see also Binge eating disorder

Overeating is a serious issue in modern society, causing many health problems, including obesity. Although the hypothalamus has been previously identified as the key brain structure that regulates body weight homeostasis, the downstream pathways and non-canonical neural circuitry involved in feeding behavior remain largely uncharacterized. Here, we discover that suppressing the activity of GABAergic cells in the anterior ventrolateral periaqueductal gray (vlPAG), whether directly or through long-projection GABAergic inputs from either the bed nucleus of the stria terminalis (BNST) or the lateral hypothalamus (LH), is sufficient to promptly induce feeding behavior in well-fed mice. In contrast, optogenetic activation of these cells interrupts food intake in starved mice. Long-term chemogenetic manipulation of vlPAG GABAergic cell activity elicits a corresponding change in mouse body weight. Our studies reveal distinct midbrain GABAergic pathways and highlight an important role of GABAergic cells in the anterior vlPAG in feeding behavior [1)].

1)
Hao S, Yang H, Wang X, He Y, Xu H, Wu X, Pan L, Liu Y, Lou H, Xu H, Ma H, Xi W, Zhou Y, Duan S, Wang H. The Lateral Hypothalamic and BNST GABAergic Projections to the Anterior Ventrolateral Periaqueductal Gray Regulate Feeding. Cell Rep. 2019 Jul 16;28(3):616-624.e5. doi: 10.1016/j.celrep.2019.06.051. PubMed PMID: 31315042.