

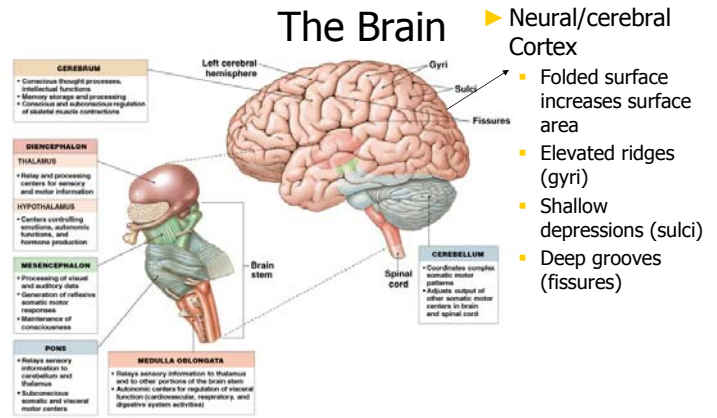
CMPE 80A: Universal Access: Disability, Technology, and Society



Brain, memory and cognition



The Brain



Brain Protection and Support

► Physical protection:

- bones of the cranium
- cranial meninges/membranes
- cerebrospinal fluid

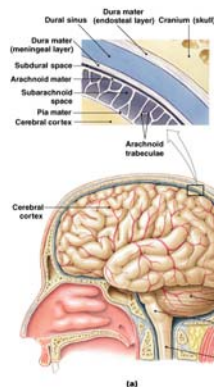
► Biochemical isolation:

- blood-brain barrier → Isolates CNS neural tissue from general circulation

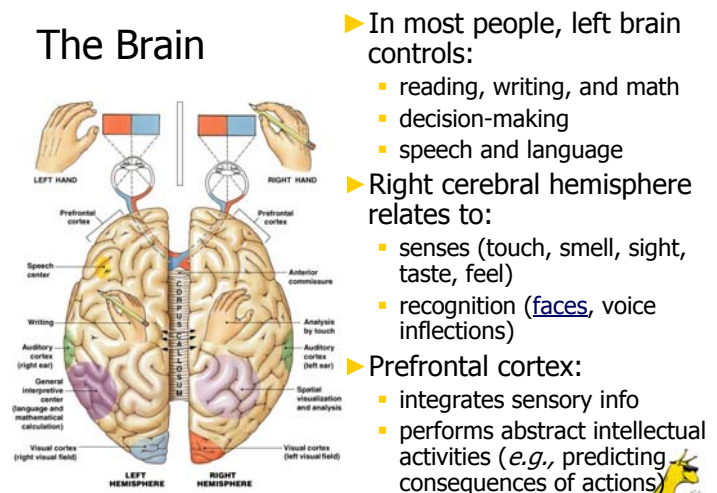
► Cranial Meninges - 3 layers:

- dura mater
- arachnoid mater
- pia mater

► Is continuous with spinal meninges



The Brain



► In most people, left brain controls:

- reading, writing, and math
- decision-making
- speech and language

► Right cerebral hemisphere relates to:

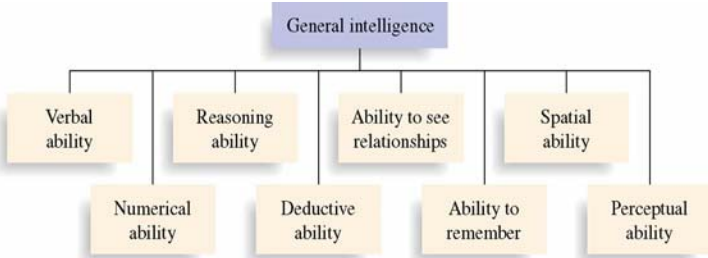
- senses (touch, smell, sight, taste, feel)
- recognition (faces, voice inflections)

► Prefrontal cortex:

- integrates sensory info
- performs abstract intellectual activities (e.g., predicting consequences of actions)



