High field single subject brain mapping of genital touch and pelvic floor motor control. A 7-Tesla fMRI study.

I.M. Groenendijk1, S.P.R. Luijten1, W. van der Zwaag2, J.C. Holstege3, J.R. Scheepe1, C.I. de Zeeuw4, B.F.M. Blok1
1 Department of Urology, Erasmus Medical Center, Rotterdam, The Netherlands, 2 Spinoza Centre for Neuroimaging, Amsterdam, The Netherlands, 3 Department of Neuroscience, Erasmus Medical Center, Rotterdam, The Netherlands, 4 Netherlands Institute for Neuroscience, Amsterdam, The Netherlands.

#396

Aim of the study

To acquire neural representations of male genital touch and pelvic floor motor control in the whole brain, at both single subject and group level.

Methods

Subject: 17 healthy right-handed male subjects (age 20-47) were scanned in a 7T MRI scanner (Philips Achieva), of which 4 subjects were excluded due to motion artefacts. All subjects completed the same scanning protocol.

Scan: 4 functional runs (2 sensory task; 2 motor tasks) using a multiband echo planar imaging sequence (voxel size 1.77x1.77x1.75mm3; matrix size 104x127; FOV 184x223mm2; number of slices =70; TR/TE =2000/25ms), block paradigm, followed by a T1 weighted anatomical scan.

Task:
- Sensory tasks: tactile stimulation of the penile shaft, control task; tactile stimulation of the feet.
- Motor tasks: performing repetitive pelvic floor contractions, control task; tongue movements.

Data:
- Activation maps were generated using the General Linear Model (GLM). Single subject threshold: p < 0.05 FWE, projected on inflated cortical surfaces of individual anatomical data. Group activation threshold: p < 0.005 uncorrected and projected on an inflated cortical surface of the MNI-template.
- Connectivity analyses were performed by calculating correlations of time-series of different ROI's.

Results

Sensory

Motor

Group analysis results: S1, S2, anterior and posterior insula, posterior cingulate gyrus and anterior lobe of the cerebellum.

Group analysis results: M1, SMA, anterior insula, putamen, thalamus and the anterior lobe of the cerebellum.

Discussion

- This study defined the neural representations of genital touch and pelvic floor motor control.
- Both in group analyses as in single subjects.
- Strong connectivity in somatosensory and somatomotor pathway.

7 Tesla fMRI:
- Reproducible results in single subjects.
- Define pathophysiology OAB/BPS/CPPS
- Use 7T in daily clinic

Sensory Motor

GROUP

GROUP

S1 lh S1 rh S2 lh S2 rh Temp-par junct lh Temp-par junct rh Insula post lh Insula post rh Insula ant lh Insula ant rh Cingulate cortex Cerebellum lh Cerebellum rh M1 lh M1 rh SMA lh SMA rh M1 inf lh M1 inf rh Mid cin gy lh Mid cin gy rh Insula lh Insula rh Putamen lh Putamen rh