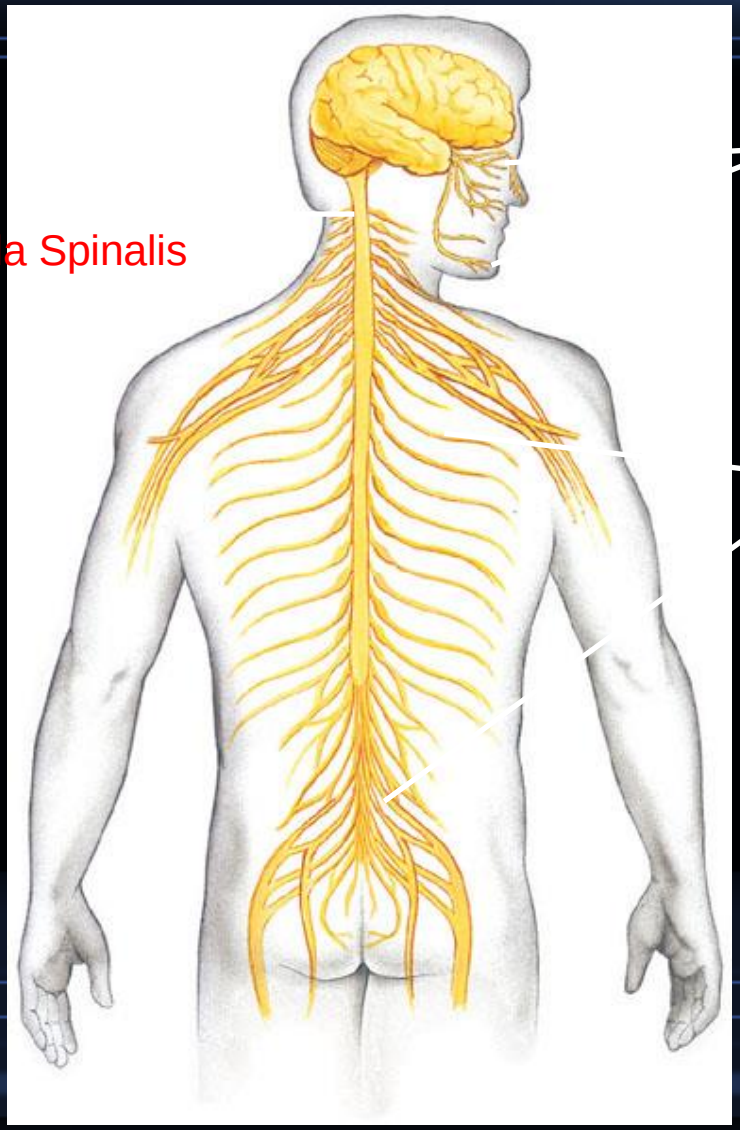
Sistem Limbik

Emosi dan Perilaku

Sistem Limbik

Susunan Sistem Saraf Pada Manusia

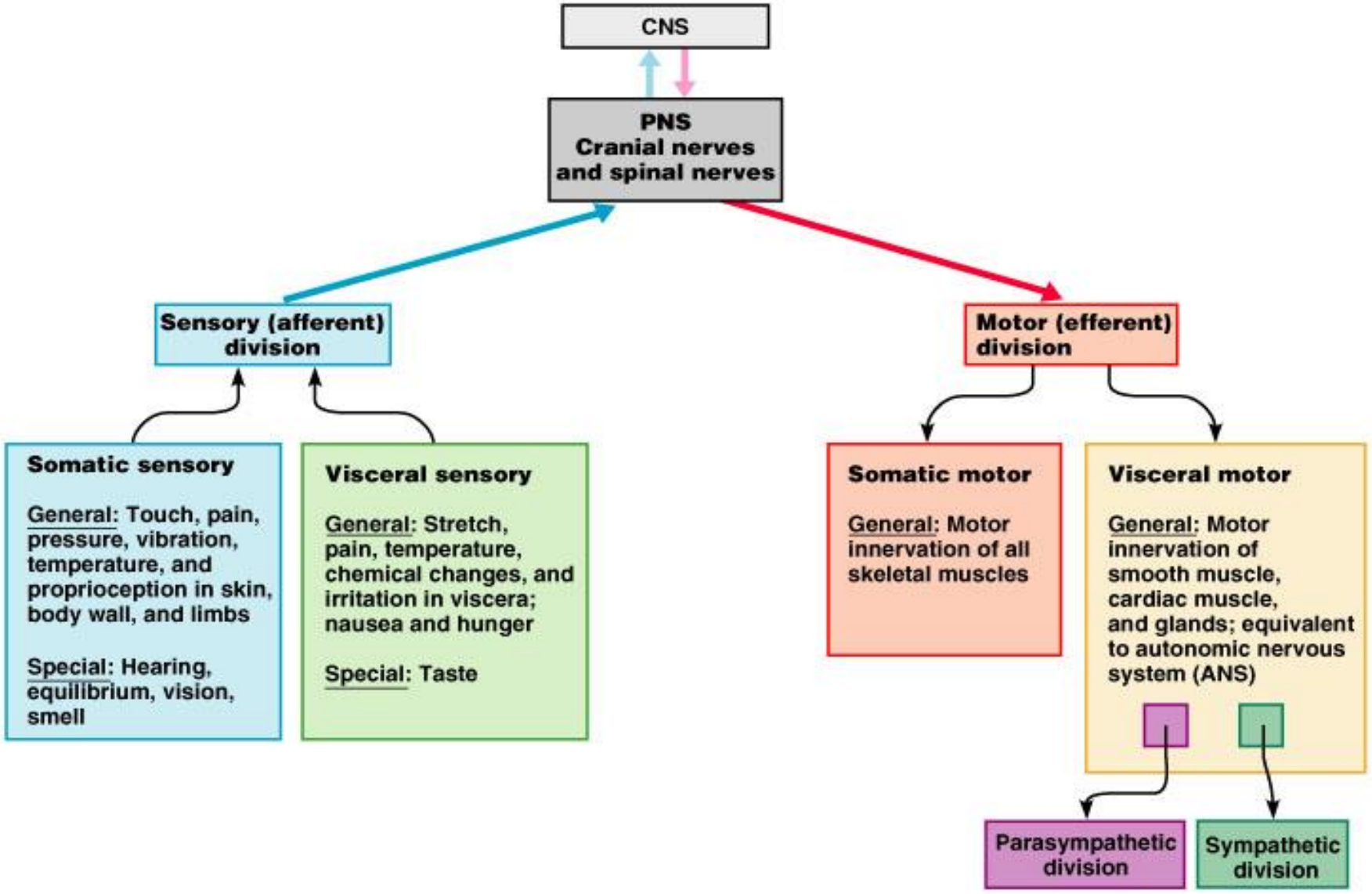
Sistem Syaraf Pusat (SSP)
- Otak
- Medula Spinalis



Sistem Saraf Tepi (SST)
- Saraf Kranial
- Saraf Spinal

Susunan Sistem Saraf pada Manusia, terdiri atas 2 kelompok yaitu SSP dan SST

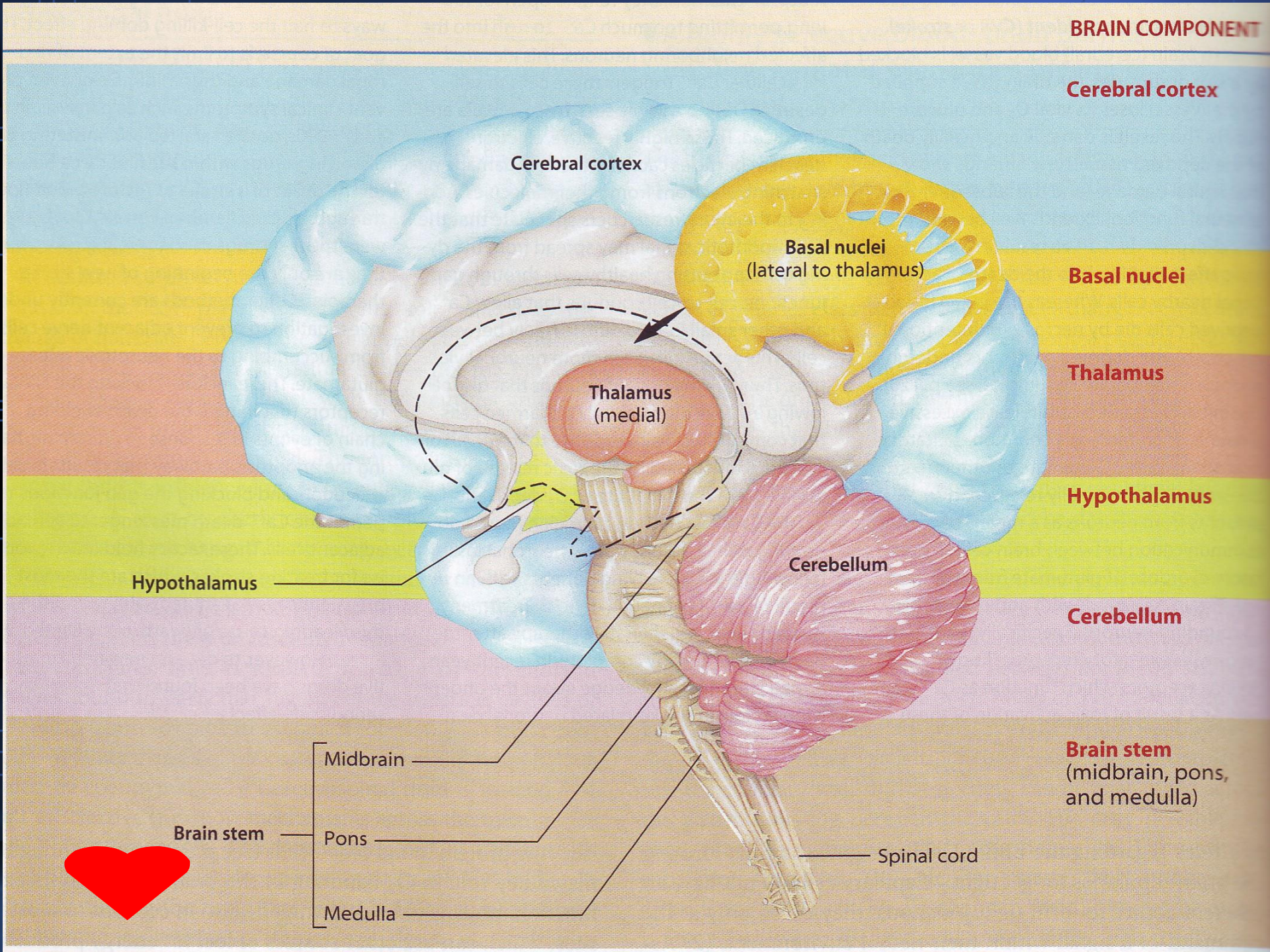
Functional Organization of



Struktur otak

Otak Kiri → berkaitan dengan fungsi akademis : berhitung (matematika), logika, membaca, menulis, menganalisa, mengembangkan kemampuan daya ingat

