

NEUROANATOMY OF THE HUMAN LOWER URINARY TRACT – NEW INSIGHTS BY FUNCTIONAL MAGNETIC RESONANCE IMAGING (FMRI)

Aims of Study

Increasing knowledge of neuroanatomy is especially gathered by animal experiments. In order to understand the variety of human neuro-urological disorders an investigation of human brain activity in relationship to lower urinary tract function is wanted. PET-studies, as previously published by Blok et al. are one way to increase those knowledge, FMRI-scanning is another way.

Methods

Ten healthy volunteers were considered for FMRI scanning after clinical neuro-urological investigation and after informed consent and approval of the ethical committee. Using a 1,5T MRI-device (Siemens Vision) ten scans were recorded during an empty and a full bladder (single-shot EPI - TR: 5.313 s, TE 60 ms, TA 4.12 s, FOV = 192 * 192 mm, flip angle = 90 degrees, 40 3mm axial slices with ac-pc-orientation, 64 * 64 matrix, 3 mm in-plane-resolution). SPM99 was used for motion correction, functional data processing and statistics. Block design was chosen for multiple contrasts.

Results

Comparing the empty and full bladder there are significant differences in the activation of different brain areas. Our current FMRI setup allows an evaluation of areas within the cortex, mesencephalon and diencephalon. There are still technical problems evaluating the medulla oblongata and the lower pons region by FMRI.

Conclusions

FMRI scanning allows an investigation of the activation of different brain areas involved in neuronal control of bladder function. It is possible to characterize the activation of brain areas during bladder filling. Despite some technical problems FMRI seems to be a promising technique for further investigation of neuronal control of the lower urinary tract and pelvic organ function.