

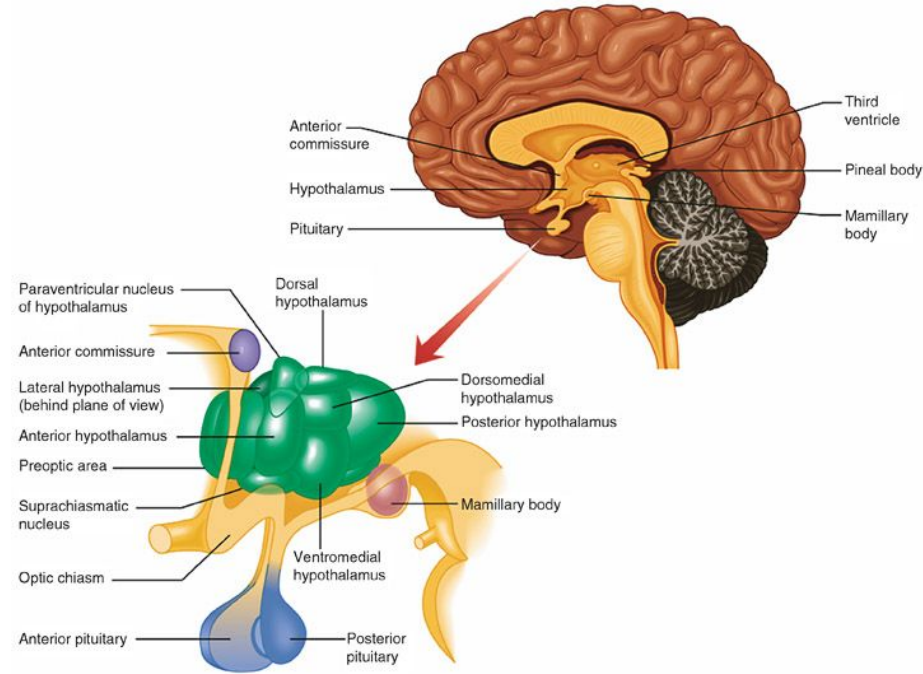


Motivation To Eat

Homeostatic vs. Hedonic Drives

Neurobiology of Hunger

- Hunger is a **homeostatic** function driven by basic physiological needs
- Feeding is regulated by **energy and fat storage expenditure**
- Key brain regions: **Hypothalamus** (ARC, LH, vmH, PVN)
 - Function: control appetite and food intake (among other homeostatic needs)
 - **Bottom-up** regulation of eating



Homeostatic Hunger-Motivated Eating

Hormonal Regulation

- Secretions of **hunger vs. satiety signals** keep the brain informed of the body's energy stores

Hunger Signals

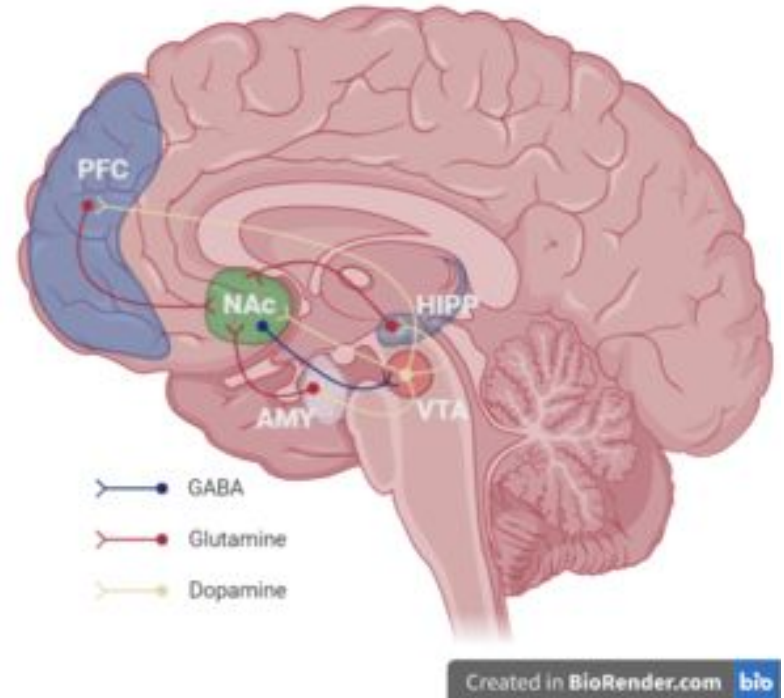
- Stomach and intestine release **ghrelin** to stimulate hunger when stomach is empty and blood glucose is low

Satiety Signals

- Adipose tissue releases **leptin** to suppress hunger
- Stomach and intestine release **cholecystokinin, peptide Y, and glucagon-like peptide 1**
- Pancreas releases **insulin**