Otak kanan → berkaitan dengan kreativitas : seni dan olah raga


BRAIN COMPONENT
Cerebral cortex
Basal nuclei
Thalamus
Hypothalamus
Cerebellum
Brain stem
(midbrain, pons, and medulla)
Cerebral cortex
Basal nuclei
(lateral to thalamus)
Thalamus
(medial)
Hypothalamus
Cerebellum
Brain stem
Midbrain
Pons
Medulla
Spinal cord

MAJOR FUNCTIONS

Kortex

1. Sensory perception
2. Voluntary control of movement
3. Language
4. Personality traits
5. Sophisticated mental events, such as thinking, memory, decision making, creativity, and self-consciousness

Nukleus Basalis

1. Inhibition of muscle tone
2. Coordination of slow, sustained movements
3. Suppression of useless patterns of movement

Talamus

1. Relay station for all synaptic input
2. Crude awareness of sensation
3. Some degree of consciousness
4. Role in motor control

Hipotalamus

1. Regulation of many homeostatic functions, such as temperature control, thirst, urine output, and food intake
2. Important link between nervous and endocrine systems
3. Extensive involvement with emotion and basic behavioral patterns

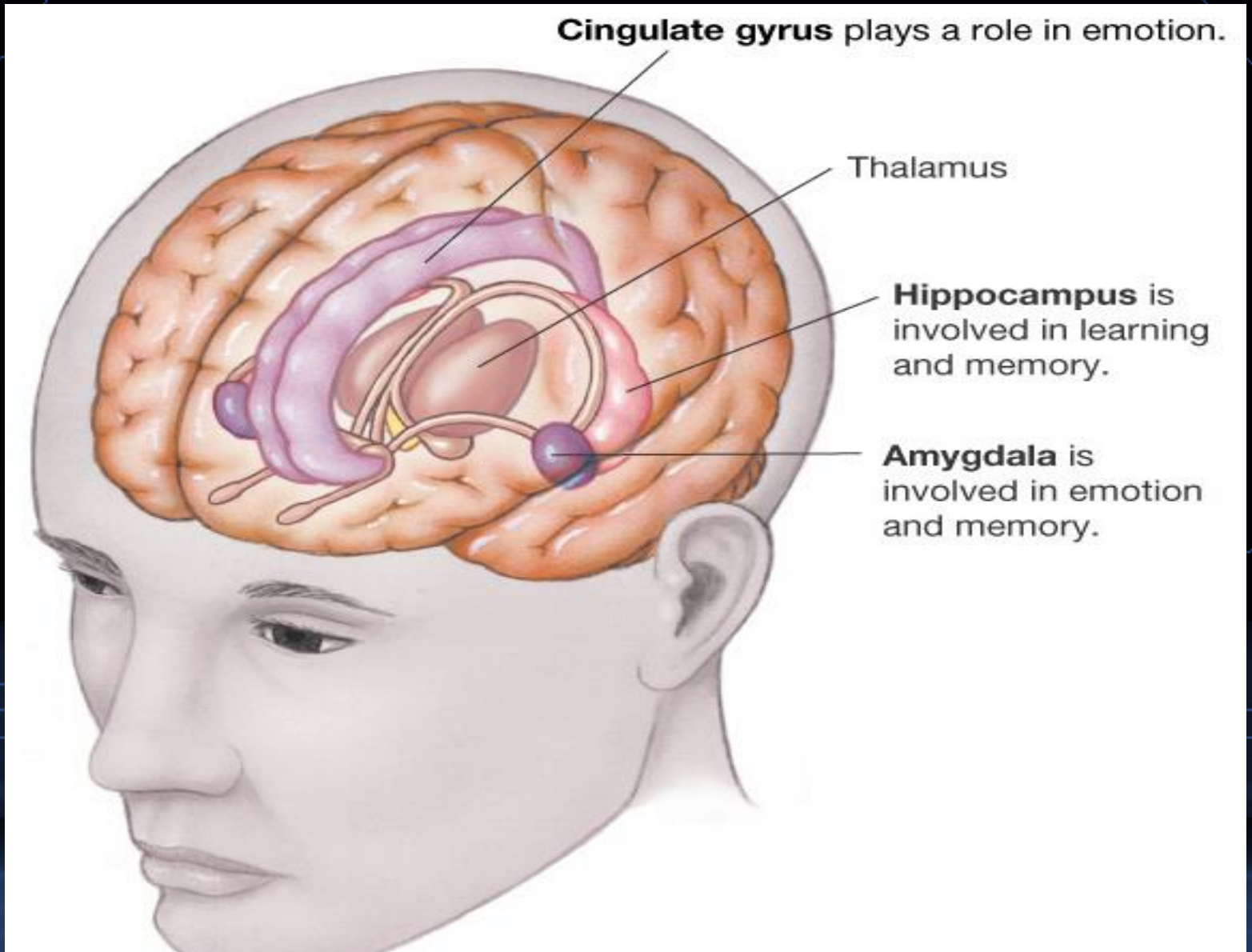
Serebelum

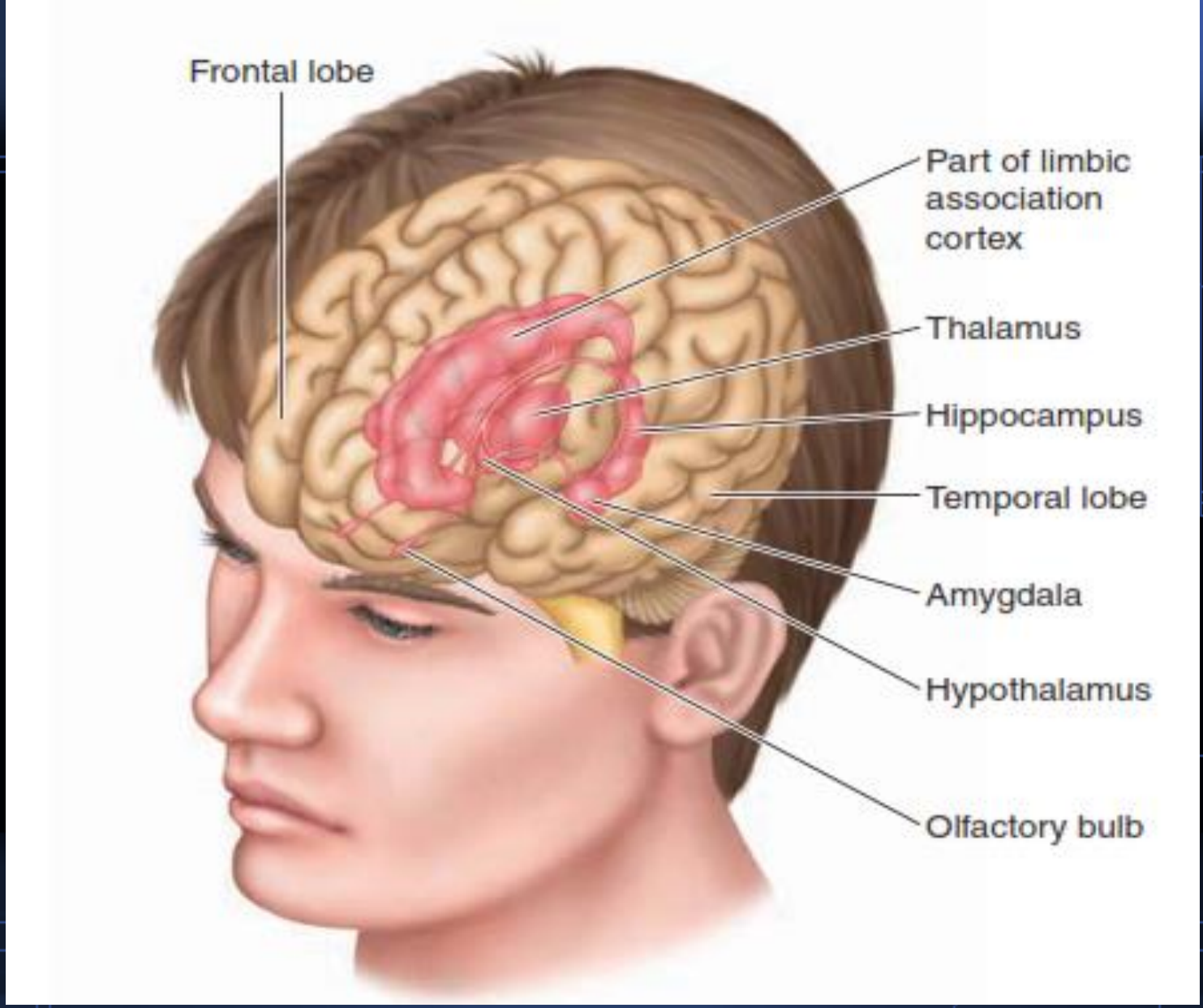
1. Maintenance of balance
2. Enhancement of muscle tone
3. Coordination and planning of skilled voluntary muscle activity

Batang Otak

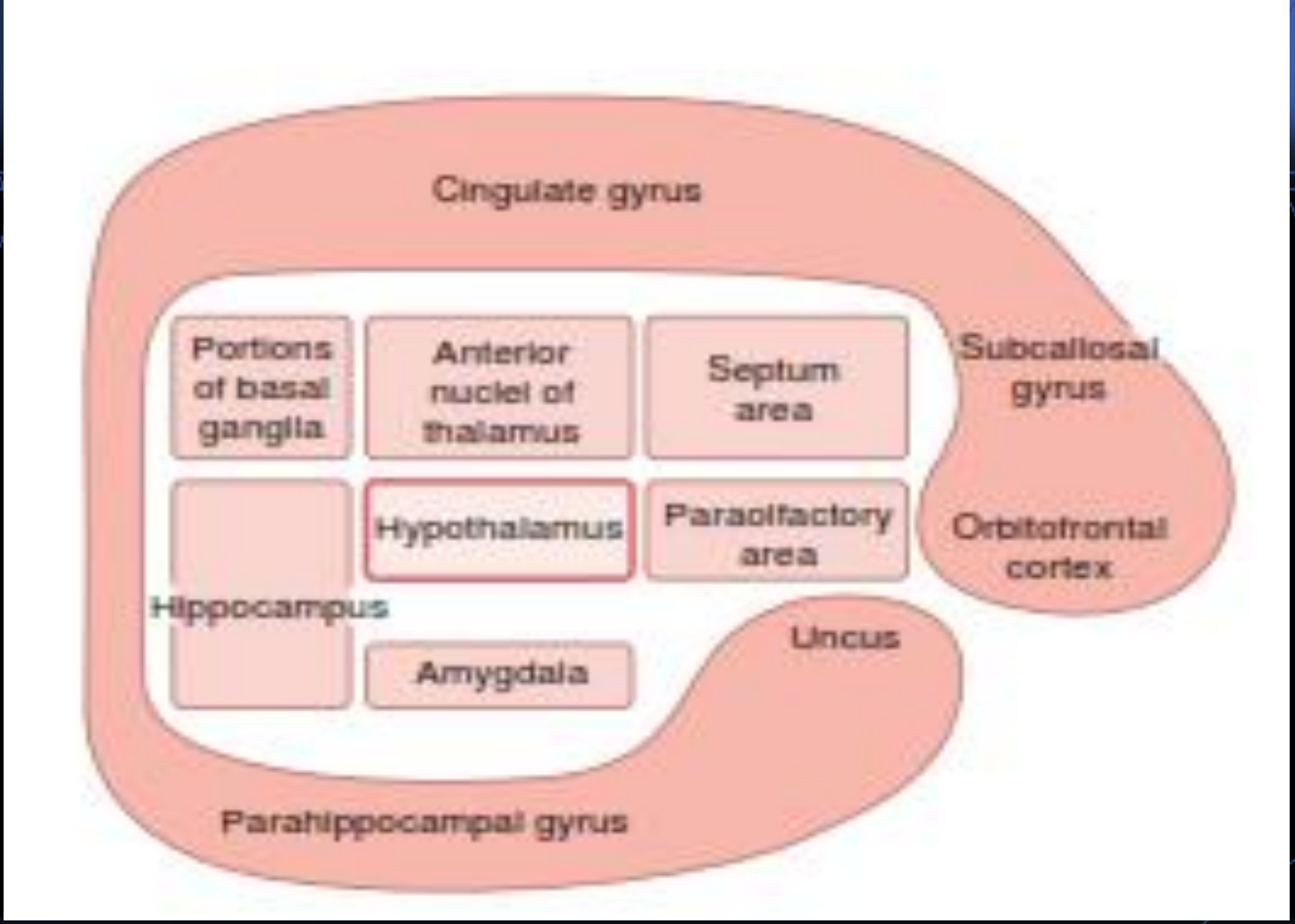
1. Origin of majority of peripheral cranial nerves
2. Cardiovascular, respiratory, and digestive control centers
3. Regulation of muscle reflexes involved with equilibrium and posture
4. Reception and integration of all synaptic input from spinal cord; arousal and activation of cerebral cortex
5. Role in sleep–wake cycle

