

Chapter 12: Ingestive Behavior

Physiological Regulatory Mechanisms

Fluid Regulation

Nutrition and Metabolism

metabolism

hunger and satiety

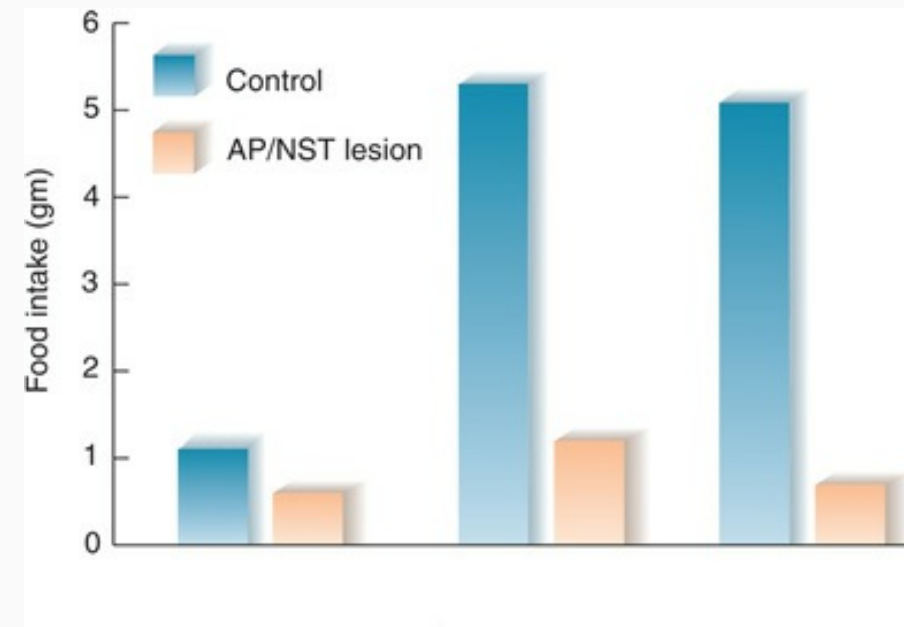
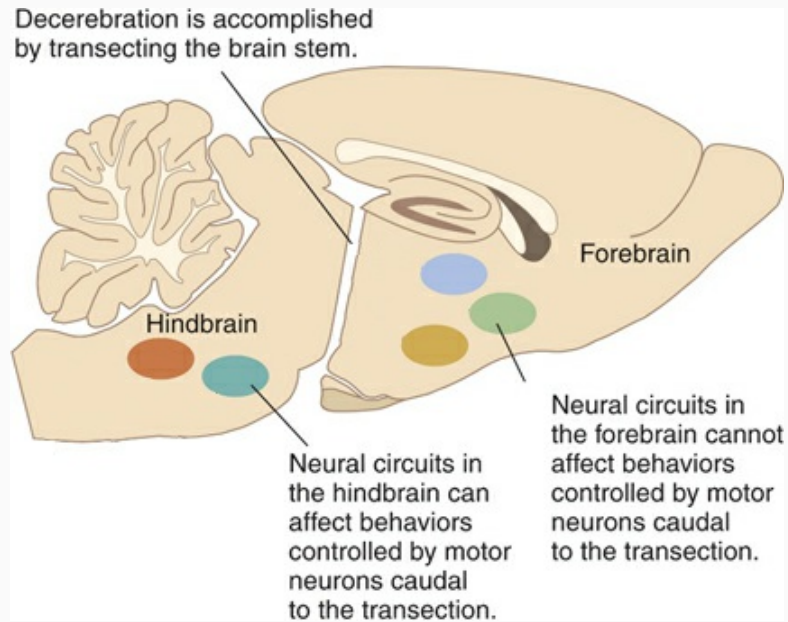
neural mechanisms

Obesity and Anorexia / Bulimia

Nutrition and Metabolism

Neural Mechanisms of Feeding - Brainstem.

