

The Brain

1. Hindbrain

- Basic processes of life
- A) Medulla – Part nearest the spinal cord
- Controls breathing, heart rate, blood pressure
 - Also where nerves cross over on their way to higher brain centers (i.e. left part of body cross to right side of brain)
- B) Pons – above the medulla
- Produces sleep chemicals
 - Connects the cerebral cortex (at the top of the brain) to the cerebellum
 - Bridge to interconnect messages between brain and spinal cord
- C) Cerebellum – 2 hemispheres
- Controls certain reflexes (posture, balance, breathing) coordinate body movement

2. Midbrain – middle part of the brain

- Important to hearing and sight
 - Where pain is registered
- Reticular Activating System – alerts brain to incoming signals
*Medulla, pons and midbrain compose the brain stem

3. Forebrain – top of the brain

Includes:

- A) Thalamus – egg shaped
- Relays/translates incoming messages from sense receptors (but not smell)
- B) Hypothalamus – below thalamus
- Controls eating, drinking, sexual behavior, sleeping, temperature control (body temp)
 - Also involved with emotional behavior (rage, terror, pleasure)
- C) Amygdala – Connects sensations and emotions
- D) Hippocampus – forms new memories
- E) Cerebral Cortex – Outer layer of brain
- 2 cerebral hemispheres
 - 80% of brain weight
 - If it spreads out could cover 2-3 square feet
 - Regulates most complex behavior
 - Convulsions – folds in cerebral cortex (unique as finger prints)
- F) Cerebrum – Inner layer
- Thinking and learning
- G) Corpus Callosum – transfers info between the 2 hemispheres

Lobes

1. **Occipital lobe** – very back of the brain
 - Receive/interpret visual information from both eyes
2. **Temporal lobe** – controls hearing –additional processing of visual
 - May also be where memories are stored
3. **Parietal lobe** – receives sensations of touch and bodily position
4. **Frontal lobe** – organization, planning, creative thinking, informs the brain.
 - Injury will affect the sense involved with that lobe

Cerebral Cortex Hemispheres

- Only connect by corpus Callosum – thin ribbon like band between hemispheres
- Left ½ of the brain controls the right side, right ½ of the brain controls the left side

*There are some things that are only controlled by ½ the brain

Right

Creative thinking
Left hand
Fantasy
Art appreciation/music
Spatial construction

Left

Right hand
Speech/Language
Writing
Love
Math/Science

Reticular Formation – bundles of neurons

- Runs through hindbrain, midbrain and forebrain
- Deals with arousal, attention, and alertness, consciousness
- Sends alert signals and prioritizes incoming messages so the most urgent are answered first (read a book with the TV on)

Limbic System – also interconnected

Roles in learning and emotional behavior

Ring of structures around the thalamus

Includes → hypothalamus, thalamus, amygdala (violent emotions) and hippocampus (memories)

ALSO –

- Septal area = works with the amygdala and hypothalamus; pleasure area of the brain
- Fornix = bundle of fibers, carry signals from the hippocampus to the septal area

Spinal Cord

Cable of nerves that connect the brain to the rest of the body

Spinal cord and brain run together without a clear division.

Motor Cortex –

region of the cerebral cortex

located in the rear portion of the frontal lobe, just before the furrow that separates the frontal lobe from the parietal lobe.

The influencing movements of the face, neck and trunk, and arm and leg.

Somatosensory Cortex –

region of the cerebral cortex

located just behind the motor cortex – front of the parietal lobe

processes information from the skin (touch, pain and temperature)

Auditory Cortex –

Top of the Temporal lobe

hearing

Visual Cortex –

Very back of the occipital lobe

Processing visual stimuli

Broca's Area –

In the frontal lobe – left side

Damage:

prevents a person from producing speech

person can understand language

words are not properly formed

speech is slow and slurred.

Wernicke's Area –

Back of the Temporal lobe

Damage:

loss of the ability to understand language

person can speak clearly, but the words that are put together make no sense.

This way of speaking has been called "word salad" because it appears that the words are all mixed up like the vegetables in a salad.

To speak a word that is read, information must first get to the primary visual cortex. From the primary visual cortex, information is transmitted to the posterior speech area, including Wernicke's area. From Wernicke's area, information travels to Broca's area, then to the Primary Motor Cortex.

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