Sistem Limbik



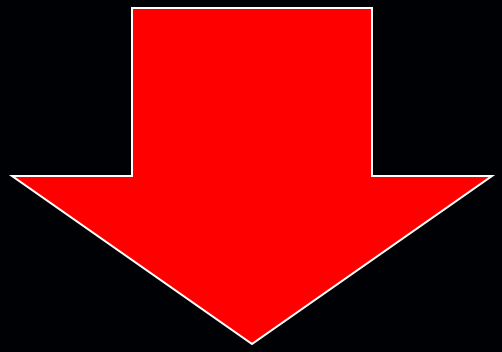


Sistem Limbik



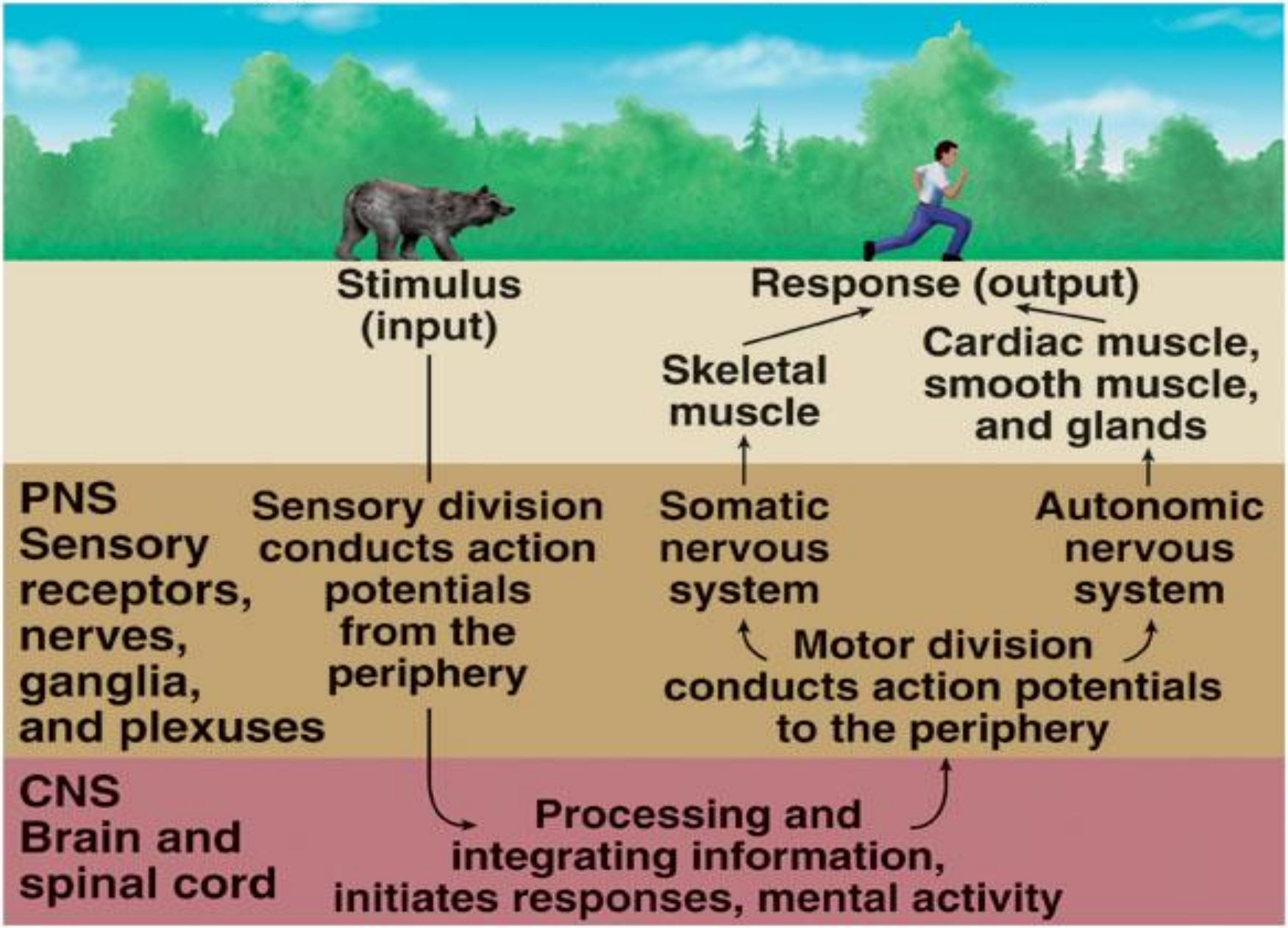
Limbic system, showing the key position of the hypothalamus.

Sistem Limbik dan Korteks yang lebih tinggi



Mengontrol Perilaku Dasar

Nervous System Organization



Complex Pathways of Emotion and Motivation

- Hypothalamus, limbic & cortex integration
- Emotions: pleasure, sexual arousal, anger & fear
- Motivation: "drives", impulse that arises to person consciously or not to perform an action with a specific goals
- Moods:
  - Long term emotional states
  - Depression

Complex Pathways of Emotion and Motivation

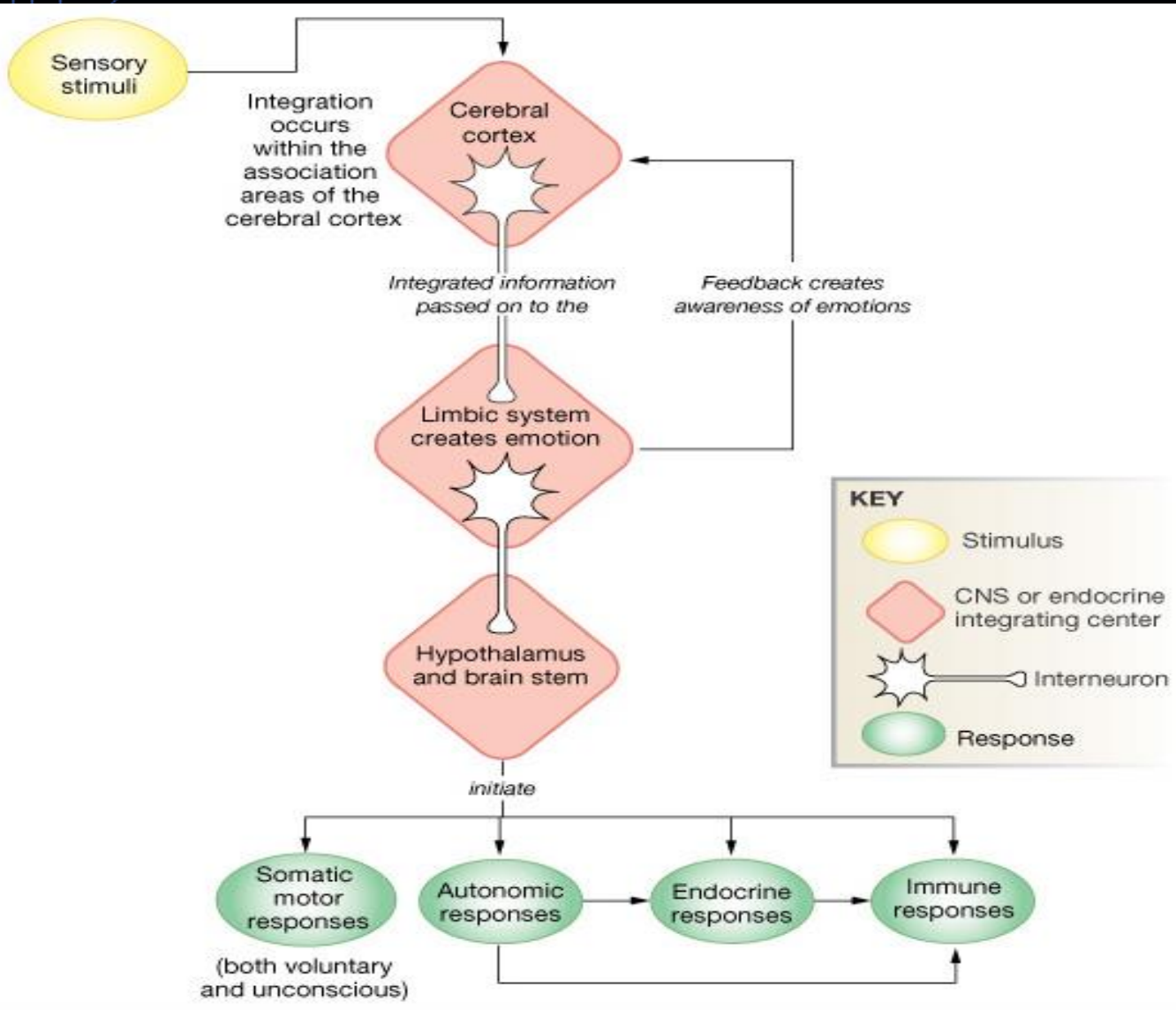
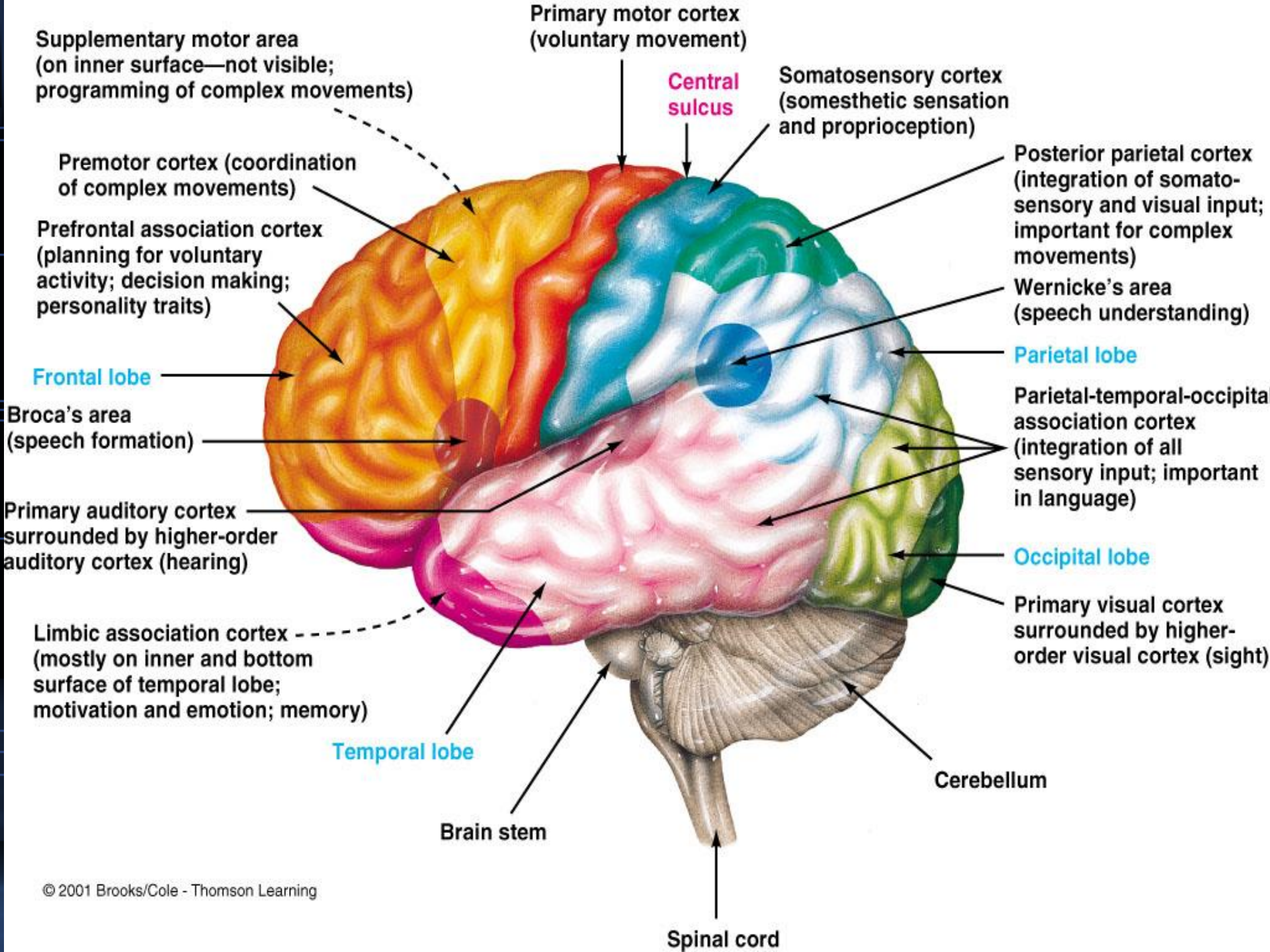