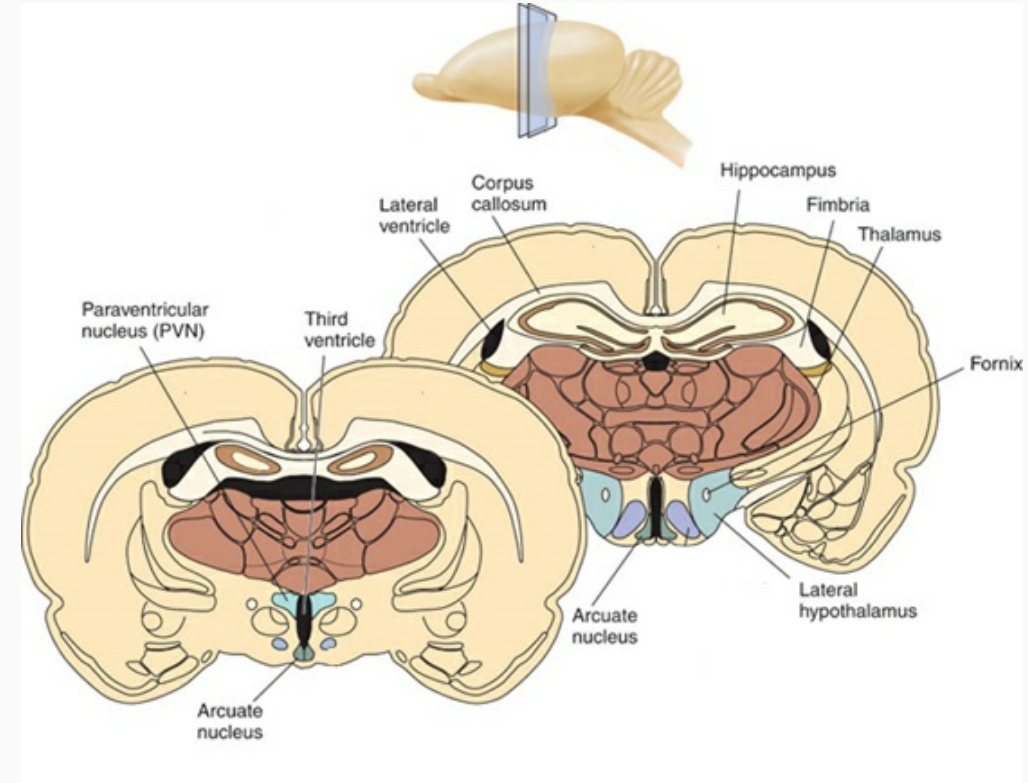
- basic mechanisms of feeding in brainstem
- demonstrated by eating in decerebrate rat
- consumes sweet or slightly salty, rejects bitter
- adjust responses after deprivation or supplementation
- area postrema and nucleus of solitary tract



Nutrition and Metabolism

Neural Mechanisms of Feeding - Hypothalamus.

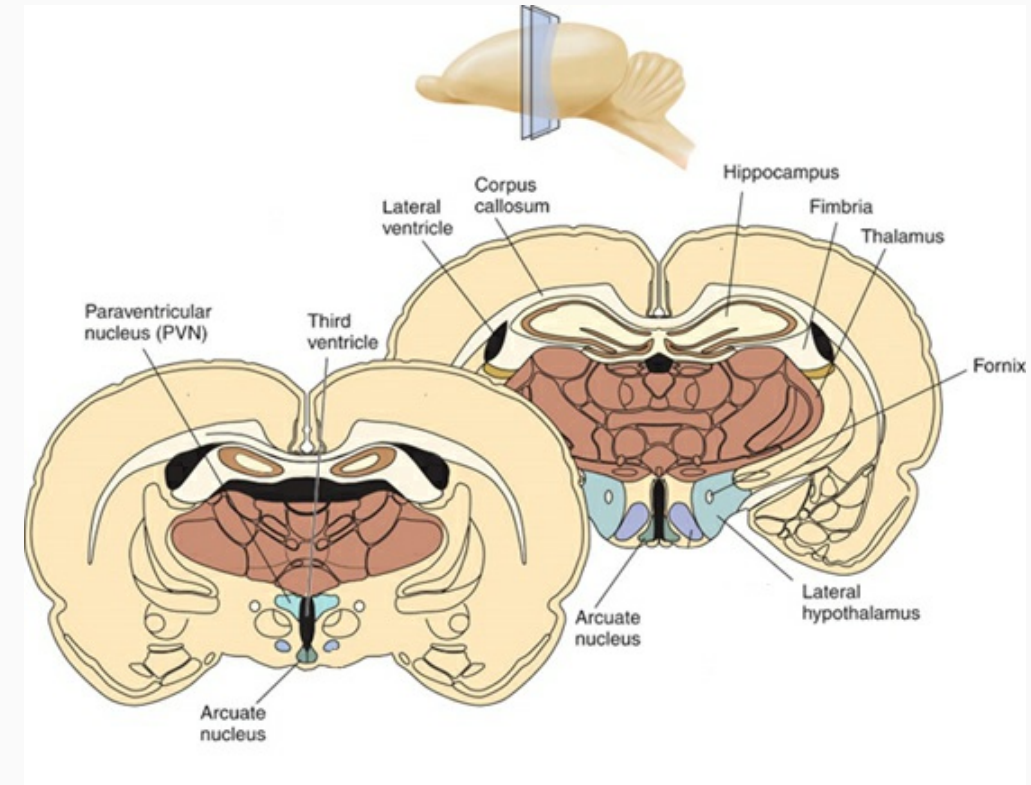
- neurons in medulla and hypothalamic arcuate nucleus release neuropeptide Y (NPY) during fasting
- arcuate also releases agouti-related protein (AgRP)
- very powerfully stimulates feeding (orexigenic)
- medulla projections to arcuate
- arcuate projections to LH and PVN



