

1		2												3	4	5	6	7	0																
																	1 H hydrogen 1								4 He helium 2										
		Key relative atomic mass atomic symbol name atomic (proton) number																																	
7 Li lithium 3		9 Be beryllium 4												11 B boron 5		12 C carbon 6		14 N nitrogen 7		16 O oxygen 8		19 F fluorine 9		20 Ne neon 10											
23 Na sodium 11		24 Mg magnesium 12												27 Al aluminium 13		28 Si silicon 14		31 P phosphorus 15		32 S sulfur 16		35.5 Cl chlorine 17		40 Ar argon 18											
39 K potassium 19		40 Ca calcium 20		45 Sc scandium 21		48 Ti titanium 22		51 V vanadium 23		52 Cr chromium 24		55 Mn manganese 25		56 Fe iron 26		59 Co cobalt 27		59 Ni nickel 28		63.5 Cu copper 29		65 Zn zinc 30		70 Ga gallium 31		73 Ge germanium 32		75 As arsenic 33		79 Se selenium 34		80 Br bromine 35		84 Kr krypton 36	
85 Rb rubidium 37		88 Sr strontium 38		89 Y yttrium 39		91 Zr zirconium 40		93 Nb niobium 41		96 Mo molybdenum 42		[97] Tc technetium 43		101 Ru ruthenium 44		103 Rh rhodium 45		106 Pd palladium 46		108 Ag silver 47		112 Cd cadmium 48		115 In indium 49		119 Sn tin 50		122 Sb antimony 51		128 Te tellurium 52		127 I iodine 53		131 Xe xenon 54	
133 Cs caesium 55		137 Ba barium 56		139 La* lanthanum 57		178 Hf hafnium 72		181 Ta tantalum 73		184 W tungsten 74		186 Re rhenium 75		190 Os osmium 76		192 Ir iridium 77		195 Pt platinum 78		197 Au gold 79		201 Hg mercury 80		204 Tl thallium 81		207 Pb lead 82		209 Bi bismuth 83		[209] Po polonium 84		[210] At astatine 85		[222] Rn radon 86	
[223] Fr francium 87		[226] Ra radium 88		[227] Ac* actinium 89		[267] Rf rutherfordium 104		[270] Db dubnium 105		[269] Sg seaborgium 106		[270] Bh bohrium 107		[270] Hs hassium 108		[278] Mt meitnerium 109		[281] Ds darmstadtium 110		[281] Rg roentgenium 111		[285] Cn copernicium 112		[286] Nh nihonium 113		[289] Fl flerovium 114		[289] Mc moscovium 115		[293] Lv livermorium 116		[293] Ts tennessine 117		[294] Og oganesson 118	

* The Lanthanides (atomic numbers 58 – 71) and the Actinides (atomic numbers 90 – 103) have been omitted.

Relative atomic masses for **Cu** and **Cl** have not been rounded to the nearest whole number.

The nervous system

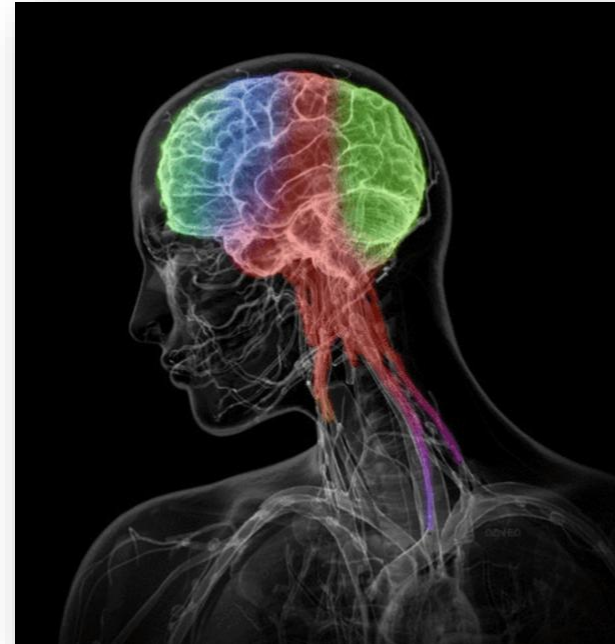
Homeostasis

Central nervous system

TA: The brain

TA: The eye

TA: Control of body
temperature



Notes:

2 ways of sending messages

Electrical impulses
Hormones

Homeostasis

What is
homeostasis?

Things controlled by
homeostasis

The two mechanisms
for homeostasis

CNS- IMPULSES ✓

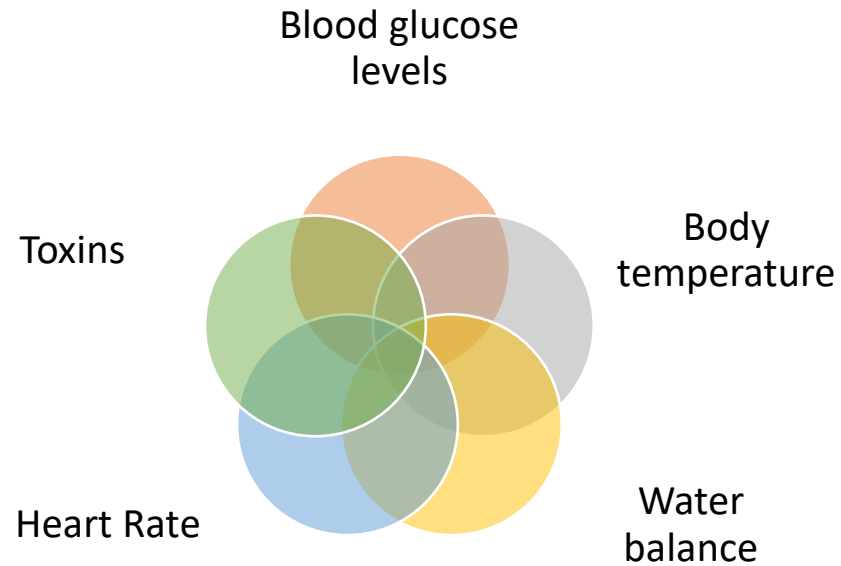
MAINTAIN CONSTANT
STATE

What is homeostasis?

Regulation of
the internal
environment
of the body

37 °C (Human
Body)

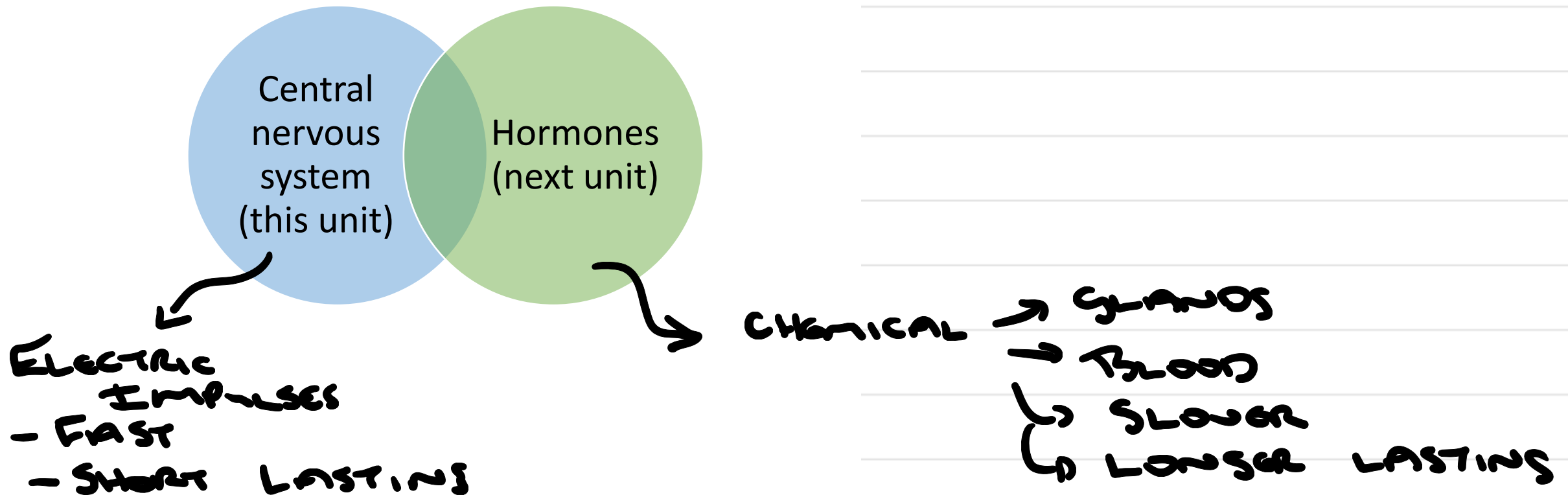
Things controlled by homeostasis



DIABETES

SUGAR LEVELS

The 2 mechanisms for homeostasis



Notes:

Central nervous system

What is the central nervous system?

What is the peripheral nervous system?