Figure 9-21: The link between emotions and physiological functions



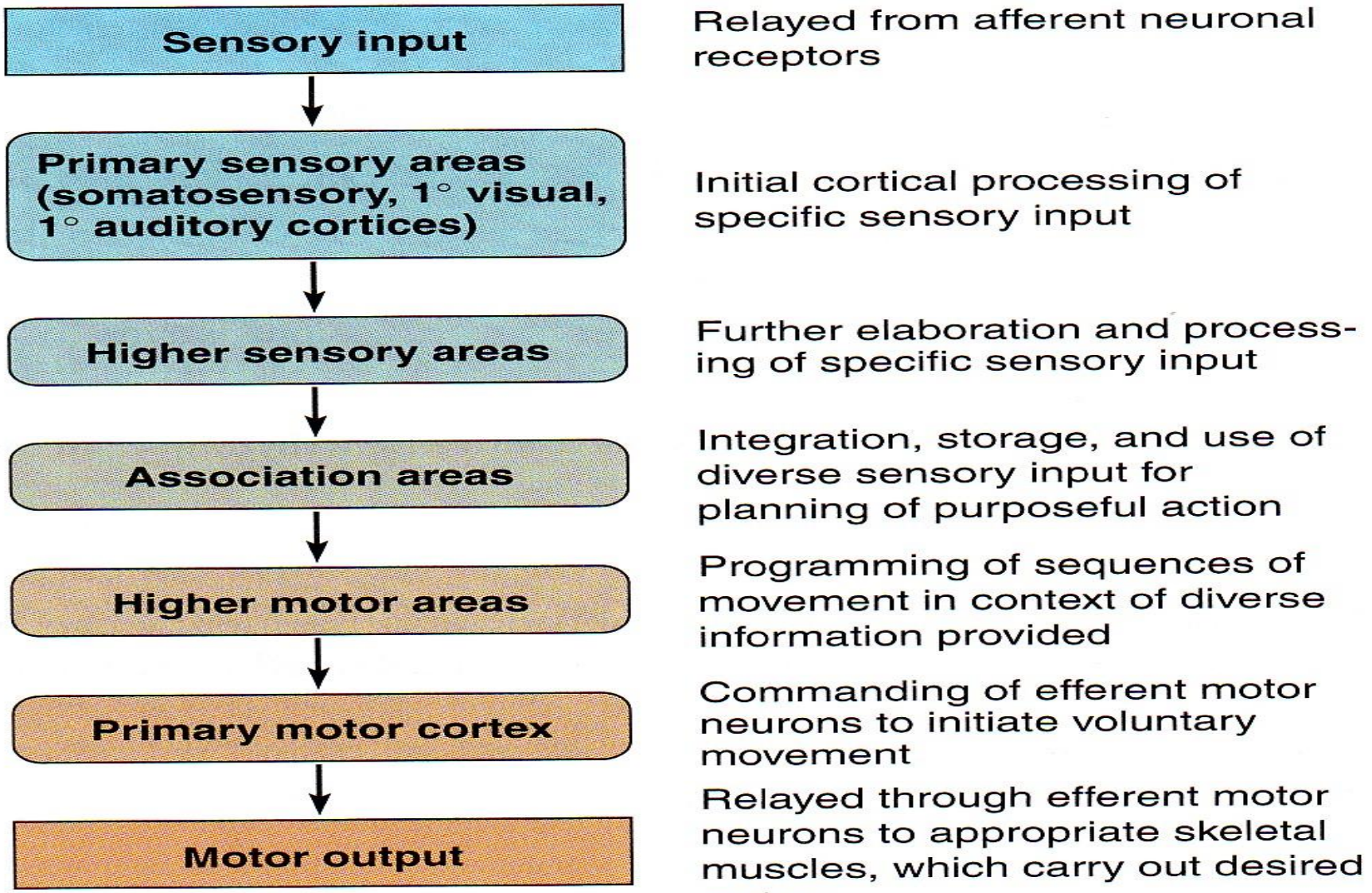


FIGURE 5-13

Schematic linking of various regions of the cortex

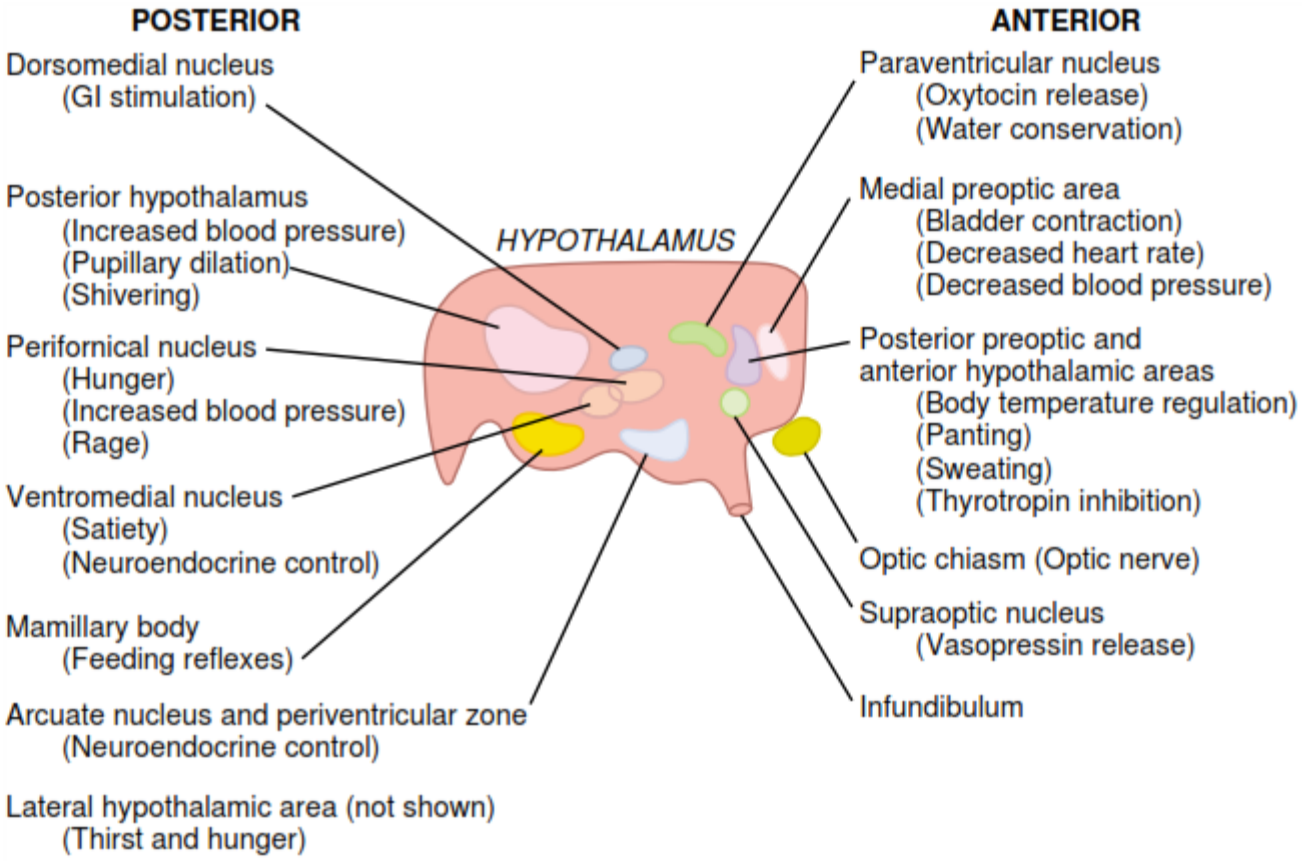


Figure 58–6

Control centers of the hypothalamus (sagittal view).

Reward Centers

lateral and ventromedial nuclei of the hypothalamus.

Punishment Centers

the central gray area surrounding the aqueduct of Sylvius in the mesencephalon and extending upwardinto the periventricular zones of the hypothalamus and thalamus.

