BIOGRAPHICAL SKETCH

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NAME: Susan M Landau

eRA COMMONS USER NAME (credential, e.g., agency login): slandau

POSITION TITLE: Associate Researcher in Neuroscience

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Completion Date MM/YYYY	FIELD OF STUDY
Wesleyan University, Middletown CT	BA	05/1999	Psychology
University of California, Berkeley	MA, PhD	12/2004	Psychology/Neurosci
University of California, Berkeley	Postdoc	06/2009	Neuroscience

A. Personal Statement

My training began cognitive neuroscience and functional neuroimaging, under the direction of Mark D'Esposito MD at the University of California, Berkeley. I carried out several projects on human memory and learning using functional magnetic resonance imaging. My training emphasized methodological and technical skills related to designing, executing, analyzing, and interpreting fMRI experiments related to human memory(1-3). This work was followed by a postdoctoral fellowship in the laboratory of William Jagust at UC Berkeley, where I learned how to acquire and analyze positron emission tomography data with multiple tracers. I developed strategies for integrating different imaging techniques (fMRI, PET) in the study of memory, aging, and dementia (4).

1. Landau SM, D'Esposito M. Sequence learning in pianists and nonpianists: an fMRI study of motor expertise. Cogn Affect Behav Neurosci. 2006;6(3):246-59. PubMed PMID: 17243360.
2. Landau SM, Garavan H, Schumacher EH, D'Esposito M. Regional specificity and practice: dynamic changes in object and spatial working memory. Brain Res. 2007;1180:78-89. doi: 10.1016/j.brainres.2007.08.057. PubMed PMID: 17916334; PMCID: PMC2100391.
3. Landau SM, Schumacher EH, Garavan H, Druzgal TJ, D'Esposito M. A functional MRI study of the influence of practice on component processes of working memory. Neuroimage. 2004;22(1):211-21. PubMed PMID: 15110011.
4. Landau SM, Lal R, O'Neil JP, Baker S, Jagust WJ. Striatal dopamine and working memory. Cereb Cortex. 2009;19(2):445-54. doi: 10.1093/cercor/bhn095. PubMed PMID: 18550595; PMCID: PMC2733326.

B. Positions and Honors

Positions and Employment

2005 – 2009 Fellow, UC Berkeley Helen Wills Neuroscience Institute, Berkeley CA
2009 – 2012 Specialist, UC Berkeley Helen Wills Neuroscience Institute, Berkeley CA
2012 – Associate research scientist, UC Berkeley Helen Wills Neuroscience Institute, Berkeley CA

Other Positions and Experience:

1998 Fellow, NSF Training Program at the Center for the Neural Basis of Behavior, Pittsburgh, PA
2001 Fellow, Dartmouth Summer Institute of Cognitive Neuroscience, Dartmouth, NH
2009 – Member, Alzheimer's Association: ISTAART

2011 Advanced Psychometrics Workshop, Friday Harbor, WA
2012 – 13 Member, Canadian Institutes of Health Research Peer Review Committee
2016 Invited Speaker, Military Risk Factors for Dementia Meeting
2016 – 2019 Member, Scientific Program Committee, Alzheimer's Association International Conference
2017 – Consultant, Cortexyme, Inc., South San Francisco, CA
2017 -- Consultant, NeuroVision, Inc., Sacramento, CA
2018 Member, National Institute on Aging Special Emphasis Panel

Honors

2000 – 03 NSF Graduate Research Fellowship Award
2006 Travel Award, Human Brain Mapping Annual Meeting, Florence, Italy
2015 Fourth Annual UC Davis Alzheimer's Disease Center Symposium: poster award
2018 Human Amyloid Imaging Christopher Clark Award, Miami, FL

C. Contribution to Science

Using multiple biomarkers to understand the development and progression of Alzheimer's disease has been a primary focus of my research. For the last 8 years, I have been involved in the PET Core of the Alzheimer's Disease Neuroimaging Initiative (ADNI), a large multisite study designed to examine cognitive performance data and fluid, genetic, and neuroimaging biomarkers longitudinally in older individuals who are cognitively normal or who have mild cognitive impairment and Alzheimer's disease. One of my roles in the PET Core is to develop innovative approaches to analysis of PET image data, and to make this data available to other researchers. For example, I used FDG-PET image data to establish a novel region-of-interest-based numerical value that represents the degree of AD-specific hypometabolism in an individual(5). I have led several studies making use of these MetaROI values to assess hypometabolism in Alzheimer's disease, including a study showing that hypometabolism is related to cognitive and functional changes in ADNI patients (5). We also showed that hypometabolism is predictive of progression to Alzheimer's disease above and beyond the contributions of other biomarkers (6) and it is linked to ApoE4 carriage even in the absence of amyloid(7). The FDG-PET 'MetaROI' values have been made publically available via ADNI and are used regularly in other studies by imaging laboratories internationally(8).