Receptors

Control centres

Effectors

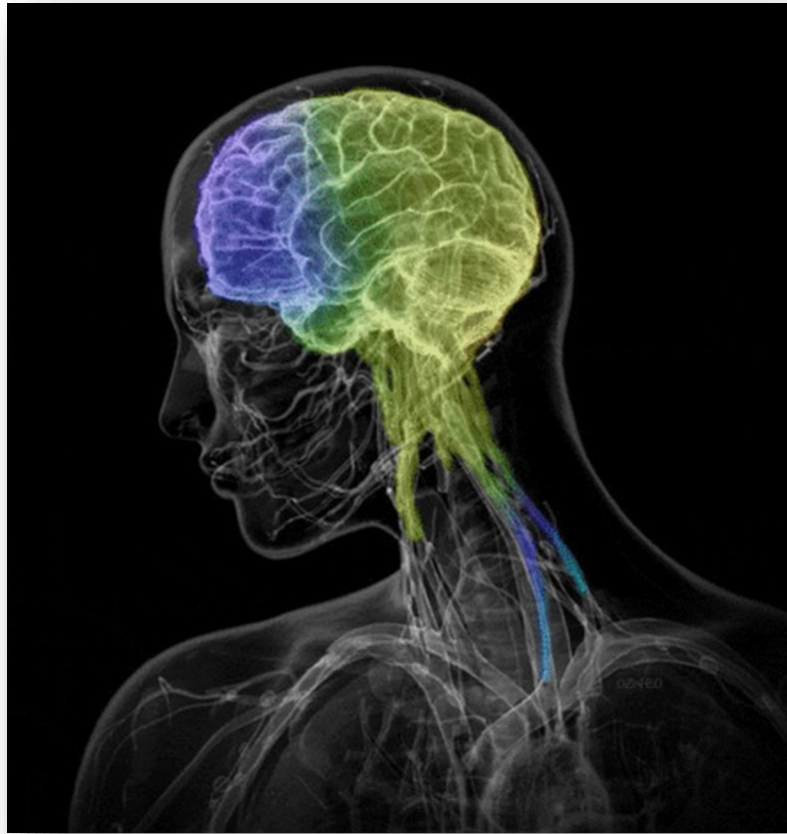
The journey of an impulse

Different types of neurons

The reflex arc

Investigating reaction time

What is the central nervous system?



Brain and spinal cord

Controls voluntary and involuntary actions

It does this by **transmitting** electrical signals along your neurons

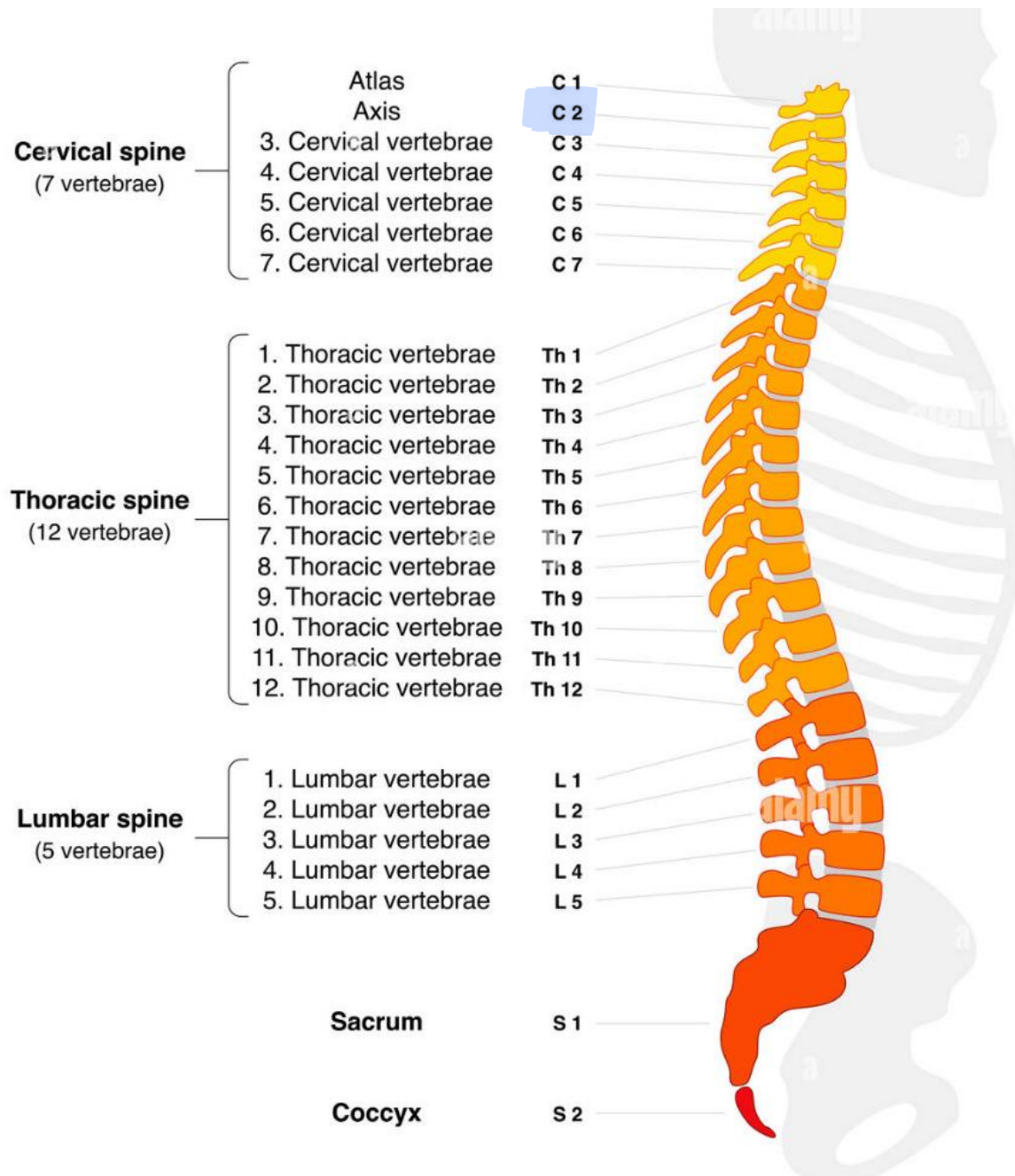
Electrical signals travel at 250 mph

The spinal cord



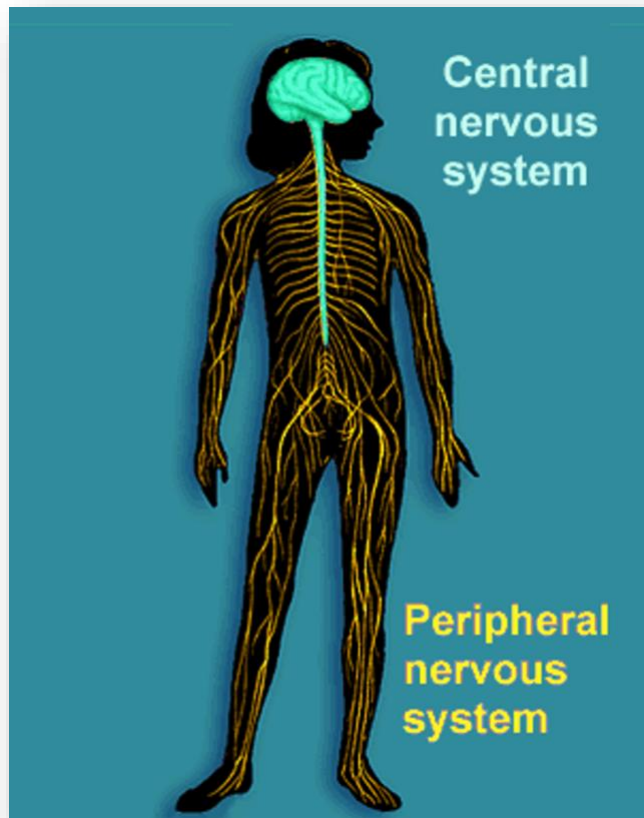
Consists of nerves that carry incoming and outgoing messages between the brain and the rest of the body

How many
vertebrae do
humans have?