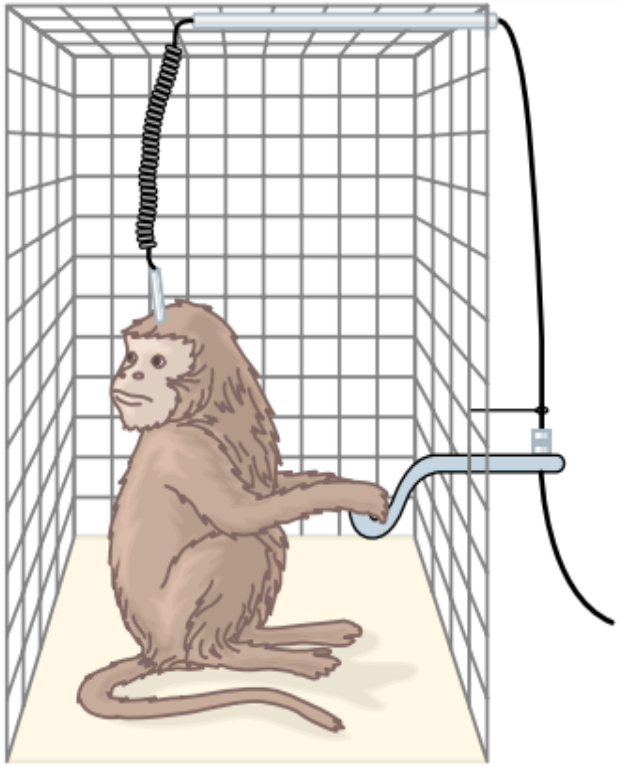
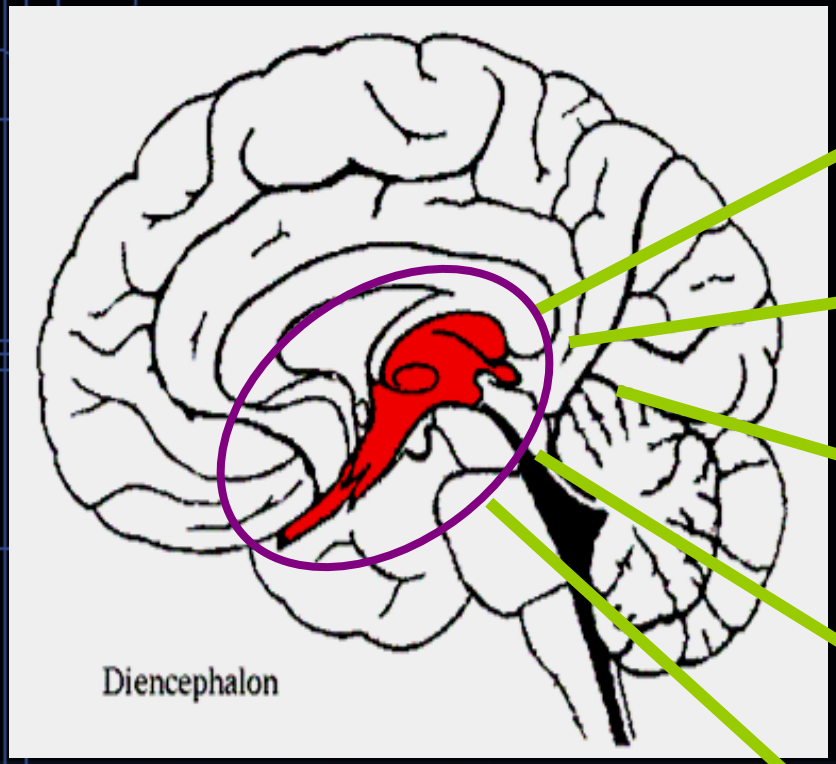


Figure 58–8

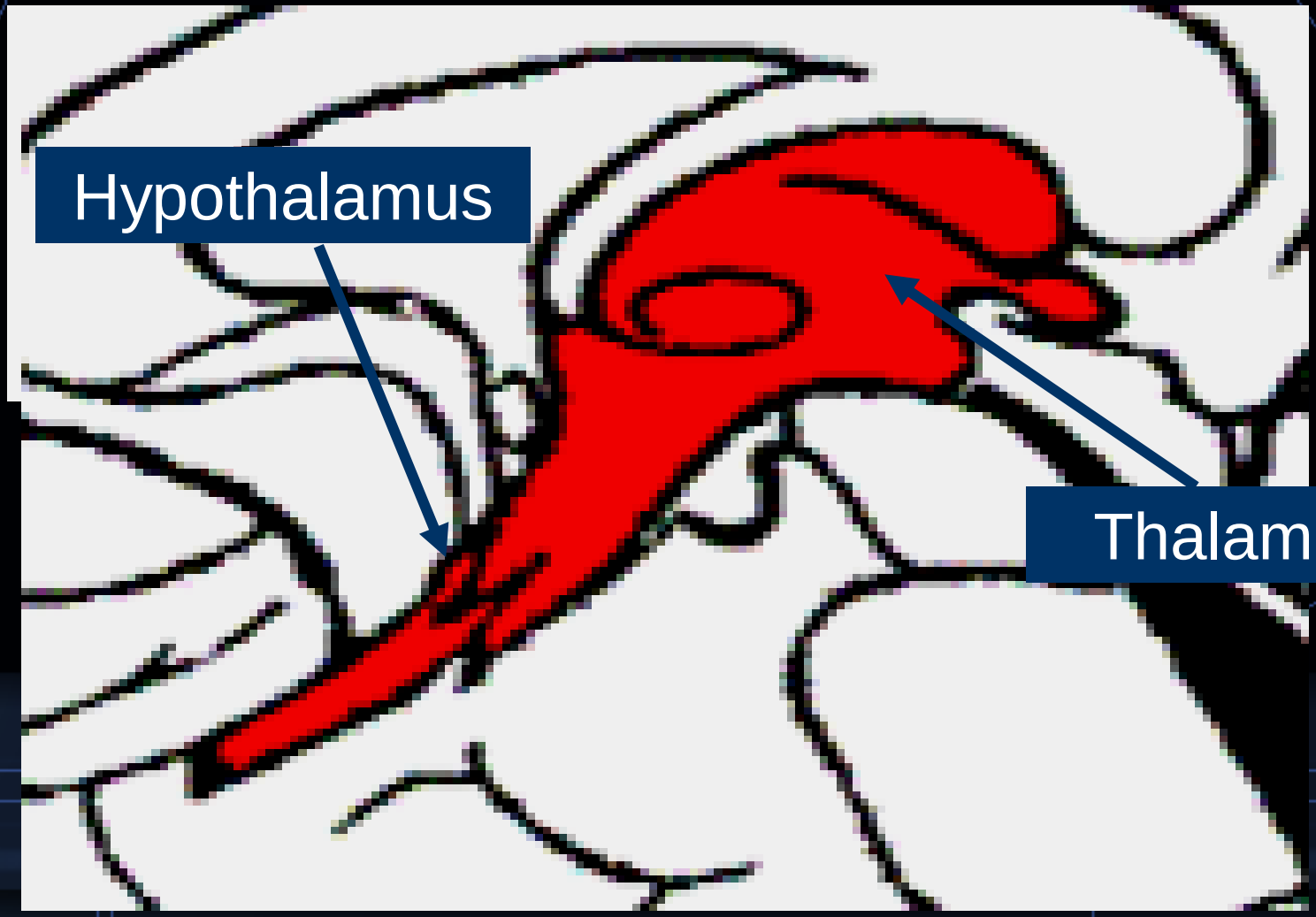
Technique for localizing reward and punishment centers in the brain of a monkey.

