

Nervous System 2



**C12: ANALYZE THE FUNCTIONAL
INTERRELATIONSHIPS OF THE DIVISIONS
OF THE NERVOUS SYSTEM**

Central vs. Peripheral Nervous System

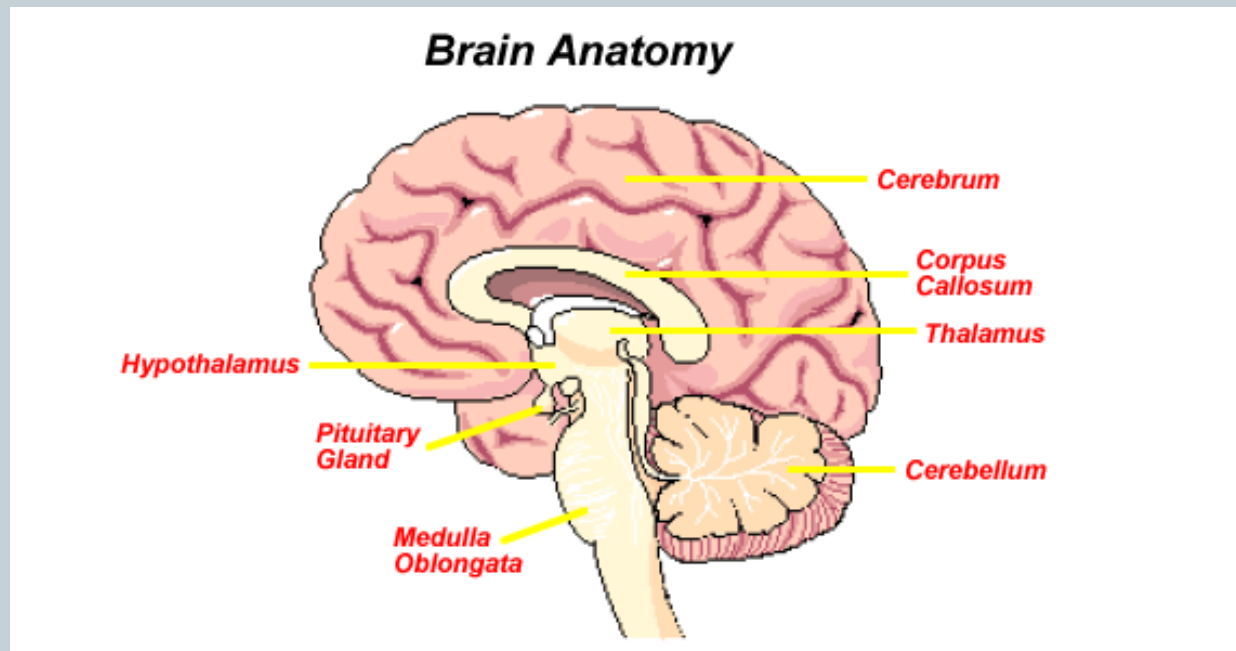


	Central Nervous System (CNS)	Peripheral Nervous System (PNS)
Location	Includes the brain & spinal cord	Includes all of the nerves that extend out from the CNS
Function(s)	<ul style="list-style-type: none">• Brain receives, coordinates, and interprets nerve impulses• Spinal cord is the centre for reflex actions & a communication link between the brain & spinal nerves	<ul style="list-style-type: none">• Collects stimuli to bring to the CNS & conducts impulses away from the CNS• 2 parts: the autonomic nervous system (involuntary) & the somatic nervous system (voluntary)