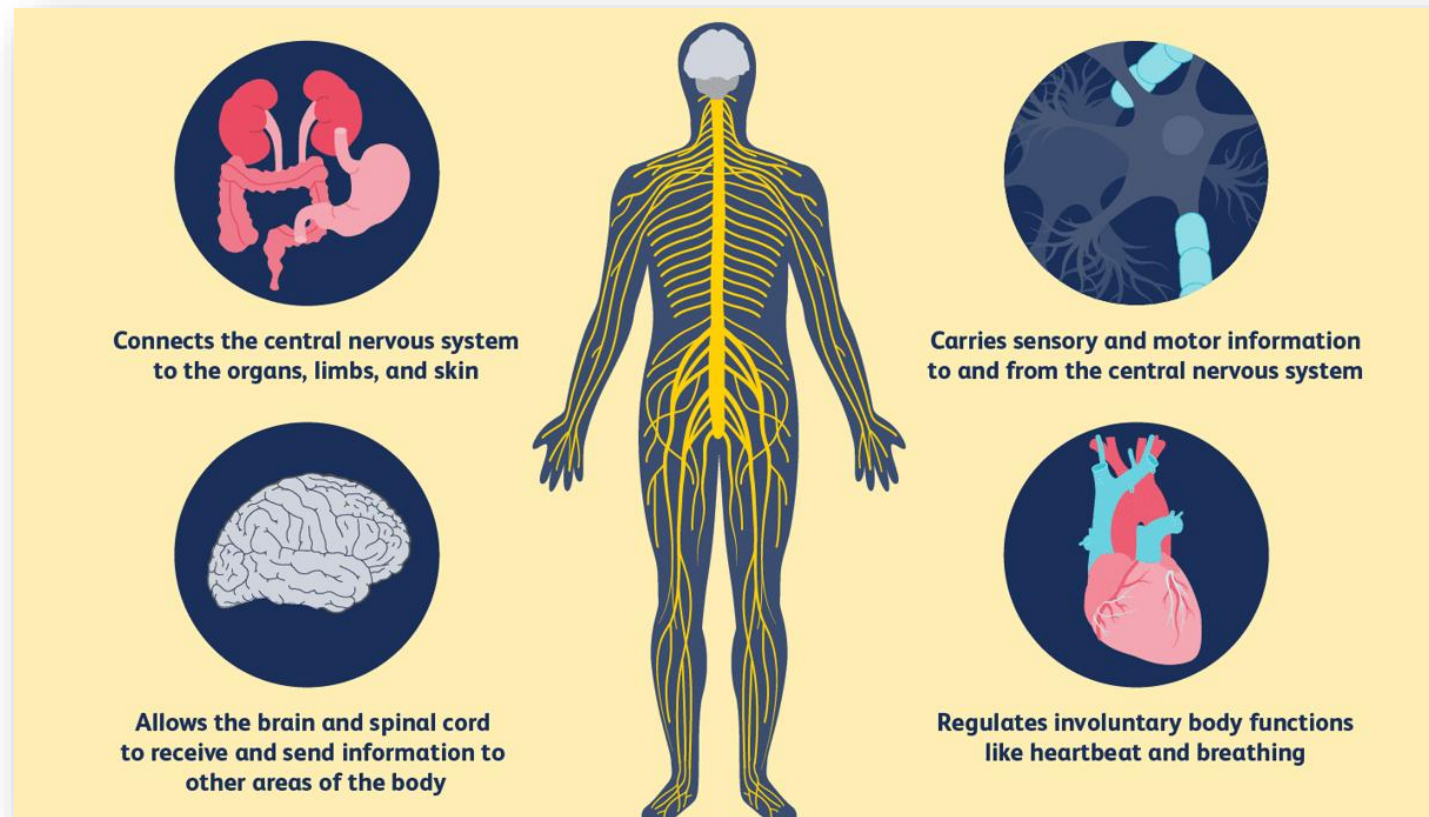
Human vertebrae

What is the peripheral nervous system?



Parts of the nervous system outside the brain and spinal cord

What does the peripheral nervous system do?



Receptors

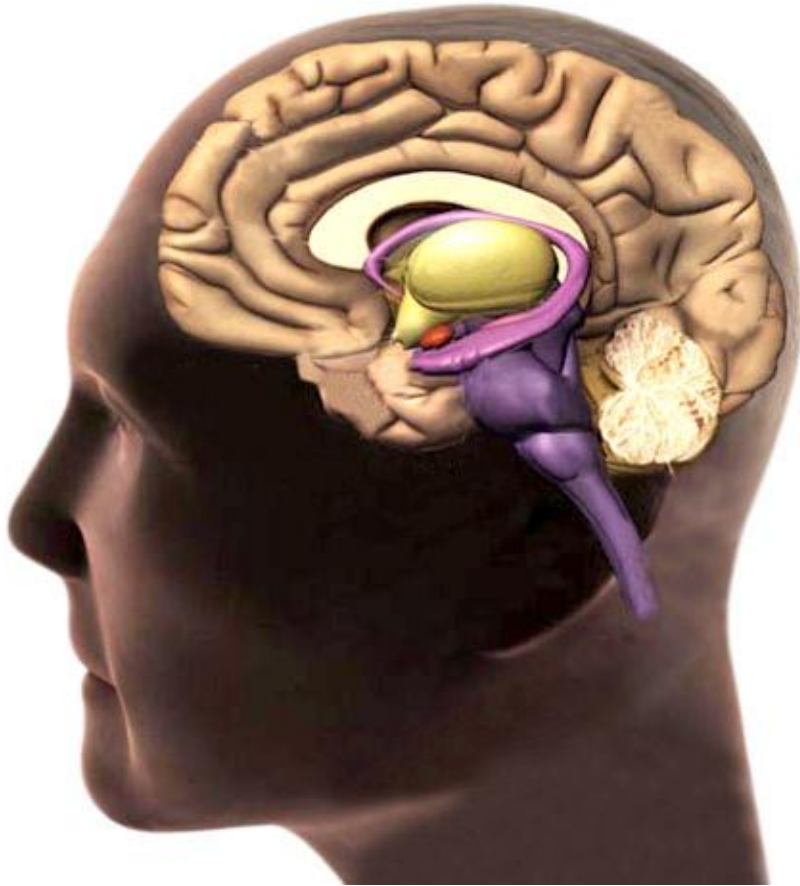
Group of cells at the beginning of a pathway

Electrical impulses are generated by receptors

All messages sent along the nerves are electrical

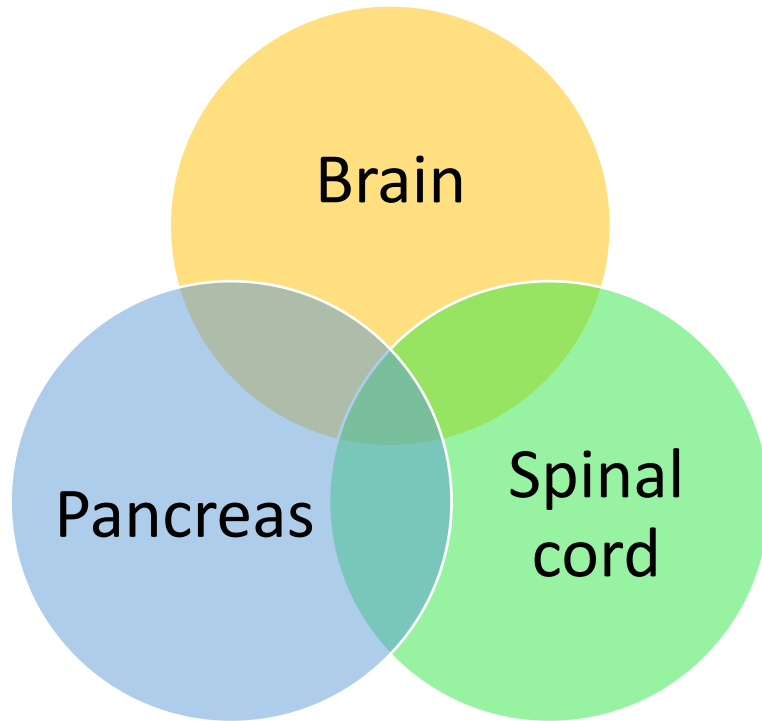


Control centres



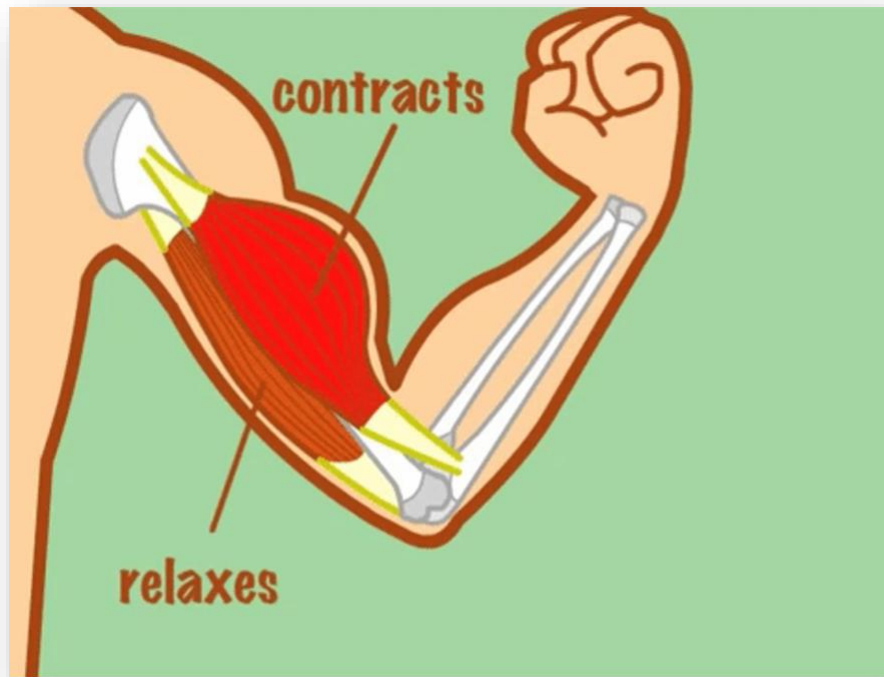
Release
hormones or
electrical signals
to **effectors**
which bring
about a response

What parts of your
body are control
centres?