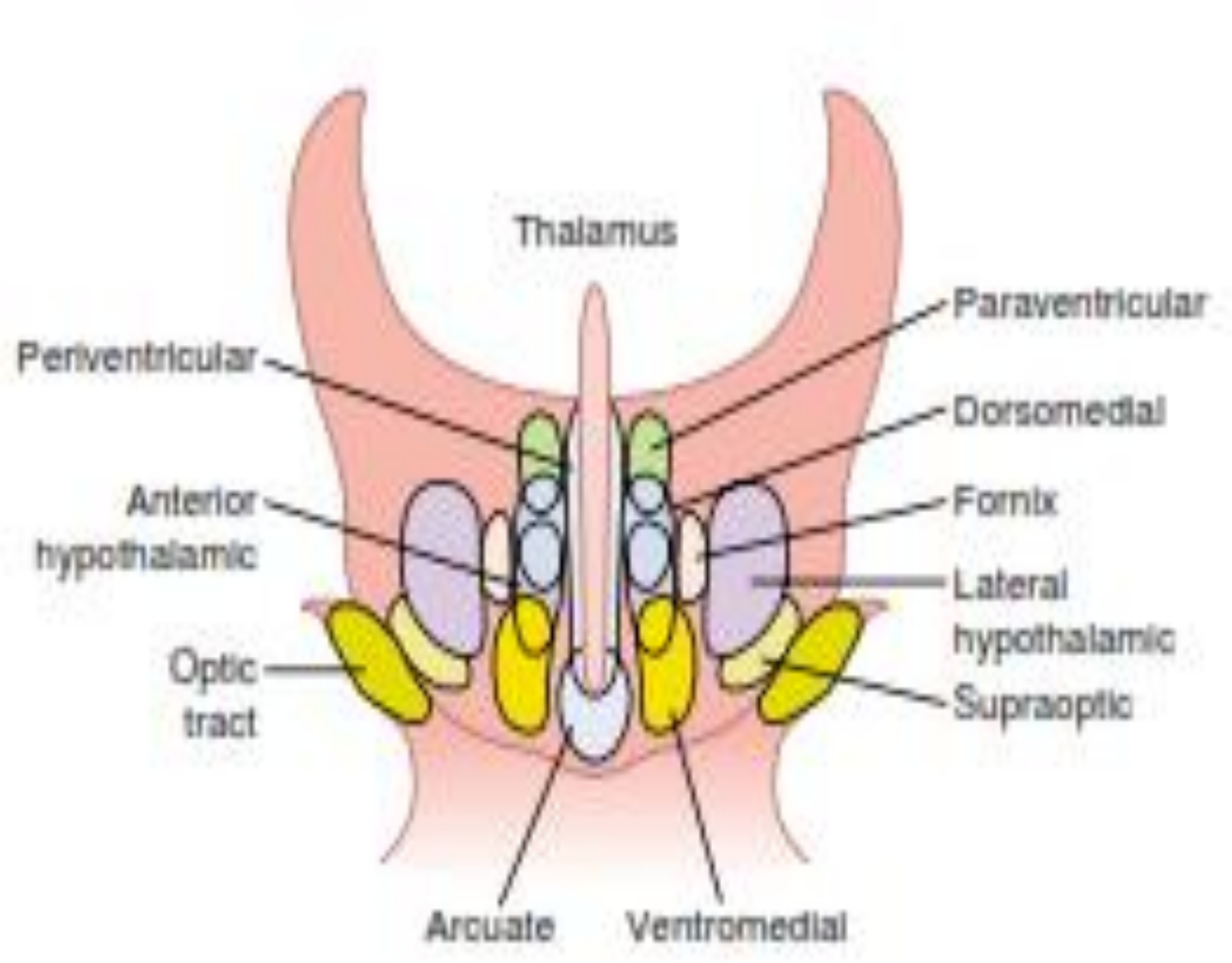
DIENCEPHALON



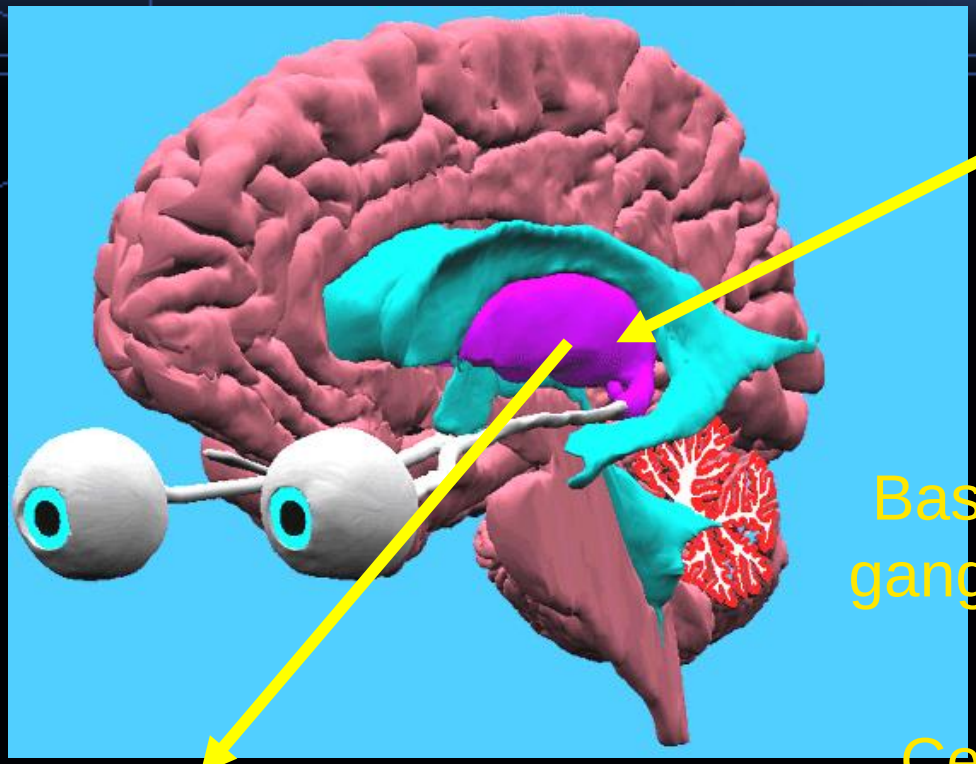
- Epithalamus
- Thalamus
- Hypothalamus
- Subthalamus
- Metathalamus

Thalamus & Hypothalamus




Thalamus
Periventricular
Paraventricular
Dorsomedial
Anterior
hypothalamic
Fornix
Lateral
hypothalamic
Optic
tract
Supraoptic
Arcuate
Ventromedial

Thalamus



Function : main relay centers between cortex and lower structures

Basal ganglia

Spinal cord

Cerebellum

Brain S

3 Classes :

Specific sensory relay nuclei

Relay for information from sensory systems (except olfactory system)

Nonspecific

Interconnects frontal cortices with cerebellum and basal ganglia

Interconnects cortical association region with limbic system

Thalamus nuclei

- Example – Output of somatosensory information from ventral posterior lateral nucleus

1. Local processing – in nucleus
2. Modulation – by brain stem inputs (noradregenic & serotonine monoamines)
3. Inhibitory feedback – from reticular nucleus (gatekeeping)
4. Excitatory feedback – from cortex

Thalamus nuclei

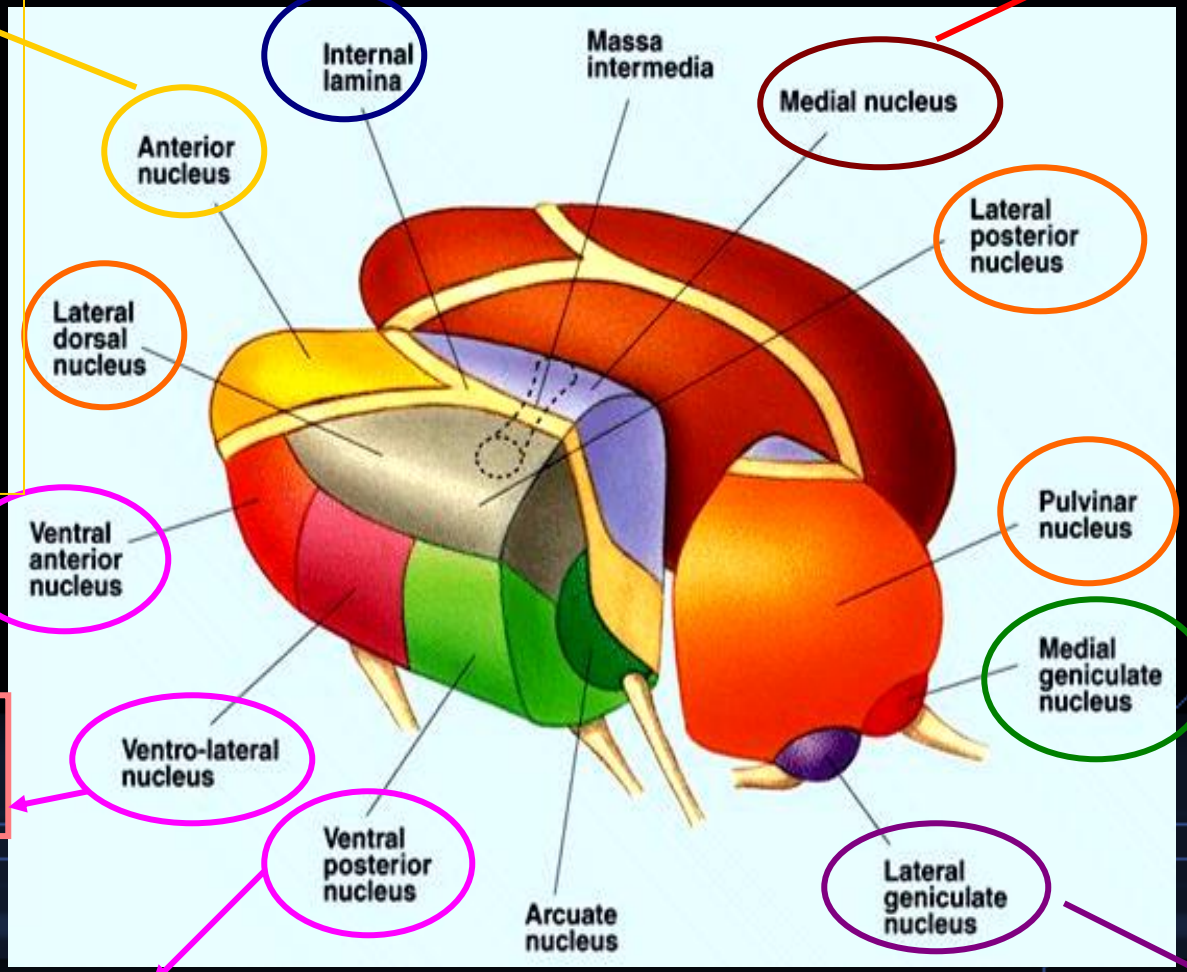
Cortical electric activity

Thalamic ‘pacemaker’

Wakefulness

- Regulates visceral function
- Associated with emotional status & recent memory
- Interconnects with frontal cortices

- Integrates somatic & visceral function
- Control affective behaviour
- Involved in memory



- Involved in motor control

Auditory relay nucleus

- Involved in sensory (ascending pathway)

Visual relay nucleus

Thalamus nuclei – interlaminar nuclei

- Input - ascending afferent from brain stem
- Output - cerebral cortex & basal ganglia
- Responsible for activation of cerebral cortex
- Simulation causes desynchronization of EEG and disruption of alpha rhythm (associated with sleep)
- Lesion – results in the reduction in level of consciousness n in the perception of pain

Thalamus nuclei – Reticular nucleus

- Utilize inhibitory neurotransmitters (GABA), others use excitatory neurotransmitters
- Axons terminate on the other nuclei of thalamus, others interconnects with neocortex
- Function – modulates activity in other thalamic nuclei based on its monitoring of the entirety of thalamocortical information

Types of nuclei

Relay (specific) nuclei

- **Anterior nucleus group**
- **Posterior nucleus group**
- **Medial nucleus group**
- **Lateral nucleus group**

Nonspecific nuclei

- **On midline of thalamus (paraventricular, parataenial & reuniens)**
- **In internal medullary laminar (centromedian nucleus) – projects to limbic structure**

Hypothalamus and Limbic System: Homeostasis

- A major function of the nervous system is to maintain homeostasis, or the stability of the internal environment.
- The hypothalamus, which comprises less than 1% of the total volume of the brain, is intimately connected to a number of structures within the limbic system and brainstem.
- Together the hypothalamus and the limbic system exert control on the endocrine system the autonomic nervous system to maintain homeostasis.

Hypothalamus and Limbic System: Emotion and Motivated Behavior

- Emotions and motivated behavior are crucial for survival:
  - Emotional responses modulate the autonomic nervous system to respond to threatening stimuli or situations.
  - Emotional responses are adaptive. If you are prepared to deal with threatening stimuli, you are more likely to survive and reproduce.
  - Motivated behavior underlies feeding, sexual and other behaviors integral to promoting survival and reproduction.
  - The hypothalamus and limbic system mediate these behaviors.

Hypothalamus and Limbic System: Clinical Context

- A large number of clinical conditions have symptoms that arise from hypothalamic and/or limbic system brain circuits.
- For example, you will encounter patients who have one or more of the following:

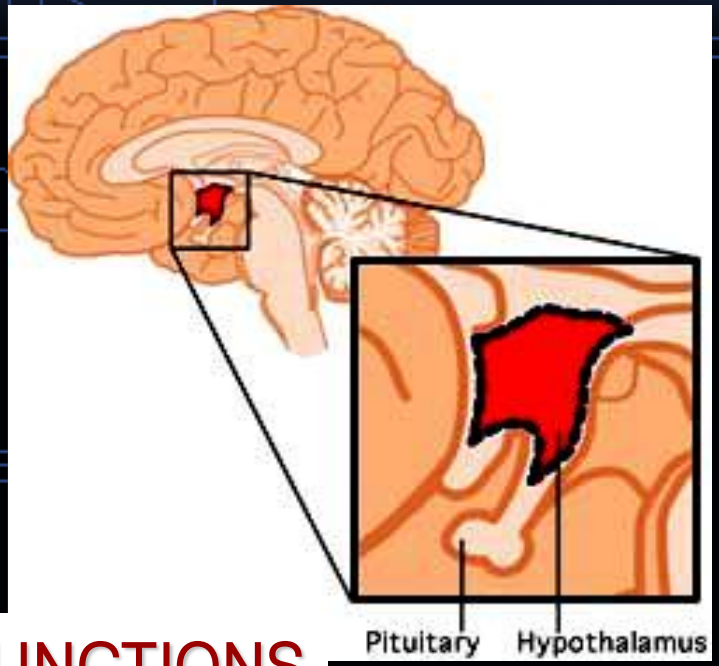
Hypothalamus and Limbic System: Clinical Context (cont.)

