AbstractID: 7058 Title: Changes in Standardized Uptake Value of Brain Tissues in Pediatric Brain Tumor Patients Treated with Chemoradiotherapy

Purpose: Survivors of pediatric brain tumors who received radiation and chemotherapy may develop late effects involving neurologic, endocrine, and cognitive function. Objective measures demonstrating normal tissue effects may allow for early intervention. In this study, we investigate the feasibility of using ^{18}F-flurodeoxyglucose (FDG) PET to monitor changes in glucose metabolism of normal brain tissues in children with brain tumors treated with combined modality therapy.

Methods: Nine children with brainstem glioma (BSG) treated with 55.8Gy and concurrent chemotherapy were evaluated with pre- and post-irradiation (2-3 months) FDG CT-PET (GE Medical Systems, Milwaukee, WI). CT-PET data were registered with T1-weighted MR images. Volumes of interest were contoured from which standardized uptake values (SUV) were calculated using commercially available software (HERMES Medical Solutions, Stockholm). For comparison, nine children with Hodgkin's diseases (HD) were analyzed. The HD patients had no evidence of CNS involvement at the time of their evaluation and served as a control group with normal brain metabolism.

Results: The cerebellar SUV of BSG patients showed a statistically significant increase comparing mean values pre- and post-therapy (3.2±1.0 vs. 5.9±1.3, p=0.0005). No difference was observed comparing pre- and post-therapy values in patients with HD (6.1±1.6 vs. 5.8±1.2). For BSG patients, the SUV of basal ganglia, medial temporal lobe, and frontal/occipital cortex showed a similar increase as those observed for the cerebellum despite differences in radiation doses.

Conclusion: Children with BSG demonstrate a reduction in cerebral and cerebellar glucose uptake. The low SUV of these brain tumor patients prior to treatment may be due to decreased glucose metabolism resulting from the regional effects of tumor, increased intracranial pressure with diminished blood flow or corticosteroids taken before and during therapy. Better understanding of this phenomenon will be required in order to incorporate FDG-PET into the assessment of radiation effects on the brain.