Central Nervous System Metabolism In Sensory-Defensive And Non-Defensive Adults: A Proton Magnetic Resonance Spectroscopy Study

S.A. Smith, M. Kinnealey, J. Barriocanal, D. Witt, J. Im, and U. Kanamalla
Temple University

Sensory-defensiveness is described as a neural processing disorder affecting modulation of sensory input triggering inappropriate responses to otherwise benign tactile, vestibular, auditory, visual, and/or olfactory stimuli. Subjective surveys have been developed to identify sensory-defensive adults (Brown, et al. *Am J Occup Ther*, 55:75-82, 2001). To determine possible underlying neurological mechanisms, this study compared CNS metabolism between 4 sensory-defensive (42-62 years) and 6 non-defensive (37-59 years) men and women. A 26-point standardized survey was used to assess sensory-defensiveness with scores >10 indicating sensory-defensiveness. Participants underwent proton magnetic resonance spectroscopy (TE=35 and TR=1150) to obtain spectra from the frontal cortex white matter and thalamus. Relative concentrations of N-acetylaspartate (NAA), choline (Cho), total creatine (Cr), glutamate, and lactate were determined using metabolite to water signal intensity ratios (mean +/- SE). ANOVA results indicate that sensory-defensive persons have less Cr in frontal cortex white matter 4.3+/-0.4 and thalamus 5.2+/-0.4 compared to non-defensive adults, 5.2+/-0.3 and 6.2+/-0.4 respectively ($p<0.05$). The sensory-defensive group also had greater glutamate levels in the frontal cortex 3.9+/-0.2 and thalamus 4.4+/-0.2 compared to non-defensive adults, 2.9+/-0.2 and 3.7+/-0.2 respectively ($p=0.05$). There were no differences in frontal cortex or thalamus NAA ($p=0.6$), Cho ($p=0.4$), and lactate ($p=0.4$) between groups. The results suggest that sensory-defensive persons may have compromised CNS metabolic capacity given the reduced levels of total Cr and the increased levels of glutamate found in the thalamus and frontal cortex. Supported by The Wallace Research Foundation.