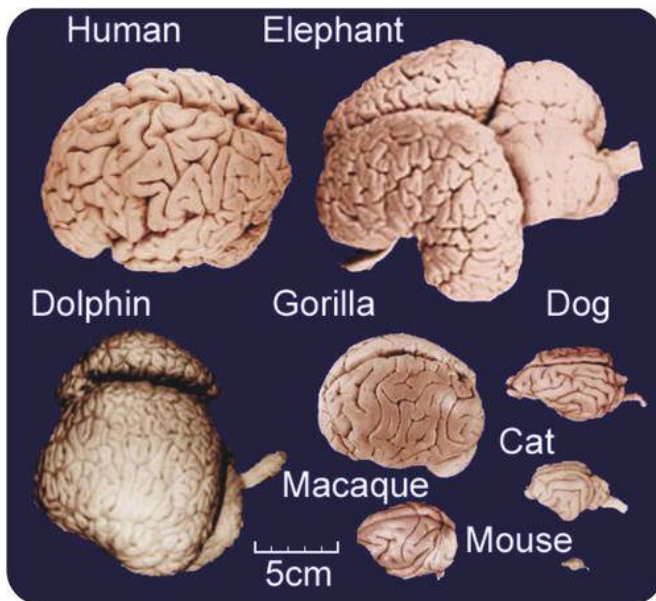


Eric
PSY 302
8/31/17

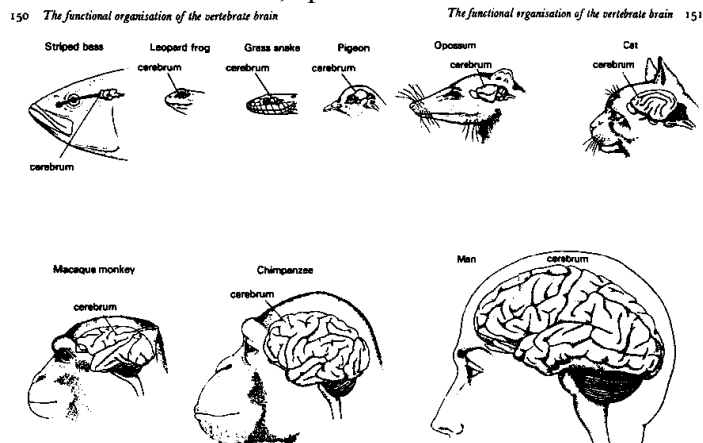
PSY 302: The Brain (Part 1) 8/31/2017

Memorize bold terms in the book. Important test material!

- Mammalian brain diversity:
 - Brains vary in size and in the number of “folds” on their surface
 - Mammalian brains are remarkably similar in overall structure

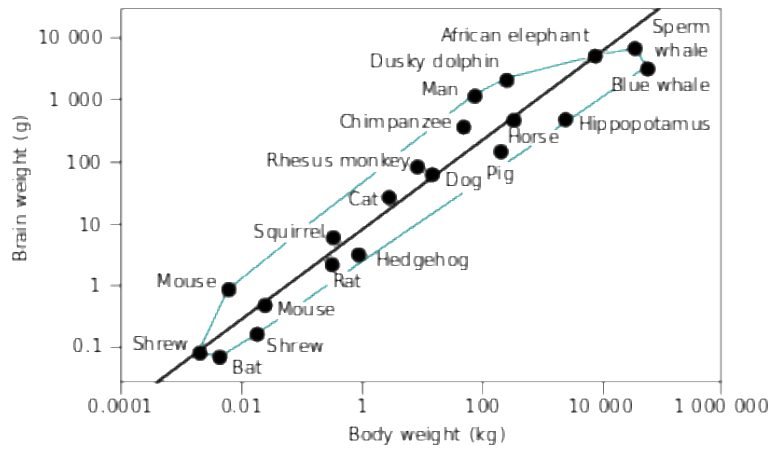


- Animal brains (vertebrates)
 - Brains, spinal cord and skulls...

