• **The Corpus Dallosum: Function**
  - Precise connections between the 2 hemispheres of the brain
  - Coordination between the right side and left side of the body (ex) hands, feet
  - Allow for some specialized functions to be restricted to only one side (ex) language on the left, face perception on the right

- Frontal lobe
- Parietal lobe
- Temporal lobe
- Occipital lobe

• **Sensory motor divisions**
  - Central fissure
    - Doing vs perceiving
    - Motor vs sensory
  - Sensory processing
    - Lateralization: right vs left (right is controlled by left) (left is controlled by right)
    - Convergence: from simple sensory features to more complex ones.

• **Primary sensory map**
  - Different parts of the body are represented by different groups of neurons. The number of neurons ‘in charge’ of a body part is **not proportional** to the size of that part.
  - Example) Kissing = activates tons of neurons

• **Beyond primary cortices: complex integrations**
- **Limbic System**
  - (Neo) cortex: evolutionary ‘new’
  - Limbic cortex: evolutionary ‘old’
  - *Involved with motivation and emotion*

- **The Basal Ganglia**
  - Control of movement
  - Parkinson’s disease
  - Basal ganglia = (caudate, putamen, Globus pallidus) caudate and putamen (aka Striatum)
Neuroanatomy

- **Diencephalon**
  - Diencephalon = Thalamus + Hypothalamus
  - **Thalamus**
    - 2 lobes linked by the massa intermedia
    - Major sensory structure made of specialized nuclei
  - Eyes (retina) > optic chiasm (when things cross) > lateral geniculate nucleus
  - Also has some motor outputs:
    - Cerebellum (memory for fine learned movements; riding a bike) > ventrolateral nucleus > primary motor cortex
    - Major role in sleep (sensory-motor isolation)

- **The Thalamus**

- **Hypothalamus**
  - Controls the autonomic (heart, lungs…) and endocrine (hormones) system
  - Species specific behaviors (four F’s)
    - Feeding
    - Fighting
    - Fleeing
    - Formicating
  - Posterior pituitary gland: oxytocin (childbirth), vasopressin (anti-diuretic hormone, control urine output). Both substances are involved in ‘attachment behaviors.'
- Anterior pituitary gland (prolactin, production of milk). Controls the production of other hormones ex) sex hormones, growth hormones. ‘Master gland’

- **The Pituitary Gland**

- **Midbrain (= mesencephalon)**
  - **Tectum**
    - Sensory reflexes (eye movements)
    - Pineal gland (sleep/wake cycle, jetlag)
    - Colliculi
      - Superior colliculus (vision)
      - Inferior colliculus (audition)
  - **Tegmentum**
    - Reticular formation
      - Sleep, attention, movement, reflexes
      - Many nuclei
    - Periaqueductal gray matter
      - Pain processing
      - Species typical basic behaviors (mating, aggression)
    - **Red** nucleus and Substantia Nigra
      - Motor info’s, (project to basal ganglia), Parkinson’s disease
- **Hindbrain** = Metencephalon (Cerebellum + Pons), Myelencephalon = Medulla (Oblongata)
  - **Cerebellum**
    - Dense and specialized structure (‘little brain’)
    - Made of cerebellar cortex, deep nuclei
    - Coordination of complex movements (walking, jumping)
    - Smooth precise movements
  - **Pons**
    - Relay between the cortex and the cerebellum
    - Many nuclei
      - Vestibular nuclei (balance)
      - Facial muscles (muscle of face)
      - Cochlear nuclei (sound)
  - **Medulla**
    - Modulating heart and lung functions
    - Many nuclei

- **Sensory-Motor Flow**
  - Sensory information enters dorsally (into the back) and motor information exits ventrally (belly).

- **Flow of Information**
  - A is out
  - E is towards

- **Spinal Cord**
  - Controls glands and muscles (low-level reflexes)
  - Collects somatosensory information.
  - Ventral and dorsal roots
  - Afferent vs efferent
Gray matter (inside), white matter (outside), brain: opposite
4 levels: Cervical, Thoracic, Lumbar, Sacral.

- **Spinal Cord Levels**

- **Spinal Cord – Brain Interactions**
  - Brain and spinal cord are in constant 2-way interactions through specialized groups of neurons.
  - **Ascending** (to brain)
  - **Descending** (from brain)

- **Peripheral Nervous System**
  - 12 cranial nerves
    - Olfactory nerve (**sensory**) SMELL
    - Optic (**sensory**) VISION
    - Oculomotor (**motor**) CONTROL EYE MOVEMENT
    - Trochlear (**motor**) CONTROL EYE MOVEMENT
    - Abduces (**motor**) CONTROL EYE MOVEMENT
    - Trigeminal (**sensory** & **motor**) PAIN, TOUCH
    - Facial (**motor** & **sensory**) FACE MUSCLES
    - Auditory (**sensory**) BALANCE
    - Glossopharyngeal (**motor** & **sensory**) TASTE
    - Vagus (aka Vegas) (**motor**) INTERNAL ORGANS, STOMACH, INTESTINE
    - Spinal accessory (**motor**) NECK
    - Hypoglossal (**motor**) TONGUE
  - Most nerves follow blood vessels
- **Somatic Nervous System**
  - Sensory communication and local control of body skeletal muscles.
  - Spinal nerves
  - Cranial nerves (12)
- **Autonomic Nervous System**
  - Sympathetic: energy expense (arousal), sympathetic ganglion chain, coordinate energy across spinal levels.
  - Parasympathetic: energy saving (rest).
  - Preganglionic (before) vs. postganglionic (after)