

Alzheimer's Disease Detect and Prevent



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AD Detect and Prevent Project

Aims to develop a **robust digital tool** that:

- Enables the early detection of **Alzheimer's disease** prior to the possible onset of dementia.
- Offers personalized cognitive training and intervention programmes that address lifestyle risk factors connected to **Alzheimer's dementia**.



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Alzheimer's Disease

- Alzheimer's disease (AD) is a neurodegenerative disease that slowly and progressively destroys brain cells. AD is the underlying cause in 70% of dementia cases.
- AD has long been considered as a form of dementia. Currently, however, the disease is described as a continuum beginning with a phase where the person has no overt symptoms but there are pathological biomarkers present in the brain, leading up to the dementia phase.
- As yet, there is no cure for AD or AD dementia.



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AD dementia

- Dementia can be described as a set of symptoms caused by one or more disorders affecting the brain. The most common cause of dementia is AD.
- Symptoms of AD dementia (e.g. memory loss, difficulties with thinking, problem-solving, language, communication and disorientation) are sufficiently severe to interfere with independence in activities of daily living.
- Dementia is also a form of disability. Various impairments may lead to disability if appropriate and timely support is not provided.
- Dementia has a significant social, physical and psychological impact on the individual and people around them.
- Each person is unique and people experience the symptoms differently.



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Disease burden of dementia

- Approximately **9 million** people in Europe are living with dementia (all forms and causes included).
- The number of Europeans living with dementia is likely to increase to **14 million** by 2040.
- In 2015, dementia imposed an estimated economic cost of approximately **\$818 billion** globally or **1.1% of global GDP**.
- Dementia is a major contributor to disability and dependency.

Sources:

- OECD - *Health at a Glance: Europe 2018*.
- WHO - *factsheet, dementia*



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Current challenges in detecting AD

- AD dementia diagnosis is often made late in the disease process.
- When AD dementia is diagnosed, it has often already caused significant nerve damage resulting in impaired memory, thought processes, behaviour, social skills etc.
- Risk reduction strategies and new disease modifying treatments (which may be developed in the future) might be more effective if started at a very early stage of the disease prior to the onset of dementia.



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The value of early detection of AD

- Up to 1/3 of all AD cases could be prevented with specialized cognitive training and lifestyle interventions, if this happens **before the disease onset**.
- Similar treatment **could slow disease progression and improve quality of life** for those with early-stage AD.
- Delaying the average disease onset by 1 year could reduce the number of projected worldwide cases by 9 million by 2050.
- Delaying the average disease onset by 5 years could result in 41% lower prevalence and 40% lower cost of AD by 2050.

Sources:

- Barnes, D. E., Yaffe, K., Belfor, N., Jagust, W. J., DeCarli, C., Reed, B. R., & Kramer, J. H. (2009). Computer-based Cognitive Training for Mild Cognitive Impairment: Results from a Pilot Randomized, Controlled Trial.
- Paillard, T., Rolland, Y., & de Souto Barreto, P. (2015). Protective Effects of Physical Exercise in Alzheimer's Disease and Parkinson's Disease: A Narrative Review.
- Shah, R. (2013). The Role of Nutrition and Diet in Alzheimer Disease: A Systematic Review.
- Zissimopoulos, J., C, E., & S, P. (2014). The Value of Delaying Alzheimer's Disease Onset.



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The AD Detect and Prevent Solution

- AD detection:

The project aims to gamify a novel method developed by Oxford University – a cognitive test on working memory (one of the first cognitive domains to be affected) that has been shown to be highly sensitive in identifying individuals at an elevated risk of AD but are asymptomatic, thus allowing for AD detection before overt clinical symptom onset.

Source: Liang, Y., Pertzov, Y., Nicholas, J. M., Henley, S. M. D., Crutch, S., Woodward, F., Husain, M. (2016). Visual short-term memory binding deficit in familial Alzheimer's disease.



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The AD Detect and Prevent Solution

- AD risk reduction:

With results from the AD detection component that is integrated on the Brain+'s digital platform, the solution will subsequently offer personalized AD risk reduction programmes in the form of computerized cognitive training and lifestyle interventions, with the goal to reduce the risk of developing into AD and/or to slow the progression of AD.



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Oxford sensitive
cognitive
assessment on the
Brain+ platform

Personalized
cognitive training &
lifestyle
interventions

Gamify & Combine

**AD Detect and
Prevent digital
solution**



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User-friendly, highly scalable
and easily accessible

➤ Smartphones

➤ Tablets



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Validation studies



Study Brain+/Oxford: *aims at identifying early subtle changes in cognition in people with a high risk of developing AD but who are currently asymptomatic.*

Study Aarhus: *aims at validating the precision of the AD Detect and Prevent detection tool for detecting subtle cognitive changes in asymptomatic AD at-risk individuals (using PET and DW-MRI scans).*

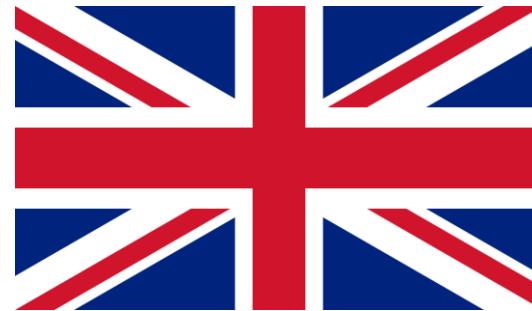
Study Nottingham: *will examine the immediate and prolonged impact of AD Detect & Prevent training, particularly for transfer effect to other real-world tasks.*



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Launch AD Detect and Prevent Tool & future ambition

- 2020: Denmark and the UK
- Potential expansion to other countries and disease areas:
 - Parkinson's disease
 - ADHD
 - Autism
 - PTSD
 - Stress
 - Schizophrenia



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AD Detect and Prevent Consortium



The University of
Nottingham



AARHUS UNIVERSITET



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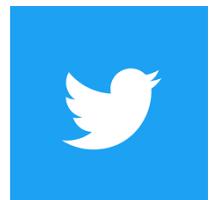
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