Brain Parts & Functions



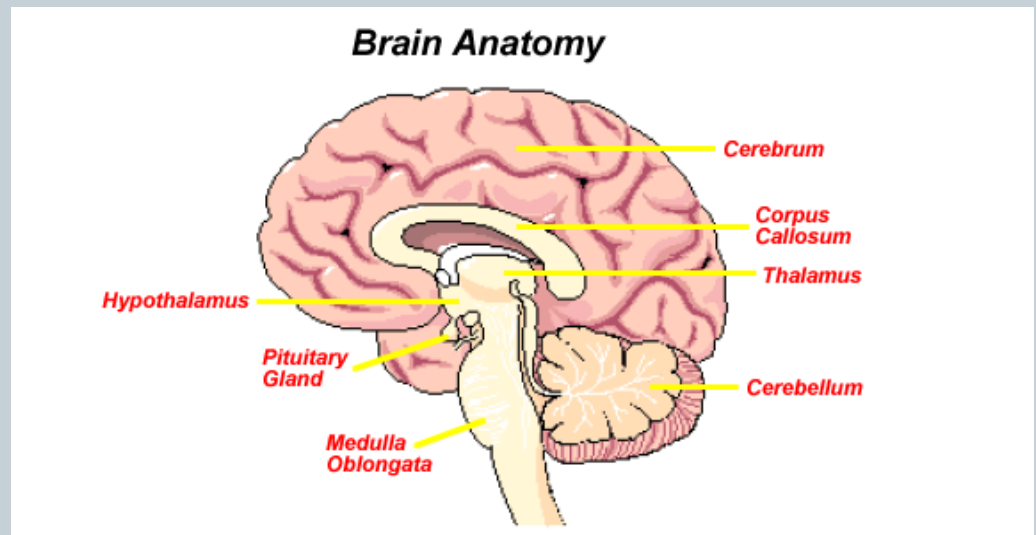
- **Medulla Oblongata:** located in the brain stem, controls involuntary actions such as heart rate and breathing.



Brain Parts & Functions

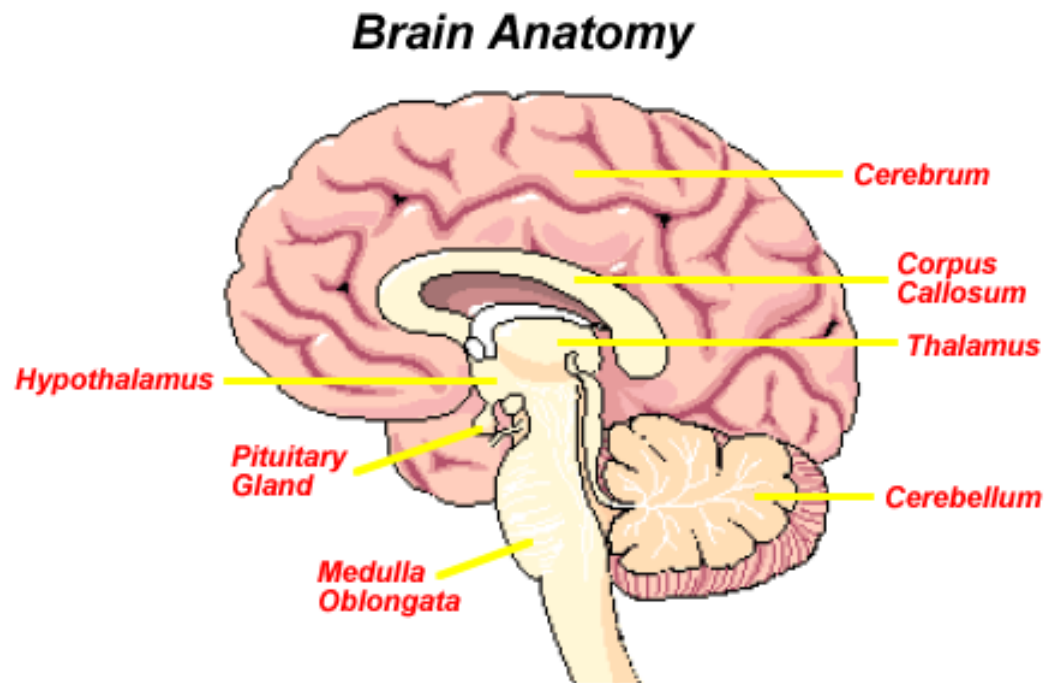


- Cerebrum: the largest portion of the brain with a left & right side, this is the central processing area.
- Responsible for memory, conscious thought, voluntary movement, intellect, artistic & creative abilities, and learning