Pancreas { INSULIN
GLUCAGON
AMYLASE
LIPASE
PROTEASE

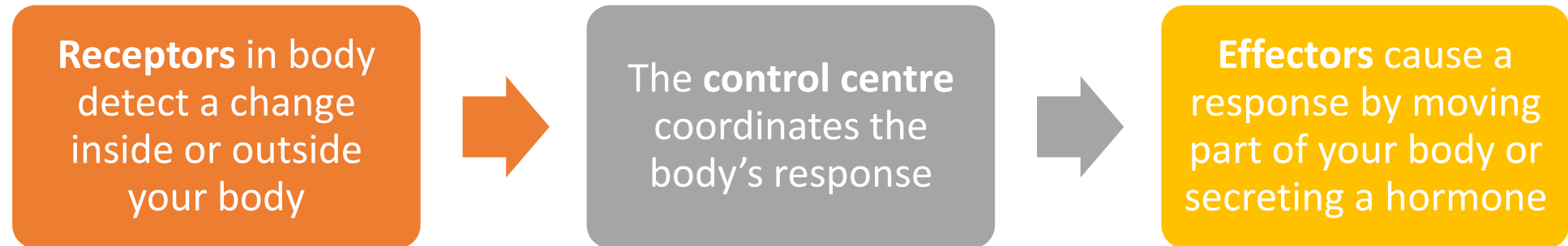
Effectors



Cause a response by moving part of your body or secreting a hormone

Effectors are muscles or glands

Overall central nervous system process

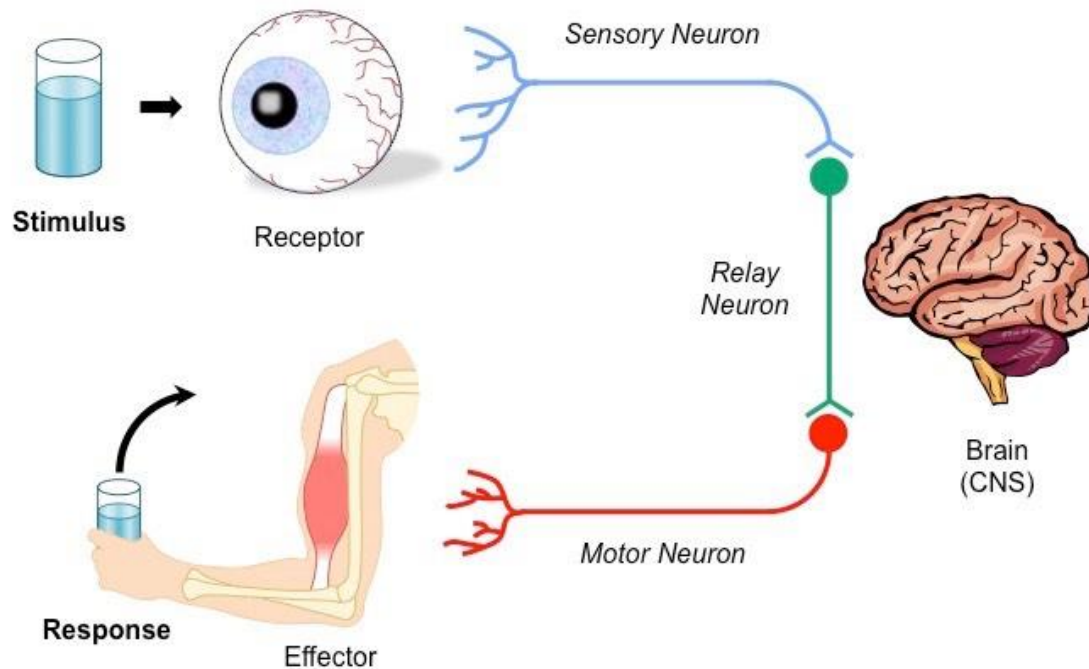


Sense and stimuli

Sense	Organ	Stimuli
Sight	Eyes	Light
Hearing	Ears	Sound
Taste	Tongue	Chemicals in food
Smell	Nose	Chemicals in air
Touch	Skin	Touch, pressure etc

THE BRAIN ONLY
'READS' ELECTRICAL
SIGNALS.

The journey of an impulse



Receptor starts electrical impulse



Impulse moves along series of neurons

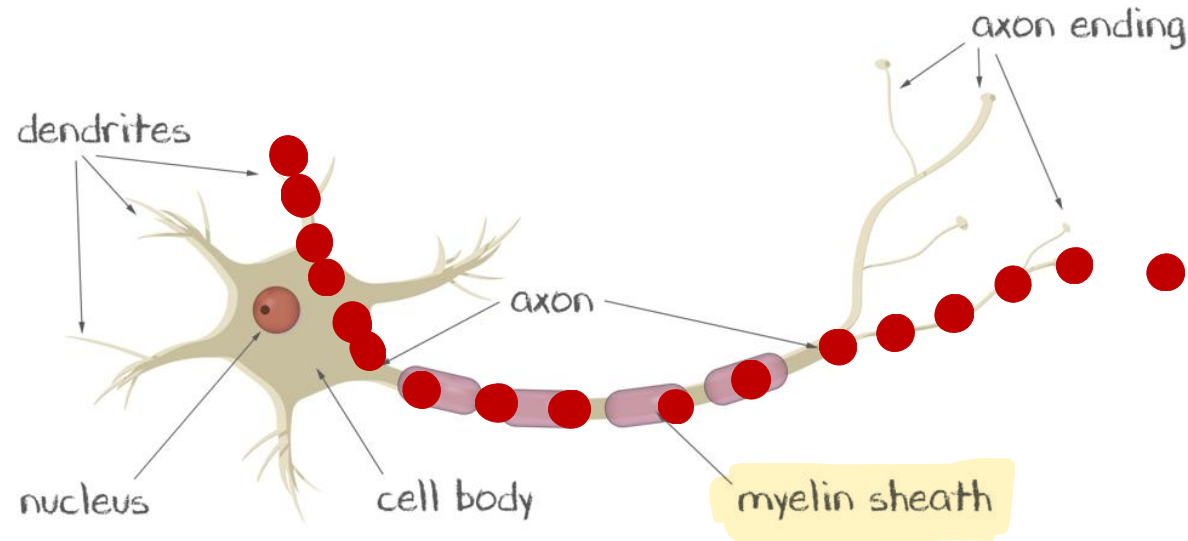


Impulse reaches **control centre**
(brain and spinal cord)



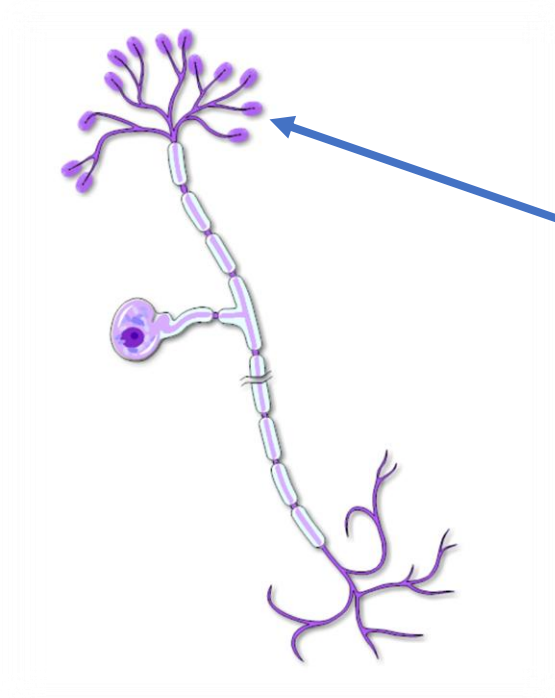
Electrical impulses are then passed to effectors
(muscles or glands)

What is a neuron?



A cell of the nervous system, which conducts nerve impulses

Sensory neuron



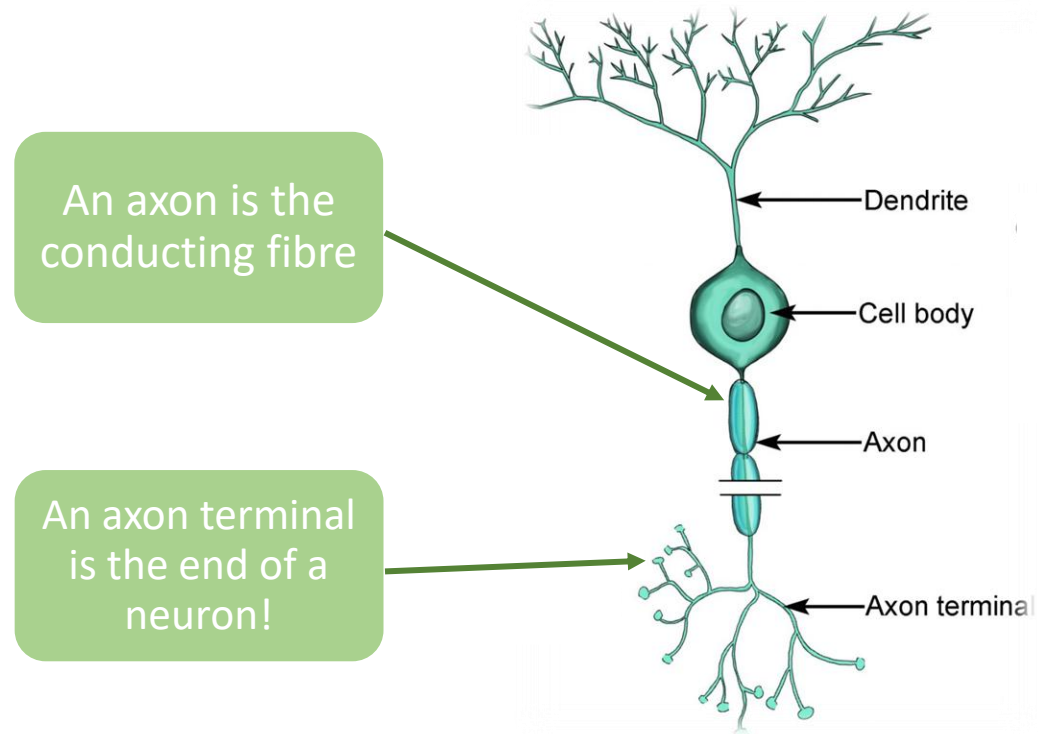
A dendrite is the branched beginning of neurones where chemical neurotransmitters transmit an impulse

