Department of Psychiatry- Columbia University Medical Center

Arielle Sasson

Mentor: Peter Balsam

# Learned Habits: Dendritic Morphology in Dorsal Striatum

Several brain areas, including dorsal striatum, amygdala, and prefrontal cortex, have been known to be involved in the transition from goal-directed to habitual action. We previously found that during the process of habit acquirement, patterns of gene expression change in the dorsomedial and dorsolateral striatum. Some of those genes are known to regulate aspects of nerve growth and structure. In order to examine morphological changes in the dorsal striatum we trained animals on a lever press task for a food reinforcer. Rats were trained on a variable interval schedule where food became available after an average of 30 s had elapsed (VI-30). One group was trained for 3 days (Short Training), thereby remaining in a goal-directed state. Another group was trained 25 daily sessions (Long Training), thereby becoming habitual in their behavior. A third control group was placed into the operant cages and received response-independent reinforcers yoked to the Long Training group (Exposure Control). Unlike the short training group, the group given long training was insensitive to devaluation of the reinforcer indicating that responding was habitual in the former group. Changes in dendritic structure were evaluated in three groups trained identically to those of the devaluation experiment. In these groups, rats were sacrificed 24 hours after the final training session and the brains stained using the Rapid GolgiStainTM Kit. Brains were sectioned to 150 microns and mounted for imaging analysis. A total of 154 neurons were traced and imaged with a Zeiss AXIO Imager.M1 upright microscope in combination with the Neurolucida 10 software by MBF. A Scholl analysis indicated differences in dendritic length and complexity in anterior vs. posterior striatum, medial vs. lateral striatum. These results indicate that the formation of habits is associated with changes in striatal morphology.