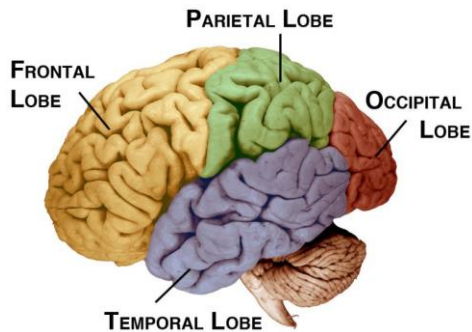


- Brain/body weight
 - Body weight positivity correlated with brain weight

- Human brain larger than expected body size ratio
- Above line = smart, below line = dumb?

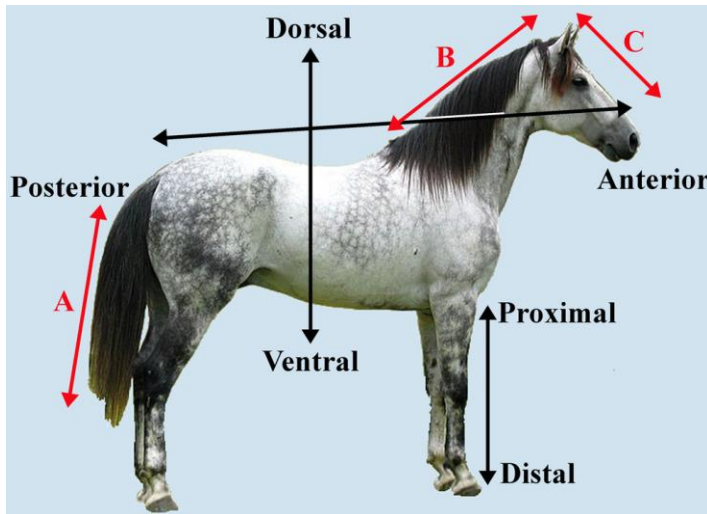


- Brain diversity: Different brains...different people
 - Prefrontal cortex: Planning, attention, working memory
 - Parietal lobe: Association cortex (ex: associates sound with sight, smell with taste etc), language
 - Einstein's IQ 160? Average 100. Brain studied at Princeton University
 - More glial cells
 - More sulci (grooves)
 - Same brain shape, neurons, dendrites etc.
 - Theory: Better brain functioning derived from support system, not abundance of neurons

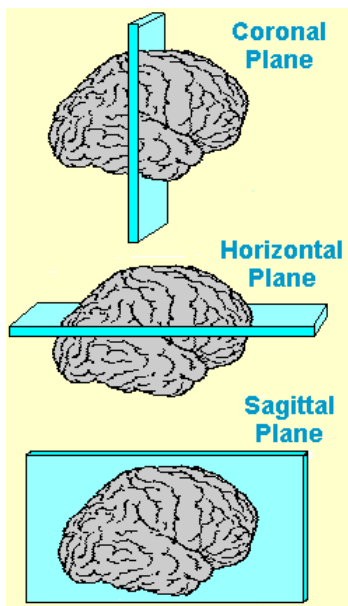


- Giving directions (All mammals are tubes)
 - Neuraxis
 - Tube surrounded by neurons
 - Rostral or anterior
 - In front
 - Caudal or posterior
 - Behind
 - Dorsal
 - Back

- Ventral
 - Under
- Medial
 - Centered
- Lateral
 - To the side
- Contralateral
 - Parts on different side of body (right foot, left hand)
- Ipsilateral
 - Parts on same side of body (left hand, left foot)

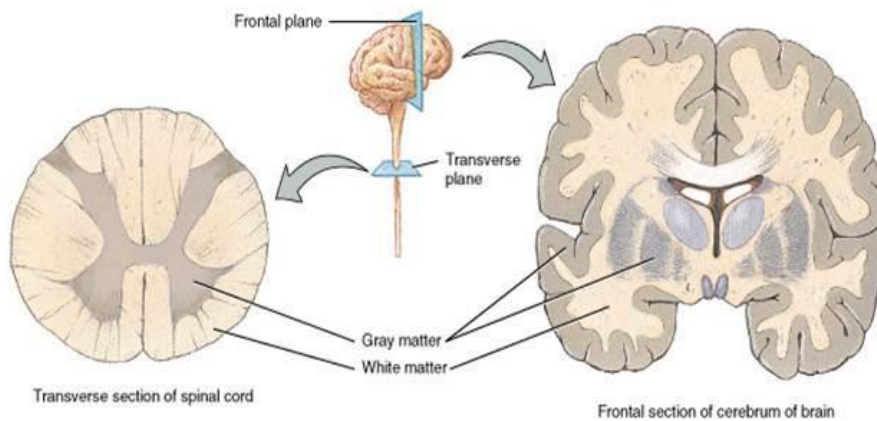


- Brain planes of section (3.2)