Neuron that carries electrical impulse from receptor *towards* central nervous system

- connects A
RECEPTOR up to
A RELAY
NEURON

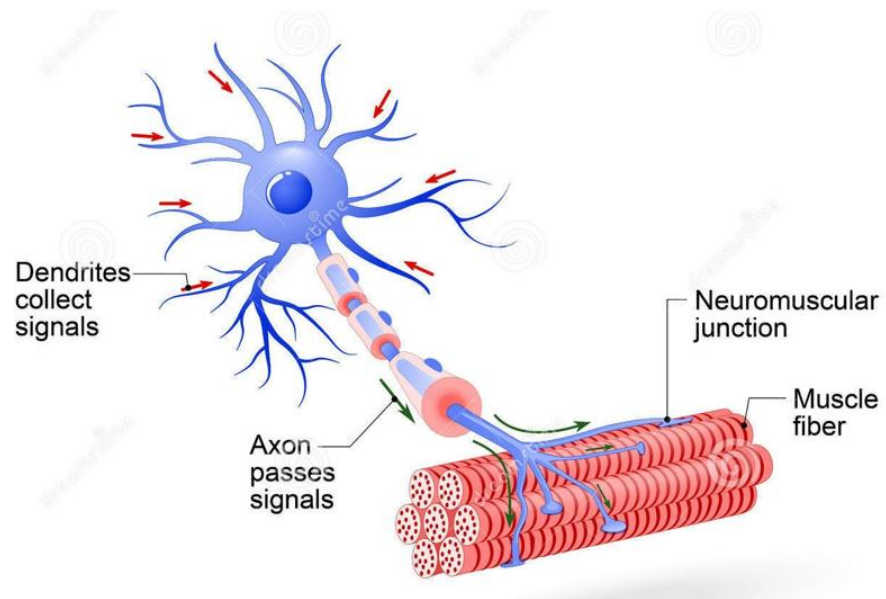
Relay neuron

- CONNECTS TO
SENSOR NEURON



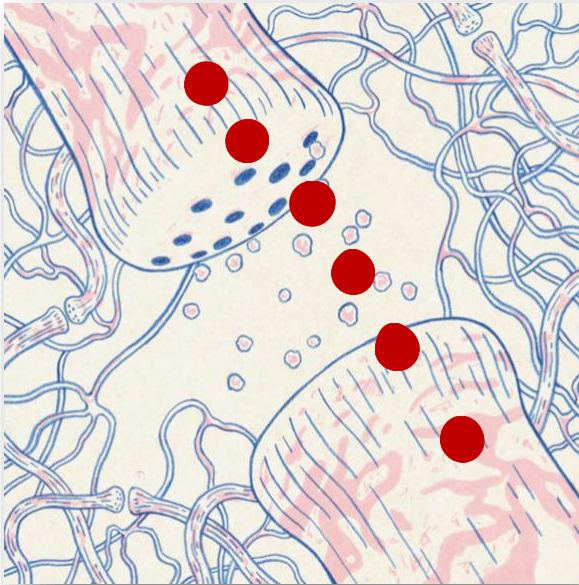
These are the only neurons in your central nervous system!!

Motor neuron



Neuron that carries electrical impulses
away from CNS to an effector

Synapses



A small gap between the dendrite (beginning) of one neuron and the end of another neuron

How do impulses 'jump' synapses?

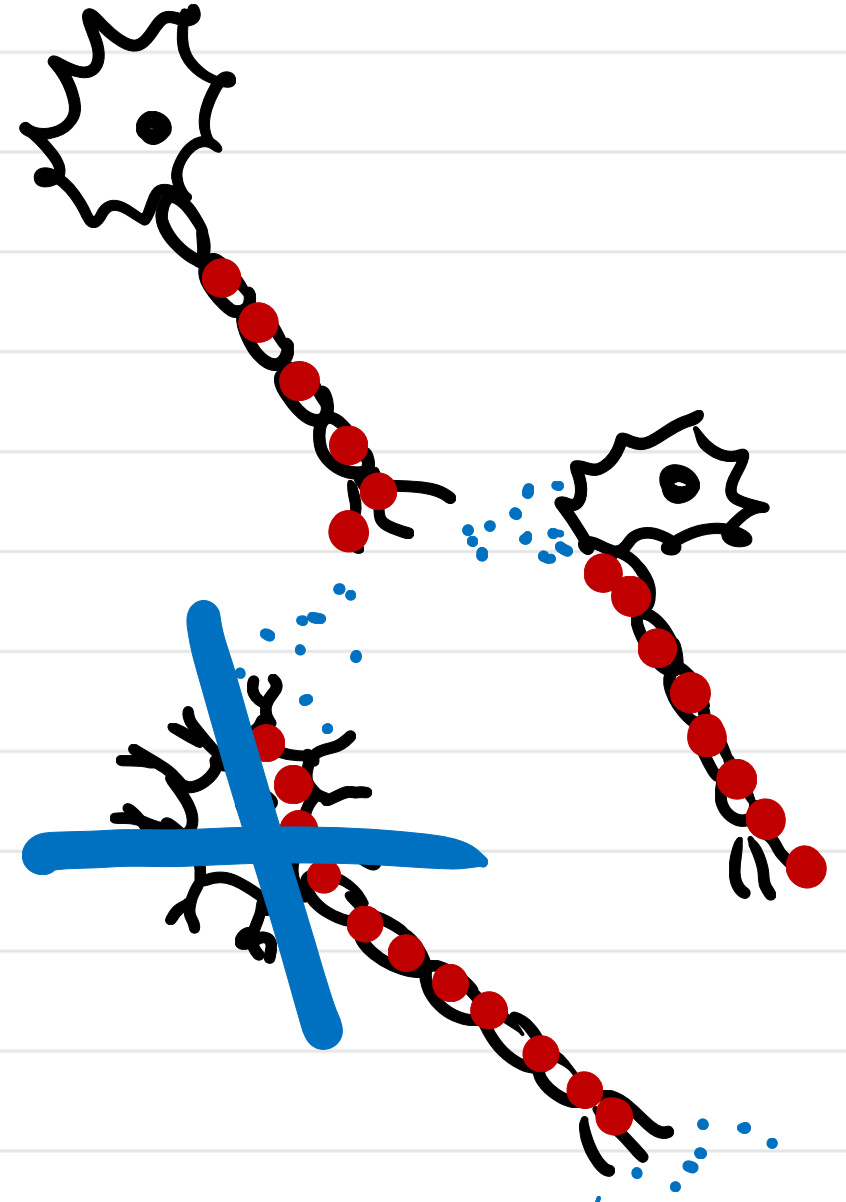
Roots in the axon terminal
convert electrical impulses
into chemical signals



