Nervous system Sept, 27, 2016

III: The Brain (CNS)

A. Introduction

B. Tools of Discovery

1- Clinical Observation - the oldest modest still in use, it was the only way. (case study see ch 1.)
- Case study on people with brain injuries with no interference

2- Brain manipulation - or purpose ↑ interfere with the funching of the brain observe the interferance
- Surgical - removing a part surgically
- Chemical - injecting
- Electrical stimulation - implant electrodes in the interest area.
- Magnetic - ~~impose~~

- Optogenetics - genetically engeneer neurons to respond to light then use light to manipulate (only used on mice)
- Sonogenetics - Sound waves to manipulate the brain (new last year used on a worm).

3- EEG - been around for a hundered year.
- allow to see brain in action.

4- Neuroimaging Techiques -
a. - CT or CAT scans - uses x-ray, multiple images multiple angles
- shows anatomy & structure
- if their is a disease but doesn't show brain in action

b. - MRI - To date we believe it's a safe test
- use powerful magnetic field to image the brain
- anatomy, structure [illegible] detection

(c.) PET scan - inject with radioactive material (glucose with "
- allows to pick up glucose because brain consume
brain for energy ↑ active ↑ consume glucose
- colored image. red ↑ active
- AI scanner tells the brain activity

(d.) FMRI - track the flow of oxygenated blood.
beauz- ↑ active brain ↑ oxygenated blood flow
FMRI allows to see brain in action.

(e.) DSI - Kind of MRI help map connections between neuron

(f.) MRS - Type of MRI helps study & measure the biochem. of the brain. non-invasive, used on cancer patients.
- helps study the biochem of the tumor.

C - Tour of the Brain

1. Lower brain structures

(a.) Brain stem - 500 million years old
- Relay station - all info from body go through it & vice versa
- Cross over point - the info coming from right side body crosses left side of the brain & vice versa.
- info from the right side of brain go to left side of body & vice versa
- life center of body - contains structure controls functions that are essential for life

Parts.
- Medulla controls breathing, heart beat etc., reflexes like swallowing & vomiting.
- Reticular formation - linked to arousal wakefulness & sleep.

(b) Thalamus - on top of brain stem & center of brain
- Relay station because all senses except smell sends info to it & it transmits to higher brain areas and vise versa. recieve higher & transmits to lower.
- It filter & sorts info recieving, down play & highlight info. like highlighting imp ~~text~~ info to a book.
- It regulates wakefulness → goos. bumps.

(c.) Cerebellum - Known as little brain. (controls volentary movement, balance, posture & muscle tone) ex: writing & learning skills that become automatic.
- 1/10th of brain volume = over half brain neurons it contains (20x more connections)
? get people to think that is something more found → linked to complex cognitive function like learning & memory.
- sensitive to alcohol

(d.) Limbic System - over 200 million yrs (In the middle.)
- It consists of multiple structure that do multiple functions.
- linked to emotions, memory, motivation, learning & etc.

examples:
Amygdala - linked to emotions. (particular fear & aggression) & perception of emotions detection & process info about threatening stimulai.
- what you being consciously aware. it works.

Hypothalamus - (called brain within brain) controls vital & essential body functions.
control -- Drives (hunger, thirst)
- responsible maintaining homeostasis, internal temp. balance of your body.