

Effects on a high-fat diet (HFD) on dendritic morphology in the male rat hypothalamic ventromedial nucleus (VMH)

L.M. FLANAGAN-CATO, S.J. FLUHARTY, D.R. LABELLE.

Department of Psychology and Animal Biology, Institute of Neurological Sciences, University of Pennsylvania, Philadelphia, Pennsylvania, USA

We recently reported that caloric restriction was associated with a selective shortening of dendrites in the VMH. In the present study, we tested the hypothesis that exposure to a high-fat diet, which causes weight gain in a subset of rats, also would be associated with modifications in dendritic morphology. Adult male rats were provided with a 15% fat diet ($n=9$) or a 45% fat diet ($n=9$) for 17 days. There was substantial variability in the 17-day weight gain in the group of animals given the HFD. Therefore, this group was subdivided. All animals that were within one standard deviation of the average weight gain of the low-fat control group were considered “non-responders” ($n=4$). The animals whose weight gain was beyond that range were considered “responders” ($n=5$). The HFD-responders consumed more kcal per day and gained more weight than either the control animals or the HFD-non-responders (both $p<0.03$). In addition, leptin levels were approximately 75% higher in the HFD-responders compared with the LFD control group ($p<0.04$). Brains from these animals were processed for Golgi impregnation. Dendrites were classified as longest primary, short primary, or secondary. Although this analysis is still ongoing, preliminary evidence ($n=3$ per group) suggests that the long primary dendrites are shortened in the HFD-responders. Thus, dendrite morphology in the VMH may not be monotonically correlated with leptin levels or energy balance. This research was supported by DK52018.

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Central injections of tachykinin NK3 receptor agonists inhibit salt appetite and cause translocation of the NK3 receptor to the nuclei of neurons in the paraventricular nucleus of the hypothalamus

F.W. FLYNN, G.E. HALEY, D.D. JENSEN, K. SCHAMBER, D. PRATT. *Neuroscience Program, University of Wyoming, Laramie, WY, USA*

Central, intraventricular injections of tachykinin NK3 receptor (NK3R) agonists inhibit the ingestion of sodium containing solutions under need-free and need-induced conditions. NK3R are internalized within the cell following agonist binding and as such, the translocation of the receptor provides a means by which to identify NK3R expressing neurons that are activated by the intraventricular injection. Male, Charles River Laboratory rats were fitted with lateral ventricle cannulas and maintained on chow and water. Rats were administered intraventricular injections of isotonic saline or 200 ng senktide, a selective NK3R agonist, and then given access to 0.15 M NaCl. A separate group of rats were

also treated with saline or senktide, and sacrificed 5, 20 or 120 min later, and the brains processed for NK3R immunoreactivity (IR). Intraventricular injections of senktide significantly suppressed the ingestion of NaCl during the first 20 min of the test. Confocal examination of the paraventricular nucleus of the hypothalamus (PVN) showed that in saline treated rats, NK3R IR was largely membrane bound but following senktide, NK3R IR was detected in punctate clusters within the cytoplasm within 10 min of the intraventricular injection. Interestingly, at 20 min, NK3R IR was detected within the cell nuclei. The presence of NK3R in the cell nuclei was confirmed by immunoelectron microscopy and Western blot. Thus, intraventricular injections of senktide activate NK3R expressed by PVN neurons and causes the internalization and translocation of the NK3R to the cell nuclei, where the protein may directly affect gene transcription.

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The Power of Food Scale predicts chocolate cravings and consumption and response to a cravings intervention

E.M. FORMAN^a, K.L. HOFFMAN^a, K.B. MCGRATH^a, J.D. HERBERT^a, L.L. BRANDSMA^b, M.R. LOWE^a.

^a*Department of Psychology, Drexel University, Philadelphia, PA 19104, USA.* ^b*Department of Psychology, Chestnut Hill College, Philadelphia, PA 19118, USA*

The Power of Food Scale (PFS) is a new measure that assesses the impact of the food environment on food-related beliefs, thoughts and feelings. The present study involved 98 undergraduates who were given transparent boxes of Hershey's[®] kisses to keep with them for 48 h. They were instructed not to eat any of the kisses or any other chocolate during this period. We examined the relationship between the PFS and (1) cravings to eat the kisses (2) amount of kisses eaten (assessed surreptitiously), and (3) response to 3 intervention conditions (no intervention and control-based and acceptance-based interventions to reduced cravings). Baseline PFS scores significantly predicted the frequency and intensity of cravings and distress associated with them over the subsequent 48 h. In the control condition (where no effort was made to help participants cope with cravings), 30% of participants in the highest PFS tertile ate some of the chocolates compared to 4% among those in the lowest two tertiles. Response to the intervention interacted with baseline PFS levels, such that acceptance-based strategies were associated with better outcomes (for cravings and consumption) among those scoring highest on the PFS, but worse outcomes among those scoring lowest. Past research found the PFS to be related to self-report measures of external, emotional, disinhibitory, binge and hunger-based eating. Taken in conjunction with the present results, it appears that the PFS may represent a global measure of appetitive responsiveness to the food-abundant environments.

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