These chemical signals
diffuse across the synapse



The dendrites convert the
chemical signal back into
an electrical impulse



Myelin sheath



A fatty substance that surrounds the axon

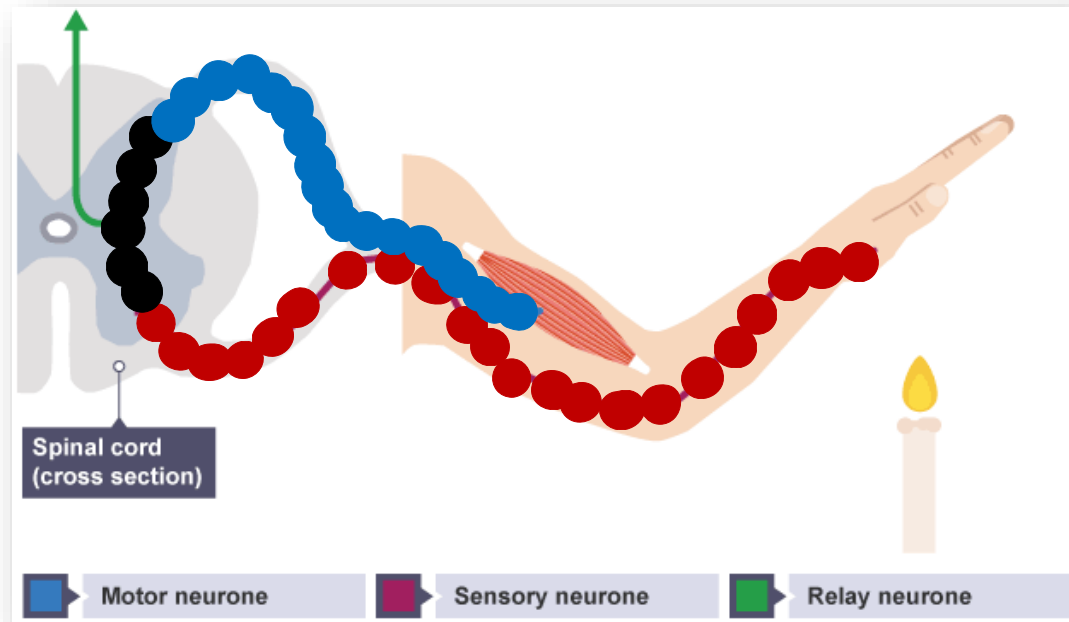
Insulating layer

* STOPS LOSS OF
SIGNAL

Key neuron terms

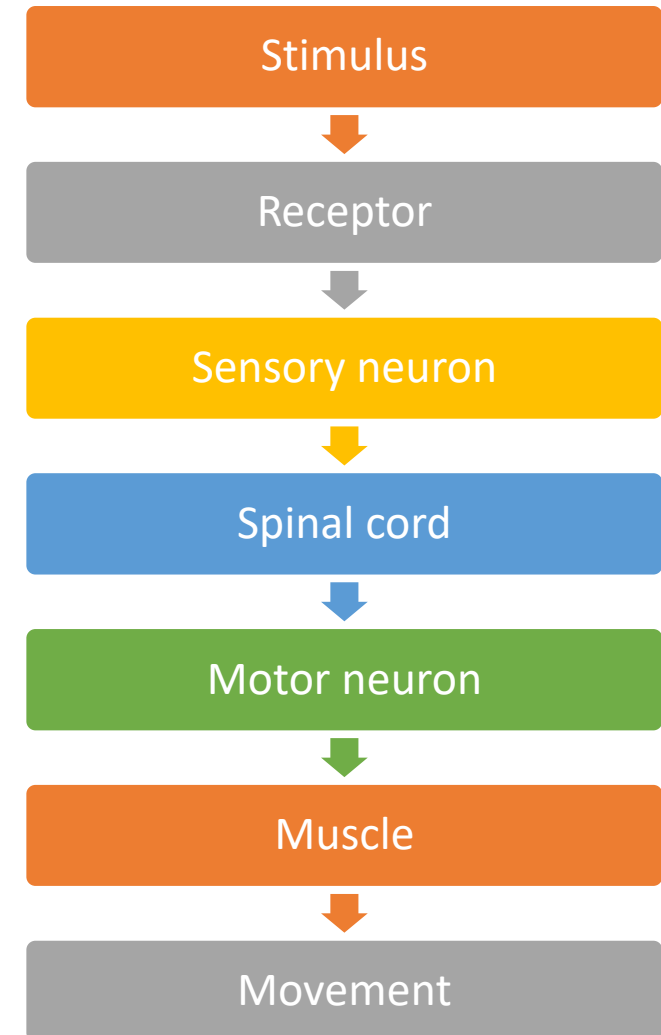
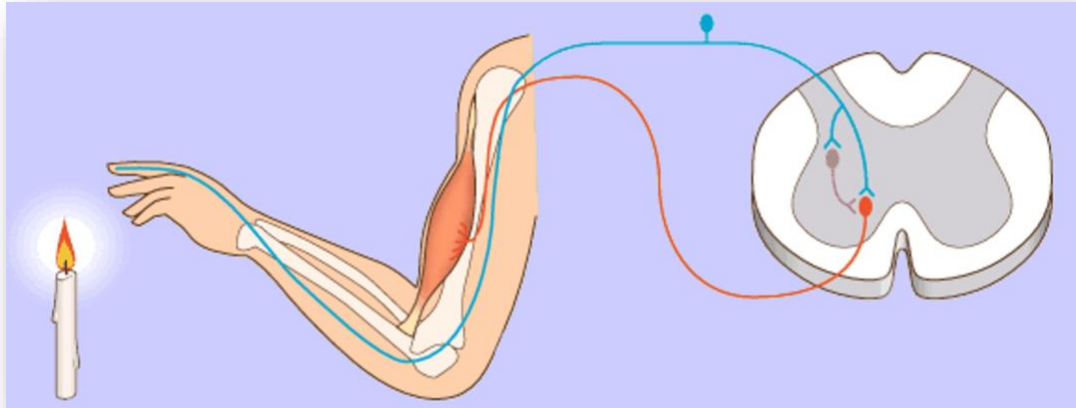
Term	What it means
Neuron	Specialised cell that carries electrical impulses
Sensory neuron	Neurone that carries electrical impulse from receptor towards central nervous system
Relay neuron	Neurone that carries electrical impulse around central nervous system
Motor neuron	Neurone that carries electrical impulses away from CNS to an effector
Effector	Muscle or gland

The reflex arc



The route of an electrical impulse that avoids the brain to save time

Reflex arc in action



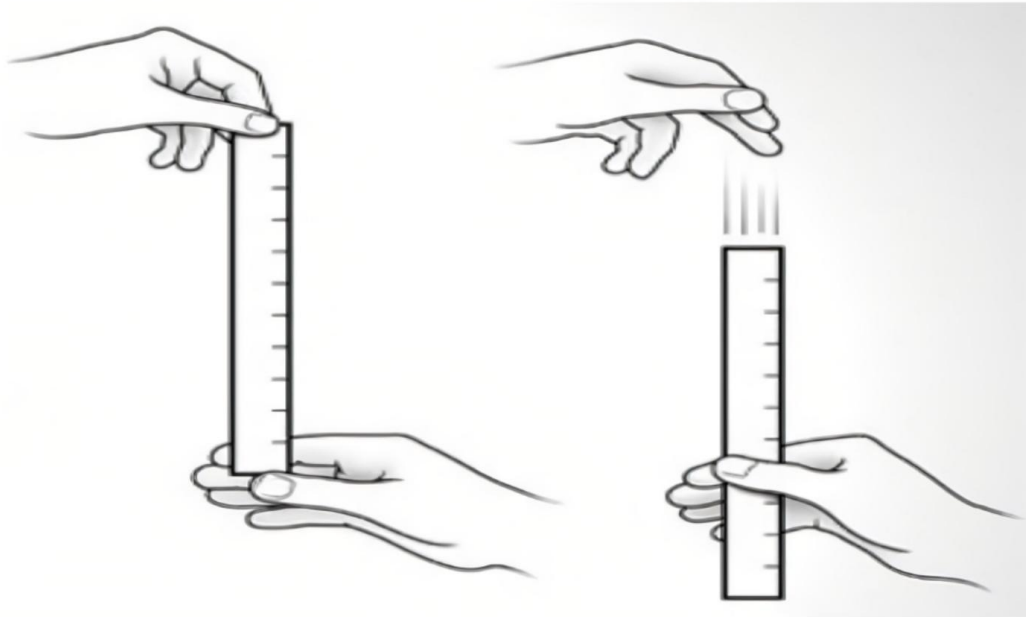
Eyes dilating



This is automatic and
therefore part of the reflex arc

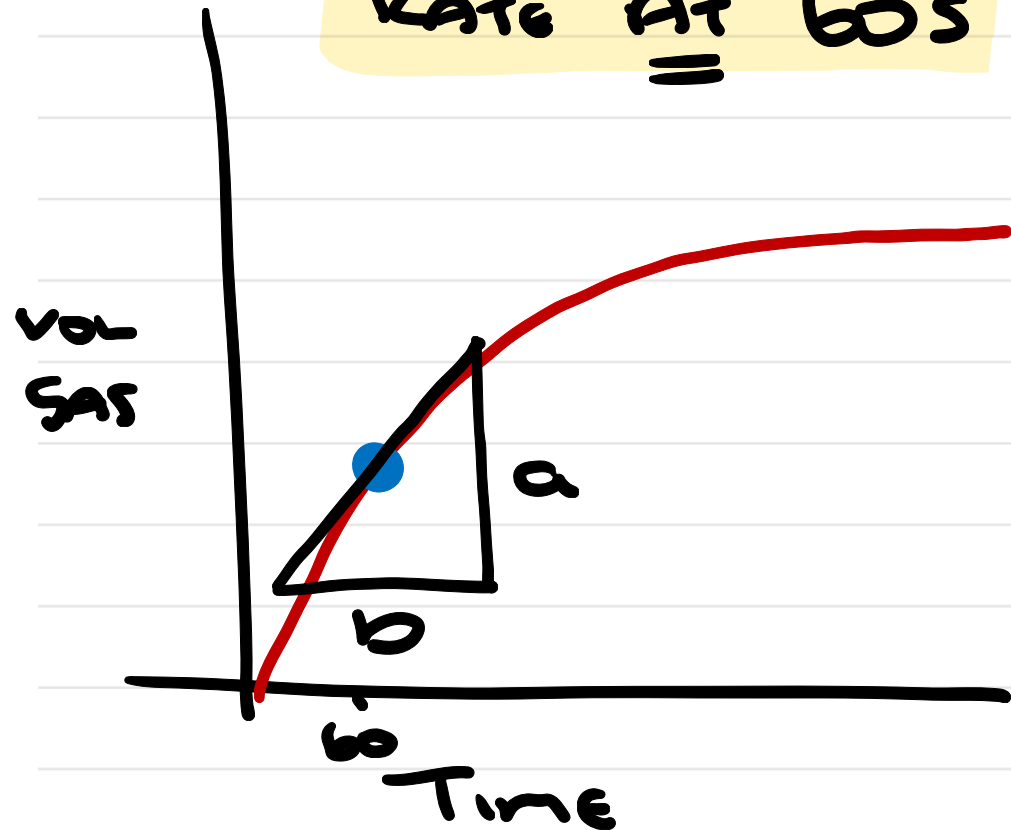
WHY DO OUR
EYES DILATE?