Nutrition and Metabolism

Neural Mechanisms of Feeding - Hypothalamus.

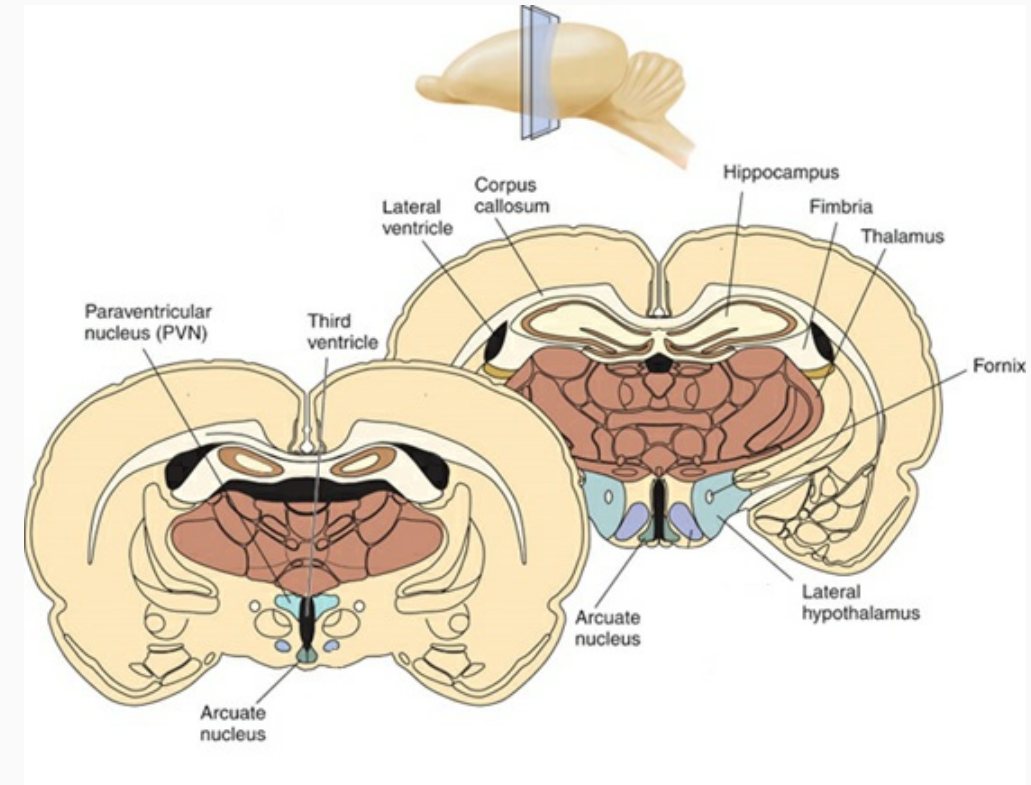
- NPY/AgRP activate LH neurons to release melanin concentrating hormone (MCH) and orexin during fasting
- stimulates feeding (orexigenic)
- projections to cortex, PAG, RF, thalamus, LC



Nutrition and Metabolism

Neural Mechanisms of Feeding - Hypothalamus.

