## 412E04

### MAGNETIC RESONANCE IMAGING IN THE EVALUATION OF TRAUMATIC APALLIC SYNDROME

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In a previous comparison of Magnetic Resonance Imaging (MRI) and Computed Tomography (CT) in the evaluation of head injury, MRI was superior to CT in visualizing non hemoragic contusion.
With regard to traumatic apallic syndrome (TAS) there are, as far as we know, very few reports in the evaluation of the apallic syndrome or coma vigile by means of MRI. Grcevic and Jacob described paraventicular diffuse demyelinating and sclerosis lesions in a very long time of survival as part of the "paraventricular butterfly-like pattern". The demylination and sclerosis was always most pronounced in the immediate vicinity of the lateral ventricular walls, the most severe sclerosis of the white matter was usually found around the periventricular focal lesion. We studied 4 patients with traumatic apallic syndrome with variable duration. MRI was performed by means of Philips Gyroscan using I.5 T magnetic field. Interestingly enough periventricular lesions were found in all the patients studied.

## 412E05

### 3D-MR-Imaging of cerebral tumors, ischaemia inflammation and degeneration.

S. Felber, F. Aichner

MRI like CT aquires cross-section images of the brain. The resulting stack of 2-dimensional images has to be correlated mentally to the complex 3-dimensional structure of the brain. Localisation of pathologic lesions often requires additional orientations. Isotropic 3D-MR examination of the whole brain became possible, using Gradient-Echo-Sequences. In order to minimize susceptibility effects, the echo time of a 3D Flash sequence was shortened to 5 ms.
Then a series of 70 patients with various disease of the central nervous system (tumor n = 23, inflammtion n = 13, degeneration n = 17, ischaemia n = 17) has been examined by the new technique and the results were compared to a conventional spin echo protocol.
T1 contrast of the 3D Flash sequence is excellent and partial volume averaging effects are minimized, according to a pixel size of 0.9 x 0.9 x 1.2 mm. Therefore the detection rate of small lesion is improved.
Like conventional T1 weighted spin echo sequences the 3D Flash examination shows enhancement of lesions after application of Gd DTPA. Main advantages however, is the possibility to postprocess arbitrary orientated images. Also inner surfaces of the brain can be reconstructed. The method shows great potential in diagnosis of small parenchymal lesions, their effect on the surrounding tissue as well as for surgical planning and irradiation protocols.

## 412E06

### THE ROLE OF MRI IN CENTRAL NERVOUS SYSTEM TRAUMA

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Experience of MRI in central nervous system trauma is is still limited, mostly because of the problems arising from the examination of incooperative and inconciousness patients, without sufficient monitoring capabilities. Recently, nonferromagnetic live-support-systems became available, facilitating MRI even in the very acute stage of trauma.
In close cooperation with the neurologic intensive-care unit, a sreies of 50 patients were evaluated clinically and repeated CT and MRI, to assess the role of MRI in CNS-trauma. MRI was performed at a 1.5T Magnetom(Siemens) using spin-echo and gradient-echo sequences. CT-exam was within the same week at a third-generation-scanner Somatom (Siemens).
CT was adaequate in all cases of intracranial hemorrhage requireing early surgical intervention. MRI showed higher sensitivity to nonhemorrhagic contusion and was more exact in delineation. MRI was also sensitive to hemorrhage, especially when isodense on CT. The major impact of MRI is the detection of shearing injuries within the white-matter (inner cerebral trauma) and primary brainstem contusions, most important for prognostic and therapeutical considerations. CT missed most of this parenchymal damage. Whereas CT, due to its faster performance remaines the initial examination in brain trauma, MRI is the modality of choice in the subacute stage. In spinal trauma MRI is also superior in the acute phase, as no intrathecal contrast agent is necessary to verify cord-compression, and the only method, which shows intramedullary contusion.

## 412E07

### NMR-IMAGING APPLIED TO IN-VIVO-NEUROANATOMY: ANALYSIS OF SERIES OF THIN SECTIONS AND DEMONSTRATION OF DEGENERATING FIBRE TRACTS

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To explore new possibilities for clinico-anatomical correlation, we studied patients with small ischemic brain lesions using MRI, magnetic resonance imaging (Magnetom®, Siemens). Series of 128 continuous sections of 1mm were obtained with the 3-D-FLASH-technique and the voxel set was subsequently analysed with an image reconstruction system (MIP-MR®, Kontron). This allows description of tissue damage in reference to the standard planes of stereotaxic atlases. In one case of hemiplegia, a small lesion was confined to the posterior limb of the internal capsule. In addition to this indirect evidence of damage to the pyramidal tract, T2-weighted images four months after the stroke showed a band of hyperintensity that extended caudally from the lesion. Its course through cerebral peduncle and pons down to the pyramid corresponds exactly to the pyramidal tract. Tracts are imaged due to signal changes in degenerating fibres.
In conclusion, in MRI two classical methods of experimental neuroanatomy can be used for in-vivo-studies of localized brain damage. Complete series of thin sections and subsequent image reconstruction provide indirect, topographical analysis of brain lesions with high resolution (below 2mm), whereas direct identification of fibre tracts is possible through imaging after fibre degeneration.

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