Background:

Ph.D. Student of Cognitive Neuroscience-Artificial Intelligence, Institute for Cognitive Science Studies (ICSS), Tehran, Iran.

M.Sc. Electrical Engineering, Tehran University, Tehran, Iran.

B.Sc. Electrical Engineering, Khajeh Nasir al-din Toosi, Tehran, Iran.

Skills:

fMRI Analysis (with FSL)

Programming (MATLAB, R, Python)

Task design (PsychoPy)

Working with TMS (Transcranial Magnetic Stimulation)

Interests:

Machine Learning, fMRI Analysis, Cognitive Neuroscience, Addiction Medicine, Brain Stimulation.

Ongoing projects:

TMS/fMRI-Machine Learning

Methamphetamine as a substance could cause cognitive deficits due to destructive and adaptive mechanisms. Drug craving is an important symptom of substance use disorders developed by a neuroadaptive mechanism. Some task-based fMRI studies in addiction have demonstrated the role of medial prefrontal cortex (MPFC) in craving. A certain and effective treatment to reduce the craving for a tolerable relapse rate and withdrawal symptoms has not been reported yet. There are lines of evidence that suggest transcranial magnetic stimulation (TMS) has been effective on improvement of cognitive processes involved in drug addiction. In this study, we apply a TMS intervention for Methamphetamine use disorders (MUDs) on frontal pole. We propose that this intervention could reduce craving by decreasing activity in mesolimbic regions. For this purpose, we employ a task-based fMRI to see the effects of TMS on activity and connectivity of frontal-striatal circuits. subjects with MUD will be recruited and divided to sham and active group. We will explore the differences between real and sham groups in craving and activity in frontal and striatal areas and their connections to evaluate the effect of TMS over frontal pole. We hypothesize that applying TMS on MPFC will decrease the activity of limbic subcortical regions by inducing a long-term depression-like (LTD-like) effects.

We will be able to evaluate the efficacy of TMS on brain activity for MUD, using resting state and task-based fMRI. Moreover, using baseline TMS/BOLD measurements and post-intervention self-report craving, we will be able to make a progress to predict the response of TMS in MUD with the help of neuroimaging techniques.

<u>Addiction Recovery Path (ARP) project-An Interdisciplinary Collaboration for Addiction Medicine:</u>

Current research on the etiology of addiction as a brain disease are not sufficient for effective treatment. The nature of neuro-cognitive processing of drug craving as an emotional response to drug cues and the inhibition of this response is the main focus of current research in the field. Therefore, the study of neuro-cognitive aspects of craving and inhibition using brain imaging technologies is the focus of this research. To our knowledge there is not sufficient evidence about this issue in the heroin users.

In this study we aim to examine the short-term and long-term effects of three major treatments for heroin addiction available in Iran: Abstinence-based treatment, Methadone Maintenance Treatment and Opium Tincture Treatment on the structure and patterns of brain activity in heroin users. One hundred and twenty heroin users who have claimed to be ready for treatment, will be recruited from treatment centers (40 participants for each treatment group). Participant will be brain scanned in four time-points: 1. Before treatment, 2. One month after the beginning of the treatment, 3. At 3rd month of treatment and 4. 6 months after the beginning of treatment. They will also answer to a complete battery of psychological and cognitive tests. The results of this study will shed a new light on the effectiveness of treatment strategies and will be very useful for policy makers in this field.

Personal webpage:

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