
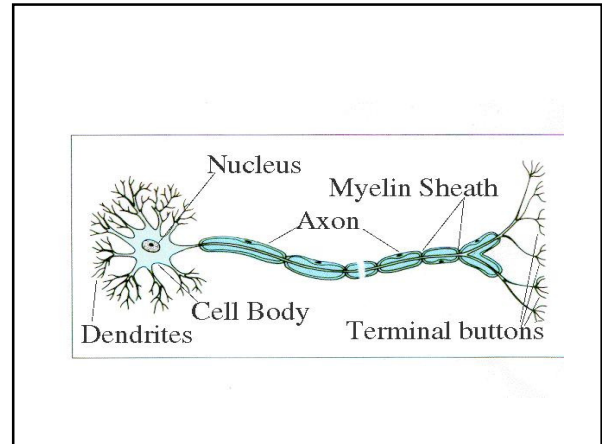


Book Fig. 4.1

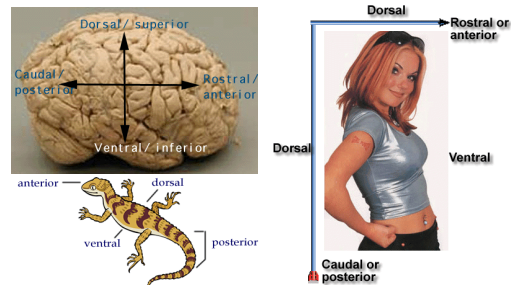
- Central Nervous System (CNS): brain and spinal cord
- Peripheral Nervous System (PNS): all the nerves outside of the brain & cord

Gray & White Matter

- Brain areas with lots of neuron cell bodies/dendrites look darker (“gray matter”) & function like information processors – receiving & combining input
- Areas with lots of myelinated axons appear lighter (“white matter”) & function like cables connecting regions
- A group of neuron cell bodies = “nucleus” (in CNS) or “ganglion” (in PNS)
- A bundle of axons = “tract” or “pathway” (in CNS) or “nerve” (in PNS)
- The CNS has a continuous fluid filled canal (or “ventricle” system throughout its length.

Anatomical Directional Terms (see Table 4.1)



Book Fig. 4.3, 4.4, 4.5

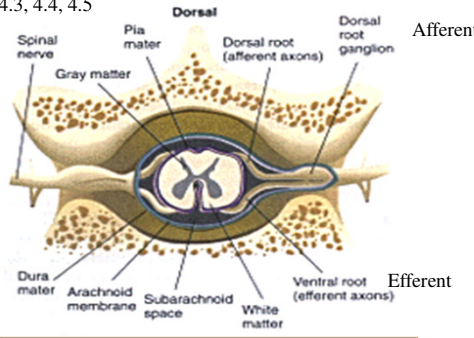
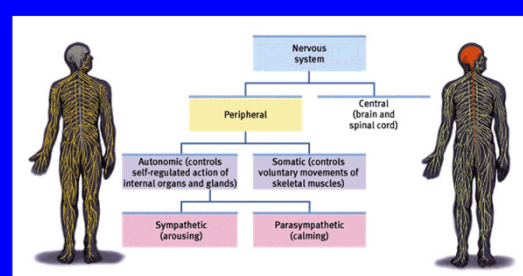
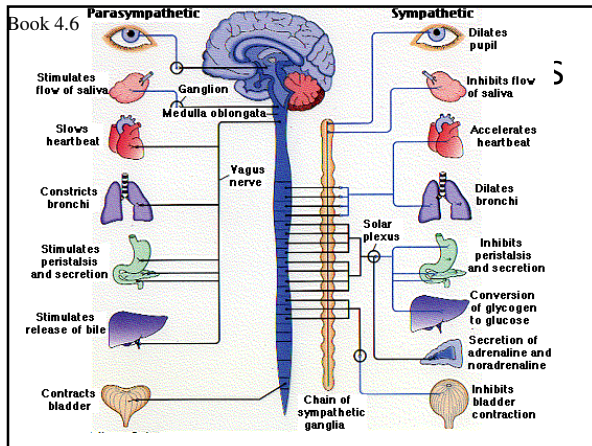


FIGURE 3
A cross section through a vertebra, showing the spinal cord, dorsal and ventral roots, and spinal nerves.