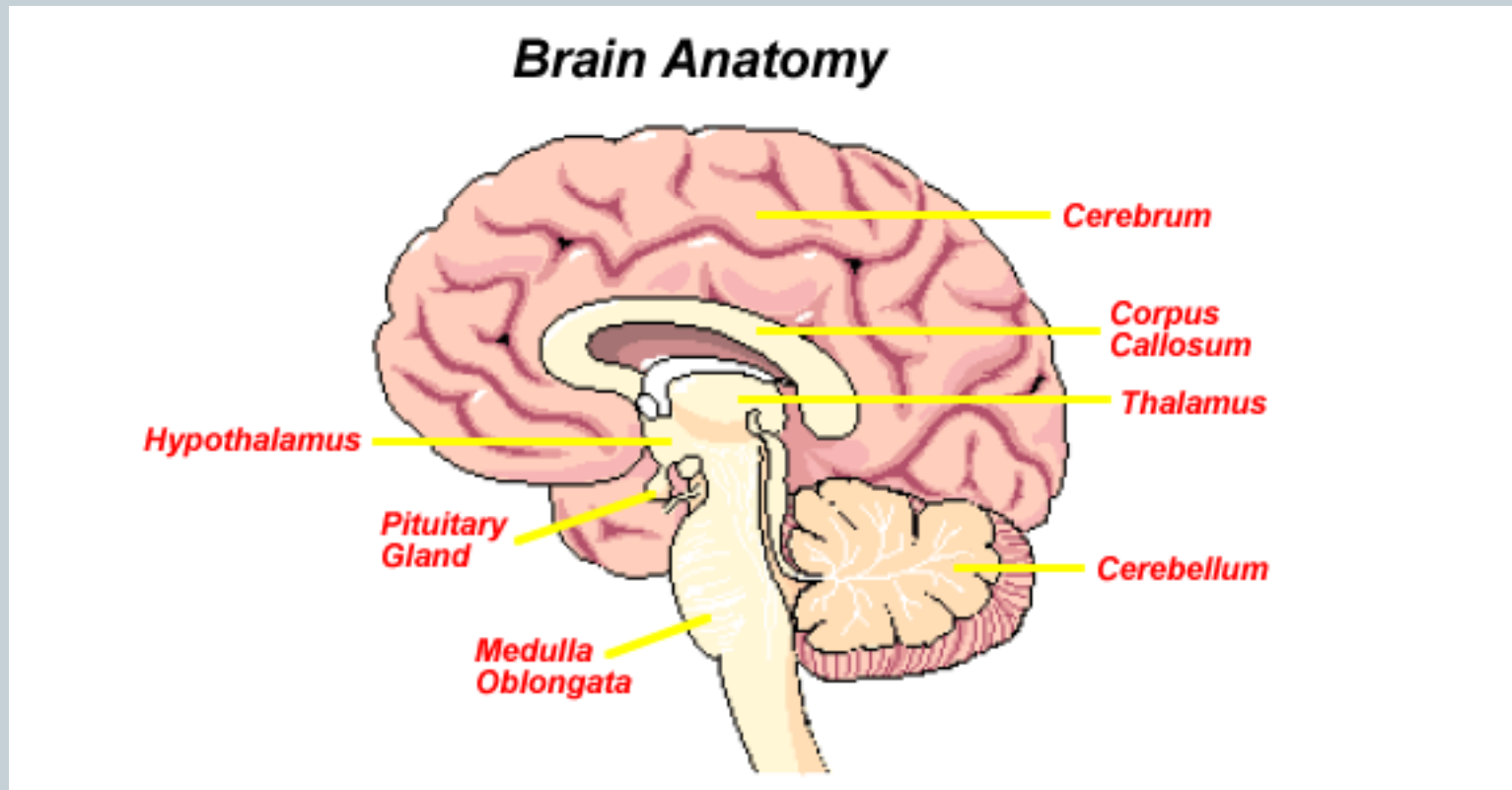
Brain Parts & Functions

- **Thalamus:** receives impulses from the spinal cord and directs them to the appropriate region of the cerebrum. (acts as a sorting centre)



