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A New Obesity Model Reveals the Hypophagic Properties of PACAP Involve the Regulation of Homeostatic Feeding in the Ventromedial Hypothalamic Nucleus and Hedonic Feeding in the Nucleus Accumbens

Matthew M. Hurley
Marquette University

Brian Maunze
Marquette University, brian.maunze@marquette.edu

Jon M. Resch
Marquette University, jon.resch@marquette.edu

Mogen M. Frenkel
Marquette University

M. J. Reilley
Marquette University

See next page for additional authors

Authors
Matthew M. Hurley, Brian Maunze, Jon M. Resch, Mogen M. Frenkel, M. J. Reilley, Megan E. Block, David A. Baker, and Sujean Choi

Presentation Abstract

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Authors:	***M. M. HURLEY**, B. MAUNZE, J. M. RESCH, M. M. FRENKEL, M. J. REILLY, M. BLOCK, D. A. BAKER, S. CHOI; Biomed. Sci., Marquette Univ., Milwaukee, WI
Abstract:	Binge eating in humans is a complex disorder that often involves discrete, compulsive feeding sessions of highly palatable foods even in the absence of a deprivation state or hunger. Binging can be effectively modeled in rodents by providing subjects with limited access to a palatable food source (Western Diet; WD) as an adjunct to ad lib access to normal chow (Standard Chow; SC). Although this design recapitulates several fundamental characteristics observed in binge eating disorder, the binge eating observed in this paradigm is likely a product of both hedonic and homeostatic drives with the need to balance energy stores still present. To isolate these feeding drives, we have developed a novel feeding regimen that modifies the classic limited access binge model to effectively delineate and separate homeostatic feeding from motivational feeding. This is achieved by entraining male Sprague-Dawley rats to a restricted feeding schedule (two hours per day) of SC followed by a short 15 minute limited access meal of either SC or WD (Restrict Fed-Limited Access; RFLA). The RFLA paradigm allows for the examination of pituitary adenylate-cyclase activating polypeptide

(PACAP) on palatable food consumption in a fully satiated subject. PACAP has previously been shown to suppress feeding behavior when injected into the hypothalamus. In the current study, PACAP injected into the ventromedial hypothalamic nuclei (VMN) suppressed the two hour homeostatic SC meal, but not the subsequent 15 minute limited access meal of WD. By contrast, PACAP bilaterally administered into the nucleus accumbens (NAc) produced the opposite effect with PACAP suppressing the consumption of WD but not SC. Thus, PACAP mediated signaling in the VMN appears to be involved in homeostatic regulation of energy stores, whereas PACAP signaling in the NAc regulates feeding driven by palatability or hedonic qualities.

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