



Meeting Report | Neurosciences

Evaluation of longitudinal regional changes in normal rat brain metabolism using MRI-registered FDG-PET

Hu Ye, Koon-Pong Wong, Sung-Cheng Huang, David Stout, Regina Ahn, Stefan Nguyen, An Nguyen and Daniel Silverman

Journal of Nuclear Medicine May 2013, 54 (supplement 2) 1748;

Article

Info & Metrics

Abstract

1748

Objectives Knowledge of brain metabolism changes over time in structurally defined brain volumes in repeated experiments during normal aging of adult rats is needed for longitudinal studies of interventions.

Methods 5 Normal SD rats (5-month old) were studied longitudinally at weeks 0, 1, 2, 4, 8, 12 and 24. Rats were fasted (8 hrs) before scan. FDG (37 MBq) was injected intravenously. After 45 min of FDG uptake in awake state, a 10-min brain PET scan was acquired. T2-weighted MRI was performed for each rat. A template-based VOI analysis based on MRI was used: the MRI template was warped to individual MRI to provide elastic mappings and the MRI was rigidly co-registered to FDG images of the same rat. A VOI set, which included whole brain and 7 brain regions (see below) that were predefined on the MRI template was mapped to FDG images to give whole brain and regional FDG uptakes. Regional Standardized Uptake Value (SUV) and SUVR (normalized to whole brain SUV) were then calculated.

Results For all regions, SUVR had smaller inter-animal variation (1.1-4.9%) than that of SUV (9.6-27.9%). Repeated measures ANOVA showed stable SUVR in sensorimotor cortex and lateral prefrontal cortex, but significant SUVR changes over time ($p < 0.01$) in 5 other regions. Linear regression showed SUVR decreased with number of

experiments (n) and number of weeks (w) in striatum ($-0.0096n+1.22$ $R^2=0.78$, $-0.0023w+1.21$ $R^2=0.77$) , hippocampus ($-0.010n+1.14$ $R^2=0.88$, $-0.0026w+1.13$ $R^2=0.84$) and medial prefrontal cortex($-0.015n+1.32$ $R^2=0.98$, $-0.0036w+1.30$ $R^2=0.86$), while SUVR increased in cerebellum ($0.0060n+1.17$ $R^2=0.34$, $0.0014w+1.17$ $R^2=0.30$) and brain stem ($0.010n+0.89$ $R^2=0.95$, $0.0025w+0.90$ $R^2=0.84$).

Conclusions Significant changes in relative brain metabolism occur in rat brain in repeated experiments during normal aging in the absence of drug intervention in structurally defined VOI. These changes observed in control longitudinal studies need to be considered in evaluating the effects of interventions in longitudinal study designs.

[← Previous](#)

[^ Back to top](#)

In this issue

Journal of Nuclear Medicine

Vol. 54, Issue supplement 2

May 2013

[Table of Contents](#)

[Index by author](#)

 [Article Alerts](#)

 [Email Article](#)

 [Citation Tools](#)

 [Share](#)

[Tweet](#)

[Like 0](#)

 [Bookmark this article](#)

▼ Related Articles

No related articles found.

[Google Scholar](#)

► [Cited By...](#)

► [More in this TOC Section](#)

► [Similar Articles](#)



© 2022 Journal of Nuclear Medicine