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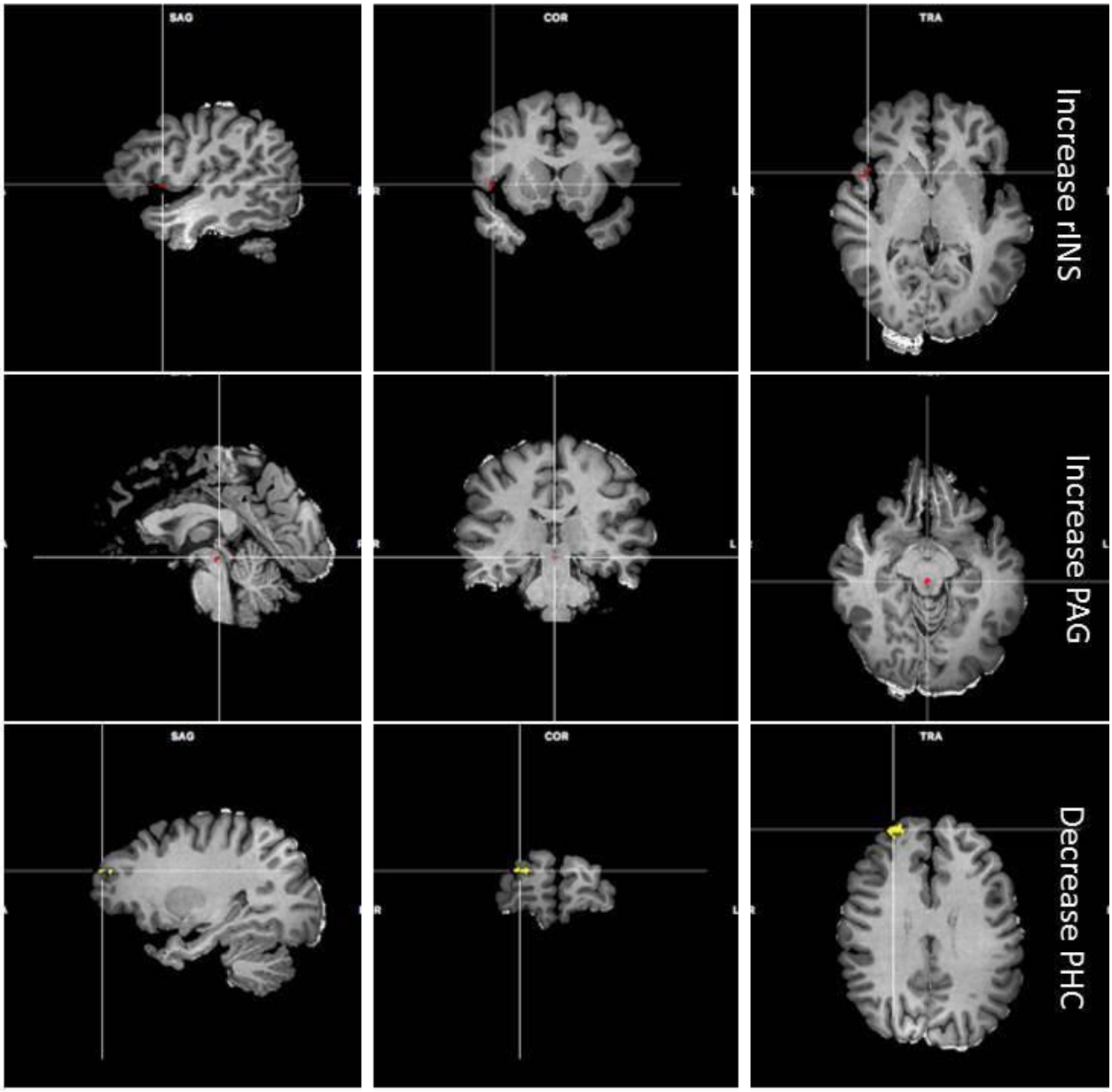
FUNCTIONAL CONNECTIVITY OF BRAIN AREAS INVOLVED IN BLADDER FILLING SENSATION USING 7 TESLA MAGNETIC RESONANCE IMAGING

Hypothesis / aims of study
During the filling phase, sensory information about bladder filling, is continuously available to the brain. However, only after reaching a certain threshold, this information reaches the conscious level.
We conducted a pilot study using a 7T Siemens Magnetom MRI scanner, with a 64-channel head coil in order to study the relevant brain areas and their inter-connectivity during bladder filling.

Study design, materials and methods
High resolution functional T2*-weighted images (1.25mm^3, 99 slices, TR=2000ms, 270 volumes) were obtained. The data were corrected for motion artefacts, after which linear trends and low frequency temporal drifts were removed. In addition, one high resolution T1-weighted anatomical scan was obtained for each participant (320 slices, resolution 0.65mm^3), and transformed to Talairach space.
The diuresis was stimulated by drinking 1 litre of water before entering the scanner. At the beginning of the measurement, the bladder of the subjects was empty, but at the end, participants reported a maximal urinary urge sensation.

Results
In two right handed female healthy volunteers, a dynamic functional connectivity analysis was conducted. The time series were split in 4 time windows of 67 volumes each. For each time window, functional connectivity was measured between five anatomically defined seed regions in each subject's brain: periaqueductal gray (PAG), pons, parahippocampal complex (PHC), dorsal anterior cingulate gyrus (dACG) and right insula (rINS).

Interpretation of results
The resulting connectivity maps were thresholded using a false-discovery rate correction (q = 0.05), after which the surviving voxels that showed a systematic increase or decrease in functional connectivity over these 4 time windows were mapped. Only the voxels appearing in both subjects are depicted in the figure.
With bladder filling the connectivity between the right insula and PAG increased. Furthermore, a decrease in connectivity between parahippocampal complex and the frontal lobe of the brain was seen.



Concluding message

These preliminary data show that it is feasible to study functional connectivity between relevant brain areas involved in bladder filling sensation using 7 Telsa fMRI of the brain. Further studies with larger group of subjects are needed to identify the location and magnitude of brain area involvement in bladder sensation.

Disclosures

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