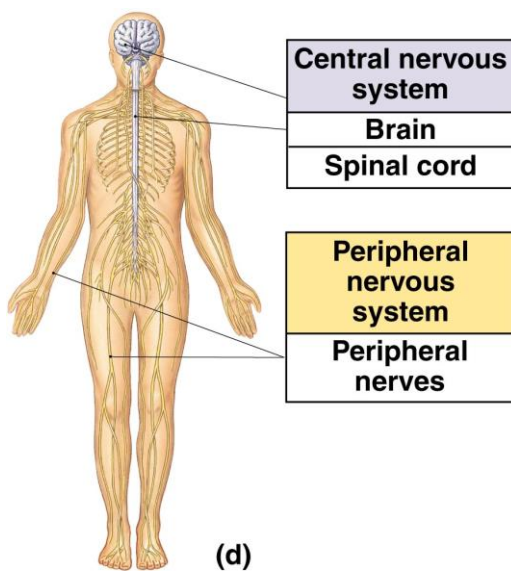


- Planes of section (3.2)

- Grey matter: cell bodies (somas)
- White matter: Axons (myelin sheaths)
- Spinal cord
 - White on outside, grey inside

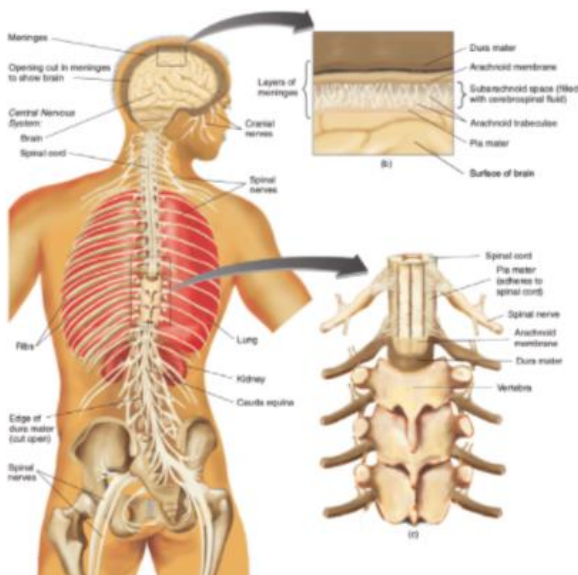


- Nervous system: Overview
 - Central nervous system (CNS)
 - Brain (skull)
 - Spinal cord (vertebral column/spine)
 - Peripheral nervous system (PNS)
 - Nerves
 - Peripheral ganglia (group of neurons)
 - Outside CNS

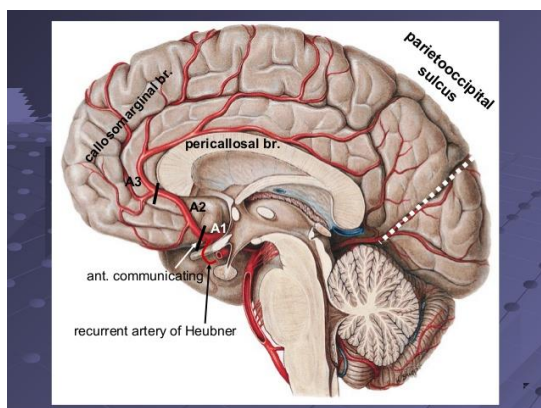


- Meninges (3.3)
 - Dura matter
 - Thick, not stretchable
 - Arachnoid membrane
 - Soft, spongy
 - Sub-archnoid space filled with Cerebro Spinal Fluid
 - Pia mater
 - Follows brain surface, contains blood vessels
 - Headache = small infection of meninges
 - Meningitis = large infection of meninges