Brain Parts & Functions

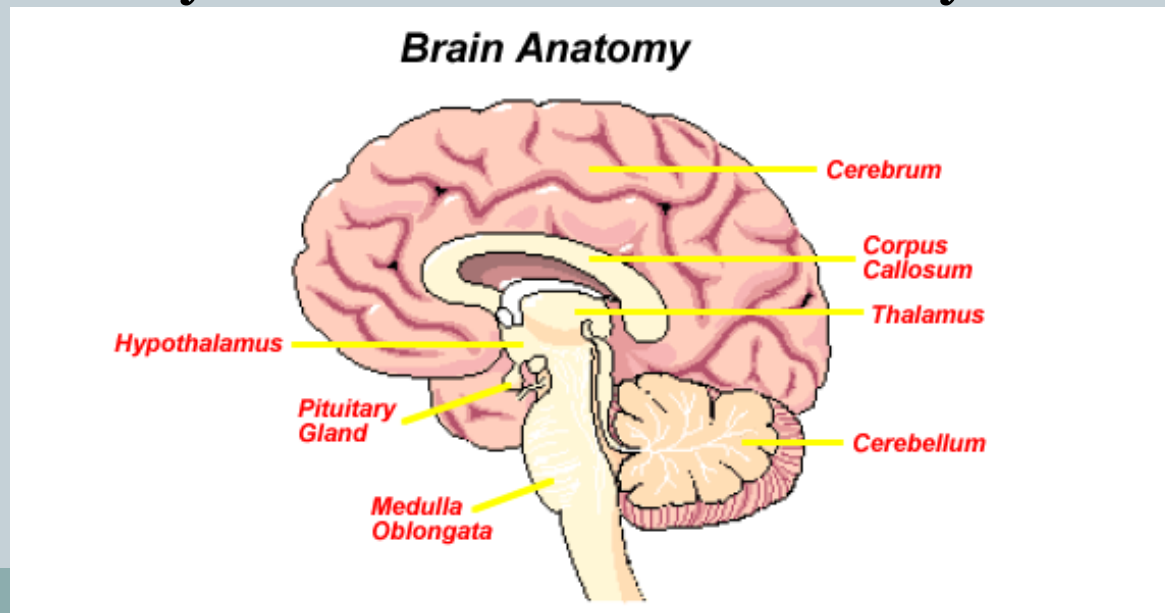
- Cerebellum: responsible for muscle coordination, balance & coordination



Brain Parts & Functions



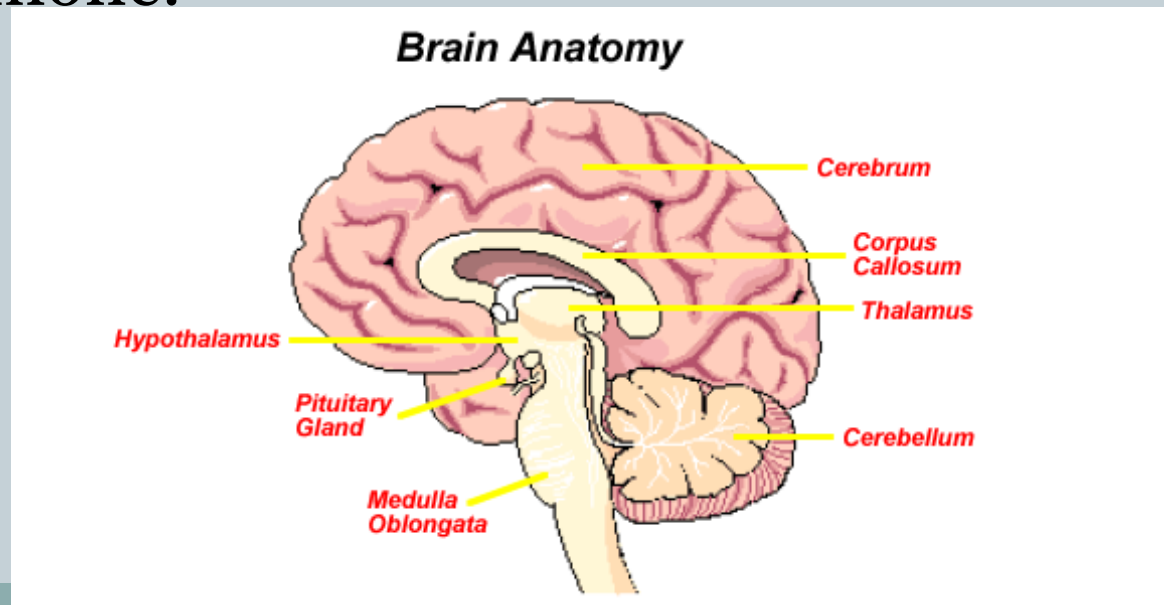
- Hypothalamus: maintains homeostasis in the body – monitors things like body temperature, hunger, sleep, thirst, water balance, and blood pressure.
- Controls the pituitary gland – acts as a link between the nervous system & the endocrine system



