**APPETITE REGULATION**

Balance of energy metabolism is the main regulator of appetite.

**CENTRAL REGULATION (CNS)**

**HYPOTHALAMUS:** regulating center of appetite and energy homeostasis.

- **Main Hypothalamic nuclei**
  - Lateral hypothalamic area (LHA): hunger center
  - Ventromedial nucleus (VMN): satiety center
  - Arcuate nucleus (ARC): two distinct neuronal populations expressing:
    - OREXIGENIC NEUROPEPTIDES: NPY, AgRP, Orexin
    - ANOREXIGENIC NEUROPEPTIDES: α-MSH, CART, POMC

**BRAINSTEM:** metabolic signals primarily relay to the solitary tract nucleus (NTS) a major neuronal link between the gut and the brain.

**MIDBRAIN:** brain rewarding system is involved in the control of hedonic feeding (mesocortical dopaminergic pathways)

**STRESS**

Stress exposure induces changes in brain development and behavioral outcomes affecting eating patterns, as stress and feeding systems share the same neuroanatomy.

**ACUTE STRESS**

- **Sympathetic adrenal medullary system**
- **Food intake**

**CHRONIC STRESS**

- **Cortisol**
- **Leptin sensitivity**
- **Insulin secretion (hypoinsulinemia)**
- **Food intake (nutrient dense)**
- **Abdominal Obesity**

**REWARD SYSTEM**

- **Hippocampus**
  - GC binds GR
  - meAmygdala
  - MC4-R

**STRESS**

- Hypothalamus
  - Hypothalamic mechanism of appetite regulation
  - Inhibition of NPY expression

- Insulin
  - Hypothalamus
  - CRF via NPY, AgRP, POMC

- Leptin
  - Hypothalamus
  - HT

**HYPERACTIVATED HPA AXIS**

- **Hypothalamus**
  - Hypothalamic mechanism of appetite regulation
  - Inhibition of NPY expression

- **CRF**
  - Hypothalamus
  - Hypothalamic mechanism of appetite regulation

- **AgRP**
  - Hypothalamus
  - Hypothalamic mechanism of appetite regulation

- **POMC**
  - Hypothalamus
  - Hypothalamic mechanism of appetite regulation

**SENSORY INPUT**

- **Dopamine system activation**
- **Stress avoidance and pleasure**
- **Intake of palatable foods**

**INFLUENCE OF EMOTIONS ON APPETITE REGULATION**

- Hypothalamic control of appetite involves the modulation of orexigenic and anorexigenic pathways that determine the positive or negative balance between food intake and energy expenditure.
- Peripheral components are in a bidirectional communication with the brain through the autonomic nervous system and hormones.
- **Insulin** and **leptin** inhibit the orexigenic NPY/AgRP neurons and activate anorexigenic POMC neurons resulting in a decrease of food intake.
- **Ghrelin** activates AgRP/NPY neurons and stimulates food intake.
- **Serotonin** acts on POMC neurons to induce melanocortin secretion and thus satiety.

**CONCLUSIONS**

- Individuals regulate their emotions and mood by changing both food choices and quantities.
- Acute stress activates the sympathetic adrenal medullary system and is associated with a decrease of food intake.
- Chronic stress produces a hyperactivation of the HPA axis, increases cortisol levels and comfort food intake, which leads to abdominal obesity.
- Depression is associated with chronic stress, altered HPA axis activity and elevated cortisol levels which lead to abdominal obesity.
- Depressed patients suffer a dysregulation of the serotoninergic system resulting in a reduction of serotonin levels and an increase of food intake.

**REFERENCES**