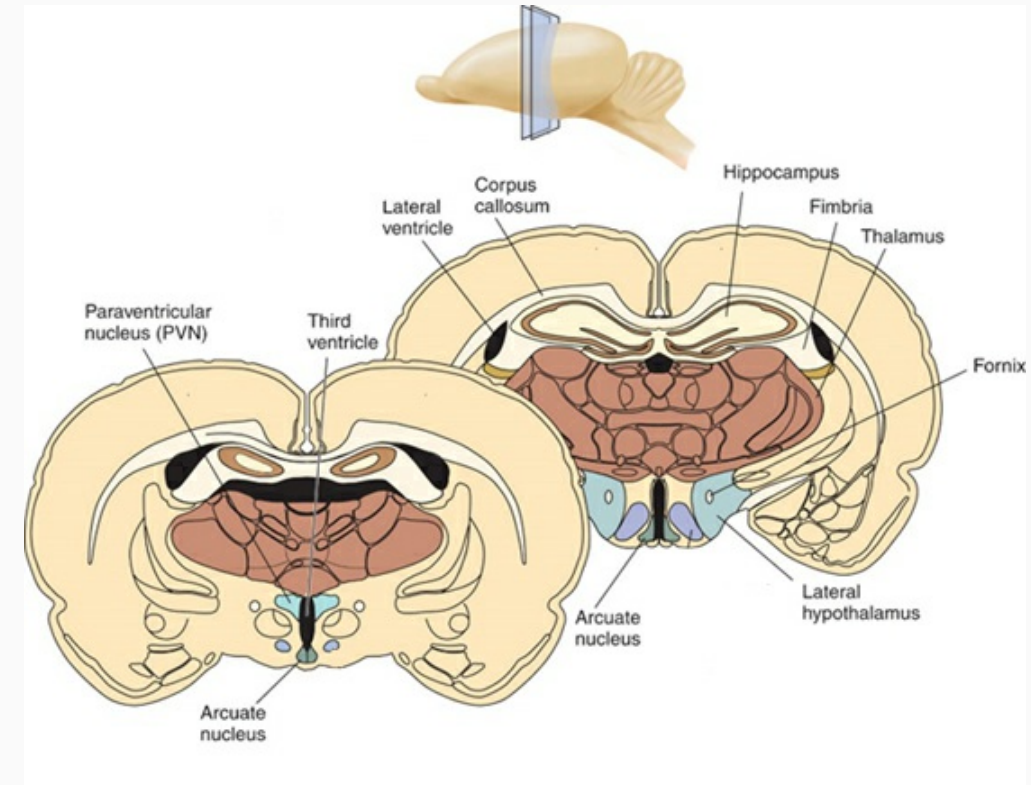
- NPY/AgRP inhibit PVN neurons to suppress release of corticotropin releasing hormone (CRH) and oxytocin during fasting
- removes (anorexigenic) inhibition of feeding



Nutrition and Metabolism

Neural Mechanisms of Satiety - Hypothalamus.

