PROVIDEMUS alz

GIVING YOU THE POWER TO FORESEE ALZHEIMER'S DISEASE EFFORTLESSLY

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BACKGROUND AND RATIONALE

Alzheimer's disease (AD) has been a **known** pathology **for over a century**, but research on it has exploded only in the last 30 years [1].

In **2015**, **over 46 million people across the globe** were afflicted by the condition. Projections point to **75 million patients in 2030** [2] and **153 million in 2050** [3].

The **first step** toward dementia due to AD is the **abnormal accumulation of amyloid beta in the brain** [4], **20–25 years before** the clinical onset [5]—**preclinical AD**.

During the preclinical phase, **subtle behavioral and cognitive changes** may precede and **indicate an upcoming decline** toward cognitive impairment and dementia, even before the patient starts feeling any symptoms.

However, these changes' power relies on **their continuous and longitudinal analysis**.

Nowadays, **technology is omnipresent**. A simple smartphone is with us for more than 88% of the day [6]. Wearables are even more time.

Machine learning (ML) possibilitate a **ubiquitous and highly scalable solution** to **detect the first changes** in individuals who will later develop dementia due to AD, **years before**.

HOW HEALTHY IS YOUR BRAIN? STAY VIGILANT!

OBJECTIVES

Apply **ML techniques to screen individuals for the onset of preclinical AD**: analyzing and modeling **nonintrusive data** that is **passively collected using portable and wearable devices** while always respecting every user's privacy.

Explore the power of globally connected devices used by people daily in their natural environment (rather than in a laboratory or controlled environment) and **combine it with the capabilities of ML** techniques.

Our **main goal** is to **examine and validate** the usage of so-called **digital biomarkers to screen for the onset of AD** in a passive and nonintrusive way.

METHODS

This project involves the collection of **four types of data**:

1. **Patient-reported** outcomes (PROs) include validated scales for assessing **depression**, **dysphoria**, **cognitive reserve**, and **demographic and family clinical history** surveys.

2. **Performance-reported** outcomes (PerfROs) include tests on **memory**, **motor actions**, and **processing speed**.

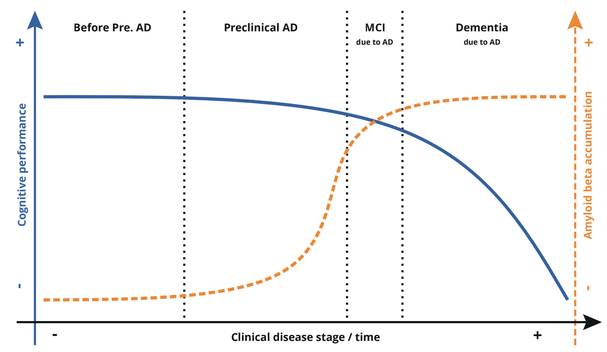
3. **Clinician-reported** outcomes (ClinROs) include **blood biomarkers of AD** and other clinical exams in case of suspected cognitive impairment in a specific participant.

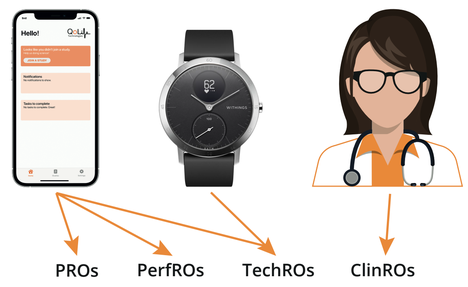
4. **Technology-reported** outcomes (TechROs) include **passive data** collected using **smartphones and smartwatches** (e.g., **heart rate**, **sleep** characteristics, and **physical activity**).

With time, the **PROs, PerfROs, and ClinROs** are expected to **show cognitive changes** in some participants. The **TechROs** collected from those same participants are also **expected to reflect those changes**.

Our **main hypothesis** is that the computational models from TechROs will enable an accurate (and timely) assessment of cognitive decline and the AD condition.

We will work on a **method for early detection of cognitive decline** in individuals **without** an immediate increase in the **burden on medical personnel**.





FIRST PHASE

Observational study with **up to 200 cognitively healthy participants** residing in Switzerland or surrounding France zones.

Individuals must be **45 years or older**, **fluent in French and/or English**, have a basic experience with a smartphone, and be **able to wear a watch** for most of the day.

PROs and PerfROs will be collected every three months for two consecutive years using a **smartphone application** [7].

TechROs will be collected during the same two years using a **clinically tested smartwatch**.

ClinROs will not be collected during this phase of the study.

QoLife Technologies

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DO IT

Sign in for **updates** and **call for participants** at **PROVIDEMUS.UNIGE.CH** or scan the QR code.

Test your cognitive performance for free at FACEMEMORY.FUNDACIOACE.COM ® [8].

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