ADNI Alzheimer's Disease Neuroimaging Initiative

Neuropathology Data - Methods

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Contents

Summary

The neuropathology data in the ADNI database are derived from the National Institute on Aging-Alzheimer's Association guidelines for the neuropathologic assessment of Alzheimer's disease (AD) (1). The neuropathologic data may be considered the 'gold standard' against which other clinical, neuropsychological, genetic, neuroimaging and body fluid biomarkers may be compared. Neuropathology data may be used to underpin multimodal studies of the natural history of AD.

Methods

Acquisition of Neuropathology Data

Pathological lesions within the brain have been assessed using established neuropathologic diagnostic criteria. The NIA-AA criteria recognize that AD neuropathologic changes may occur in the apparent absence of cognitive impairment. Using the NIA-AA protocol, an "ABC" score for AD neuropathologic change is generated which incorporates histopathologic assessments of amyloid β deposits (A), staging of neurofibrillary tangles (B), and scoring of neuritic plaques (C). In addition, detailed methods for assessing commonly co-morbid conditions such as Lewy body disease, vascular brain injury, hippocampal sclerosis, and TAR DNA binding protein (TDP) immunoreactive inclusions are included (1).

Neuropathology data were captured in the format of the Neuropathology Data Form Version 10 of the National Alzheimer's Coordinating Center (NACC) established by the National Institute on Aging/NIH (U01 AG016976). For more information see:

Neuropathology Coding Guidebook NACC Version 10:
https://www.alz.washington.edu/NONMEMBER/NP/npguide10.pdf

Neuropathology Data Collection Form NACC Version 10:
https://www.alz.washington.edu/NONMEMBER/NP/npform10.pdf

Neuropathology Data Dictionary NACC Version 10:
https://www.alz.washington.edu/NONMEMBER/NP/npded10.pdf

Description of Brain Regions Sampled

The brain areas sampled for microscopic assessment are described in the Neuropathology Core - MICROSCOPY DATABASE FORM 03-01-2018 (see below). These data are included in the Neuropathology Data Set. **Brain areas sampled include:**

1. Middle frontal gyrus [L1 MFG].
2. Precentral gyrus/motor cortex [L21 MX].
3. Superior and middle temporal gyri [L2 STG].
4. Anterior cingulate gyrus [L19 A. Cing.].
5. Amygdala [L23 Amyg.] and entorhinal cortex [L23 Ent. X].
6. Hippocampus at the level of lateral geniculate nucleus and includes CA1 subfield [L5 CA1], dentate gyrus [L5 DG], and parahippocampal gyrus [L5 PHG].
7. Inferior parietal lobe (angular gyrus) [L3 IPL].
8. Occipital lobe [L4 OL].
9. Caudate nucleus and putamen [L6 Put/C] and olfactory cortex [L6 Olf. X] at level of the nucleus accumbens.
10. Globus pallidus [L17 GP] and nucleus basalis of Meynert [L17 NBM] at the level of the anterior commissure.
11. Thalamus [L8 Thal.].
12. Midbrain [L9 SN].
13. Pons. Locus caeruleus [L11 LC] and pontine base [L11 Pons].
14. Medulla oblongata [L12 Med.].
15. Cerebellum with dentate nucleus [L14 CBM].
16. Spinal cord [L13 SC].

Dataset Information

This methods document applies to the following dataset(s) available from the ADNI repository:

Dataset Name	**Date Submitted**
Neuropathology Core – Data Dictionary	01 March 2018
Neuropathology Core – Data Methods	01 March 2018
Neuropathology Core – Neuropathology Data	01 March 2118

References

1. Montine TJ, Phelps CH, Beach TG, Bigio EH, Cairns NJ, et al. National Institute on Aging-Alzheimer's Association guidelines for the neuropathologic assessment of Alzheimer's disease: a practical approach. *Acta Neuropathol*. 2012; **123**: 1-11.

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ADNI Neuropathology Core
MICROSCOPY DATABASE FORM

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Patient ID: _____Autopsy #: _____Reviewer:_____
Date completed:_____

Enter codes: **0** (none), **1** (mild), **2** (moderate), **3** (severe), or **NA** (not available) for each area (x10 obj.). DP, diffuse plaque; CP, cored plaque; NFT neurofibrillary tangle; NP, neuritic plaque. ***For Aβ and pTau in most severe area (DP, CP, NFT, NP) use NIA-AA criteria (e.g. C score): **C0** = none, **C1** = 1-5 NP/1mm^2, **C2** = > 6 < 20, **C3** = > 20. **P-α-Syn/pTDP : **0**, none; **1**, <1 LB/NCI x10 field; **2**, 1-3 LB ; **3**, 4-10; LB; **4**, >10 or numerous LB. ***CAA, cerebral amyloid angiopathy (NIA-AA criteria): **1** (mild), **2** (moderate), **3** (severe). LB, Lewy body; NCI, neuronal cytoplasmic inclusion; NII, neuronal intranuclear inclusion; DN, dystrophic neurite; GCI, glial cytoplasmic inclusion.

AREA (Block #)	NL/ gliosis	Aβ			p-Tau			p-α-Syn		p-TDP-43				Arterio-sclerosis	Other
		DP *	CP *	CAA ***	NFT *	NP *	Glial *	LB **	GCI **	NCI **	NII **	DN **	GCI **		
L1 MFG															
L19 A. Cing															
L21 MX															
L2 STG															
L3 IPL															
L4 OL															
L23 Amyg.															
L23 Ent. X															
L5 CA1															
L5 DG															
L5 PHG															
L6 Put/C															
L6 OLF. X															
L17 NBM															
L17 GP															
L8 Thal.															
L9 SN															
L11 LC															
L11 Pons															
L12 Med															
L13 SC															
L14 CBM															

Final Diagnosis 1:
Final Diagnosis 2:
Final Diagnosis 3:
Final Diagnosis 4:
Final diagnosis 5:
Final diagnosis 6:
Pituitary:

Braak NFT stage:
Braak Aβ stage:
Thal Aβ stage:
Braak Lewy stage:

Khachaturian criteria:
CERAD criteria:
NIA-Reagan criteria:
NIA-AA criteria: A( ), B( ), C( )

DLB (McKeith) criteria:
DLB (prob. dement):
AGD stage:
NIA-AA (Overall burden: Not AD, Low, Intermediate, High)