Divisions of the Nervous System





Online quizzes Know Your Lobes and Know Your Anatomy Due by next Wed. **The Brainstem**

Thalamus
Hypothalamus
Midbrain
Pons
Medulla

Reticular Activating System

- The cells of the “reticular formation” have many other functions as well.

2 and 3 on the “dorsal” surface of midbrain are the primitive visual (2) and auditory (3) processing centers, the superior (2) and inferior (3) colliculus.

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Substantia Nigra Dopamine Neurons

Parkinson's Disease Normal

Substantia nigra

Red Nucleus is another motor region in the midbrain
http://mindsci-clinic.com/rostral_midbrain.htm Book 3.22

The Reptilian Brain

- The brainstem, especially its core, is the most primitive portion of our brain, relatively unchanged from the time that dinosaurs roamed the earth. Most reptile behavior is reflexive response to stimuli.

Middle layer added emotion & memory capabilities.
 Newest outer layer added judgment, reasoning, planning and self-control.

NEOMAMMALIAN
PALEOMAMMALIAN
 (Limbic System)
REPTILIAN

The Triune Brain - (P. MacLean 1990)

Mike, the Headless Chicken

- Survived 18 months
- Could still stand, sit on a perch, walk clumsily, and attempt to crow and preen.
- These basic behaviors are like reflexes – built into the brainstem.

http://en.wikipedia.org/wiki/Mike_the_Headless_Chicken

A Sadder Example

- Anencephaly – forebrain fails to develop. Baby has a flattened, open skull. Baby shows basic reflexive behaviors (can nurse, grasp, etc.) but with only hindbrain & midbrain structures intact, survival is brief (hours-days).
- An example of such reflexive behaviors in a normal infant

Hypothalamus

- Plays a role in lots of different basic behaviors/motivations necessary for survival of individual & survival of the species
- The “four F’s”
 - Feeding
 - Fighting (aggression & rage)
 - Fleeing (fear behaviors)
 - Mating :)
- But also primitive parenting behaviors, temperature regulation, hormone regulation, biorhythms & sleep, mood/emotions

► Nuclei of the Hypothalamus

Means “beneath the thalamus”

Labels include: Paraventricular nucleus, Lateral hypothalamic area, Dorsal hypothalamic area, Anterior commissure, Preoptic nucleus, Anterior hypothalamic area, Frontal cortex, Supra-optic nucleus, Optic nerve, Optic chiasm, Anterior pituitary, Posterior pituitary, Posterior hypothalamic area, Dorsomedial nucleus, Ventromedial nucleus, Mammillary body.

► Human Diencephalon

Labels include: Bands of myelinated axons, Right thalamus, Left thalamus, Hypothalamus, Cerebellum.

Book 3.23

Nuclei of the Thalamus

The Thalamus works closely with regions of cortex

- Partially processing incoming sensations before passing input on to cortex
- Part of the motor system
- Works with higher cortical regions related to cognition, memory, personality etc.

