Estradiol-dependent decreases in emotional binge-like eating are associated with decreased brain pERK expression in ovariectomized rats

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Bulimia nervosa, binge eating disorder and emotional eating occur more commonly in females than in males. To further investigate the mechanisms underlying this sex difference, we used an animal model in which binge-like eating is evoked in female rats by three cycles of food restriction followed by 'frustration' stress (15 min exposure to the sight and odor of a palatable food). We sought to determine whether binge-like eating behavior varies across the estrus cycle or is influenced by estradiol (E2) in ovariectomized (OVX) rats and whether these differences are associated with differences in the numbers of cells in which extracellular signal-regulated kinase (ERK) was activated in the basolateral (BLA) and the central (CeA) amygdala, paraventricular nucleus of hypothalamus (PVN) and arcuate nucleus (ARC).
Food restricted and stressed non-estrus rats showed binge eating behavior in comparison to the control not restricted and not stressed rats. This response was not present in restricted and stressed rats in estrus, and in OVX rats treated with E2.
The lack of binge-like eating behavior in estrous rats was accompanied by significant decreases in ERK phosphorylation in ARC, PVN and in the CeA, but not in BLA. Our findings indicate that E2 reduces binge-like eating behavior in OVX rats and does so also in intact, cycling rats. These results are consistent with reports in women with bulimia nervosa and extend our previous findings and increase the validity of our model that can be used in translational studies of the mechanism of binge eating behavior.