William Jagust - selected references


1 Jagust, W. (2014). Time for tau. *Brain, 137,* 1570-1571.

2 Jagust, W. (2013). Vulnerable neural systems and the borderland of brain aging and neurodegeneration. *Neuron, 77,* 219-234.
Notes: Brain aging is characterized by considerable heterogeneity, including varying degrees of dysfunction in specific brain systems, notably a medial temporal lobe memory system and a frontostriatal executive system. These same systems are also affected by neurodegenerative diseases. Recent work using techniques for presymptomatic detection of disease in cognitively normal older people has shown that some of the late life alterations in cognition, neural structure, and function attributed to aging probably reflect early neurodegeneration. However, it has become clear that these same brain systems are also vulnerable to aging in the absence of even subtle disease. Thus, fundamental systemic limitations appear to confer vulnerability of these neural systems to a variety of insults, including those recognized as typical disease and those that are attributed to age. By focusing on the fundamental causes of neural system vulnerability, the prevention or treatment of a wide range of late-life neural dysfunction might be possible
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3 Jagust, W. J. & Mormino, E. C. (2011). Lifespan brain activity, beta-amyloid, and Alzheimer's disease. *Trends in Cognitive Sciences, 15,* 520-526.
Notes: Alzheimer's disease (AD) is the most common cause of progressive cognitive decline and dementia in adults. While the amyloid cascade hypothesis of AD posits an initiating role for the beta-amyloid (Abeta) protein, there is limited understanding of why Abeta is deposited. A growing body of evidence based on in vitro, animal studies and human imaging work suggests that synaptic activity increases Abeta, which is deposited preferentially in multimodal brain regions that show continuous levels of heightened activation and plasticity across the lifespan. Imaging studies of people with genetic predispositions to AD are consistent with these findings, suggesting a mechanism whereby neural efficiency or cognitive reserve may diminish Abeta deposition. The aggregated findings unify observations from cellular and molecular studies with human cognitive neuroscience to reveal potential mechanisms of AD development
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4 Jagust, W. J., Landau, S. M., Shaw, L. M., Trojanowski, J. Q., Koeppe, R. A., Reiman, E. M. et al. (2009). Relationships between biomarkers in aging and dementia. *Neurology, 73,* 1193-1199.
Notes: BACKGROUND: PET imaging using [(18)F]fluorodeoxyglucose (FDG) and [(11)C]Pittsburgh compound B (PIB) have been proposed as biomarkers of Alzheimer disease (AD), as have CSF measures of the 42 amino acid beta-amyloid protein (Abeta(1-42)) and total and phosphorylated tau (t-tau and p-tau). Relationships between biomarkers and with disease severity are incompletely understood. METHODS: Ten subjects with AD, 11 control subjects, and 34 subjects with mild cognitive impairment from the Alzheimer's Disease Neuroimaging Initiative underwent clinical evaluation; CSF measurement of Abeta(1-42), t-tau, and p-tau; and PIB-PET and FDG-PET scanning. Data were analyzed using continuous regression and dichotomous outcomes with subjects classified as "positive" or "negative" for AD based on cutoffs established in patients with AD and controls from other cohorts. RESULTS: Dichotomous categorization showed substantial agreement between PIB-PET and CSF Abeta(1-42) measures (91% agreement, kappa = 0.74), modest agreement between PIB-PET and p-tau (76% agreement, kappa = 0.50), and minimal agreement for other comparisons (kappa <0.3). Mini-Mental State Examination score was significantly correlated with FDG-PET but not with PIB-PET or CSF Abeta(1-42). Regression models adjusted for diagnosis showed that PIB-PET was significantly correlated

with Abeta(1-42), t-tau, and p-tau(181p), whereas FDG-PET was correlated only with Abeta(1-42). CONCLUSIONS: PET and CSF biomarkers of Abeta agree with one another but are not related to cognitive impairment. [(18)F]fluorodeoxyglucose-PET is modestly related to other biomarkers but is better related to cognition. Different biomarkers for Alzheimer disease provide different information from one another that is likely to be complementary
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5 Jagust, W., Reed, B., Mungas, D., Ellis, W., & DeCarli, C. (2007). What does fluorodeoxyglucose PET imaging add to a clinical diagnosis of dementia? *Neurology, 69,* 871-877.
BACKGROUND: Few studies have compared the accuracy of [(18)F]fluorodeoxyglucose (FDG) PET to the accuracy of clinical and pathologic diagnosis in dementia patients. METHODS: Forty-four individuals with dementia, cognitive impairment, or normal cognitive function underwent clinical initial evaluation (IE) and PET scanning and were followed up for approximately 4 years until a final evaluation (FE) and 5 years until death and autopsy. Clinical, pathologic, and imaging diagnoses were categorized as Alzheimer disease (AD) or not AD. RESULTS: Sensitivity of the IE for the pathologic diagnosis of AD was 0.76, and specificity was 0.58; PET had values of 0.84 and 0.74, and FE had values of 0.88 and 0.63. Positive predictive values for IE, PET, and FE were 0.70, 0.81, and 0.76. Negative predictive values were 0.65, 0.78, and 0.80. The diagnosis of AD was associated with a 70% probability of detecting AD pathology; with a positive PET scan this increased to 84%, and with a negative PET scan this decreased to 31%. A diagnosis of not AD at IE was associated with a 35% probability of AD pathology, increasing to 70% with a positive PET scan. CONCLUSIONS: As a diagnostic tool, PET is superior to a baseline clinical evaluation and similar to an evaluation performed 4 years later. Although the addition of [(18)F]fluorodeoxyglucose PET to a clinical diagnosis provides useful information that can affect the likelihood of detecting Alzheimer disease pathology, the value of this technique in the current clinical environment with limited therapeutic options is likely to be modest

