

1. Title: A Neuroimaging Investigation of Severely Traumatized Refugees

2. Project period: 1/02-2015 – 31/1-2018

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4. Supervisors and collaborative partners

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5. Background

In addition to various pre- and post-migration stressors, some traumatized refugees have also been subjected to the atrocity of torture. These experiences may lead to a complex form of posttraumatic stress disorder (PTSD) which apart from the core symptoms of hyperarousal, flash-backs and anxiety encompasses persistent and pervasive impairments in affective, self and relational functioning. Although PTSD is not classified as a psychotic disorder in either DSM-5 or ICD-10, clinical and epidemiological studies report that traumatized persons may even develop frank psychotic symptoms such as auditory and visual hallucinations, delusional thinking and paranoid ideas. Until now, very limited neuroimaging research has been done on survivors of torture who suffer from PTSD.

6. Aims

We wish to study the neural underpinnings of psychotic symptoms, dissociative symptoms and emotional disturbances. To this end, we will study the neural processing during reward and emotional processing and exposure to auto-biographical trauma material. First, we will deploy a theoretical framework developed in schizophrenia research to investigate psychotic symptoms experienced by tortured refugees, the so-called salience hypothesis. Secondly, we will explore the preliminary findings that dissociative experiences in persons with PTSD are linked to increased activity of the prefrontal cortex using naturalistic emotional stimuli depicting social interactions.

7. Methods

The design is a cross-sectional study of 40 tortured male refugees with PTSD and 20 healthy control refugees matched on age, ethnicity and socioeconomic status. Study participants will undergo three days of interview and one day of neuroimaging. On day two, the investigator and the participant will compose two individual scripts; one portraying a traumatic experience and one describing a neutral experience from the participant's past. Each script will be 30 seconds long and be written in the second person, present tense. The emotional response will be employed using the Responses to Script-Driven Imagery Scale (RSDI) and it will be assured that the trauma script triggers not more than a state of moderate re-experiencing (a maximum score of 4 on any item on the RSDI). The scripts-driven imagery procedures will be obtained and adapted to fMRI according to previously published methods

MRI is a non-invasive imaging technique, which produces detailed images of the body's internal structure (structural MRI). Magnetic resonance imaging systems use a strong static magnetic field, a pulsed gradient magnetic field and radiofrequency (RF) energy to obtain images of the body in selected planes. The subject is placed in a strong magnetic field created by a superconducting magnet surrounding the bore of a scanner. The subject, lying in the scanner, is exposed to brief pulses of non-ionizing radiofrequency radiation from a transmission coil around the subject's head. The energy of a radiofrequency signal, transmitted into the brain tissue, can be absorbed by the nuclei of its constituent hydrogen atoms. This energy is then released, and the rate at which it is released (magnetic "relaxation") depends on the local molecular environment. Grey and white matter, as well as other tissues, can therefore be distinguished with MRI. Patients and control subjects will be scanned using a 3Tesla (T) Phillips Achieva scanner at the Danish Research Centre for Magnetic Resonance, Hvidovre Hospital. The total scanning time will be approximately 1.5 hours.

8. Expected results

- PTSD patients will have an attenuated BOLD response during reward anticipation in the striatum, and this attenuation will correlate with the degree of psychotic and depressive symptoms.
- During outcome evaluation of a reward, patients will have an attenuated pleasure-related BOLD response in the medial PFC when receiving a reward and this attenuation will correlate with the degree of emotional numbness.
- During emotional stimuli viewing, PTSD subjects will display attenuated activity in brain areas that have a key role in social perception and cognition, such as temporoparietal junction, superior temporal sulcus, insula, anterior cingulate cortex, and inferior frontal gyrus.
- An interaction effect between high vs. low dissociative trait scorers will be found in the amygdala and medial prefrontal cortex during neutrally-primed emotional stimuli viewing.
- In the trauma-related primed emotional stimuli viewing, the prefrontal-amygdala relationship will be differentially modulated in high vs. low dissociative scorers.
- Analysis of structural MRI data will reveal increased prefrontal volumes in high dissociative scorers compared to low scorers.
- We expect patients with PTSD to differ in intrinsic resting-state fMRI based functional connectivity from healthy controls, and patients with schizophrenia.

9. Dissemination of results: Peer-reviewed international journals.