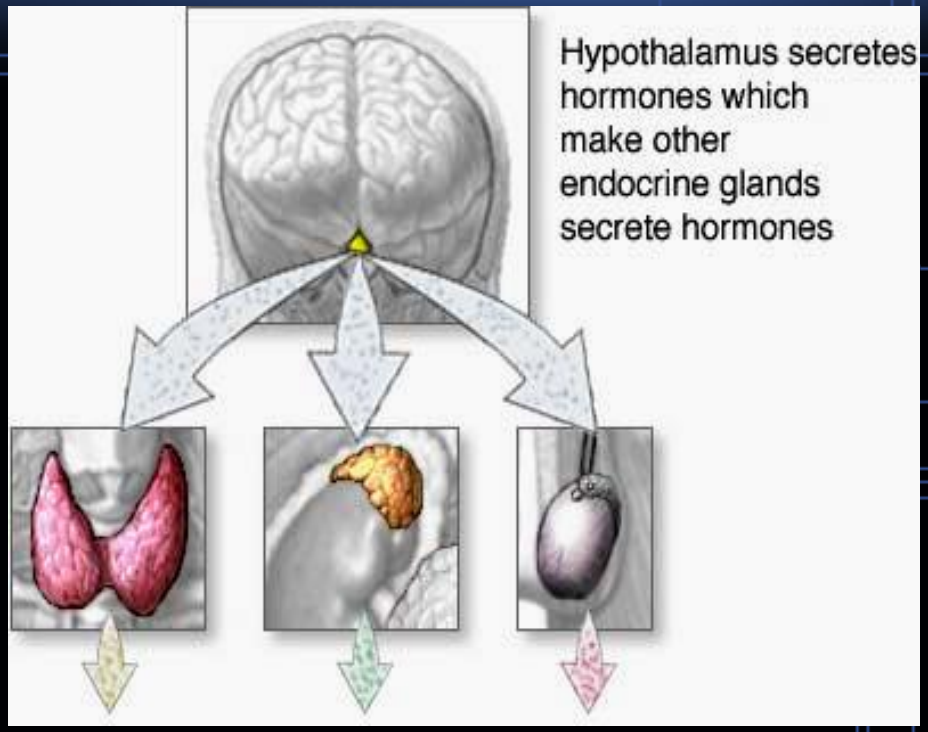
- **Fever**
  - Need to detect temperature changes and modulate the autonomic nervous system to either retain or dissipate heat.
- **Addiction**
  - Many recreational drugs work through neural pathways involved in reward and motivated behavior that form an important part of limbic system function.
- **Anxiety Disorders**
  - Many anxiety disorders, such as Panic Disorder and Post-traumatic stress disorder have physiological symptoms mediated by the autonomic nervous system and by the limbic system.
- **Obesity**.
  - Feeding behavior is in part controlled by the hypothalamus, and interactions between limbic reward circuitry and the hypothalamus are important to feeding behavior.

Hypothalamus: Integrative Functions

- The hypothalamus helps regulate five basic physiological needs:
  1) Controls blood pressure and electrolyte (drinking and salt appetite).
  2) Regulates body temperature through influence both of the autonomic nervous system and of brain circuits directing motivated behavior (e.g. behavior that seeks a warmer or cooler environment).
  3) Regulates energy metabolism through influence on feeding, digestion, and metabolic rate.
  4) Regulates reproduction through hormonal control of mating, pregnancy and lactation.
  5) Directs responses to stress by influencing blood flow to specific tissues, and by stimulating the secretion of adrenal stress hormones.