6 Jagust, W., Gitcho, A., Sun, F., Kuczynski, B., Mungas, D., & Haan, M. (2006). Brain imaging evidence of preclinical Alzheimer's disease in normal aging. *Annals of Neurology, 59,* 673-681.
OBJECTIVE: This study was designed to test the hypothesis that baseline glucose metabolism and medial temporal lobe brain volumes are predictive of cognitive decline in normal older people. METHODS: We performed positron emission tomography using [18F]fluorodeoxyglucose and structural magnetic resonance imaging at baseline in 60 cognitively normal community-dwelling older subjects who were part of a longitudinal cohort study. Subjects were followed for a mean of 3.8 years, with approximately annual evaluation of global cognition (the Modified Mini-Mental State Examination) and episodic memory (delayed recall). Baseline brain volumes and glucose metabolism were evaluated in relation to the rate of change in cognitive test scores. RESULTS: Six subjects developed incident dementia or cognitive impairment (converters). Baseline positron emission tomography scans showed regions in left and right angular gyrus, left mid-temporal gyrus, and left middle frontal gyrus that predicted the rate of change on the Modified Mini-Mental State Examination ($p < 0.001$). The left hemisphere temporal and parietal regions remained significant when converters were excluded. Both hippocampal ($p = 0.03$) and entorhinal cortical volumes ($p = 0.01$) predicted decline on delayed recall over time, and entorhinal cortical volumes remained significant when converters were excluded ($p = 0.02$). These brain volumes did not predict Modified Mini-Mental State Examination decline. INTERPRETATION: These results indicate that temporal and parietal glucose metabolism predict decline in global cognitive function, and medial temporal brain volumes predict memory decline in normal older people. The anatomical location of these findings suggests detection of preclinical Alzheimer's disease pathology

7 Jagust, W. (1999). Neuroimaging and the frontal lobes. In B. L. Miller & J. L. Cummings (Eds.), *The human frontal lobes: Functions and disorders* (pp. 107-122). New York: Guilford Press.

8 Jagust, W. J., Haan, M. N., Eberling, J. L., Wolfe, N., & Reed, B. R. (1996). Functional imaging predicts cognitive decline in Alzheimer's disease. *Journal of Neuroimaging, 6,* 156-160.
Notes: Department of Neurology, University of California, Davis, USA Eighteen patients with Alzheimer's disease were studied with positron emission tomographic measurements of regional cerebral metabolism of glucose. All patients were initially diagnosed and evaluated, underwent positron emission tomography, and then were followed with annual reevaluations, at which time the Mini-Mental State Examination (MMSE) was performed. Patients were followed for an average of 2.5 years, and the rate of cognitive decline was calculated by determining the rate of change in the MMSE score defined as the MMSE score at the initial evaluation minus the MMSE score at the last examination, divided by the number of months between testing. The regional cerebral metabolic rates for glucose determined at the time of the first MMSE were then regressed on these changes in scores. Results showed that glucose metabolic rates in posterior temporal and primary visual cortex regions were significantly correlated with the subsequent rate of cognitive deterioration. These associations were not confounded by age, length of follow-up, baseline MMSE score, or education. Stratification on gender suggested that these associations were much stronger in women than in men. These results replicate previous findings showing that functional brain imaging is predictive of the rate of cognitive decline in Alzheimer's disease

9 Jagust, W. J. (1994). Neuroimaging in normal aging and dementia. In M. L. Albert & J. E. Knoefel (Eds.), *Clinical neurology of aging* (2 ed., pp. 190-213). Oxford: Oxford University Press.

10 Jagust, W. J., Davies, P., Tiller Borcich, J. K., & Reed, B. R. (1990). Focal Alzheimer's disease. *Neurology, 40,* 14-19.
Notes: Department of Neurology, Veterans Administration Medical Center, Martinez, CA 94553 Alzheimer's disease is characterized by relative sparing of primary sensory and motor cortex and a lack of sensory or motor symptomatology. We report a case of presenile onset dementia accompanied by a slowly progressive hemiparesis. Autopsy examination showed severe pathologic involvement of somatosensory cortex with neuritic plaques and neurofibrillary tangles, in addition to degeneration of the nucleus basalis and locus ceruleus. Neurochemical and immunocytochemical studies showed a moderate cortical cholinergic deficiency with normal somatostatin- like immunoreactivity and a profuse immunostaining of somatosensory cortex with the Alz-50 antibody. These unusual features emphasize that Alzheimer's disease is extremely variable in its clinical symptomatology, pathologic distribution, and neurochemical dimensions

11 Jagust, W. J. (1987). Single-photon emission computed tomography in the clinical evaluation of dementia. In G. G. Glenner & R. J. Wurtman (Eds.), *Advancing frontiers in Alzheimer's disease research* (pp. 217-233). Austin: University of Texas Press.