Neurobiology of Reward

- The **Limbic System** evaluates emotionally valenced stimuli to exhibit and **reinforce** emotional responses in response to **reward** and **punishment**
- Key regions: **NAc**, **VTA**, **amygdala**, **hippocampus** (plus corticolimbic projections to the PFC)
- Receives input from ventromedial and lateral hypothalamus
- **Top-down** regulation of eating



Hedonic Reward-Motivated Eating

Reward Reinforcement

- LH integrates reward-related input upon consumption of food and projects to the **VTA** to trigger **dopamine** release onto the **NAc**, **reinforcing pleasure** associated with eating food

Emotional Regulation

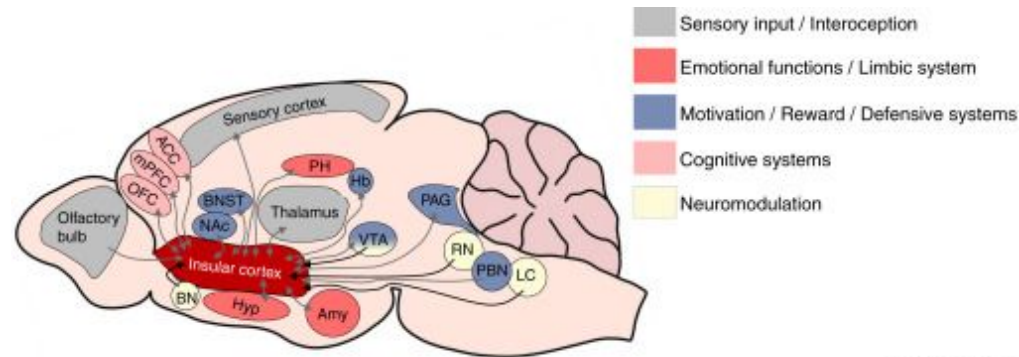
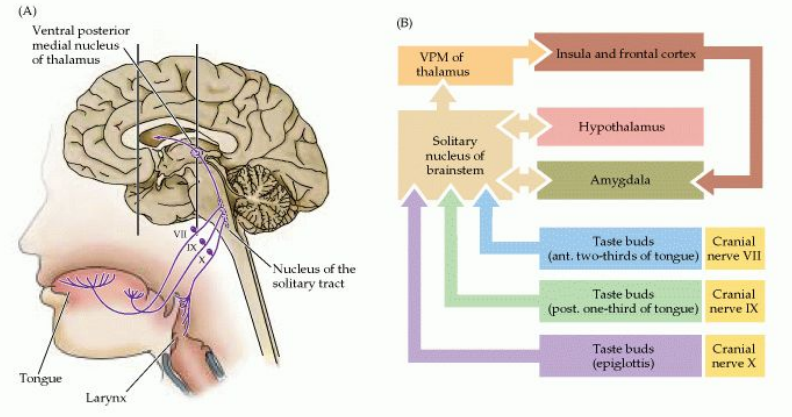
- NAc forms synapses with **amygdala** and **hippocampus**, allowing one to feel good and strengthen the memory associated with eating food

Perceptual Salience

- **Interoceptive cues** associated with **taste** and **satiety** are integrated with emotional processes
- **Insula** links sensory cues associated with taste to the emotional and motivational response to eating food

Palatability and the Gustatory Pathway

- **Palatability:** experience of pleasure especially in the sense of taste
- Reciprocal connection between **insula** (primary taste cortex) and motivation/emotion systems
- When we're hungry, **ghrelin** also sends **direct input to the VTA** to boost rewarding characteristics of food and can override homeostatic drive to eat



Proposed Research Question(s)

In adults living in California, what factors modulate hunger-motivated and pleasure-motivated eating behaviors?

⇒ How might mood motivate hunger and pleasure associated with eating?

⇒ When does emotion override the homeostatic drive to eat? What foods may have a higher incentive value?

Proposed Study Procedure

Method : Survey

Target Population: Adults (18+) in California

Goal : Identify correlations between eating habits and individual homeostatic versus hedonic drive. Identify eating patterns and behaviors in the California population.

Survey Content

- Will assess:
 - Sample demographics
 - Mood questionnaire
 - Motivation for eating
 - Environmental factors that influence motivation to eat
 - Individual differences pertaining to motivation for eating & eating behaviors
- Example Questions:
 - On an average day how often do you consume a meal (open ended)?
 - What is your comfort food (open ended)?
 - On a scale of 1(Not Frequent) to 5 (Very Frequent) how often do you consume a meal after exercise?
 - How likely are you to consume [food] after a bad day on a scale of 1 (not likely) to 5 (very likely)?

Data Acquisition

- Survey will be administered through Google Forms
- Survey participants will be recruited through person to person interaction and online social media postings
- Data will be collected from adults in California over the age of 18

Data Analysis

- Data will be cleaned and analyzed using Python through Jupyter Notebook
- Data will be secondarily evaluated using IBM SPSS
- Statistical analysis and linear regressions will be used to draw inferences and promote discussion