Outline
• CSF
• Blood supply to brain
• Structures of brain & their functions (on your own)
• Disorders
• Autonomic Nervous System (ANS)

Cerebrospinal Fluid
• Produced in the choroid plexuses of the four ventricles
• Formed by filtration of blood plasma (blood-CSF barrier)
• Circulates thru’ ventricles, subarachnoid space & central canal (in spinal cord)

• CSF is produced at the same rate it is reabsorbed to maintain constant pressure.
• Abnormalities in CSF flow (tumor, inflammation) can cause increase in pressure = HYDROCEPHALUS

Functions of CSF
• Mechanical protection
• Chemical protection
• Supply of nutrients and removal of wastes

Brain blood supply
• Blood brain barrier prevents certain substances from entering nerve tissue
• Nerve tissue has demand for glucose & oxygen

Cerebrovascular Accident (CVA) = Stroke = brain attack
• Resulting from: clot; plaque; hemorrhage
• Often preceded by Transient Ischemic Attack
Treatment

- Blood thinners
- Anticoagulants
- Surgery

Main causes

- High blood pressure
- Elevated cholesterol
- Smoking
- Obesity

Regions of the Brian and their functions study from Table 10.1 p.251

Brain Stem

Medulla oblongata

- 5 pairs of cranial nerves extend
- Decussation of Pyramids
- Cardiovascular center
- Respiratory center
- Vomiting, coughing sneezing

Pons (bridge)

- 4 cranial nerves extend
- Helps medulla in the control of breathing

Midbrain

- Reflex centers for visual and auditory stimuli

Cerebellum

- Controls subconscious movements in skeletal muscle
- Controls coordination, posture and balance
• Damage to cerebellum = Ataxia

**Diencephalon (through brain)**

• Thalamus:
  - main relay station for sensory impulses (e.g. pain, touch, temperature) on the way to the cerebrum from PNS

**Hypothalamus  (hypo = under)**

• Controls and integrates autonomic nervous system (ANS)
• Intermediary between nervous system & endocrine system by secreting regulating hormones
• Regulation of emotional and behavioral patterns
• Thirst and hunger centers
• Regulation of body temperature
• Mind-over-body
• Key role in maintaining homeostasis

**Epithalamus**

• Pineal gland:
  - secretes melatonin

**Cerebrum (higher brain)**

• Left & right hemispheres
• Cerebral cortex - gray matter
• Many folds (gyri) increases surface area
• Cerebral white matter = 60% of cerebrum
• Corpus callosum connects two hemispheres
• Each hemisphere has four lobes:
  - **frontal lobe**: voluntary control of skeletal muscle
  - **parietal lobe**: conscious perception of touch, pressure, vibration, pain, temperature and taste
- **occipital lobe**: conscious perception of visual stimuli
- **temporal lobe**: conscious perception of auditory and olfactory stimuli

- All lobes integrate and process sensory information and process and initiate motor responses

**Alzheimer’s Disease**
- Senile dementia
- Brain cell death and depletion of ACh
- Memory loss, impaired thinking, personality change
- No reversal treatment

**Parkinson Disease**
- Rigid/slow movements & tremors
- Death of nerve cells and depletion of dopamine
- No reversal treatment

**Autonomic Nervous System (ANS)**
- Part of the PNS
- Regulated mainly by hypothalamus
- Main input to ANS comes from autonomic sensory neurons e.g. receptors for body temp., osmotic pressure

- Autonomic motor neurons regulate smooth muscle, cardiac muscle and glands

**Autonomic motor pathway**
- Preganglionic neuron (cell body in CNS) - myelinated axon
- Synapse (ACh)
- Postganglionic neuron (cell body in autonomic ganglia in PNS)
- Synapse (ACh or NE)

**Two divisions of ANS**
- Sympathetic
- Parasympathetic
- Dual innervation

**Sympathetic Division**
- Responds to E-situations
- Innervates fight-or-flight response
- Examples

**Parasympathetic Division**
- Responsible for rest-and-digest activities
- “paradoxical fear” in response to NO-WIN situations

**ANS neurotransmitters**
- All preganglionic neurons secrete ACh at synapse
- All postganglionic parasympathetic neurons secrete ACh at neuroeffector junction
- Some postganglionic sympathetic neurons secrete ACh at neuroeffector junction
- Most postganglionic sympathetic neurons secrete NE
- Slow inactivation by enzymes linger in synaptic cleft

**Autonomic reflexes**
- Same components as somatic reflex arc

**Examples**
- Sympathetic:
  - excitatory: increased HR, blood flow, airflow
  - inhibitory: decreased digestion activities
- Parasympathetic:
  - inhibitory: decreased HR, blood flow
  - excitatory: increased digestion activities