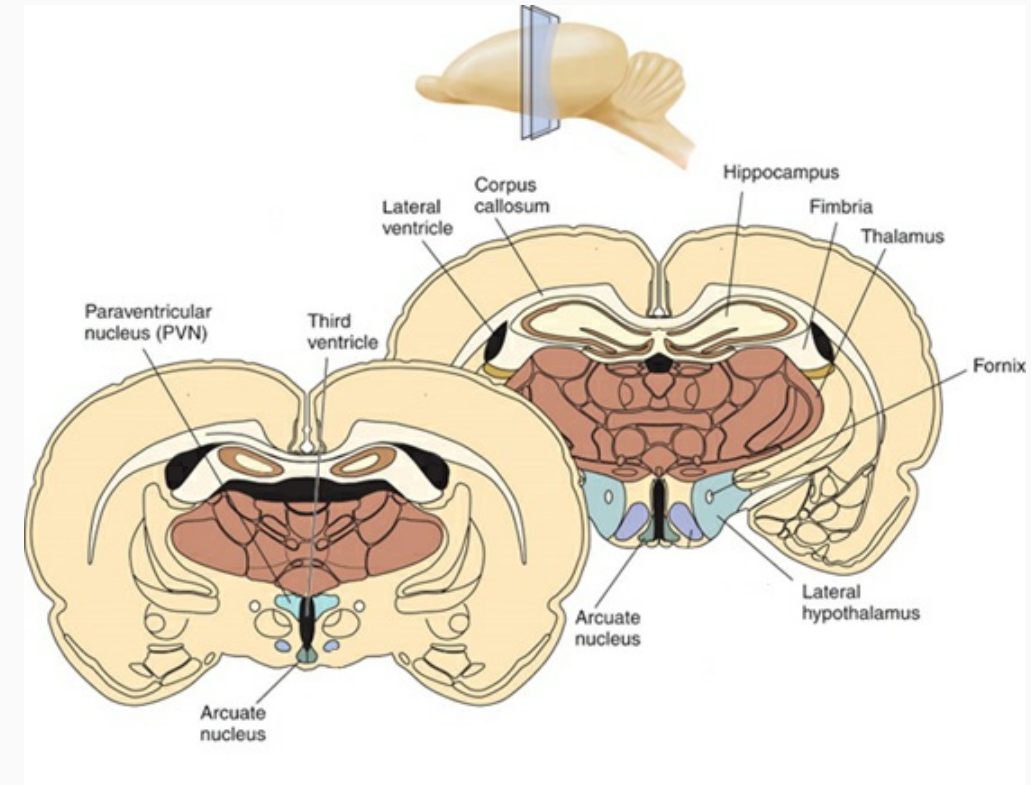
- leptin binds to receptors on NPY/AgRP neurons and inhibits them (anorexigenic)



Nutrition and Metabolism

Neural Mechanisms of Satiety - Hypothalamus.

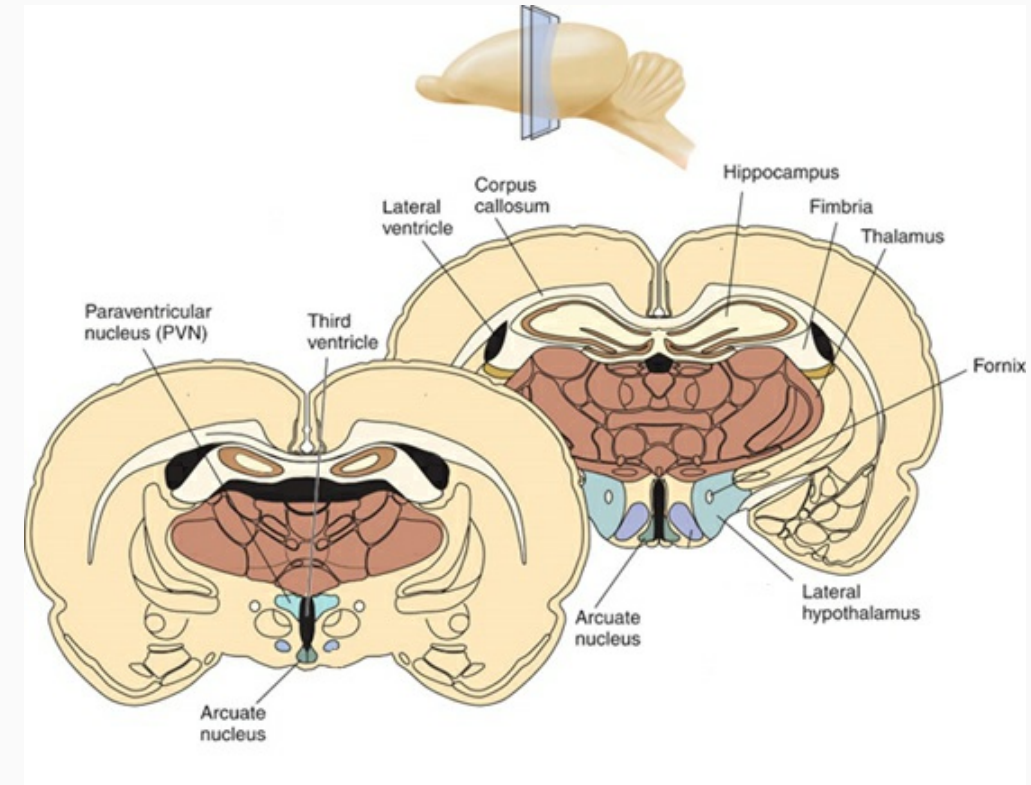
- arcuate neurons release α -melanocyte stimulating hormone (α -MSH) and cocaine and amphetamine-regulated transcript (CART) after feeding
- blocks feeding (anorexigenic)
- projections to LH and PVN



Nutrition and Metabolism

Neural Mechanisms of Feeding - Hypothalamus.

