Ingestive Behavior

Homeostasis: The process by which the body's substances and characteristics are maintained at their optimum level.

Ingestive behavior: Eating or drinking

A physiological regulatory mechanism maintains the constancy of some internal characteristics of the organism in the face of external variability. EX: keeping body temperature constant despite changes in the temperature externally.

A regulatory mechanism contains four essential features: the system variable (characteristic to be regulated), a set point (the optimal value of the system variable), a detector that monitors the value of the system variable, and a correctional mechanism that resources the system variable to the set point.

Drinking

To maintain our internal milieu at its optimal state, we have to drink some water from time to time.

Intracellular fluid: The fluid contained within cells
Extracellular fluid: All body fluids outside of cells. interstitial fluid, blood plasma, and cerebrospinal fluid.
Intravascular fluid: the fluid found within the blood vessels.
Interstitial fluid: The fluid that bathes the cells, filling the space between the cells of the body.

Hunger and satiety signals arise from the periphery and reach the brain. Eating and drinking are evolutionarily ancient (ie involve the brain stem)
Control mechanisms do not require the cortex. Decerebrated animals - cannot seek food, can eat/drink, can respond to hunger and thirst, Can differentiate different kinds of food, and can vomit/reject bad food: area postrema is intact.

Hypothalamus:
Lateral hypothalamus (LH)
Controls hunger, lesion -> decrease eating/drinking and body weight, Stimulation -> increase eating/ drinking, Block glutamate transmission to LH -> decrease food intake.
LH needs input
2 types of neurons produce: Melanin-concentrating hormone (MCH)
Orexin (sleep)
Food deprivation increases MCH in LH, saity decreases MCH
Stimulation of MCH/Orexin neurons: Appetite inducing, decrease metabolic rate, increase motivation and movement.
MCH/Orexin neurons project to areas involving planning, motivation, and movement.

What triggers the Lateral hypothalamus MCH and orexin neurons?
NeuroPeptide Y (NPY)
NPY injections in the hypothalamus: Eating frenzies. Rats will tolerate pain in order to eat ->
NPY increases motivation to eat

Npy from arcuate nucleus in hypothalamus near 3rd ventricle.
NPY secretion is triggered by brain stem nuclei and controlled by stomach secretions (ghrelin)
Endocannabinoids act like NPY. marijuana is used to increase appetite in chemo patients.

Stomach(ghrelin)/ Liver (brain stem) -> Arcuate (NPY) -> lateral Hypothalamus
(MCH/Orexin)-> Increase eating, decrease metabolism.

Satiety:
Leptin -> - NPY ->+ CAR=> MCH/ Orexin

Leptin
Hereditary leptin deficiency (ob-like) in humans. A genetic deficit in the production of leptin.
Leptin no longer used in weight-loss diets: Leptin resistance.

Biological causes of obesity:
Metabolic disorder (more calories in than out). Due to fast metabolism. In general, not due to a deficiency in leptin production.
Genetic factors: different metabolic rates
Twin studies (tested with high/low-calorie diets)
Epidemiological studies (study of populations)