Reward magnitude tracking by neural populations in ventral striatum.

Evaluation of the magnitudes of intrinsically rewarding stimuli is essential for assigning value and guiding behavior. By combining parametric manipulation of a primary reward, medial forebrain bundle (MFB) microstimulation, with functional magnetic imaging (fMRI) in rodents, we delineated a broad network of structures activated by behaviorally characterized levels of rewarding stimulation. Correlation of psychometric behavioral measurements with fMRI response magnitudes revealed regions whose activity corresponded closely to the subjective magnitude of rewards. The largest and most reliable focus of reward magnitude tracking was observed in the shell region of the nucleus accumbens (NAc). Although the nonlinear nature of neurovascular coupling complicates interpretation of fMRI findings in precise neurophysiological terms, reward magnitude tracking was not observed in vascular compartments and could not be explained by saturation of region-specific hemodynamic responses. In addition, local pharmacological inactivation of NAc changed the profile of animals' responses to rewards of different magnitudes without altering mean reward response rates, further supporting a hypothesis that neural population activity in this region contributes to assessment of reward magnitudes.