Epigenetic regulation of nociceptin/orphanin FQ and corticotropin-releasing factor system genes in frustration stress-induced binge-like palatable food consumption

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Evidence suggests that binge eating may be caused by a unique interaction between dieting and stress. We developed a binge-eating model in which female rats with a history of intermittent food restriction show binge-like palatable food consumption after 15 min exposure to the sight of the palatable food (frustration stress). Aim of the present study was to investigate the regulation of the stress neurohormone corticotropin-releasing factor (CRF) system and of the nociceptin/orphanin FQ (N/OFQ) system genes in selective rat brain regions, using our animal model. Food restriction by itself might be responsible in the hypothalamus for the down-regulation on mRNA levels of CRF-1 receptor (CRF-1R), N/OFQ as well as its receptor NOP. For the latter, this alteration might be due to selective histone modification changes. Instead, CRF gene appears to be up-regulated in the hypothalamus and in the ventral tegmental area only when rats are food restricted and exposed to frustration stress and, of relevance, these changes appear to be due to a reduction in DNA methylation at gene promoters. Moreover, CRF-1R mRNA resulted also to be differentially regulated in these two brain regions. Our data add information on altered N/OFQ and CRF signalling in food restriction and under stressful conditions, and provide insight on the use of this model of binge eating for the study of epigenetic modifications in controlled genetic and environmental backgrounds.