Investigating reaction time



Notes:

RATE AT 60S



Average Rate
up to 60 seconds

VOL
GAS



The brain (Triple)

Main parts of the brain

Cerebrum

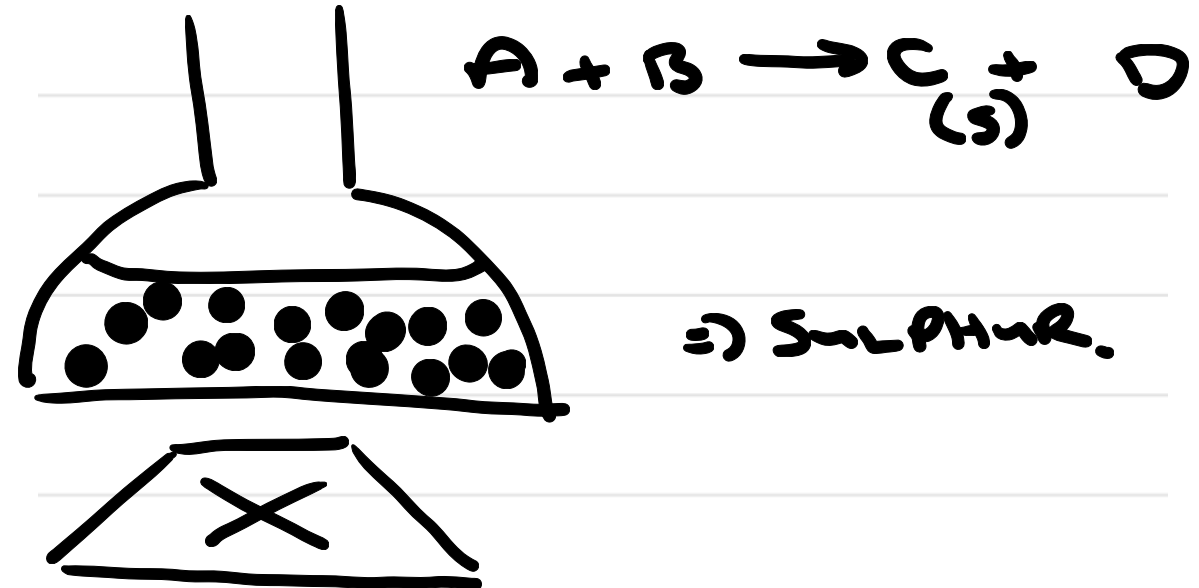
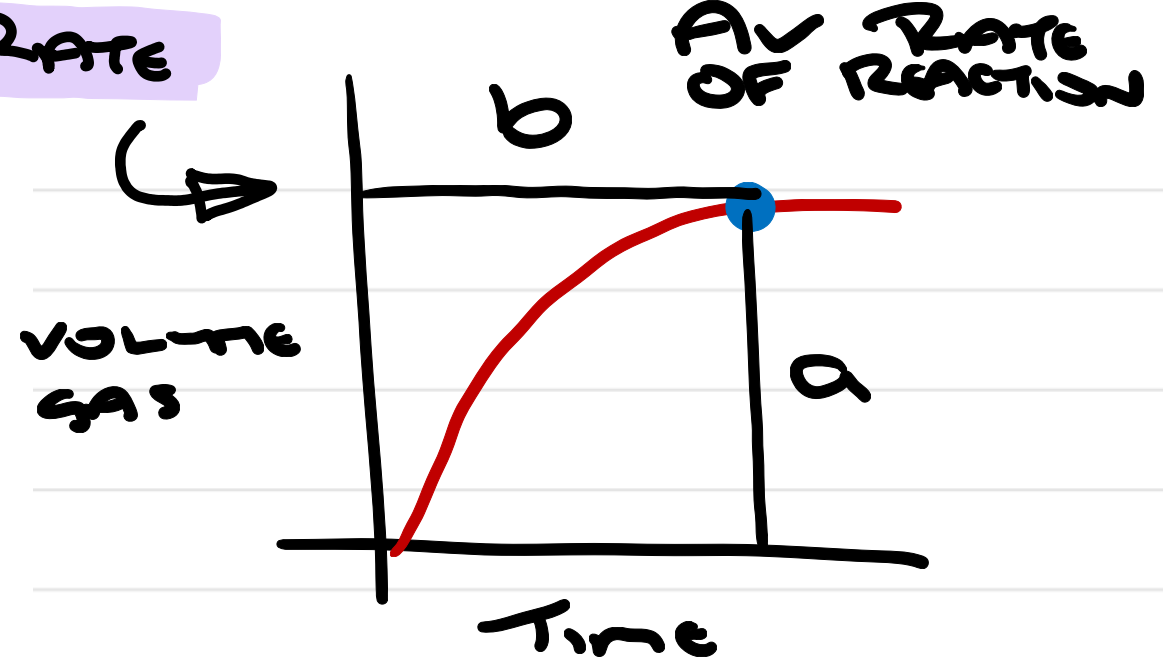
Cerebral cortex

