ALZHEIMER’S DISEASE
Medical Imaging Expertise

Magnetic Resonance Imaging (MRI)
MRI-based eligibility, safety, and efficacy endpoints play a key role in the design of AD clinical trials. Furthermore, the introduction of quantitative MRI endpoints and automated image processing enables high throughput analysis and adds valuable data in support of faster registrations.

Expertise in quantitative image processing for AD trials
- Cross-sectional cortical and subcortical segmentation (Freesurfer based)
- Hippocampus segmentation using the Harmonized Hippocampus Protocol
- Longitudinal based measurements using Tensor Based Morphometry (TBM) and Boundary Shift Integral (BSI) for the assessment of global and regional atrophy
- Global, regional, and longitudinal changes in cortical thickness
- Quantification of intracranial cavity volume
- Quantification of hyperintense FLAIR/T2 lesions
- Diffusion-Tensor Imaging (DTI) & Diffusion-Weighted Imaging (DWI) histogram analysis
- Magnetization Transfer Ratio (MTR) histogram analysis
- Arterial Spin Labeling (ASL) perfusion analysis
- Resting-state and task-based fMRI

Positron Emission Tomography (PET)
Molecular imaging tracers used to visualize amyloid and assess brain function provide key tools for identifying early disease.

Amyloid PET Outcome Measures
- Visual reads
- Quantitative SUVr
  - Freesurfer-based, SPM-based
  - Hybrid visual/quantitative SUVr
- Distribution Volume Ratio (DVR)

Site qualification and training
- Network of 300+ global PET sites
- On-site or remote training
- Use of Hoffman phantom scans

Absolute Quantification for Novel PET Tracers
- Dynamic PET acquisition
- Blood sampling standardization
- Kinetic analysis and modeling

FDG PET Outcome Measures
- MetaROI: Meta-region assessment (Landau & Jagust)
- Freesurfer-based approaches
- PMOD Alzheimer’s Discrimination Analysis (PALZ)

Molecular Imaging Tracers
- 18F FDG-PET
- Amyloid-PET
  - 11C PIB
  - 18F Florbetapir
  - 18F Flutemetamol
  - 18F Florbetaben
- Tau-PET
  - 18F Flortaucipir (AV-1451/T807)

EXPERT INDEPENDENT IMAGE REVIEW
Board-certified Neuroradiologists assess image data for eligibility inclusion/exclusion criteria and safety findings. Centralized image review can significantly increase the efficiency of clinical trials while minimizing costs. Data are made available to sponsors in real-time enabling rapid patient monitoring and trial decisions.

SITE STANDARDIZATION and IMAGE QC
Bioclinica ensures high quality, reproducible MRI and PET data by minimizing site variability, providing vendor and model specific acquisition parameters, and ongoing quality control.
Structural MRI

Bringing together atlas-based brain segmentation and registration-based atrophy quantification for accurate and reliable volumetric analysis for clinical trials.

Brain Segmentation
Whole brain, ventricles, hippocampus, entorhinal cortex as well as cortical and subcortical segmentation is performed using cross-sectional Freesurfer. Multi-atlas segmentation techniques can also be used for alternative brain parcellation. In particular, our system supports the use of the Harmonized Hippocampus Protocol.

Registration-based Techniques
Tensor-Based Morphometry-Jacobian Integration (TBM-JI) and Boundary Shift Integration (BSI) are used to quantify Brain, Hippocampal, and Ventricular atrophy with high reproducibility.

Functional MRI (fMRI)

Initiatives to improve the standardization of fMRI acquisition, processing, and analysis are facilitating its implementation as a primary or exploratory endpoint in large, multi-center clinical trials. Bioclinica has expertise with task-based and resting-state fMRI, with a focus on standardized capabilities for clinical trials.

Acquisition
- Deployment across major vendors (GE, Philips, and Siemens) at both 1.5T and 3T
- Deployment across expert academic centers as well as standalone clinical imaging facilities
- Standardization across sites and optimization at each site
- Experience with many types of cognitive tasks, facilitating standardization of stimulus presentation across sites
- Behavioral responses (for task-based fMRI) and physiological recordings
- fMRI time series and additional sequences for image processing and analysis (high-resolution structural imaging, field mapping)
- Technologist web-based training (remote or on-site)
- Site qualification including phantom scanning (including both static and temporal stability evaluation) and/or in vivo testing
- In-depth quality assessment and site feedback with fast turnaround

Processing, Analysis, and Reporting
- 100% automated preprocessing stream including motion correction, distortion correction, registration to anatomical space, segmentation, and parcellation
- For resting-state fMRI, the complete connectivity matrix reports functional relationships between all brain regions (seed-based and ICA approaches also possible)
- For task-based fMRI, General Linear Models (containing predictors of interest and nuisance regressors) are estimated to derive the effects of a task