Public Abstract

First Name:Howard

Middle Name:William

Last Name:Johns

Adviser's First Name:Matthew

Adviser's Last Name:Will

Co-Adviser's First Name:

Co-Adviser's Last Name:

Graduation Term:SS 2015

Department:Psychology

Degree:PhD

Title:Examination of mu-Opioid Receptor Activation in the Nucleus Accumbens on Baseline Diet Preferences in Rats Selectively Bred to Run Long or Short Distances

The obesity epidemic and associated diseases are a direct result of both diet choice and inactivity, as over-consumption of palatable foods and a sedentary lifestyle invariably precede the onset of weight gain. Our laboratory uses opioid activation of the nucleus accumbens to model hedonically-driven feeding of energy-dense palatable food in the sated condition, a behavior that typically precedes the onset of obesity. However, it is not clear how dietary choice and physical inactivity interact, and to what extent.

The current study used two novel rat phenotypes, developed by selectively breeding for either high- or low-levels of voluntary running (HVR and LVR, respectively). As of the 10th generation, HVRs run approximately 10-fold greater daily distances compared to the LVR rats, thus providing a unique model to examine cross-generational influence of inactivity on diet preference and overall feeding behavior. The current study sought to investigate the influence of voluntary exercise or forced sedentary conditions in HVR and LVR rats using an opioid feeding model choice task between either a low-fat/high-carb or high-fat/low carb diet.

LVRs demonstrated a strong preference for the low-fat/high carb diet at baseline; this preference became further pronounced in a dose-dependent fashion following intra-Acb infusions of the mu opioid agonist DAMGO. HVR rats did not demonstrate a clear preference for either diet at baseline; however, their consumption of the high-fat/low carb diet increased dose-dependently following DAMGO infusions. Analysis of low-fat/high-carb consumption revealed interactions between phenotype and baseline preference, as well as between phenotype, exercise condition, and DAMGO dose, suggesting differential opioid signaling across phenotype-by-exercise conditions.