5. Landau SM, Harvey D, Madison CM, Koeppe RA, Reiman EM, Foster NL, Weiner MW, Jagust WJ, Alzheimer's Disease Neuroimaging I. Associations between cognitive, functional, and FDG-PET measures of decline in AD and MCI. Neurobiol Aging. 2011;32(7):1207-18. doi: 10.1016/j.neurobiolaging.2009.07.002. PubMed PMID: 19660834; PMCID: PMC2891865.
6. Landau SM, Harvey D, Madison CM, Reiman EM, Foster NL, Aisen PS, Petersen RC, Shaw LM, Trojanowski JQ, Jack CR, Jr., Weiner MW, Jagust WJ. Comparing predictors of conversion and decline in mild cognitive impairment. Neurology. 2010;75(3):230-8. Epub 2010/07/02. doi: WNL.0b013e3181e8e8b8 [pii] 10.1212/WNL.0b013e3181e8e8b8. PubMed PMID: 20592257.
7. Jagust WJ, Landau SM. Apolipoprotein E, not fibrillar beta-amyloid, reduces cerebral glucose metabolism in normal aging. J Neurosci. 2012;32(50):18227-33. Epub 2012/12/15. doi: 10.1523/JNEUROSCI.3266-12.2012. PubMed PMID: 23238736; PMCID: 3537830.
8. Caroli A, Prestia A, Chen K, Ayutyanont N, Landau SM, Madison CM, Haense C, Herholz K, Nobili F, Reiman EM, Jagust WJ, Frisoni GB, Eadc-Pet Consortium N-D, Alzheimer's Disease Neuroimaging I. Summary metrics to assess Alzheimer disease-related hypometabolic pattern with 18F-FDG PET: head-to-head comparison. J Nucl Med. 2012;53(4):592-600. doi: 10.2967/jnumed.111.094946. PubMed PMID: 22343502; PMCID: PMC3640308.

Cognitive stimulation over the course of the lifetime is linked to lower rates of dementia, but the mechanism behind this relationship is unknown. I led a study showing that healthy older individuals with high levels of cognitive stimulation over the course of their lifetime had lower amyloid deposition, suggesting that more cognitive engagement over the lifetime may play a protective role on neuropathology itself, and not just the ability to withstand this pathology(9). This study received a great deal of media attention, and the effect has been examined further in several recent publications from this laboratory. In ongoing projects in the laboratory we are examining the influence of early-life events, physical activity, and personality on Alzheimer's disease

biomarkers to try to understand which factors increase or decrease vulnerability to late-life neuropathology and cognitive deficits.

9. Landau SM, Marks SM, Mormino EC, Rabinovici GD, Oh H, O'Neil JP, Wilson RS, Jagust WJ. Association of lifetime cognitive engagement and low beta-amyloid deposition. Arch Neurol. 2012;69(5):623-29. Epub 2012/01/25. doi: 10.1001/archneurol.2011.2748. PubMed PMID: 22271235.

The recent development of different methods for measuring amyloid and tau *in vivo* has raised a number of theoretical and methodological questions about how to quantify these neuropathological markers of Alzheimer's disease accurately. These issues are critical for the growing use of amyloid and tau measurements for subject selection in clinical trials of therapeutic AD drugs. Using ADNI data, I showed that amyloid PET and cerebrospinal fluid measurements of Aß are comparable(10). I also carried out two studies showing a close correspondence of imaging data acquired with different amyloid PET tracers (Pittsburgh Compound B, florbetapir, flutemetamol) in the same individuals, and demonstrated methods for converting imaging measurement units between these different tracers(11). The accurate measurement of amyloid PET data over time has become an increasingly important component of clinical trials and for our understanding of AD progression. Using longitudinally-acquired ADNI amyloid PET data, I carried out a study evaluating strategies for optimizing measurement of amyloid PET change over time(12).

10. Landau SM, Lu M, Joshi AD, Pontecorvo M, Mintun MA, Trojanowski JQ, Shaw LM, Jagust WJ, Alzheimer's Disease Neuroimaging I. Comparing positron emission tomography imaging and cerebrospinal fluid measurements of beta-amyloid. Ann Neurol. 2013;74(6):826-36. doi: 10.1002/ana.23908. PubMed PMID: 23536396; PMCID: 3748164.
11. Landau SM, Breault C, Joshi AD, Pontecorvo M, Mathis CA, Jagust WJ, Mintun MA. Amyloid-beta imaging with Pittsburgh compound B and florbetapir: comparing radiotracers and quantification methods. J Nucl Med. 2013;54(1):70-7. Epub 2012/11/21. doi: 10.2967/jnumed.112.109009. PubMed PMID: 23166389.
12. Landau SM, Fero A, Baker SL, Koeppe R, Mintun M, Chen K, Reiman EM, Jagust WJ. Measurement of longitudinal beta-amyloid change with 18F-florbetapir PET and standardized uptake value ratios. J Nucl Med. 2015;56(4):567-74. doi: 10.2967/jnumed.114.148981. PubMed PMID: 25745095.

