

COLLEGE OF HEALTH SCIENCE FACULTY GRANT-IN-AID REPORT
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PROJECT TITLE: Sensory cues predictive of food availability undergo time-dependent prominence, which facilitates overeating behaviors

INVESTIGATOR: Travis Brown, PhD

YEAR PROJECT WAS SUPPORTED: 2014-2015

Participants/Subjects: Sprague Dawley Rats

Methods: Rodent food self-administration and neuronal spine density analysis with Dil staining and confocal microscopy.

Results: We published two papers (Darling, Dingess, Schlidt, Smith, & Brown, 2016; Dingess, Darling, Kurt Dolence, Culver, & Brown, 2016) that were facilitated by the support we received from the faculty grant-in-aid. Briefly, rodents that associate a compound sensory cue with a food reward show a time-dependent increase in the operant responding for those cues. In addition, we showed that there were diet specific effects within the brain that may contribute to maladaptive food seeking behaviors.

Darling, R. A., Dingess, P. M., Schlidt, K. C., Smith, E. M., & Brown, T. E. (2016). Incubation of food craving is independent of macronutrient composition. *Sci Rep*, 6, 30900.

doi:10.1038/srep30900

Dingess, P. M., Darling, R. A., Kurt Dolence, E., Culver, B. W., & Brown, T. E. (2016). Exposure to a diet high in fat attenuates dendritic spine density in the medial prefrontal cortex.

Brain Struct Funct. doi:10.1007/s00429-016-1208-y

Limitations: A limitation of my laboratory are the number of self-administration chambers my laboratory has and the “man hours” available to work on the project, which limited the number of studies that we could perform in a timely manner. A scientific limitation was not identifying whether rodents were obesity prone or obesity resistant, which could have influenced our interpretation.

Conclusions: Our results demonstrate a significant reduction in the density of thin spines on the apical and basal segments of dendrites within the infralimbic, but not prelimbic, mPFC. In addition, we showed that food cues gain importance over time, trigger increased approach behaviors, and increased consumption of high-fat food following abstinence. Taken together, our data begins to identify structural plasticity within the brain and behavioral changes that may play a significant role in facilitating overeating and obesity.

Future Research & Dissemination: I am currently working on an NIH grant with a collaborator to follow-up on these studies. In addition, we have submitted another manuscript to *Neuropsychopharmacology*, which identifies a possible mechanism for time-dependent increases in food cue sensitivity.