

Functional Imaging in Obesity and its Complications: Understanding Food Craving and Satiety

J. D. Ragland¹

¹University of Pennsylvania, Philadelphia, Pennsylvania, United States

Food craving is an intense desire to eat a specific food. Such cravings are a normal occurrence in healthy subjects, and may be increased in intensity or frequency in individuals who are obese. Although functional imaging has been used to study hunger and satiety, and to study drug craving, little work has been done to understand the neural basis of food craving. In this presentation we will describe how diet manipulation and cue-induction techniques can be used to trigger food cravings in the absence of hunger during functional magnetic resonance imaging (fMRI). Data will be presented on 10 healthy volunteers who received a normal diet, and 10 individuals who received a monotonous diet prior to scanning. Subjects randomly alternated between six 30 sec. blocks in which they were presented with liked food cues, six 30 sec. blocks in which they received monotonous food cues, and six baseline blocks in which they were asked to relax. When presented with verbal food cues subjects were asked to imagine their favorite version of the food, including its appearance, smell, taste, and mouth feel. Data were acquired on a 4 Tesla GE scanner using a BOLD EPI sequence, and a boxcar design contrasted liked and monotonous food cues with resting baseline and with each other. As expected, higher rates of food craving were reported in the monotonous diet group during liked food cue conditions. Groups also differed in patterns of liking-specific fMRI activation. Although the normal diet group did not show any activation during the liked minus monotonous food cue contrast, subjects who had been on the monotonous diet showed above-threshold activation in candidate limbic and paralimbic brain regions. Between-group contrasts revealed greater activation in the left hippocampus, left insula, and right caudate in the monotonous diet group. These regional effects suggest a common neural substrate for food and drug craving. Clinical implications of diet manipulations are also discussed in relationship to the obesity literature.