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[(11)C]-L: -Methionine positron emission tomography in the management of children and young adults with brain tumors.

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Only a few Methyl-[(11)C]-L: -methionine (MET) positron emission tomography (PET) studies have focused on children and young adults with brain neoplasm. Due to radiation exposure, long scan acquisition time, and the need for sedation in young children MET-PET studies should be restricted to this group of patients when a decision for further therapy is not possible from routine diagnostic procedures alone, e.g., structural imaging. We investigated the diagnostic accuracy of MET-PET for the differentiation between tumorous and non-tumorous lesions in this group of patients. Forty eight MET-PET scans from 39 patients aged from 2 to 21 years (mean 15 +/- 5.0 years) were analyzed. The MET tumor-uptake relative to a corresponding control region was calculated. A receiver operating characteristic (ROC) was performed to determine the MET-uptake value that best distinguishes tumorous from non-tumorous brain lesions. A differentiation between tumorous (n = 39) and non-tumorous brain lesions (n = 9) was possible at a threshold of 1.48 of relative MET-uptake with a sensitivity of 83% and a specificity of 92%, respectively. A differentiation between high grade malignant lesions (mean MET-uptake = 2.00 +/- 0.46) and low grade tumors (mean MET-uptake = 1.84 +/- 0.31) was not possible. There was a significant difference in MET-uptake between the histologically homogeneous subgroups of astrocytoma WHO grade II and anaplastic astrocytoma WHO grade III (P = 0.02). MET-PET might be a useful tool to differentiate tumorous from non-tumorous lesions in children and young adults when a decision for further therapy is difficult or impossible from routine structural imaging procedures alone.

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