Alzheimer’s Disease Neuroimaging Initiative (ADNI)

Research Areas

- **Biomarker Research**
  Diagnostic, Genomic Biomarker

- **Basic Research**

At a Glance

- Status: Active Consortium
- Year Launched: 2003
- Initiating Organization: Foundation for the National Institutes of Health
- Initiator Type: Nonprofit foundation
- Location: International

Abstract

The Alzheimer’s Disease Neuroimaging Initiative (ADNI) is a public-private partnership managed by the Foundation for the National Institutes of Health (FNIH). The initiative aims to advance clinical trials through the identification and validation of biomarkers that can be used to diagnose the various stages of Alzheimer’s disease (AD) and track its natural progression, as well as develop methods to track a patient’s response to a therapy.

Mission

ADNI was established to develop biomarker-based methods to detect and track the progression of AD.

ADNI has three overarching goals to

- detect AD at the earliest stage possible and identify ways to track the disease using biomarker-based methods

- support advances in AD intervention, prevention, and treatment through the application of new
diagnostic methods to apply at the earliest stages technically possible—when intervention may be most effective

- develop best practices for data-sharing

ADNI aims to provide the basic knowledge behind the neuroscience of AD and determine the relationships among

- clinical imaging
- genetics
- biochemical marker characteristics of the disease such as those in the blood and cerebrospinal fluid

Its efforts focus on developing improved methods that

- lead to uniform data standards
- acquire an accessible data repository of longitudinal changes in the brain structure and metabolism
- test a series of hypotheses based on the clinical and biomarker data

The study is gathering and analyzing thousands of brain scans, genetic profiles, and biomarkers in blood and cerebrospinal fluid, with a commitment to make the data immediately available to the research community.

**Consortium History**

ADNI began in 2004 and was initially designed to find more sensitive and accurate methods to detect
AD at earlier stages and mark its progression through the use of biomarkers.

In 2009, ADNI was extended with funding from an NIH Grand Opportunities (GO) award. The ADNI GO phase extended the original ADNI-1 studies with both longitudinal studies of the existing cohort and the enrollment of a new cohort of early mild cognitive impairment (EMCI) patients to investigate biomarkers at the early stage of disease progression. ADNI began its third phase in 2010 (ADNI-2), adding additional elderly controls, participants with EMCI and late mild cognitive impairment (LMCI), additional AD patients, and a new group of 100 people with significant, yet subtle, memory complaints, referred to as the significant memory concern (SMC) cohort.

In 2012, the U.S. Department of Defense awarded ADNI a grant for “The Study of Brain Aging in Vietnam War Veterans.” The DOD ADNI project aims to study 1,000 veterans with an aim to explore the links between traumatic brain injury, posttraumatic stress disorder, and AD. This extension of ADNI is not managed by FNIH.

ADNI is also the founding member of the World Wide Alzheimer’s Disease Neuroimaging Initiative (WW-ADNI, http://www.alz.org/research/funding/partnerships/ww-adni_overview.asp). Similar to ADNI, WW-ADNI also aims to standardize the methods used for conducting imaging scans and gathering testing fluid samples so that data from all sites can be readily combined. Its members include European ADNI, Japan ADNI, Australian ADNI, Taiwan ADNI, Korea ADNI, China ADNI, and Argentina ADNI. WW-ADNI is managed by the Alzheimer’s Association.

**Structure & Governance**

ADNI is a federally funded effort that receives support from several industry and nonprofit organizations through FNIH. FNIH both coordinates fundraising efforts from private partners for the project, and additionally convenes and manages the ADNI Private Partner Scientific Board, but NIH is responsible for the scientific management of the initiative. Three governance bodies ensure that the ADNI project adheres to the study design and methodology laid out in the grant submission.

ADNI is governed by a Steering Committee comprised of the principal investigator (PI), eight funded core leaders, site investigators (57 sites in the United States and Canada), representatives from NIH and U.S. Food and Drug Administration (FDA), and representatives of the companies contributing funds (observers only).
The Executive Committee is responsible for day-to-day operations and falls under the jurisdiction of the steering committee. Membership consists of the ADNI PI, and the PIs of the Cores, the NIH program officer, and the Chair of the PPSB (as an observer only).

Operationally, the Cores coordinate intra-consortia activities in eight areas: on administration (overall scientific, management, and financial), biomarkers, biostatistics, clinical, genetics, informatics, Magnetic Resonance Imaging (MRI), neuropathology, and Positron Emission Tomography (PET). In addition, the Data and Publications Committee provides recommendations for sharing data from ADNI as well as policies for publication and publication credits for those who use ADNI data. The Resource Allocation Review Committee (RARC) is an independent group, managed by the National Institute on Aging that reviews and processes requests for fluid and DNA samples collected from ADNI study participants.