Brain Parts & Functions



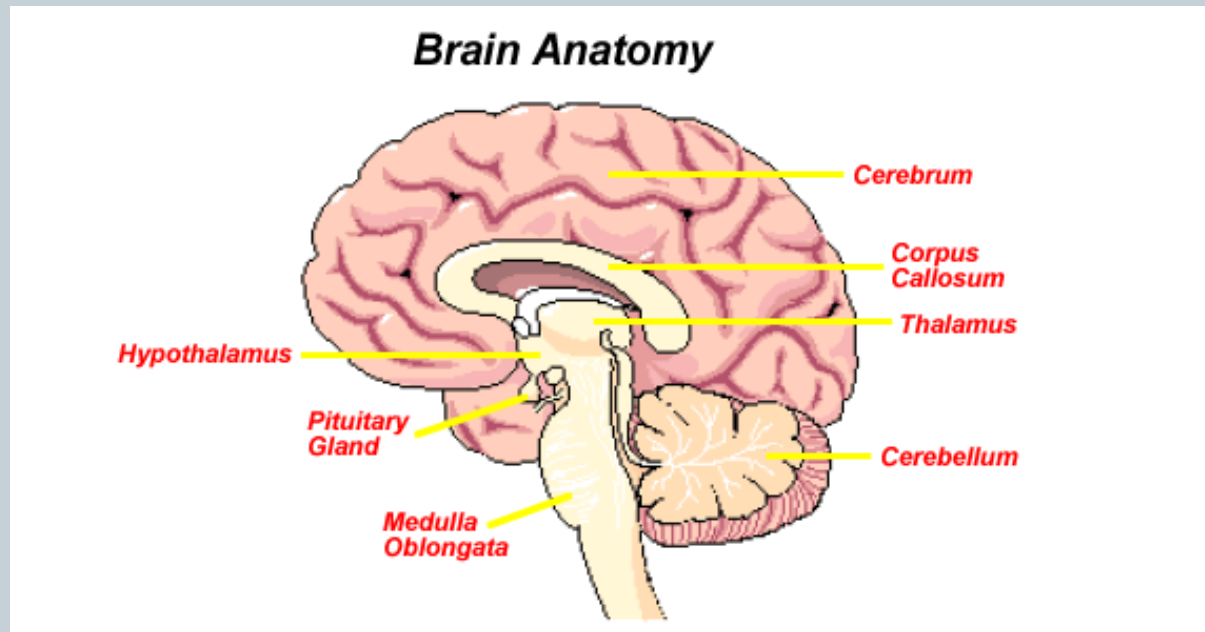
- Pituitary Gland: located just below the hypothalamus
- Works with the hypothalamus to regulate certain body responses through the release of hormones including ADH, oxytocin, FSH, LH, and thyroid stimulating hormone.



Brain Parts & Functions



- **Corpus callosum:** conducts impulses from one side of the brain to the other so that left and right brain activities are coordinated.



