

## Task Based Functional Connectivity within Reward Network in Food Image Viewing Paradigm Using Functional MRI

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**Abstract :** Activation of reward and satiety networks in the brain while processing palatable food cues, as well as functional connectivity during rest has been studied using functional Magnetic Resonance Imaging of the brain in various obesity phenotypes. However, functional connectivity within the reward and satiety network during food cue processing is understudied. 14 obese individuals underwent two fMRI scans during viewing of Macronutrient Picture System images. Each scan included two blocks of images of High Sugar/High Fat (HSHF), High Carbohydrate/High Fat (HCHF), Low Sugar/Low Fat (LSLF) and also non-food images. Seed voxels within seven food reward relevant ROIs: Insula, putamen and cingulate, precentral, parahippocampal, medial frontal and superior temporal gyri were isolated based on a prior meta-analysis. Beta series correlation for task-related functional connectivity between these seed voxels and the rest of the brain was computed. Voxel-level differences in functional connectivity were calculated between: first and the second scan; individuals who saw novel (N=7) vs. Repeated (N=7) images in the second scan; and between the HC/HF, HSHF blocks vs LSLF and non-food blocks. Computations and analysis showed that during food image viewing, reward network ROIs showed significant functional connectivity with each other and with other regions responsible for attentional and motor control, including inferior parietal lobe and precentral gyrus. These functional connectivity values were heightened among individuals who viewed novel HS/HF images in the second scan. In the second scan session, functional connectivity was reduced within the reward network but increased within attention, memory and recognition regions, suggesting habituation to reward properties and increased recollection of previously viewed images. In conclusion it can be inferred that Functional Connectivity within reward network and between reward and other brain regions, varies by important experimental conditions during food photography viewing, including habituation to shown foods.

**Keywords :** fMRI, functional connectivity, task-based, beta series correlation

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