Memory and Cognition



► Different types of memory:

- Episodic – things you have done (personal experiences)
- Semantic – facts and concepts
- Prospective – things you intend to do (go shopping, visit friends, make and keep appointments)



Cognitive Disorders

► Four major types listed in the DSM-IV (Diagnostic and Statistical Manual of Mental Disorders)

1. Delirium

- Impaired consciousness & cognition for hours or days
 - Appear confused and disoriented
 - Cannot focus
 - Impaired memory and language
 - 10-15% → acute care facilities
 - Quick recovery after treatment
 - Most prevalent in older adults, patients undergoing medical procedures, cancer and AIDS patients
- Associated medical conditions**
- Intoxication by drugs
 - Withdrawal from drugs
 - Infections
 - Brain traumas



Cognitive Disorders

2. Dementia

- ▶ Progressive deterioration of brain functions including memory, language, judgment, attention, and other cognitive domains
- Incidence is higher among older adults (but can occur at any age)
 - ▶ 1% among 65-74 yrs of age
 - ▶ 4% among 75-84 yrs of age
 - ▶ 10% among 85 yrs and older
 - ▶ Women > men (women live longer)
- Causes: Abuse of drugs, infection, Alzheimer's, Cerebrovascular events, Parkinson's, Huntington's



Cognitive Disorders

2. Dementia of Alzheimer's type

- Most common type of dementia
- Multiple cognitive deficits that develop gradually
- Inability to incorporate new information
- Main symptom: Memory loss
- Forget important events/lose objects
- Aphasia → Difficulty with language
- Apraxia → Impaired motor functioning
- Agnosia → Failure to recognize objects
- Impaired Executive Functioning → Coordination of behavior to achieve a goal
- Neurofibrillary tangles → Abnormal bundles of filaments in nerve cells in the brain



Cognitive Disorders

2. Vascular Dementia (Stroke)

- Progressive brain disorder
- Blockage or damage to blood vessels
- Onset is often sudden
- Variable impairments
- Motor problems and weakness in limbs
- Prevalence
 - ▶ 1.5% in age 70 to 75
 - ▶ 15% in age 80 or older
 - ▶ Men > Women → Higher rates of cardiovascular disease
- Death from infection: pneumonia or weak immune system



Dementia vs. Pseudodementia

▶ Dementia

- Gradual onset
- Course is uncertain
- Positive history for dementia
- Good cooperation
- Denies/minimizes impairment
- Consistent on repeated exams
- Increased neurological symptoms

▶ Pseudodementia

- Precise onset
- Rapid, uneven course
- Positive history for depression
- Uncooperative
- Emphasizes memory loss
- Variable on repeated exams
- Increased psychological symptoms



Cognitive Disorders

3. Amnestic disorder

- Inability to learn new information
- Inability to recall previously learned information
- Intact global cognitive functioning
- Multiple causes
 - ▶ Industrial solvent, mercury, lead, insecticides
 - ▶ Head trauma
 - ▶ Long-term drug use
- Wernicke-Korsakoff Syndrome
 - ▶ Chronic heavy alcohol use
 - ▶ Thiamine deficiency → thiamine treatment will prevent further damage but does not restore memory
 - ▶ Thalamic damage



Schizophrenia

- ▶ DSM subtypes; paranoid, undifferentiated, disorganized, catatonic
- ▶ Impaired ability to perceive, understand and interpret the environment.
- ▶ Impaired function - social and motivational
- ▶ Behavioral syndrome - positive and negative symptoms
- ▶ Onset in late teens to early 20s
- ▶ Males and females equally affected but females have later onset and better functional outcome
- ▶ Genetic: 10% for first degree relative or fraternal twin, 50% for monozygotic twin
- ▶ Environmental factors certain but poorly characterized (intrauterine malnutrition, viral illnesses, perinatal insults, drug exposure)
- ▶ Early intervention important: medication & psychosocial

