a holistic view of the patient by combining information from several sources, such as clinical

tests, imaging and blood samples, and by comparing these measurements to previously diagnosed cases available in hospital databases.

"Alongside the better prediction of memory disorders, PredictND wants to provide a completely new approach for clinicians to systematically manage the information load that they are facing in current clinical practice", says Dr Jyrki Lötjönen, Scientific Coordinator of PredictND, VTT. "For that, we intend to transfer state-of-the-art computer-based technologies, for example for image analysis and machine learning, to a modern hospital environment in order to assist clinicians in their daily work. At the earliest, the new diagnostics tool could enter the market in a couple of years."

The novel approach will be tested on 800 patients in four top hospitals in Europe: Kuopio (Finland), Copenhagen (Denmark), Amsterdam (the Netherlands) and Perugia (Italy), and compared with the existing diagnostic procedures.

Early detection is crucial

"This project has been granted European funding because increasing the quality of life in Europe is high on our agenda, and memory disorders affect this seriously", explains Project Officer Amalia Vlad of the European Commission. "To treat these disorders, early detection and an accurate diagnosis are essential."

It is important to predict memory disorders before the symptoms start, especially in Alzheimer's disease where the pathological process leads to the death of brain cells. New cost-efficient methods are needed for detecting persons at high risk and corroborating this with new ways of intervention. PredictND will develop novel cost-efficient biomarkers for the early detection of persons at high risk.

One of the project partners, GE Healthcare, has already developed a PET amyloid imaging agent, a potentially powerful tool in aiding the diagnosis of Alzheimer's disease. "But results from this tool must be combined with other types of information to fully characterise the patient", says Dr Lennart Thurfjell, Head of Biomarkers and Software, Medical Diagnostics at GE Healthcare.

Big data

The use of modern machine learning techniques and the exploitation of large databases, i.e., "big data" as it is called nowadays, is still relatively limited in clinical practice. Hilkka Soininen, professor of neurology at the University of Eastern Finland, says: "The innovation of the project is to test the decision-making tool for the detection and differentiation of memory diseases at earliest phases. Detecting signs of progressive memory disease in time will allow earlier interventions and treatments. Tools which support decision-making will be common into tomorrow's clinical practice. These tools can help a clinician to extract the most important information and profiles among the multitude of data."

Dementia is a health priority in Europe. Alzheimer's disease alone accounts for costs equivalent to about 1% of the gross domestic product (GDP) of the whole world and the number of persons affected will double in the next 20 years. Alzheimer's disease affects more than five million people in Europe.

Provided by VTT Technical Research Centre of Finland