

Central regulation of viscera

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Hypothalamus

- ▶ Component of diencephalon (cerebrum)

 - Thalamus

 - Epithalamus

 - Pineal gland

 - Habenula

 - Posterior commissure

 - Subthalamus (inferior to the thalamus)

 - Hypothalamus (interior and inferior)

 - Mamillary body (small nucleus hanging of hypothalamus)

 - Pituitary gland

 - Optic chiasma

 - Lamina terminals (border of hypothalamus)

 - Anterior commissure

Nucleus for visceral regulation

- ▶ Tuber cinereum (funnel shape)
- ▶ Infundibulum (extends down into pituitary gland)

Medial zones

Preoptic zone Medial preoptic nucleus

Supra optic zone Suprachiasmatic nucleus

Supra optic nucleus

Periventricular nucleus

Anterior hypothalamic nucleus

Tuberal zone Arcuate nucleus (monster)

Ventral medial nucleus

dorsal medial nucleus

Mamillary zone Mamillary nuclei

Posterior hypothalamic nucleus

Lateral zone

Lateral hypothalamic nucleus

Functions

- ▶ Autonomic nerves system
- ▶ Endocrine system (master)
- ▶ Limbic system (Epicenter)

Limbic system

Mamillary bodies (memory consolidation)

Reflex of olfaction

Episodic memory

Papez circuits

Hippocampus to fornix to mamillary body

Mamillary body to anterior thalamic nucleus (mamillothalamic tract)

Anterior thalamic nucleus to cingulate gyrus to hippocampus

Amygdala

Stria terminalis

ventral amygdalofugal pathway

Arcuate nucleus

alpha melanocyte stimulating hormone

+Ventral medial nucleus

+Corticotropin releasing hormone

+Satiety

Neuropeptide Y and aguti-regulating peptide

+Lateral hypothalamic nucleus

+ Orexins

+ hunger

Regulating centers of hunger and satiety

Increase fat storage

+ adipocyte +leptin + satiety +ventral medial nucleus

Pancreas

+High glucose level +Beta cells +Insulin + Satiety + ventral medial nucleus

GIT

+Stretching reflex in GIT +Vagus nerve +satiety + ventral medial nucleus

+ fasting + Ghrelin + Hunger +Lateral hypothalamic nucleus

► Obesity (hyperphagia)

Damage to ventral medial nucleus

Infants Failure to thrive (FTT)

Damage to Lateral hypothalamic nucleus

Adults Anorexia nervosa

Damage to lateral hypothalamic nucleus

Dorsal medial nucleus

Savage behavior

Damage to mamillary body

Wernicke's encephalopathy

Endocrine function

Hypothalamic Hypophyseal portal system

► Arcuate nucleus

Releasing factor and inhibiting factor

Hormones through portal system to different types of cells
in anterior pituitary

Growth hormone releasing hormone

Somatotropic cells to release GH

Bones , cartilage, liver all the adipocyte

Growth hormone inhibiting hormone

Corticotropin releasing hormone , Corticotropin inhibiting hormone

ACTH adrenal cortex cortisol

► Prolactin inhibiting hormone (dopamine)

Prolactin

Thyroid tropine releasing hormones, thyroid inhibiting hormone

TSH T3 and T4

Medial preoptic nucleus

Gonadotropin releasing hormone and gonadotropin inhibiting hormone

FSH and LH

Hypothalamic hypophyseal tract

Supraoptic nucleus axons to posterior pituitary

+Hypertonic plasma

+Angiotensin 2

ADH (blood vessels and kidneys)

Paraventricular nucleus axons to posterior pituitary

+Suckling and uterine stretch

Oxytocin

Retinal hypothalamic tract

Suprachiasmatic nucleus pineal gland melatonin (circadian rhythm)

Autonomic

► Anterior hypothalamic nucleus

Parasympathetic nervous system

Dorsal longitudinal fasciculus

Cranial

Edinger Westphal nucleus CN III pupillary constrictions

Superior salivatory nucleus CN VII

Inferior salivatory nucleus CN IX

Dorsal nucleus of vagus CN X

Brain stem Reticular formation system

Nucleus tractus solitarius (visceral sensation) deep medulla

Sacral (S2-S4)

Preganglionic parasympathetic

- ▶ Posterior hypothalamic nucleus
(hypothalamic spinal tract)

Sympathetic fibers (T1 to L2)

Preganglionic of sympathetic neurons

Thermoregulation

► Anterior hypothalamic nucleus

Decrease temp

Vasodilation of cutaneous vessels

Sweating

Posterior hypothalamic nucleus

Increase temp

Vasoconstriction

Shivering

Connection of hypothalamus

- ▶ Prefrontal cortex
- ▶ Reticular formation

Median fore brain bundle

- ▶ Amygdala

Stria terminalis

Ventral amygdalofugal pathway

Hippocampus

Fornix