Brain Parts & Functions

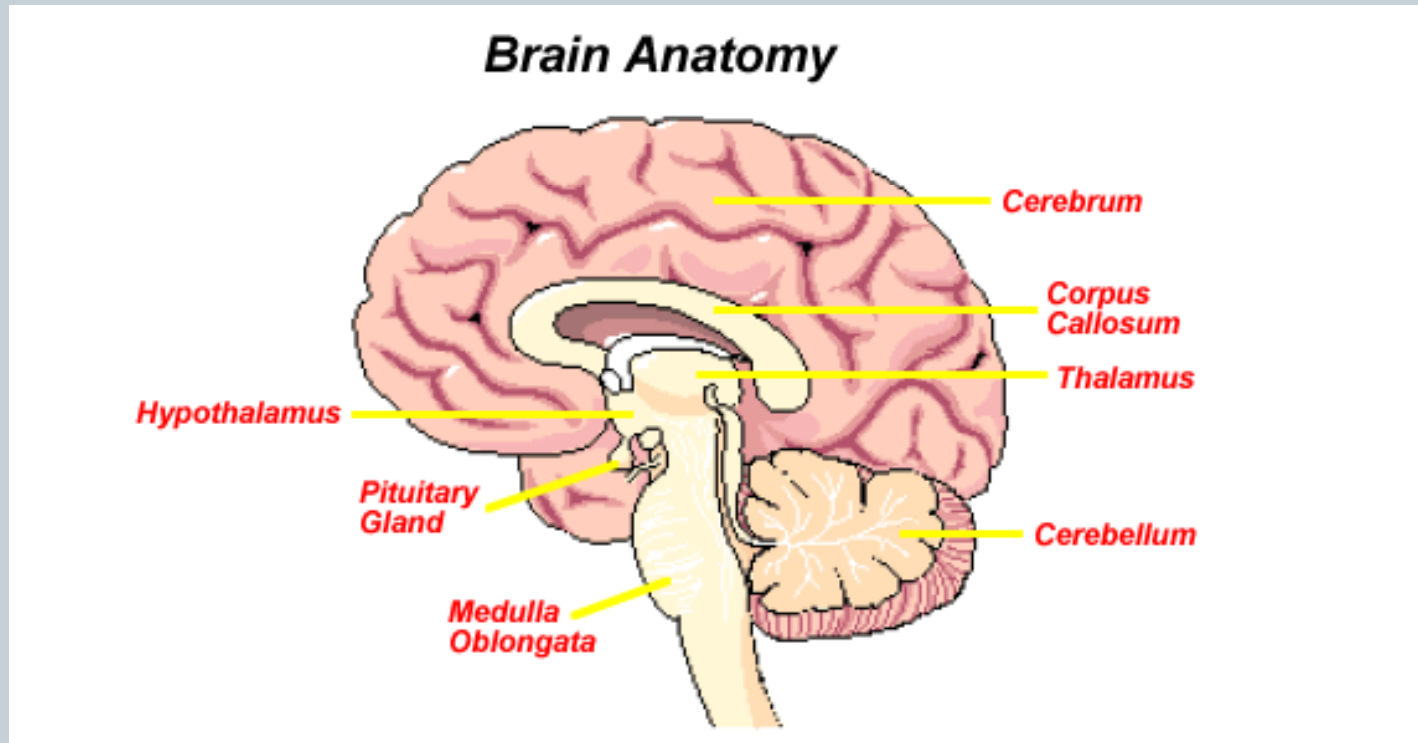


- **Meninges:** The brain & spinal cord are surrounded by 3 protective membranes called the meninges
- Meningitis is an infection of these membranes
- The spaces between the meninges are filled with cerebrospinal fluid which cushions & protects the CNS.

Neuroendocrine Control Centre



- Made up of the hypothalamus and the pituitary gland (anterior & posterior pituitary)



