Arshiya Sangchooli

MD student in the Tehran University of Medical Sciences

Member of Addiction Recovery Path (ARP) project

Ongoing project:

- Visual drug cue validation project
- Visual cue reactivity methodological parameter space: systematic review and consensus papar
- Cue reactivity fMRI markers as Drug Development Tools (DDTs)

Skills:

Medical science background

Basic statistics

Basic fMRI Image analysis, mostly using FSL

English writing and translation

Description of projects:

My research projects revolve around fMRI cue-reactivity in addiction medicine. Cue reactivity involves the controlled exposure of research subjects to various affectively or appetitively salient sensory stimuli. These can be visual, auditory, olfactory, tactile, gustatory, or semantic cues. Drug cue reactivity involves the exposure of individuals with substance use disorder to cues associated with drug use. This paradigm has been extensively used and repeatedly validated as a useful means to induce craving in individuals with dependency on substances or those with behavioral addictions. Cue reactivity paradigms allow the researcher to elicit affective, physiological, and behavioral craving-related responses in a laboratory environment, which makes possible the controlled studying of these phenomena.

fMRI research has recently demonstrated the effectiveness of cue reactivity paradigms in inducing reliable brain activations across certain networks and regions. This has risen hopes of using fMRI cue reactivity in substance use disorders to better understand the neuroscientific bases of these diseases, and to formulate new, clinically relevant biomarkers. These biomarkers would help researchers and clinicians in better diagnosis, treatment, and prognosis of substance use disorders and would also aid the process of drug development for these syndromes.

Unfortunately, despite these efforts, fMRI remains far from the bedside and is rarely used even in basic substance use research. A major reason for this is the incredible heterogeneity in drug cue reactivity research, and the absence of any systematic effort in bridging the methodological gaps between different groups. There are also issues with the lack of standardized participant enrollment standards, lack of widely-used cue databases, and inconsistent statistical methods and standards of reporting.

Towards the goal of greater homogeneity and to help move fMRI cue reactivity towards wider use in drug development and other areas of substance use research, my first research project involve a systematic review of 318 fMRI cue reactivity studies to assess areas of heterogeneity in the methodological space and in reporting. This project will culminate in writing a consensus paper with experts in the field on the current state of fMRI drug cue reactivity research and include recommendations for collaboration and standardization.

Another project, currently in its early stages, involves considering a drug cue reactivity fMRI biomarker, establishing its reliability and validity as a biomarker of substance use disorder, and making the case for its use in the early stages of drug development research

The last project of mine includes the validation of a large database of pictorial methamphetamine and opioid drug cues and control images. This database includes 360 images that are matched for visual complexity and content, and during the validation process the cues would be rated by individuals with methamphetamine and opioid substance use disorders in terms of their ability to induce craving, their typicality for drug use situations, their relevance to the rating subject, their ability to induce excitement, and the negative or positive valence they induce in the subjects. There are few comparable databases of validated visual cues in addiction medicine. The validation process would establish the consistent ability of these cues to elicit craving in individuals with substance use disorder, help discover the best cues and cue categories for reliable craving-induction in populations with substance use disorder, and obtaining normative values for the excitation and negative or positive affects that these cues can induce. The validation process would help anyone wishing to use the database to have a degree of certainty in the reliability of craving-induction by these cues, and the database would provide neutral cues as controls for any drug cue they would wish to include. We hope that the extensive validation process and the large number of visual cues and the precise matching will encourage researchers to make widespread use of the database and to further validate it in further countries and cultural settings. This would, again, help our wider goal of greater homogeneity in the field of fMRI cue reactivity within addiction medicine.