Hypothalamus



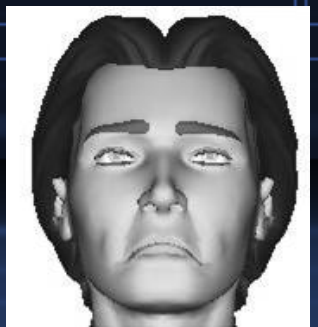


FUNCTIONS

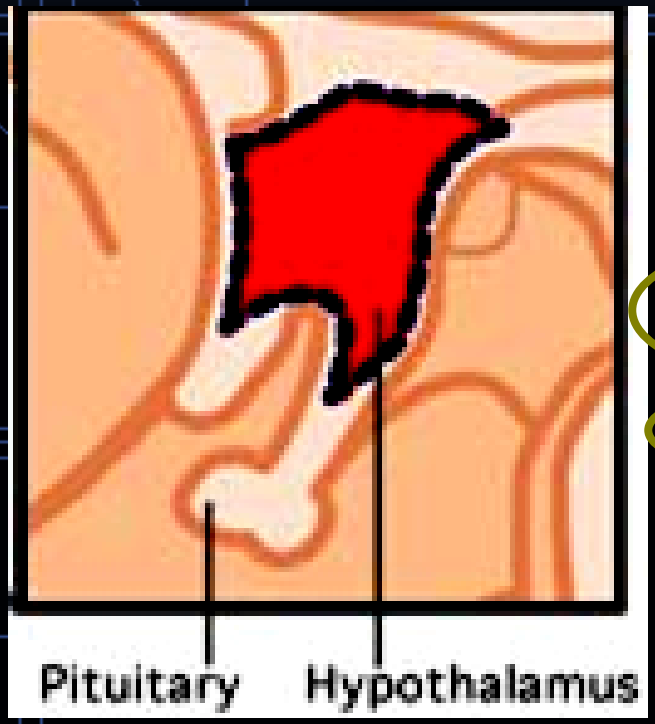
Thyroid Adrenal Gonads

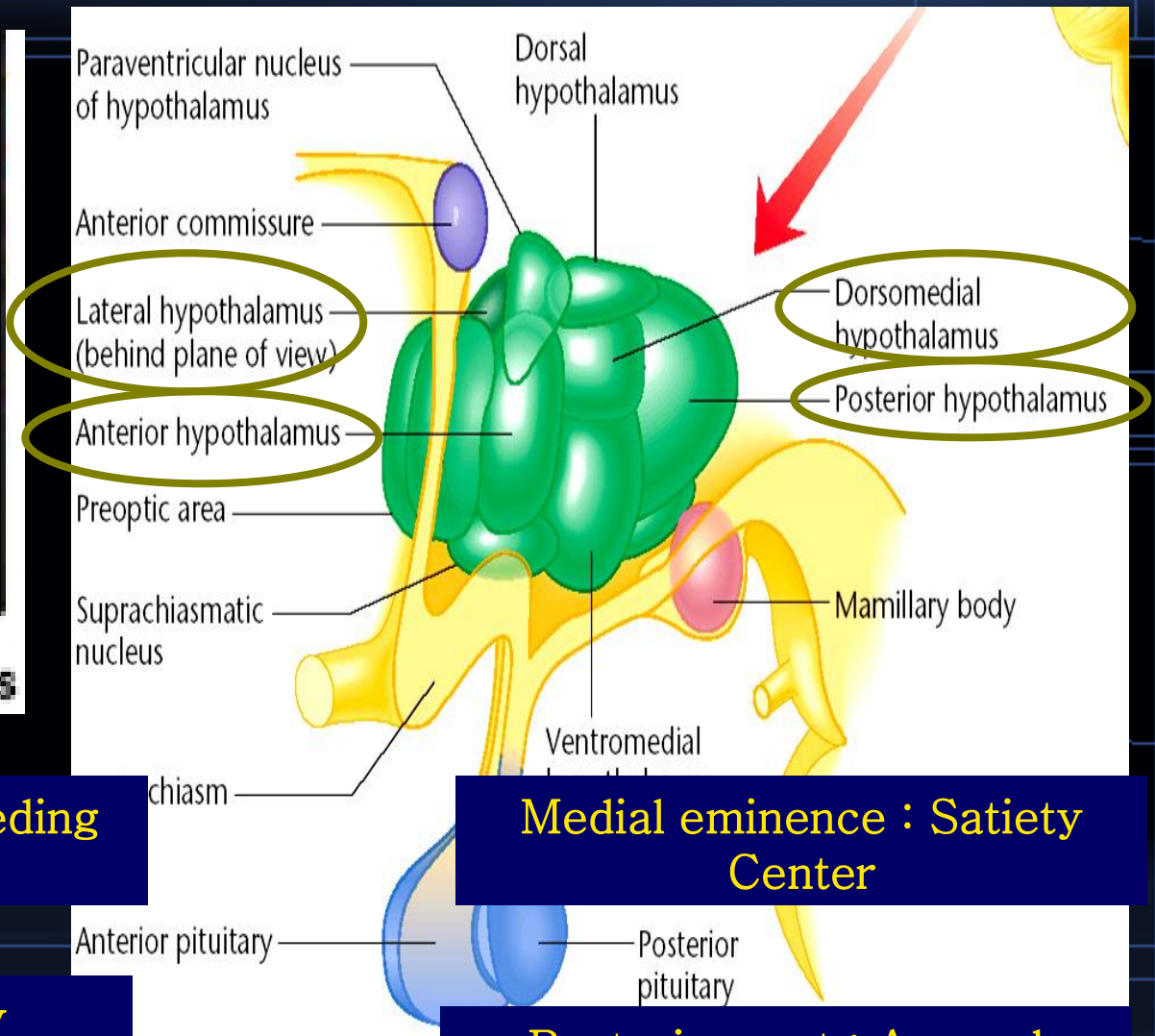
Visceral Autonomic Endocrine Emotions

Parasympathetic Sympathetic



Hypothalamus



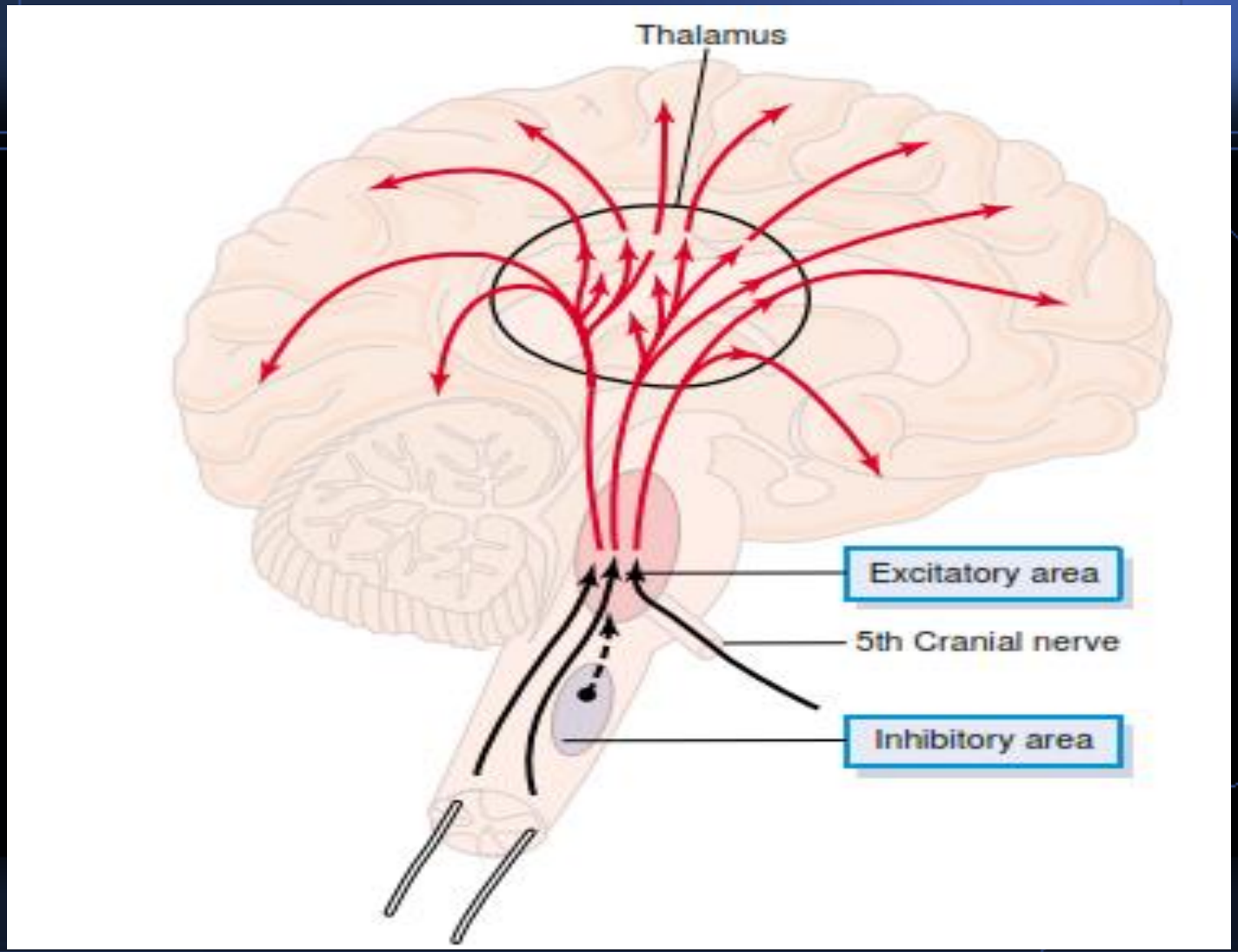


Lateral eminence : Feeding Center

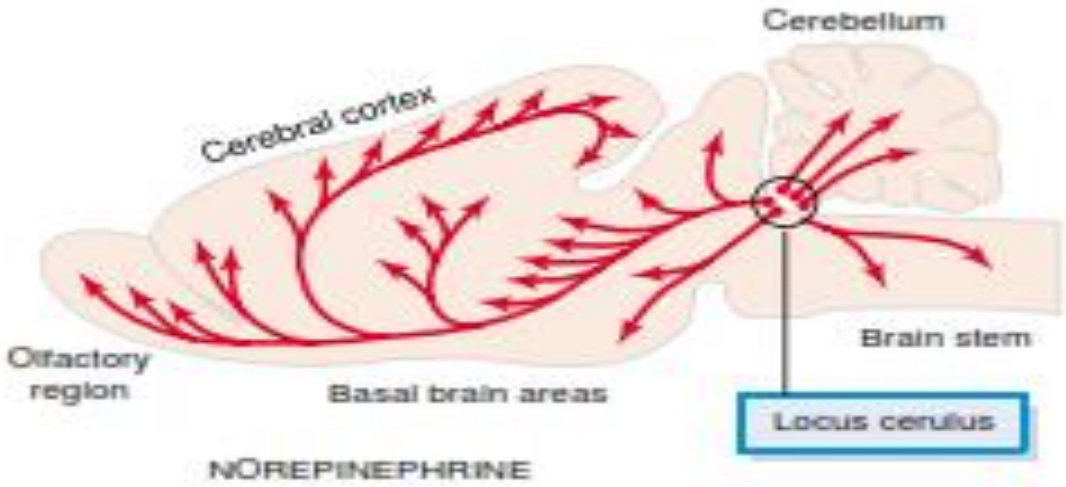
Medial eminence : Satiety Center

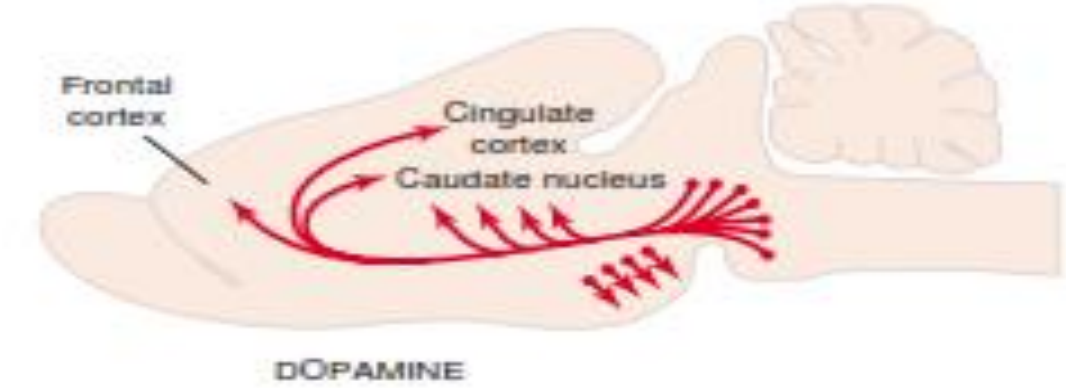
Anterior part : Body temperature (with posterior part)

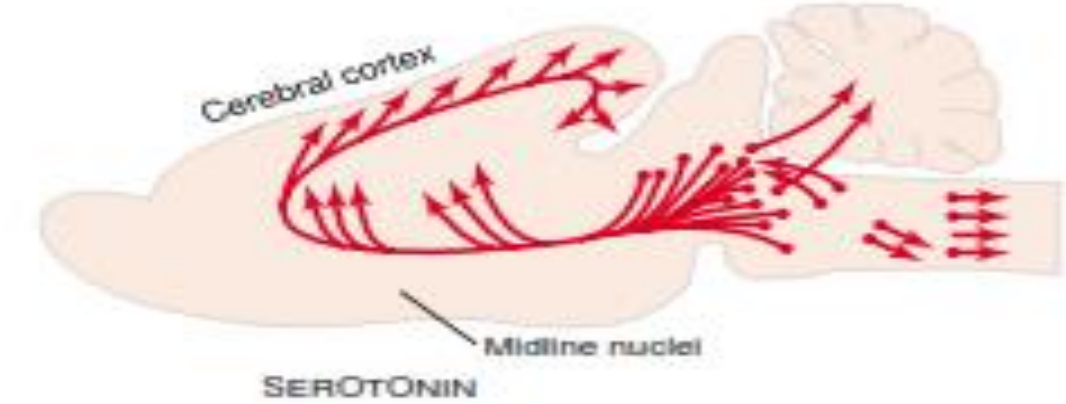
Posterior part : Arousal Center



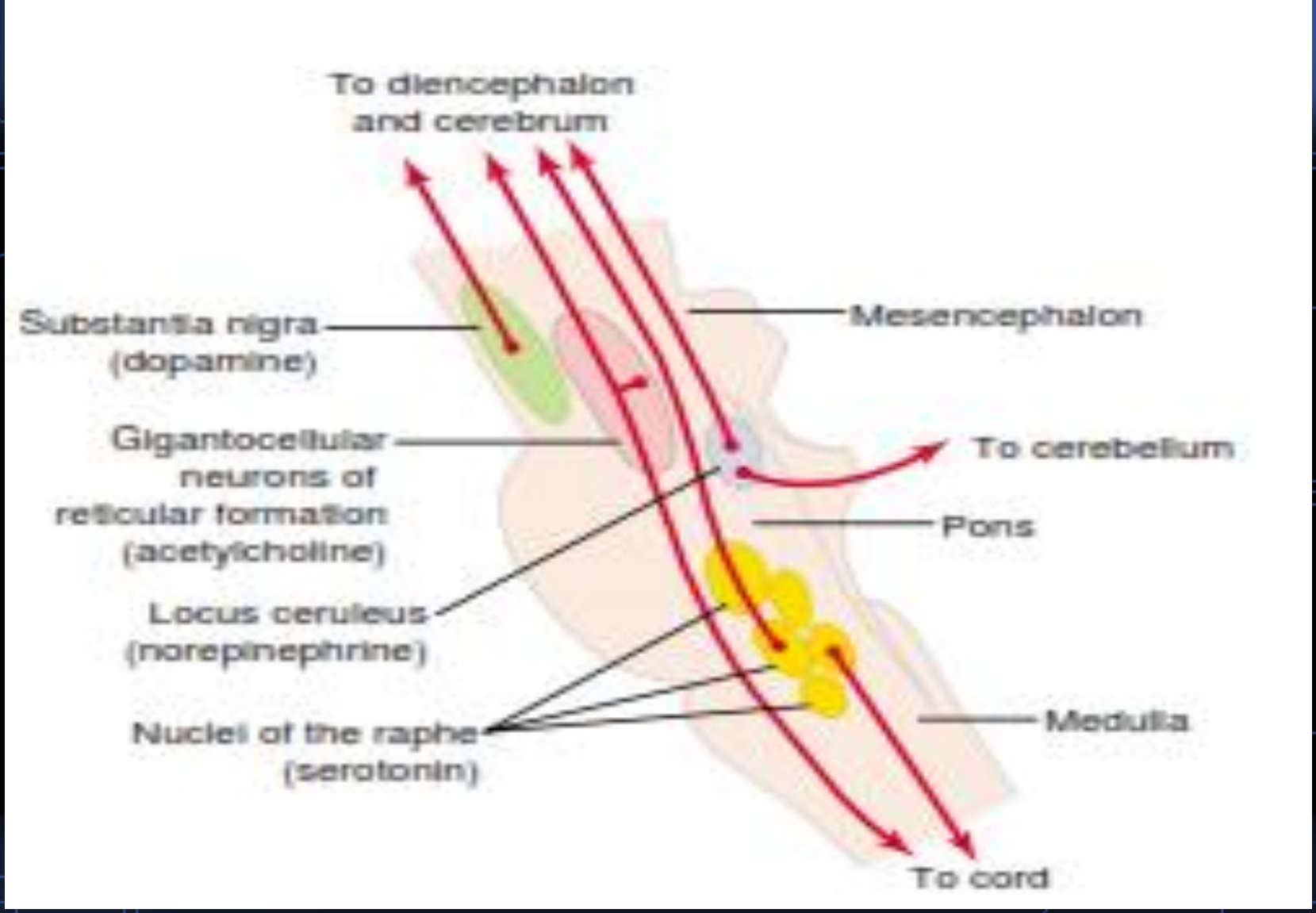
Excitatory-activating system of the brain. Also shown is an inhibitory area in the medulla that can inhibit or depress the activating system.







Three neurohormonal systems that have been mapped in the rat brain: a *norepinephrine system, a dopamine system, and a serotonin system.*



Multiple centers in the brain stem, the neurons of which secrete different transmitter substances (specified in parentheses). These neurons send control signals upward into the diencephalon and cerebrum and downward into the spinal cord.

thankyou