Hypothalamus & Posterior Pituitary

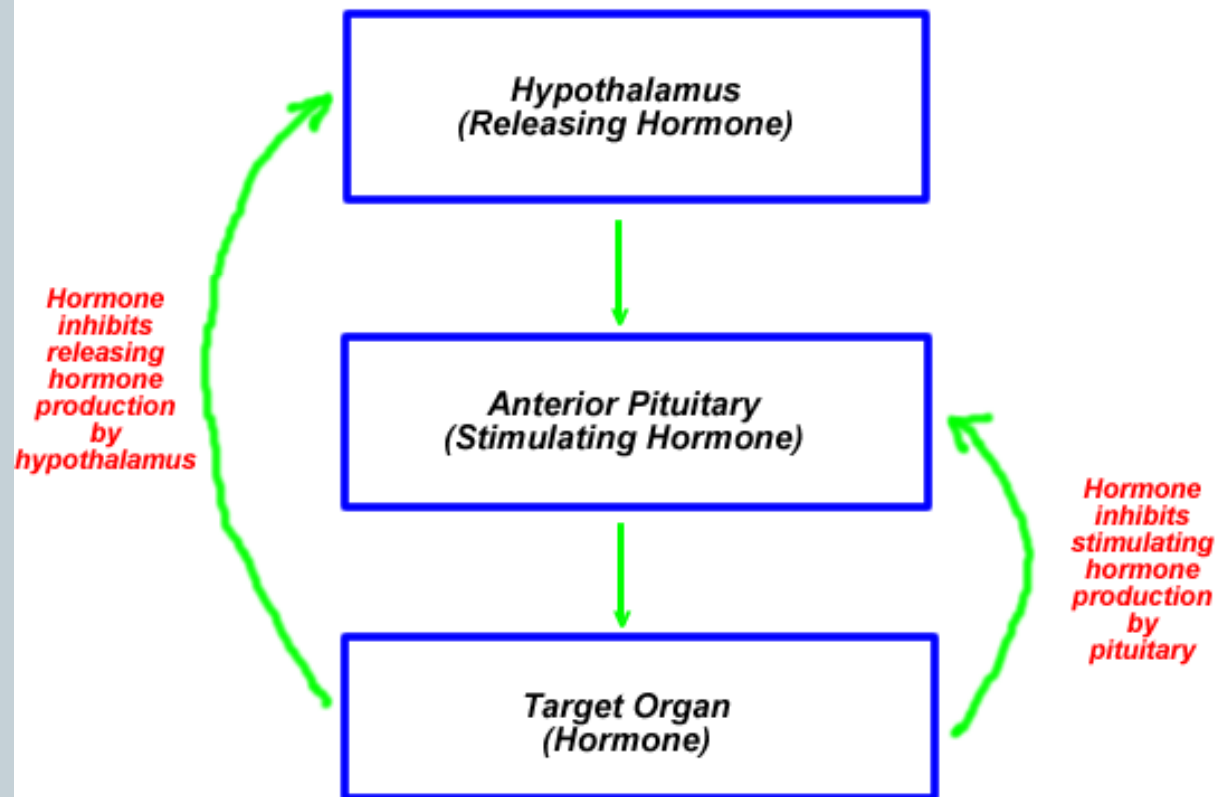


- Neurosecretory cells in the hypothalamus produce ADH & oxytocin
- ADH & oxytocin move to the posterior pituitary where they are stored until needed
- The hypothalamus monitors the blood and will stimulate the posterior pituitary to release ADH if blood is low in water or too concentrated. This works via a negative feedback mechanism
- Oxytocin release is controlled by positive feedback (childbirth & breastfeeding)

Negative Feedback



Control of Hormone Levels by feedback inhibition



Hypothalamus & Anterior Pituitary



- The anterior pituitary produces many of its own hormones
- The hypothalamus produces pituitary stimulating hormones that cause the anterior pituitary to release particular hormones that target a variety of organs in the body.
- Examples of anterior pituitary hormones include thyroid stimulating hormone (causes thyroid to produce thyroxin), growth hormones, LH, and FSH
- Release of anterior pituitary hormones is controlled by negative feedback.

