NATIONALT VIDENSCENTER FOR DEMENS

Brain imaging and Biomarkers

Read about DDRC's research projects on brain imaging and biomarkers.

Development and evaluation of data-driven diagnostic approaches (PredictND)

PredictND is an international multicenter study performed in the period 2014 to 2018. The aim was to increase the diagnostic accuracy following dementia evaluation in patients with cognitive dysfunction.

The project developed and evaluated a diagnostic software tool that could help clinicians evaluating all available data in the diagnostic process. The PredictND project has since continued as a research collaboration between the four European memory clinics involved and data experts from Finland.

The projects was financed by the European 7th Framework Program and included VTT Technical Research Centre of Finland, GE Healthcare, Imperial College London, The University of Eastern Finland, Danish Dementia Research Center, Rigshospitalet, Amsterdam University Medical Centers, The University of Perugia, Alzheimer Europe.

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Publications

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Diagnosis and prognosis in Normal Pressure Hydrocephalus (NPH)

In NPH, decreased flow and absorption of brain fluid leads to cognitive dysfunction, gait and balance problems and urinary incontinence. All patients referred on suspicion of NPH are evaluated by a standardized program and patients that are operated with ventriculo-peritoneal shunting are followed up in collaboration with the Neurosurgical department. New imaging tools, supplementary investigations and biomarkers are investigated for their ability to increase diagnostic and prognostic accuracy.

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Publications

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BIOMARKAPD

The aim of the BIOMARKAPD project was to standardize all aspects of the measurement of AD and PD biomarkers across Europe. I. e. how to collect samples, how to perform the measurements and how to interpret the results.

The project also created a virtual biobank with samples from well characterised AD and PD patients, including patients in very early disease stages, as well as neurologically healthy controls. These samples could then be used to develop new and better assays and to test new and better biomarker candidates.

Furthermore, the project partners also developed certified reference materials that can be used to harmonise assays that are used to measure the different biomarkers.

The project was financed through the EU JPND (EU Joint Programme – Neurodegenerative Disease Research) and Innovation Fund Denmark. BIOMARKAPD was a collaboration between fifteen EU memer countries together with Turkey, Schwitzerland and Canada.

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Publications

Oliveira F, Leuzy A, Castelhano J, et al. Data driven diagnostic classification in Alzheimer's disease based on different reference regions for normalization of PiB-PET images and correlation with CSF concentrations of Aβ species. Neuroimage Clin. 2018;19(20):603-610.

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Mitochondrial health in AD (MITO-AD)

Throughout life, the brain is exposed to significant stress, among these are aging processes, decreasing brain metabolism, and oxidative stress. This project will investigate the importance of aging processes for the development of Alzheimer's disease with a focus on the reduced energy metabolism in the brain.

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Biomarkers for Alzheimer's Disease and other Neurodegenerative Diseases in Saliva

There is a need for an early, inexpensive and noninvasive diagnostic biomarker for AD. A saliva sample could be a valid alternative to cerebrospinal fluid or blood, and a valid and reproducible saliva biomarker would therefore be preferable over other present biomarkers.

The project was coordinated by Helena Sophia Gleerup, Anja Hviid Simonsen and Steen Gregers Hasselbalch at the DDRC, and its primary partners are the Regional Dementia Research Centre, Zealand University Hospital, Denmark and the Sahlgrenska Academy at the University of Gothenburg. The collaboration is still ongoing and continues to publish papers from the project.

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Publications

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Biomarkers for idiopathic normal pressure hydrocephalus

Idiopathic normal pressure hydrocephalus (iNPH) is one of the few potentially reversible causes of dementia. However, the diagnostic workup can be challenging.

The purpose of this study is to investigate the molecular profile of patients with iNPH. The aim is three-fold: First, to find biomarkers that can aid in the diagnosis of iNPH, second, to find biomarkers that can aid in predicting whether a patient will benefit from a drainage operation, and third, to identify possible pharmacological targets for the treatment of hydrocephalus.

This project is done in collaboration with the department of Neurosurgery, Rigshospitalet and the department of Neuroscience, University of Copenhagen.

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Publications

Manniche C, Hejl AM, Hasselbalch SG, Simonsen AH. Cerebrospinal Fluid Biomarkers in Idiopathic Normal Pressure Hydrocephalus versus Alzheimer's Disease and Subcortical Ischemic Vascular Disease: A Systematic Review. J Alzheimers Dis. 2019;68(1):267-79.

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Biomarkers for Bipolar Disease, a longitudinal study

The aim of this ongoing study is to investigate state-specific changes in cerebrospinal fluid markers in outpatients diagnosed with Bipolar Disease compared to healthy individuals during a one-year prospective, longitudinal follow-up study.

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Publications

Knorr U, Simonsen AH, Zetterberg H, et al. Biomarkers in cerebrospinal fluid of patients with bipolar disorder versus healthy individuals: A systematic review. Eur Neuropsychopharmacol. 2018;28(7):783-794.

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Neuroimaging

Neuroimaging of brain structure is essential in dementia evaluation, and functional imaging can increase the diagnostic accuracy. Imaging of glucose metabolism using Fluoro-deoxyglucose positron emission tomography (FDG-PET) is widely used, and the added diagnostic and prognostic value of FDG-PET is evaluated.

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Publications

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