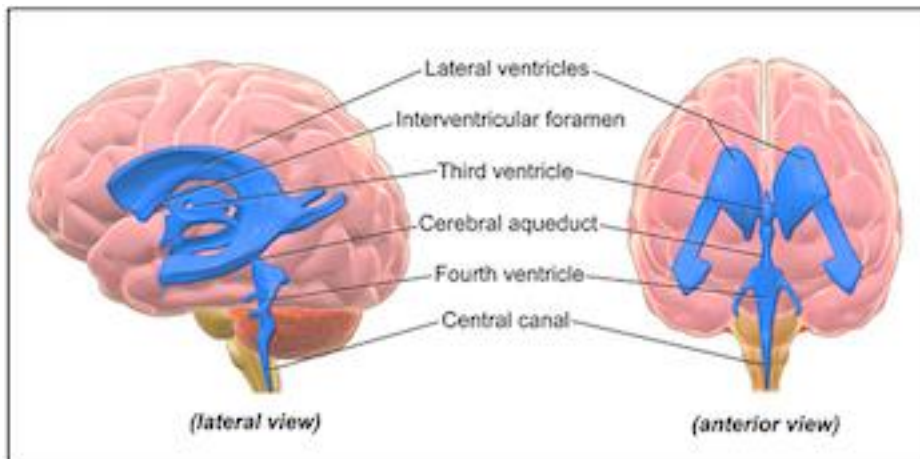
82 CHAPTER 5 Structure of the Nervous System



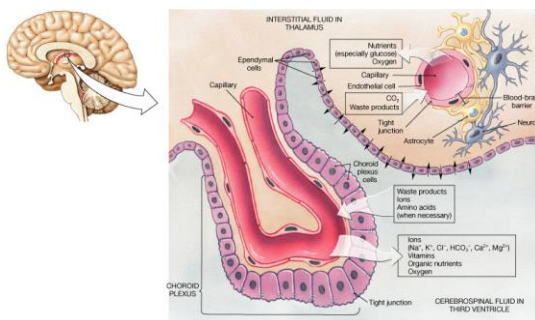
- Brain vasculature
 - Brain (2% of the body) used about 20% of oxygen absorbed by the lungs
 - Contains large network of capillary vessels
 - Dense: One can tell which group of neurons are active by looking at where blood flows (fMRI: glucose and oxygen).
 - Migraine, stroke



- Cerebral ventricles (3.4)
 - Cerebro Spinal Fluid
 - Contains nutrients for the brain
 - Lateral ventricles
 - 2 on right and left sides
 - Third ventricle
 - Middle
 - Cerebral aqueduct
 - Tube structure
 - Fourth ventricle
 - Small, underneath eyes
 - Subarachnoid space
 - Central canal
- Lateral ventricle – third ventricle – cerebral aqueduct – fourth ventricle – central canal or subarachnoid space

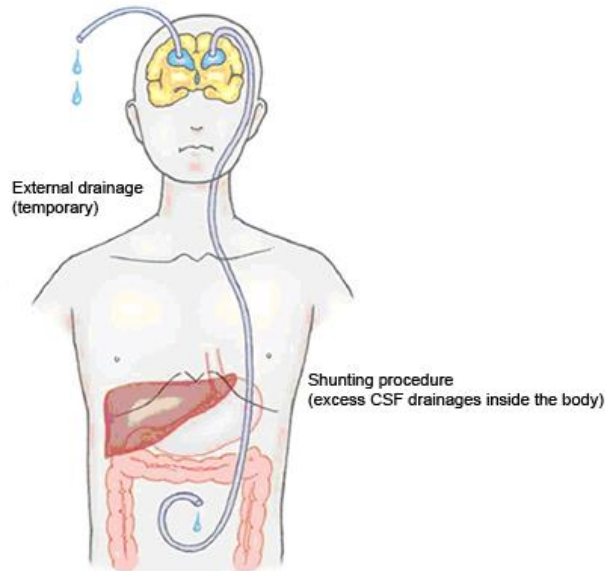


- CSF produced by the choroid plexus from blood
- CSF absorption in the sinuses
 - CSF: Fully replaced every 6 hours
 - Note: 1 meninx, 2 meninges

