

# ANTERIOR-TO-POSTERIOR HIPPOCAMPAL METABOLIC HETEROGENEITY IN HEALTHY ELDERLY AND YOUNG ADULTS USING 3D 1H MR SPECTROSCOPY

K. King<sup>1</sup>, S. Liu<sup>1</sup>, L. Glodzik-Sobanska<sup>2</sup>, J. Babb<sup>1</sup>, M. de Leon<sup>2</sup>, and O. Gonen<sup>1</sup>

<sup>1</sup>Radiology, NYU School of Medicine, New York, NY, United States, <sup>2</sup>Center for Brain Health, NYU School of Medicine, New York, NY, United States

**Purpose:** To quantify the proton MR spectroscopy-detectable metabolite concentrations along the anterior-posterior axis of the hippocampus in healthy young and elderly human subjects.

**Materials and Methods:** Twelve healthy volunteers, 6 ‘young’ (3 women, 25-35 years old) and 6 ‘elderly’ (4 women, 68-72 years old) were enrolled. They underwent MRI and 3D multivoxel, (0.5 cm)<sup>3</sup> spatial resolution, proton MR spectroscopic imaging (<sup>1</sup>H-MRSI) at 3T. In each subject, the volume of interest was centered on and tilted parallel to the anterior-posterior plane of the hippocampus. Absolute concentrations of N-acetylaspartate (NAA), choline (Cho) and creatine (Cr) were obtained in each voxel with phantom replacement.

**Results:** The NAA, Cr, and Cho concentrations in the posterior of the hippocampus were significantly higher in the young (13.2±1.0, 7.4±0.8 and 2.1±0.3 mM) than the elderly (9.0±1.0, 5.8±0.8 and 1.8±0.3 mM) and in both groups higher than the anterior (p<0.05). These posterior-to-anterior metabolic gradients also differed between age groups: NAA decreased faster in the young, -1.0 mM/cm, than the elderly: -0.7 mM/cm, but Cr and Cho decreased faster in elderly: -0.8 and -0.058 mM/cm, than -0.16 and -0.008 mM/cm, respectively, in the young. No left-right metabolic differences were found.

**Conclusion:** A significant metabolic heterogeneity is observed between young and old and along the anterior-posterior axis of the healthy hippocampus in both age groups. These underscore the

importance of age-matching and that consistent voxel placement is important for correct comparisons of both absolute metabolic levels and metabolite ratios in (a) longitudinal intra-subject; and (b) inter-subject cross-sectional studies.

## References

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