The ability to measure Alzheimer's amyloid and tau pathology in vivo with PET imaging has also provided important insights into the consequences of this pathology for cognitive function. The link between biomarker and cognitive changes is critical for understanding the earliest stages of disease and also measuring the effects of a potential therapeutic treatment. Several recent studies taking advantage of multiple biomarker measurements in the same individuals have revealed that FDG and tau are more closely related than amyloid to cognitive change(13, 14). Recent work has also revealed that amyloid measurements can provide insights into the cognitive changes of unusual subject groups. For example, I examined the characteristics of patients who were clinically diagnosed with mild cognitive impairment or Alzheimer's disease based on their cognitive symptoms but who were negative for amyloid, and found that other symptoms like depression and vascular disease were likely to account for their cognitive symptoms(15). Finally, within amyloid-negative and cognitively normal individuals – who are considered free of any pathology-related consequences – I showed that increasing amyloid is linked to memory (but not executive function) decline(16), indicating that there are cognitively relevant consequences of amyloid accumulation even prior to the onset of amyloid positivity.

13. Landau SM, Mintun M, Joshi A, Koeppe RA, Petersen RC, Aisen P, Weiner MW, Jagust WJ, Alzheimer's Disease Neuroimaging I.Amyloid deposition, hypometabolism, and longitudinal cognitive decline. Ann Neurol. 2012;doi:10.1002/ana.23650.
14. Maass A, Landau S, Baker SL, Horng A, Lockhart SN, Joie R, Rabinovici GD, Jagust WJ, Alzheimer's Disease Neuroimaging I. Comparison of multiple tau-PET measures as biomarkers in aging and Alzheimer's Disease. Neuroimage. 2017. doi: 10.1016/j.neuroimage.2017.05.058. PubMed PMID: 28587897.
15. Landau SM, Horng A, Fero A, Jagust WJ, Alzheimer's Disease Neuroimaging I. Amyloid negativity in patients with clinically diagnosed Alzheimer disease and MCI. Neurology. 2016. doi: 10.1212/WNL.0000000000002576. PubMed PMID: 26968515.
16. Landau SM, Horng A, Jagust WJ, Alzheimer's Disease Neuroimaging I. Memory decline accompanies subthreshold amyloid accumulation. Neurology. 2018;90(17):e1452-e60. doi: 10.1212/WNL.0000000000005354. PubMed PMID: 29572282; PMCID: PMC5921038.

Full publication list:
https://www.ncbi.nlm.nih.gov/sites/myncbi/susan.landau.1/bibliography/48584968/public/?sort=date&direction=descending

D. Research Support

ACTIVE

1R01AG062689-01 08/01/19-03/31/24
UCB (NIH/National Institute on Aging prime)
US POINTER Neuroimaging Ancillary Study
This is an ancillary study linked to the US POINTER trial, an Alzheimer's Association-sponsored study examining the effects of a multidomain lifestyle intervention on cognitive decline. The goals of the imaging ancillary study are to determine the effects of lifestyle intervention on MRI and PET biomarkers of Alzheimer's disease.
Role: Principal Investigator

U01 AG24904 Weiner (PI) 09/30/04-08/31/21
UCSF (NIH/National Institute on Aging prime)
Alzheimer's Disease Neuroimaging Initiative
This is a multicenter cooperative agreement to image patients with AD, MCI and normal aging using MRI and PET scanning with FDG and Florbetapir (AV45).
Role: Co-Investigator in the PET Core

W81XWH-13-1-0259 Weiner (PI) 09/30/13 – 09/29/19
NCIRE (US Army/MRMC Prime)
Effects of traumatic brain injury and posttraumatic stress disorders on Alzheimer's disease AD in Veterans with mild cognitive impairment MCI using the Alzheimer's Disease Neuroimaging Initiative
The overall long-term goal of this project is to prevent Alzheimer's Disease. This study targets veterans who have suffered PTSD and TBI and show mild cognitive impairment to assess their risk for Alzheimer's Disease.
Role: Consortium Investigator

UCSF (NIH/NIMH Prime) 08/01/13 – 04/30/19
Characterizing cognitive Decline in Late Life Depression: The ADNI-D Project
This project will identify and study the underlying neural substrates of cognitive dysfunction and accelerated cognitive decline in older adults with depression
Role: Consortium Investigator

RECENTLY COMPLETED

W81XWH-12-2-0012 Weiner (PI) 02/21/12 – 02/20/17
NCIRE (US Army/MRMC Prime)
Effects of Traumatic Brain Injury (TBI) and Post Traumatic Stress Disorder (PTSD) on Alzheimer's Disease (AD) in Veterans Using Imaging and Biomarkers in the AD Neuroimaging Initiative (ADNI)
This study will provide novel data to test the hypothesis that Combat associated TBI and/or PTSD increase the risk for AD, and decrease cognitive reserve, determined with imaging/biomarkers, in Veteran subjects, after accounting for age and APOE genotype.
Role: Consortium Investigator