Neuroradiology abstracts

Accuracy of Positron Emission Tomography for Localization of Language and speech functions.

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The purpose of this study is to examine the accuracy of [O15] water positron emission tomography (PET) to localize speech and language functions. We studied 30 children of 4-19 year of age with PET scans in Phoenix Children’s Hospital USA, utilizing [O15] water. Brain maps were acquired with activation of speech and language cortical functions. These studies were performed in the preoperative evaluation of children with brain tumors and medically intractable seizures. All patients tolerated the procedure well. After intravenous administration of [O15] water; 5 baseline, 5 language and 2 motor speech activation studies were performed. The base line data was subtracted from activation data and coregistered with the patient's magnetic resonance images (MRI) for subsequent viewing and interpretation. The cortical areas of language including expressive, receptive, motor speech and semantic components were analyzed. [O15] water PET activation was able to localize language functions in 29 out of 30 (97%) patients; the expressive component in 29 (97%), receptive in 25 (84%), motor speech in 27 (90%) and semantic speech areas in 23 (77%). [O15] water PET activation is a noninvasive and safe procedure for accurate localization of language and speech functions.

Role of MRS in the assessment of irradiated primary brain tumors

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To evaluate the role of proton MR Spectroscopy (MRS) in differentiating post-radiation scarring/necrosis from tumor residue/recurrence in primary brain tumors. Fourteen patients with pathologically proven primary brain tumors (8 GBMs, 4 anablastic astrocytoma and 2 low grade gliomas) were evaluated by MRI studies and multi-voxel MRS using PRESS technique, before and after radiation. Choline, N-Acetyl Aspartate, Creatine, lipids and lactate metabolite peaks were evaluated in the tumoral and peritumoral regions at the time of diagnosis and 2-3 months after completion of radiotherapy followed by periodic 6 months follow-up. Post-radiation biopsy was performed for 6 patients. Group I: 9 patients showed MRS evidences of tumor residue after radiation in the form of persistently high Choline and diminished NAA peaks on initial and follow up studies. Group II: 3 patients showed changes of pure post-radiation scarring / necrosis in the form of regression of Choline and normal NAA peaks. Lipids and lactate peaks in all tumoral and peritumoral zones were elevated. These changes were persistent for 2 year. Group III: Two cases showed changes of tumor recurrence in the first post-radiation study followed by marked decline of Choline peak in follow-up series. MRS is a non-invasive reliable tool for...
differentiation of post-radiation scarring/necrosis from tumor residue/recurrence when associated with detailed MRI studies and done on follow-up basis.

Proton MR spectroscopic changes in viral encephalitis

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To document the MRS changes in cases of viral encephalitis. Proton MRS was performed for 6 patients with proven herpes encephalitis prior and after medical therapy. The diagnosis was based on clinical findings; viral CSF and serum titer and MRI changes. Follow-up MRI studies were performed for all patients 4 to 6 weeks after medical therapy. All cases showed elevated Choline levels and reversal of Cho/NAA ratio on the initial studies prior to initiation of medical treatment. The follow-up studies revealed normalization of the Choline peak and the Cho/NAA ratio. Elevated Choline levels and reversal of Cho/NAA ratio is seen in cases of viral encephalitis and normalize on short term follow up.

Image-guided Surgery for Epilepsy

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The use of neurosurgical navigation systems is becoming an increasingly important part of both planning and performing intracranial surgery. Numerous clinical reports have described neuronavigation as a useful adjunct to microsurgical techniques that allows epilepsy surgery to be less invasive and more effective. Although the method of image-guided surgery was introduced more than a decade ago, new technologies have changed and refined the procedure substantially. For most operations, microscope navigation has replaced pointer navigation. Using the microscope as the localizing device, the workflow is not interrupted and microsurgical procedure can be continued as usual. New chip technology allows integration of anatomical and functional magnetic resonance images. Moreover, a new method of patient registration is laser scanning and surface matching. When using high-quality images, this new method can be used without additionally acquired images, may reduce costs, simplify the pre-registration procedure, and increase application accuracy compared to skin-fiducial registration. The author discusses the utilization of neuronavigation system for epilepsy surgery which allows accurate and less-invasive surgery which contributes to better outcome.