Central Nervous System

Chapter 12
(a) Lateral view, left cerebral hemisphere

- **Motor areas**
  - Primary motor cortex
  - Premotor cortex
  - Frontal eye field
  - Broca's area (outlined by dashes)

- **Prefrontal cortex**
  - Working memory for spatial tasks
  - Executive area for task management
  - Working memory for object-recall tasks
  - Solving complex, multitask problems

- **Sensory areas and related association areas**
  - Primary somatosensory cortex
  - Somatosensory association cortex
  - Gustatory cortex (in insula)
  - Wernicke's area (outlined by dashes)
  - Primary visual cortex
  - Visual association area
  - Auditory association area
  - Primary auditory cortex

- **Central sulcus**

- **Legend**
  - Primary motor cortex
  - Motor association cortex
  - Primary sensory cortex
  - Sensory association cortex
  - Multimodal association cortex

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(a) Lateral view, left cerebral hemisphere

Key:
- Primary motor cortex
- Motor association cortex
- Primary sensory cortex
- Sensory association cortex
- Multimodal association cortex

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(b) Parasagittal view, right hemisphere

- Primary motor cortex
- Motor association cortex
- Primary sensory cortex
- Sensory association cortex
- Multimodal association cortex
Radiations to cerebral cortex

Visual impulses

Reticular formation

Auditory impulses

Ascending general sensory tracts (touch, pain, temperature)

Descending motor projections to spinal cord
Awake

REM: Skeletal muscles (except ocular muscles and diaphragm) are actively inhibited; most dreaming occurs.

NREM stage 1: Relaxation begins; EEG shows alpha waves, arousal is easy.

NREM stage 2: Irregular EEG with sleep spindles (short high-amplitude bursts); arousal is more difficult.

NREM stage 3: Sleep deepens; theta and delta waves appear; vital signs decline.

NREM stage 4: EEG is dominated by delta waves; arousal is difficult; bed-wetting, night terrors, and sleepwalking may occur.

(b) Typical progression of an adult through one night’s sleep stages

(a) Typical EEG patterns
(a) Pyramidal (lateral and anterior corticospinal) tracts
1. Afferent impulses from stretch receptor to spinal cord

2. Efferent impulses to alpha (α) motor neurons cause contraction of the stretched muscle that resists/reverses the stretch.

3. Efferent impulses to antagonist muscles are damped (reciprocal inhibition).

**Key:**
- + Excitatory synapse
- - Inhibitory synapse