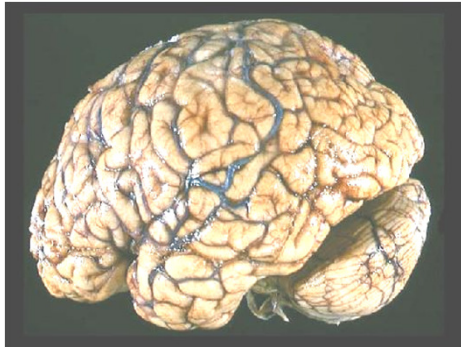
The Brain is Like a Tootsie Pop

Current "limbic" system

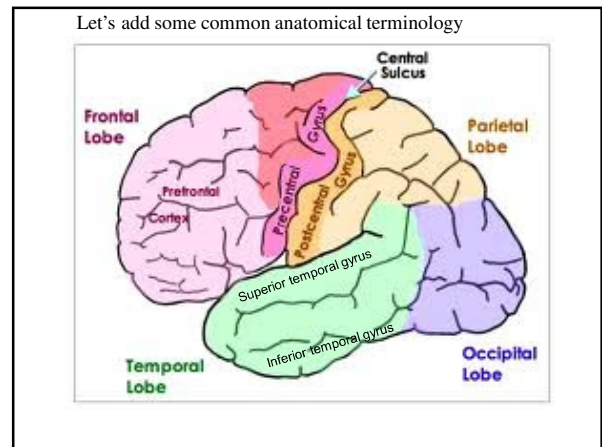
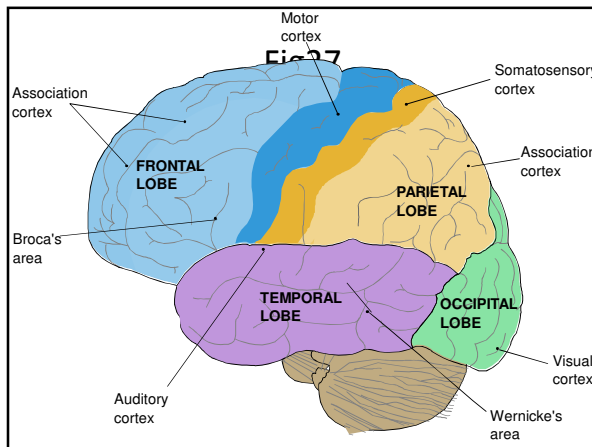
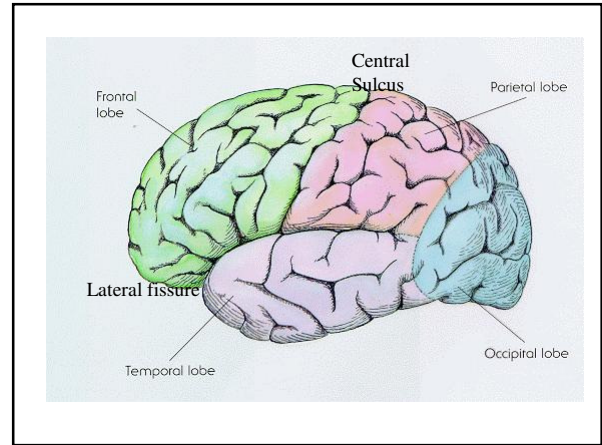
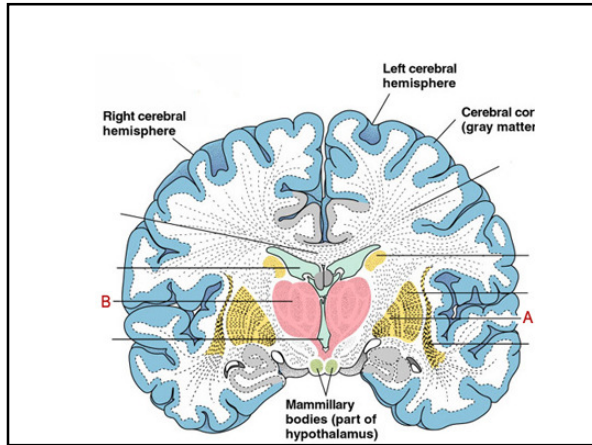
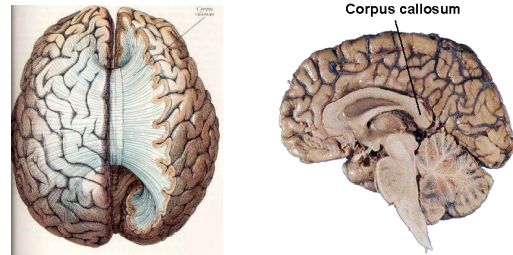
The Basal Ganglia System

