## Central Nervous system

Somatic Nervous system - Action of muscle and skin

Autonomic - actions you do not need to think to do, internal organs and glands

Sympathetic - energy levels increase and stress response, fight or flight, can not stay in it for long, at a healthy dose can be good

Parasympathetic - allows us to calm down, back to normal heart rate etc..

problems occur when people can not turn off the sympathetic and create stress long after the stress

## Understanding the brain

Franz Gall and Phrenology

phrenology (early 1800) brain is divided into different regions and each one of the regions is responsible for different parts of someones personality. Bigger the region the more influence it has on the person

you can tell things about someone personality by the shape of their skull

one thing they got right is that you can divide the brain into regions and each one served a different functions

the more brain area devoted to a specific function the more influence will have

## Divisions of the brain

modern brain can be divided into 4 different lobe

temporal lobe - auditory processing, language and memory, taste and smell. Hippocampus involved in developing memory found in temporal lobe. Damage brain = loss of sense of taste

## Divisions of the brain (cont)

frontal lobe - planning, organizing and impulse control. How to get through a problem is very depending on the frontal lobe. Damage to brain = impulse control, say and do random things. Origin of all motor control

Pariental lobe - touch and spatial awareness. Damage = person stops being who they are, spacial awareness. Unconsious awareness of space

Occitpital lobe - visual processing. very back of the brain

Cerebllum - motor movement. Bottom of the brain. Damage = speech problems or movement problems

Two side of Brain - whatever is happening on the left side is happening on the right

## Human brain

100 billion neurons in a healthy adult brain

surface area of the brain - Gyrus (pl. gyri ) hills - Sulcus (pl. sulci) valley - fissure, deep sulcus, define left from right

cerebral hemispheres - connected by the corpus callosum. super highway of signals. everything we do needs both hemisphere working together

Orientation of the brain

Structure towards the brains midline are medial, those located towards the sides are lateral

Anterior is in front, posterior is at the back

Structures towards the bottom of the brain or one if its part of ventral

Structures atop of the brain or structure within the brain are dorsal

## Blood circulation in the brain

Brain matter

circulating throughout the brain - blood

oxygen - moves very freely to blood cells

Stroke - loss of blood flow in brain

Ischemic stroke - kills brain cells - blood blockage - blood thinner allows blood to flow more free

Hermorhagic stroke - brain bleed - blood mixes with brain cells - runaway immune cause more damage

blood brain barrier

most things are unable to pass into blood - protective thing

more active different regions are during its task the more blood flow is required

## techniques for studying the brain - Histological

the brain is sectioned and sliced psotmortem and neuronal loss is examined

if there is damage to the brain you can actually see it

measure cell loss

best way to study the brain and collect data

downside: person has to be dead

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## Nervous System

Central nervous system

Peripheral nervous system (PNS)

PNS- sensory connections to receptors, motor connections

## Brain stem

Medulla - controls heart rate and breathing

Reticular formation - wake up from sleep, allows you to become consciously aware that you are no longer sleeping

pons - bridge to the cerablem, deep sleep to rem sleep

## complex behaviour vs. basic

forebrain (cortex) - responsible for most complex behaviour. example: language, reasoning, etc...

brainstem - source of much of our unconscious behaviours that are critical for survival

## Measuring electrical activity in the brain

electeoncephalography (EEG)

slow waves

electrical activity in the brain forms different wave pattern

## Diffusion tensor imaging (DTI)

visual pathways of the brain

neuropathways - different kinds of signals pathways

## Magnetic resonance imaging (MRI)

can produce more detail than CT scan

can identify specific tissue

## computerized tomography (CT scan)

x-ray passed through the brain at many different angles creating many different images

## static imaging techniques

## Near-infrared spectroscopy

identify oxygen in blood

uses light to identify blood that has less oxygen

completely non-invasive

real time measurement - person is doing a task

safe

downside - limited to the outside of the brain because light can not travel deep enough into the brain

## functional magnetic imaging (fMRI)

change in the oxygen content of the blood alter its magnetic properties

functional - used while a person carries out a task

tissue that is higher in oxygen can stay out

measured in blood flow

does not require a tracer - less invasive

## PET scanning

exploit blood flow

targets compounds like glucose - radioactive tracer

real-time measurement

Identify what regions of the brain is active during a task - ex. listening to a person speak