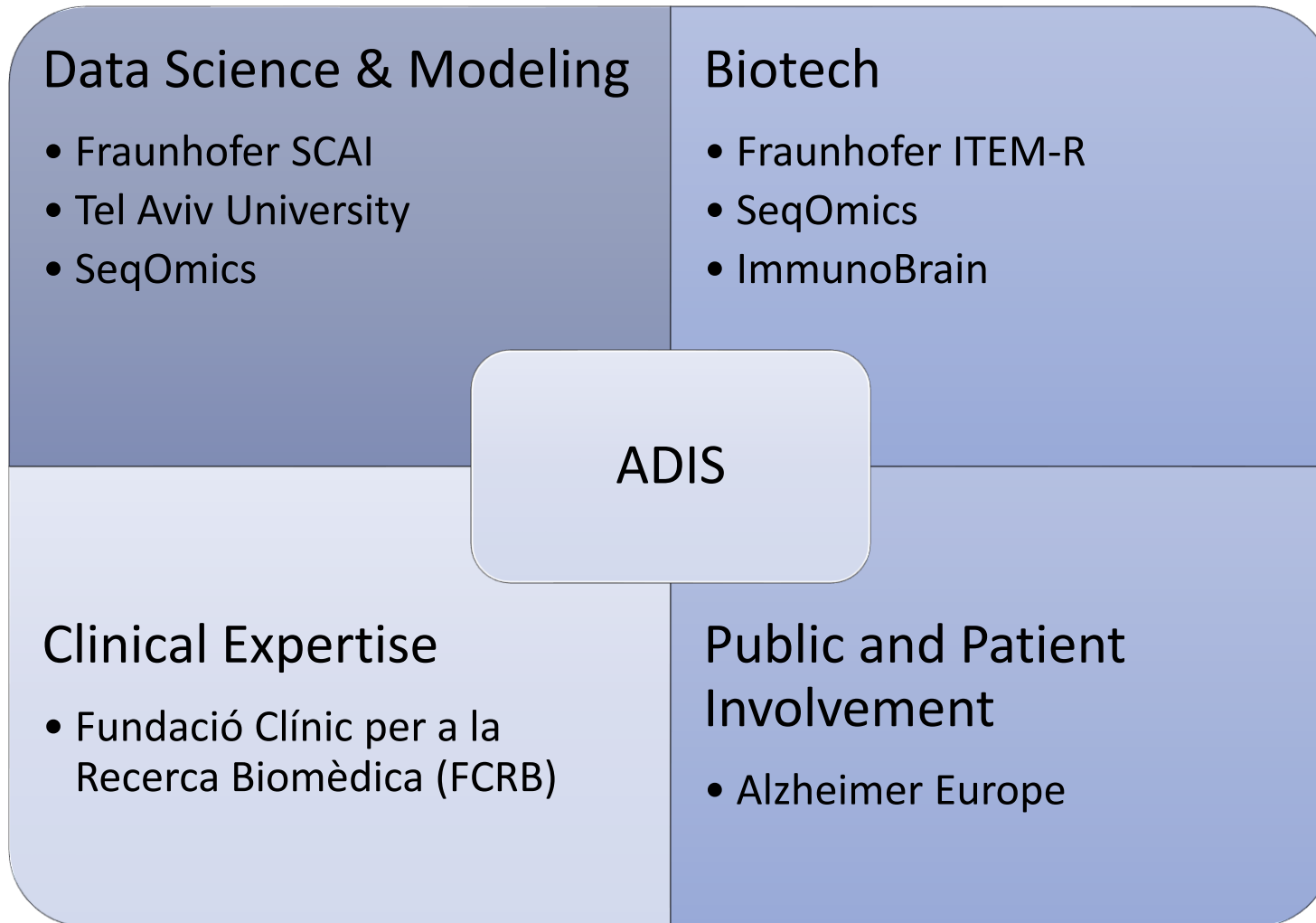


Early Diagnosis of Alzheimer's Disease by Immune Profiling of Cytotoxic Lymphocytes and Recording of Sleep Disturbances (ADIS)