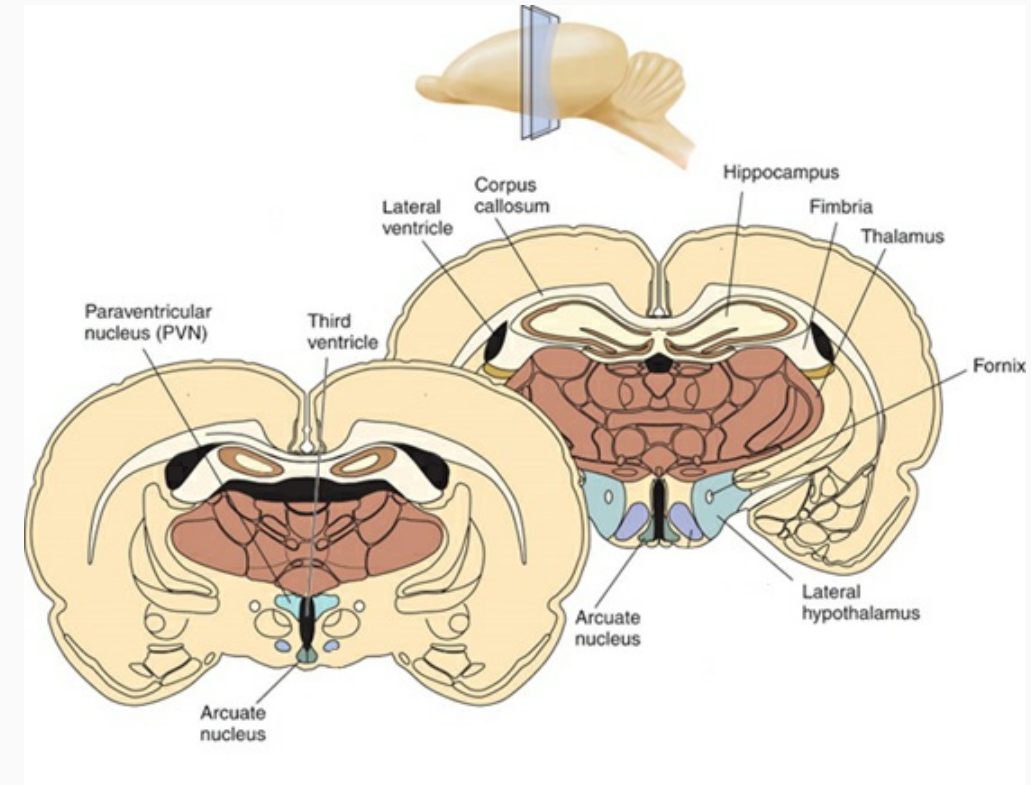
- α -MSH and CART activate PVN neurons to release corticotropin releasing hormone (CRH) and oxytocin after feeding (anorexigenic)
- projections to pituitary (CRH) and various brain sites (oxytocin)



Nutrition and Metabolism

Neural Mechanisms of Feeding - Hypothalamus.

- α -MSH and CART inhibit LH neurons to suppress release of melanin concentrating hormone (MCH) and orexin after feeding (anorexigenic)



Nutrition and Metabolism

Neural Mechanisms of Feeding / Satiety - Hypothalamus.

- arcuate release of NPY/AgRP during fasting
- stimulates LH release of MCH and orexin (orexigenic)
- inhibits PVN release of CRH and oxytocin

Nutrition and Metabolism

Neural Mechanisms of Feeding / Satiety - Hypothalamus.