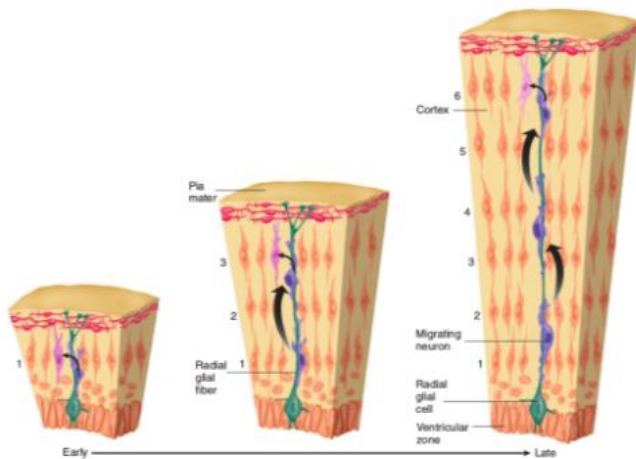


- Hydrocephalus

- Choroid plexus produces CSF, but is not recycled properly. CSF accumulates, expanding skull.
- Occurs in 2/1000 children. Mostly congenital, also as a result of meningitis
- Treatable. Most children live normal lives
- Placidity
 - The extent to which the brain can adapt to things

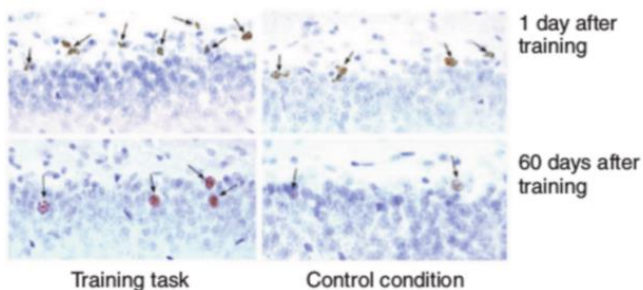


- CSF summary
 - Produced from blood by the choroid plexi (all ventricles)
 - Full replacement every 6 hours
 - Flows all around the brain and spinal cord
 - Reabsorbed into the blood
 - Ventricles also have a role in development
- Neural migration
 - On the 18th day...we start as a tube (neural tube) made of progenitor cells
 - By 20 weeks, the brain looks “superficially” like an adult brain



- Neural development
 - Symmetrical cell division (last 7-8 weeks)
 - Progenitor cells – 2 progenitor cells (increase ventricular size)
 - Asymmetrical cell division *last 3 months)
 - Progenitor cell – progenitor cell or brain cell (Radial glial cells support migration to other cells, neurons + glial cells) (create brain tissue)
- Longer asymmetrical division stages – larger brains
- After 5 months: **Apoptosis** “suicide” signal for progenitor cells
- Ventricles produce 2x more neurons than necessary. Unused neurons progressively die by apoptosis.

- Neural development: new cells in the adult (3.7)
 - There is a **neurogenesis** in the adult brain. In rats: Hippocampus (learning and memory) and olfactory bulb (sense of smell).
 - Physical exercise increase neurogenesis. Stress/depression reduce neurogenesis



- Developmental stages (3.5) Major division of the brain as provided for by major ventricles
 - Telencephalon: Cognitive + emotional areas

- Diencephalon: Early sensory and hormonal
 - Mesencephalon: Motivation, regulation of behavior
 - Metencephalon: Basic motor actions and plans
 - Myelencephalon: Interface with spinal cord
- 6 division of the adult human brain
 - Forebrain
 - Telencephalon + diencephalon
 - Telencephalon: 2 hemispheres
 - 1 hemisphere: Cerebral cortex, basal ganglia, limbic systems
- The 3 major fissures: 2 hemispheres (3.8)
 - Fissure – fissures
 - Sulcus – sulci
 - Gyrus – gyri
 - Corpus callosum – contralateral perceptual + motor information flow
- Each side of brain talk to each other
 - Left side of brain controls right side of body and vice versa