07/22 – 06/25

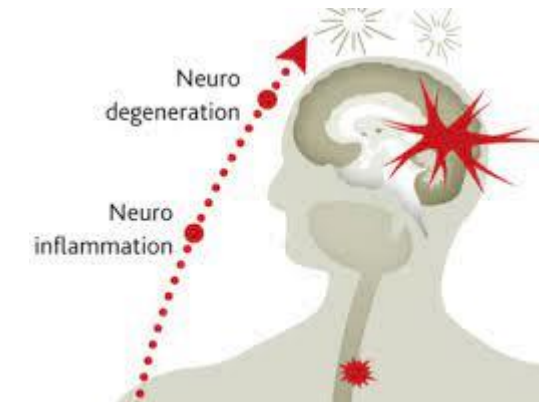


Overview about the consortium



Motivation

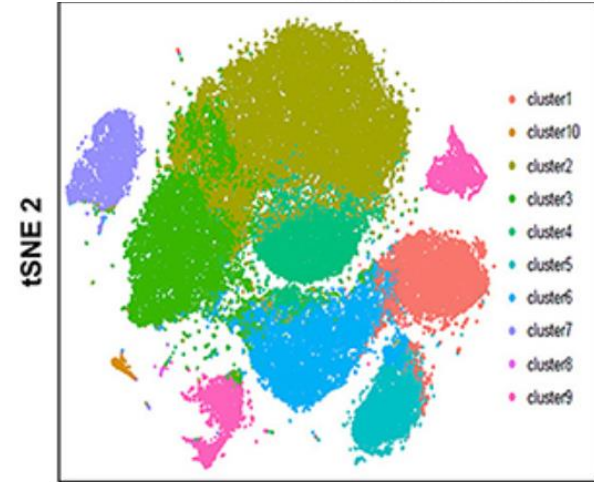
- Alzheimer's Disease (AD) is the most prevalent neurodegenerative disease with ~130 million patients expected in 2050.
- Disease modifying treatments are only effective in early disease stage
- Diagnosis is challenging and often comes too late
 - CSF and PET biomarkers are invasive and expensive
 - Plasma biomarkers for, e.g., p-tau 217, only available in specialized centers
- Additional low-cost, scalable biomarkers needed, specifically for non-specific processes in AD pathophysiology
- (Neuro-)inflammation as a candidate mechanism for diagnosis and prognosis
 - Inflammatory signals have been detected in the peripheral immune system of AD patients
- Sleep disturbances are a common early disease symptom → potential for deriving digital biomarkers



Project Aims

- Deep characterization of **peripheral blood cytotoxic lymphocytes (NK and cytotoxic T-memory cells)** as potential markers for the early diagnosis of AD
 - single cell sequencing, flow cytometry, immune biomarker profiling

- Evaluate digitally assessed **sleep disturbances** for early diagnosis of AD and investigate the correlation of sleep disturbances with blood-based biomarkers
 - Motion Watch 8 vs. questionnaire-based assessment



Expected Outcomes

- New candidate biomarker signatures for early disease diagnosis and insights into the role of peripheral cytotoxic lymphocytes in AD
- Digital signatures reflecting disturbances of sleep and cognition as additional candidate markers for early diagnosis
- An understanding of the correlation of immune signatures with digitally assessed pathophysiological disturbances, such as sleep

Patient and Public Involvement

- Regular consultations of ADIS patient advisory board
 - Understand relevance of earlier disease diagnosis from a patient perspective
- Developed a communication strategy directed towards young adults regarding „brain health“
 - What can I do to maintain my brain health?



Scientific Successes and Challenges

- Association between self-reported sleep problems and genetic disease predisposition (polygenic risk score, genetic burden of immune pathways)
- Machine learning can predict cognitive impairment based on sleep (→ see poster)
- Contribution of noradrenergic and orexinergic systems to sleep-awake patterns within AD continuum
- Agent based modeling stratifies patients by response to anti-PD-L1 treatment
- App for quantification of behavioral changes in MCI and AD
- **Challenges:**
 - Strongly increased prices for lab agents → mitigated by switch of vendor and placing orders at the right time
 - Delayed delivery of lab agents → delayed start of some experiments

Dissemination of Project Results

- 2 scientific publications
 - Further manuscripts in preparation and/or submitted
- 6 talks, including major scientific conferences
 - AAIC 2023, 2024
- 9 poster presentations, including major scientific conferences
- Project web page
- Social media: LinkedIn + X



frontiers | Frontiers in Immunology

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Check for updates

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Towards early diagnosis of Alzheimer's disease: advances in immune-related blood biomarkers and computational approaches

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RESEARCH ARTICLE | [Open Access](#) |

Locus coeruleus integrity and neuropsychiatric symptoms in a cohort of early- and late-onset Alzheimer's disease

Neus Falgàs ✉, Marta Peña-González, Andrea Val-Guardiola, Agnès Pérez-Millan, Núria Guillén, Jordi Sarto, Diana Esteller, Beatriz Bosch, Guadalupe Fernández-Villullas ... [See all authors](#) ▾

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Lea T. Grinberg and Raquel Sánchez-Valle contributed equally to this work.



Cross-Institutional Collaboration: Lessons Learned

- Interdisciplinary work requires intense and regular discussions
- Involvement of patient perspective is not always straight forward
- Data sharing agreement took a long time (~ 1.5 years)
- Logistics around biological lab experiments across institutions are complex and time consuming
- Challenges due to war in the Near East
 - Flights canceled
 - People drafted to the army

www.adis-project.eu



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in



Welcome to the ADIS project

ADIS stands for “Early Diagnosis of Alzheimer’s Disease by Immune Profiling of Cytotoxic Lymphocytes and Recording of Sleep Disturbances”. The research project brings together EU-leading expertise in data science, biotechnology, clinical research as well as public involvement.

As the title already highlights, the partners aim to advance research into one of the most challenging conditions, Alzheimer’s disease.