- arcuate release of α -MSH/CART
- stimulates PVN release of CRH/oxytocin (anorexigenic)
- inhibits LH release of MCH and orexin

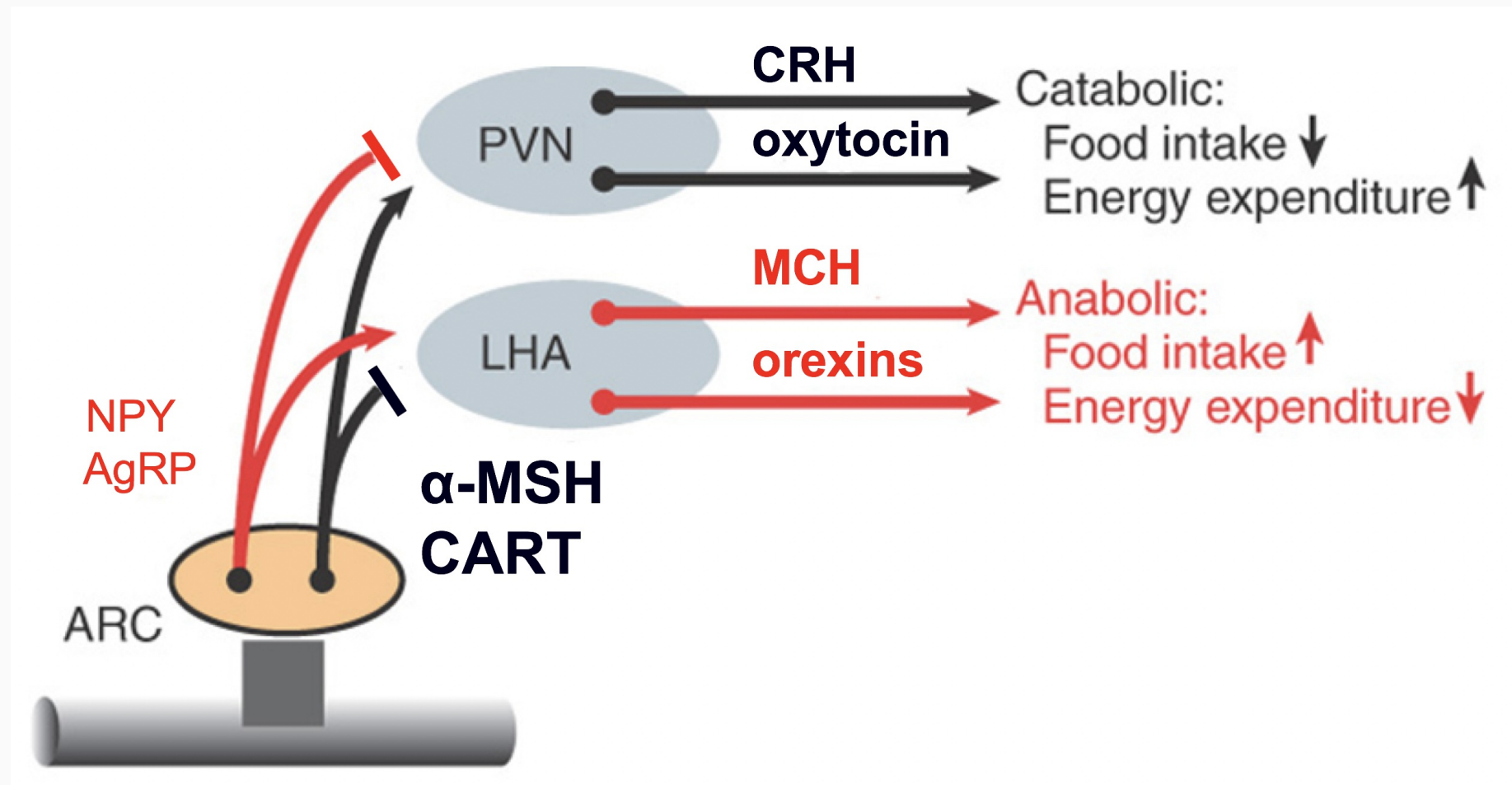


Image Credits

- slide 2-9: Carlson, N.R. (2012). Physiology of Behavior, 11th ed. Pearson Publishing
- slide 10-11: Zigmond, M.J., Bloom, F.E., Landis, S.C. Roberts, J.L., and Squire, L.R. (1999). Fundamental Neuroscience., Academic Press.