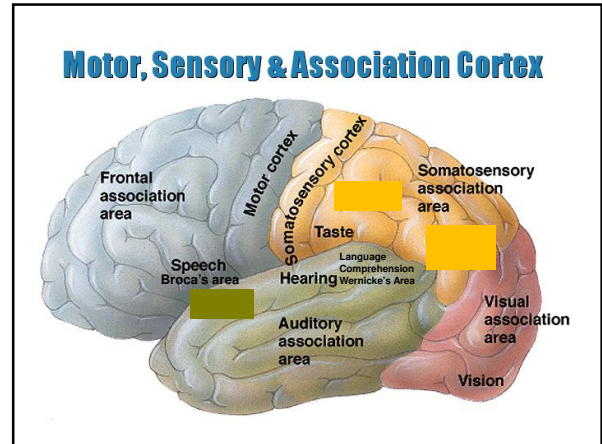
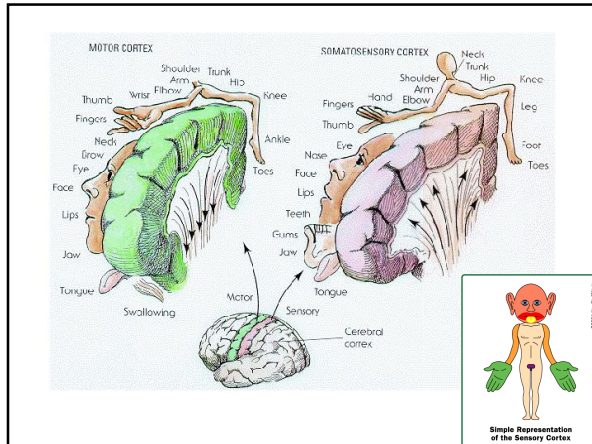
Book 3.29

Side View of Cortex & Cerebellum



Corpus Callosum



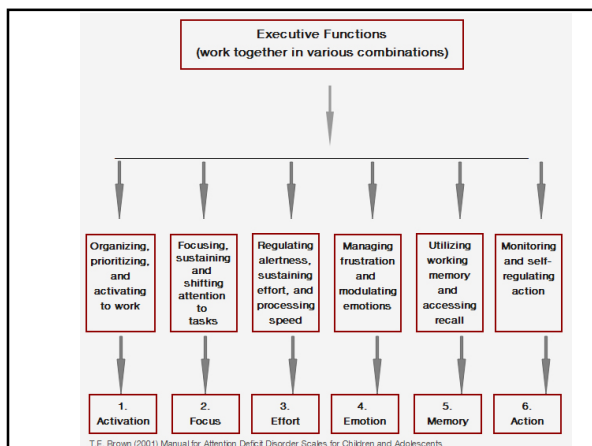


The Case of Phineas Gage

- <http://www.youtube.com/watch?v=jK1sj4JEJ2o&list=UU943UnajVxe9SpFJpwxpLsQ&index=1>

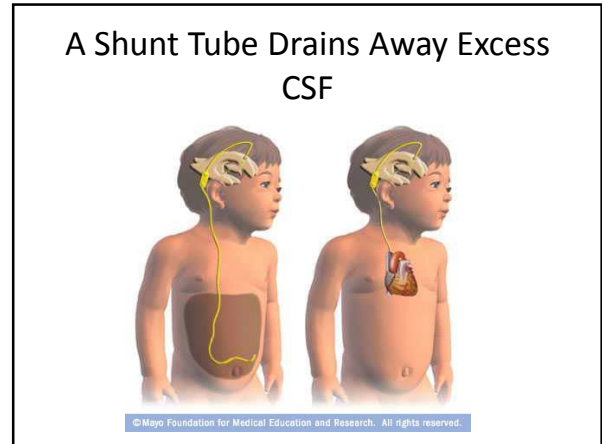
Damasio's MRI Reconstructions of Prefrontal Damage

- Effects produced:
 - Lack of tact, restraint, empathy
 - Immature, irresponsible, coarse language
 - Lack of social graces & emotional control
 - In ability to plan & follow through



Frontal Lobotomy

- http://www.youtube.com/watch?v=_0aNILW6ILk



- Notice the *plasticity* (ability to reorganize) in the young, developing brain.
- If hydrocephalus (or other brain problem) occurs in an adult there is little such ability to reorganize since by that time the functional areas we've discussed are pretty fully programmed.
- <http://www.youtube.com/watch?v=TSu9HGnlMVO>