Autonomic vs. Somatic Divisions of the Peripheral Nervous Systems

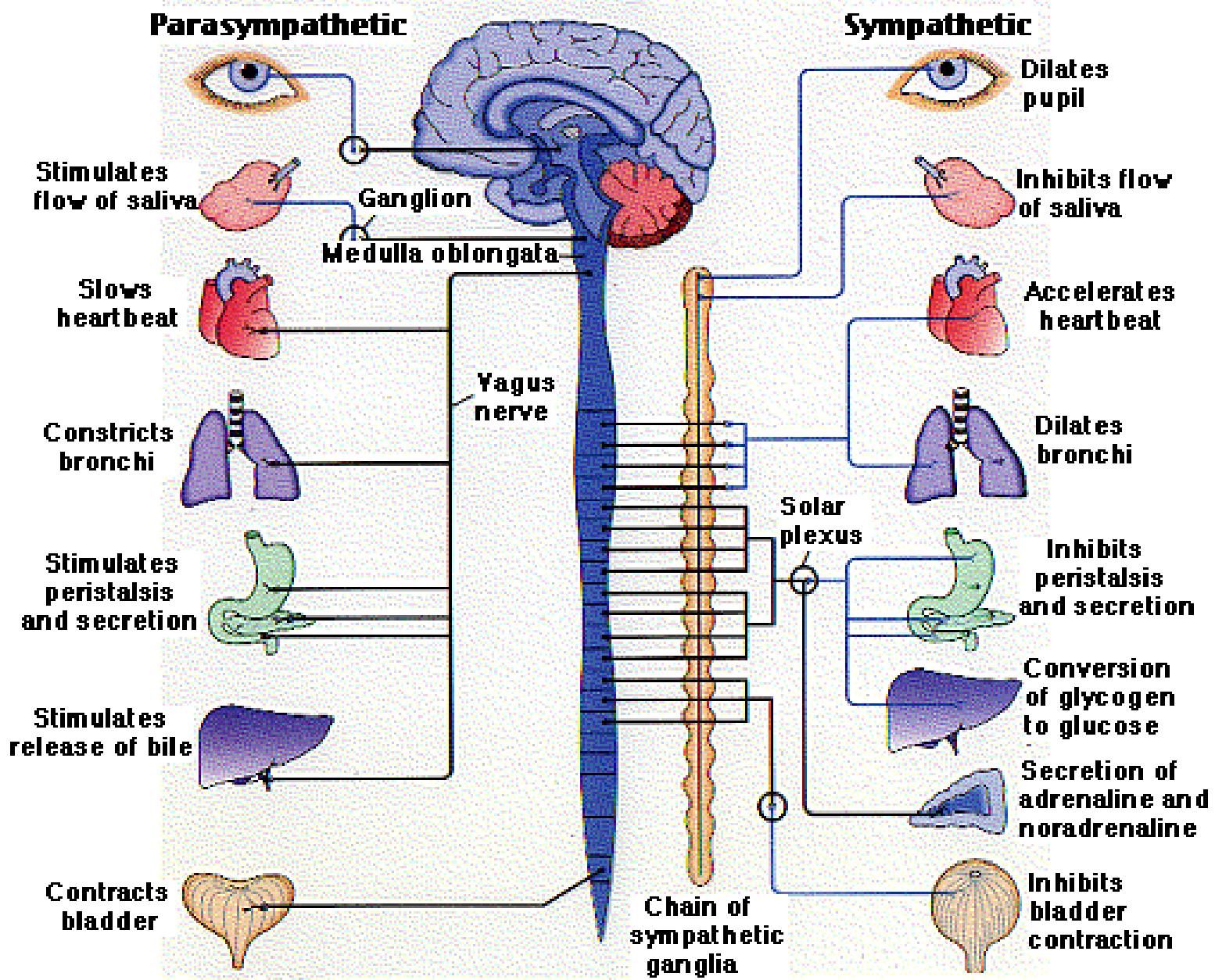


	Autonomic Nervous System	Somatic Nervous System
Functions	<ul style="list-style-type: none">• Controls involuntary responses to stimuli<ul style="list-style-type: none">• Acts to maintain homeostasis & reacts to stress• Divided into 2 sections: the sympathetic and parasympathetic divisions	<ul style="list-style-type: none">• Controls voluntary movement of skeletal muscles (walking, running, note-taking...)<ul style="list-style-type: none">• Facilitates reflex actions that involve skeletal muscles (when you touch something hot)

Sympathetic vs. Parasympathetic Divisions of the Autonomic Nervous System



	Sympathetic	Parasympathetic
Heart Rate	Increased	Decreased
Breathing Rate	<ul style="list-style-type: none">• Widens air passages• Increased	Decreased
Pupil Size	Increased	Decreased
Digestion	Decreased Activity	Increased Activity
Neurotransmitters	Noradrenalin	Acetylcholine
Overall Response	“fight or flight”	Relaxed state



“Fight or Flight” Response



- Release of noradrenalin from sympathetic neurons causes the release of adrenalin from the medulla of the adrenal glands
- Noradrenalin + adrenalin initiates the “fight or flight” response to prepare the body to respond to perceived danger

5 Steps of “fight or flight”



- 1. Increased heart rate so more blood is supplied to the body quickly
- 2. Altering blood flow patterns – reduced flow to surface tissues & digestive system and increased flow to skeletal muscles
- 3. Widening of air passages – increased air exchange
- 4. Contraction of skeletal & other muscles tenses the body up for action
- 5. Contraction of irises to widen pupils – maximize visual alertness