

Modification in functional connectivity of resting state networks in patients affected by psychogenic erectile dysfunction during visual erotic stimulation: an fMRI study

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INTRODUCTION

In the past decade, numerous studies have investigated brain processing underlying sexual arousal in healthy men, whereas scarce evidence exists on brain response in males with psychogenic erectile dysfunction (ED). In particular little is known about possible changes in the functional architecture of resting state networks (RSNs) in ED patients. In the present fMRI study we investigated statistical differences in different RSNs on ED patients and healthy controls (HC) during visual erotic stimulation using independent component analysis.

METHODS

16 unmedicated psychogenic ED outpatients (mean age 35 years) and 19 matched controls were studied. The protocol was approved by the local Ethics Committee and each subject signed a written informed consent. Subjects affected by psychiatric disorders were excluded. Visual erotic stimulation consisted of the presentation of a video clip lasting 7 minutes. BOLD fMRI was performed by means of a 3T Achieva Philips scanner (T2* EPI, TR 2s, flip angle 80°, TE 35 ms, matrix 96x96, voxel size 2.8mm x 2.8mm x 3mm, SENSE factor 1.8 anterior-posterior). Heart and respiratory signals were recorded using the scanner pulse oximeter and respiratory belt, while penile tumescence was recorded by means of a custom built MRI compatible pneumatic device. fMRI analysis was performed using the BrainVoyager QX software. After preprocessing and normalization of functional scans to the Talairach space, spatial independent component (IC) analysis was used for the decomposition of the voxel time series into a set of independent spatiotemporal patterns. In this analysis the Z values associated to each IC provides an indirect measure of the functional connectivity within the related network. For a given network, between-groups differences in functional connectivity were assessed by means of a two-sample t-test on Z values.

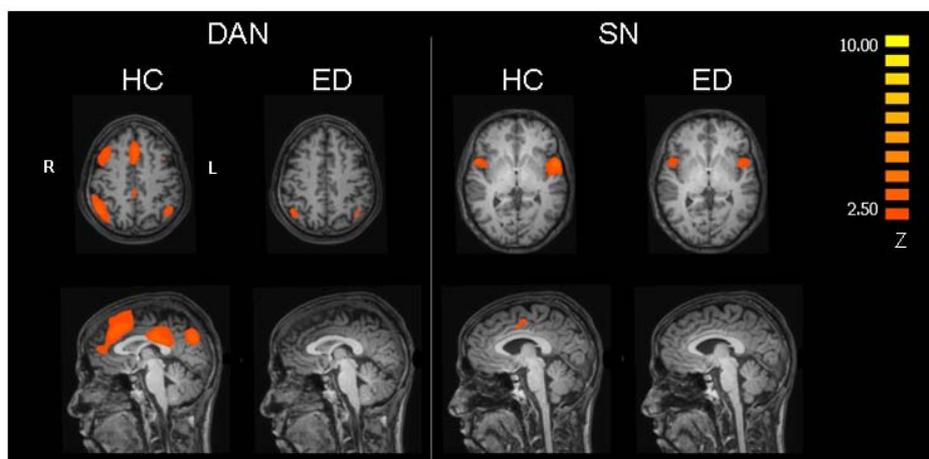
RESULTS

Penile tumescence showed a significant increase only in the control group, whereas no significant between-groups differences were observed for heart and respiratory rate. The RSNs investigated in the current work were: dorsal attention (DAN), default mode (DMN), self-referential (SRN), and salience (SN) networks. Compared to HC, ED patients showed a decreased functional connectivity in the SN ($p < 0.02$) and DAN ($p < 0.0005$) (see Figure).

CONCLUSIONS

DAN is thought to play an important role in emotional regulation, whereas the SN is involved in coding of hedonic evaluation of a stimulus and in reward feedback. The present findings suggest that the decreased functional connectivity in DAN and SN may be related to a failure of emotion regulation and a reduced coding of salience of visual erotic stimuli in psychogenic ED.

Dorsal attention (DAN) and salience (SN) networks in healthy controls (HC) and psychogenic erectile dysfunction patients (ED)



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