The Private Partner Scientific Board (PPSB), convened and managed by FNIH, is the primary method for getting gathering strategic input from the private-sector sponsors. The FNIH convenes the PPSB on a monthly basis and provides the ADNI leadership with valuable private partner viewpoints and feedback. The PPSB is currently composed of 27 industry partners, 2 nonprofit partner organizations, and 1 government organization (Canadian Institutes for Health Research). The PPSB serves as an independent, open, and pre-competitive forum for the ADNI private-sector sponsors to collaborate, share study results, and offer scientific expertise to the project.

Financing

ADNI was initially launched with a total budget of $67 million for a five-year period: $40 million from NIH (National Institute on Aging, National Institute on Biomedical Imaging and Bioengineering, and other NIH Institutes), $20 million from 25 pharma companies through FNIH, and $7 million from two foundations.

The project was awarded an additional $24 million in 2009 for ADNI-GO and $60 million in 2011 to continue and extend the study as ADNI-2. FNIH raised an additional $22 million for ADNI-2. In 2012, the U.S. Department of Defense (DOD) awarded ADNI $6.5 million in funding for "The Study of Brain Aging in Vietnam War Veterans" (DOD ADNI) project.
Intellectual Property

ADNI shares any intellectual property and research resources, such as tissue and data, with minimal restrictions. ADNI data is available to the public without embargo, and specimens can be obtained through application to RARC. Inventions created from ADNI data belong to the inventor and their institution.

Patent Engagement

Two patient foundations are active participants in ADNI—Alzheimer’s Association and Alzheimer’s Drug Discovery Foundation. These organizations incorporate ADNI findings and progress into their own scientific meetings, work to inform patients about current studies and research, and act as a recruitment vehicle using their patient community. Currently ADNI involves more than 1,700 study participants, including people without memory problems, with mild cognitive impairment, and with diagnosed AD.

International replication of this study points to the potential impact of ADNI worldwide. The study results are expected to provide researchers with a better understanding of AD progression in its earliest stages, when treatments may be the most effective. More than 350 papers have been published based on ADNI data and have resulted in the development of several methods for detection and diagnosis as listed below:

- Developed methods for early detection of AD including cerebrospinal fluid (CSF) biomarkers, ?-amyloid 42 and tau, as well as amyloid PET. These markers may reflect the earliest steps in AD pathology in mildly symptomatic or even non-symptomatic subjects and are leading candidates for the detection of AD in its preclinical stages.

- Developed standardized methods for clinical tests, magnetic resonance imaging (MRI), PET, and CSF biomarkers in a multicenter setting.

- Demonstrated the feasibility and value of multicenter PET amyloid imaging, which is expected to have a significant impact on future clinical trials and diagnosis of early Alzheimer’s disease.

- Garnered unanticipated observations—some completely normal subjects having beta amyloid in their brain may be at increased risk for cognitive decline and dementia associated with AD.
pathology.

- Resulted in new findings about how changes in the structure of the hippocampus area of the brain are more likely to develop dementia, which may help to detect disease progression and effectiveness of potential treatments.

- Stimulated the development of a worldwide AD collaboration among academia, government, and industry researchers by making study data publicly accessible and has resulted in more than 350 published papers. To date, nearly 2,500 researchers have signed up for ADNI database access.

- Expanded the global impact of furthering AD research through the establishment of ADNI-like programs in Australia, Europe, and Asia.

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Data Sharing

ADNI provides immediate and complete access to its database for all qualified scientists so that they
can obtain access to imaging, clinical, genomic, and biomarker data for the purpose of scientific investigation and teaching or planning clinical research studies data in real time. New data are quarantined for a maximum of 30 days for quality control review prior to posting and are available at the University of California, Los Angeles Laboratory of Neuroimaging ADNI database (ADNI LONI, http://adni.loni.ucla.edu/).

Data requestors must fill out an application that includes the investigator’s institutional affiliation and the proposed research to be conducted using ADNI data. Applications for ADNI data are reviewed by the ADNI Data Sharing and Publications Committee. Each application is carefully reviewed to ensure investigator affiliation with a scientific or educational institution and on the basis of the proposed research. Incomplete applications or those without a clear research focus will not receive approval. Data will be immediately available to approved investigators; ADNI study investigators do not have privileged access.

**Sponsors & Partners**

AbbVie (Abbott Laboratories)*  
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TransTech Pharma Inc.
*Asterisk denotes support of ADNI1 and ADNI2 phases; italics denote current members as of October 2015
#The Industry Scientific Advisory Board (ISAB) was renamed the Private Partner Scientific Board (PPSB) to reflect the broader range of funding partners

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