Cerebellum

Medulla

Neuroscience

Treating the brain



Almost all animals
have a brain



My Octopus Teacher

Equilibrium



• Flux

CONCENTRATIONS A, B & C
ARE CONSTANT

Exam Review

Some animals don't
have a brain



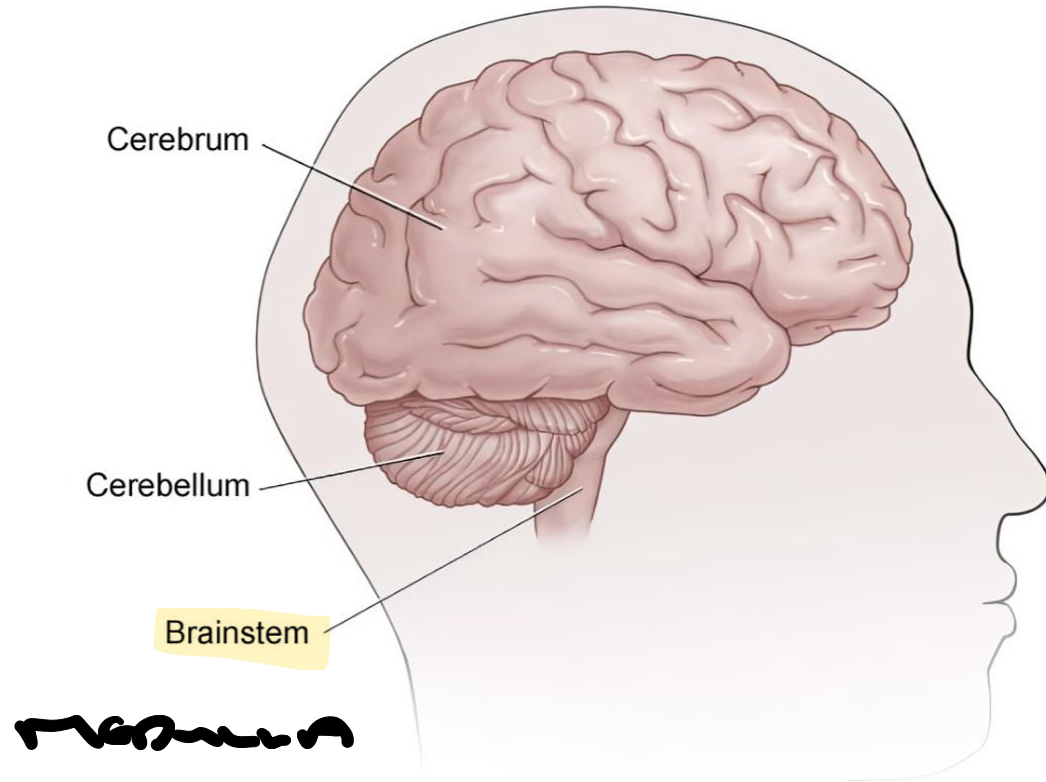
Concentration

A + B $\rightleftharpoons$ C
~~LESS~~ ~~MORE~~
MORE LESS

Temperature

A + B $\rightleftharpoons$ C
~~HOT~~
COLD

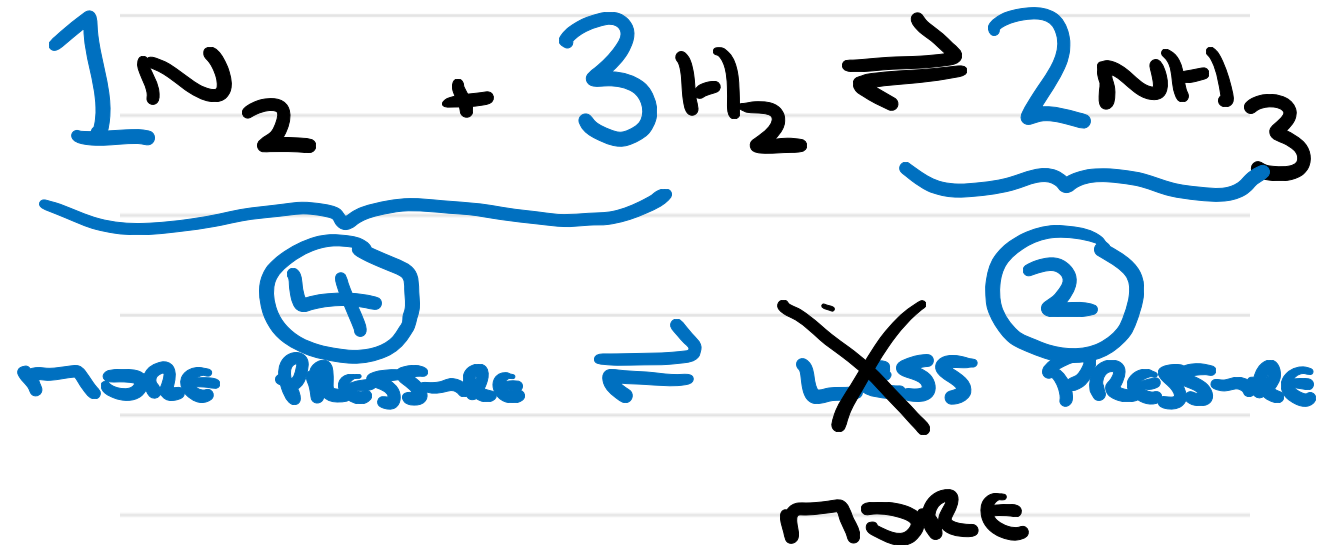
Main parts of the brain



~~CO₂~~

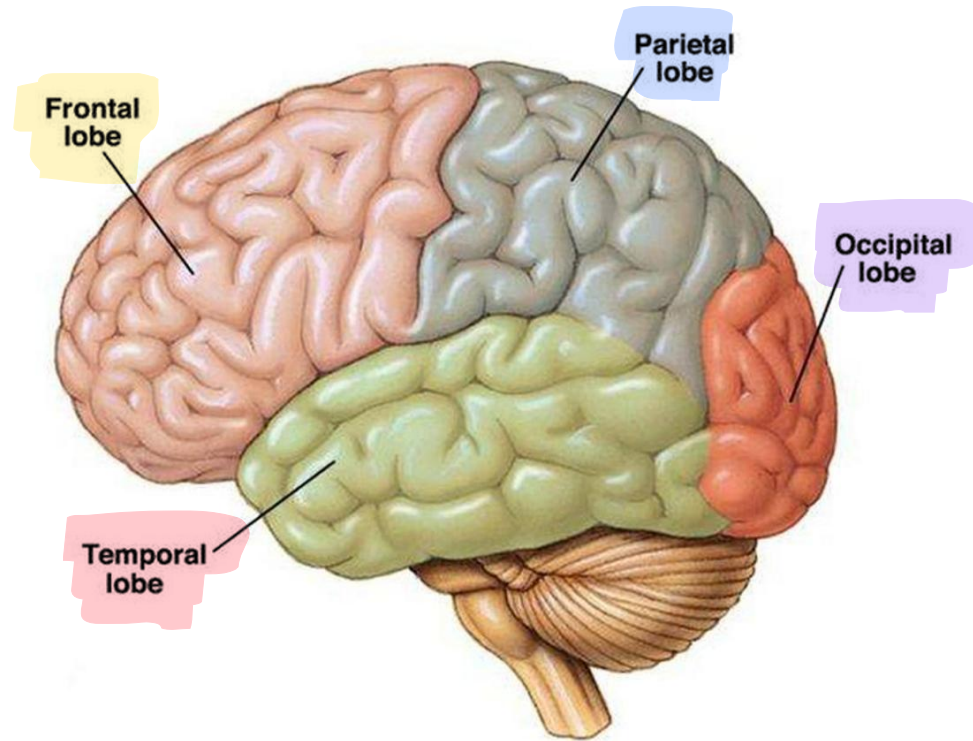
HOT

Pressure $\leftarrow$ Ammonia
HABER Process



Cerebrum

(largest part of the brain)



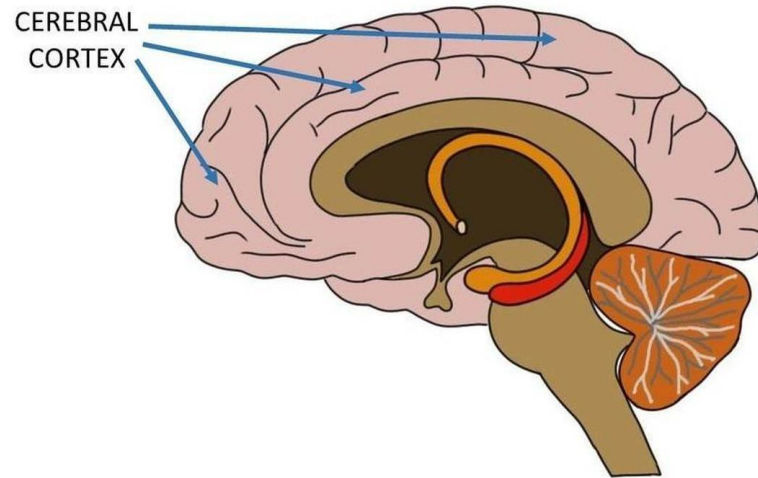
Frontal lobe: controls voluntary movements

Parietal lobe: processes sensory information

Temporal lobe: provides our visual memories and processes language

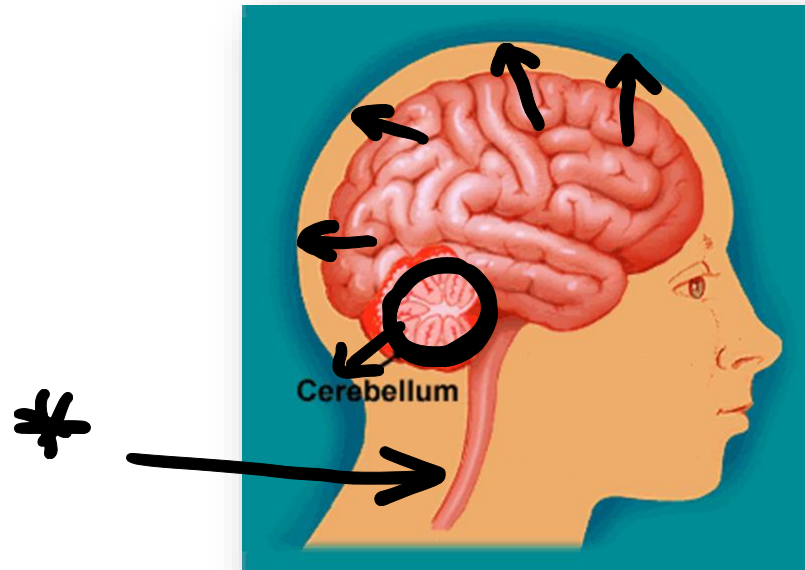
Occipital lobe: processes visual information

(outer layer of cerebrum)



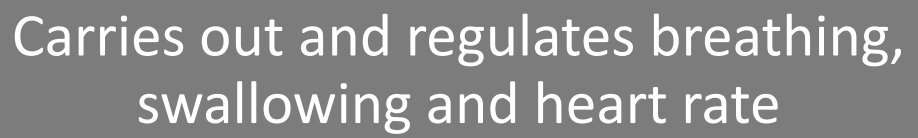
Centre of conscious thought and memories

Cerebellum

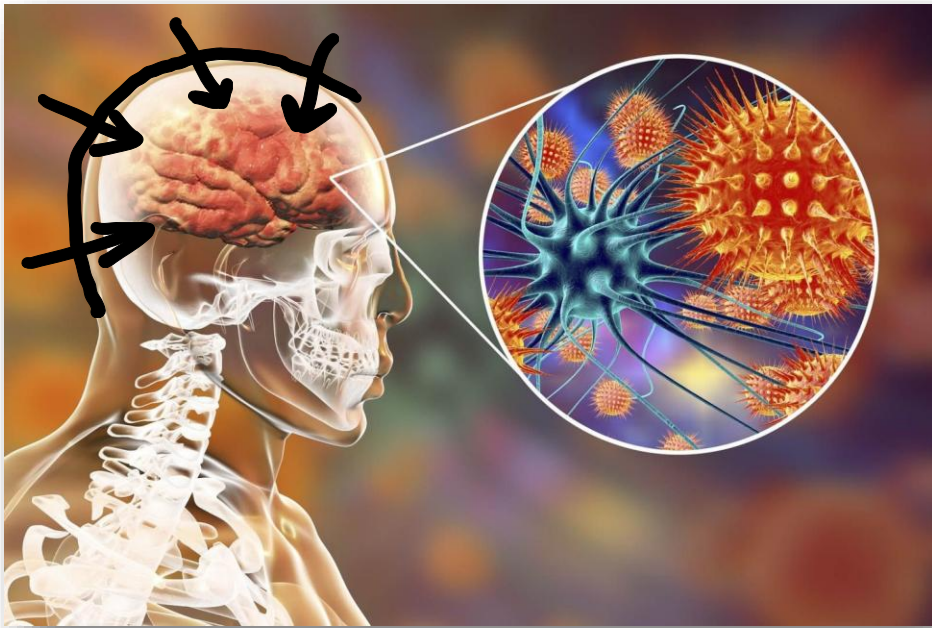


Controls and coordinates
movements of your muscles

(brain stem)



Meningitis



Infection of protective membrane
that surrounds the brain

Neuroscience

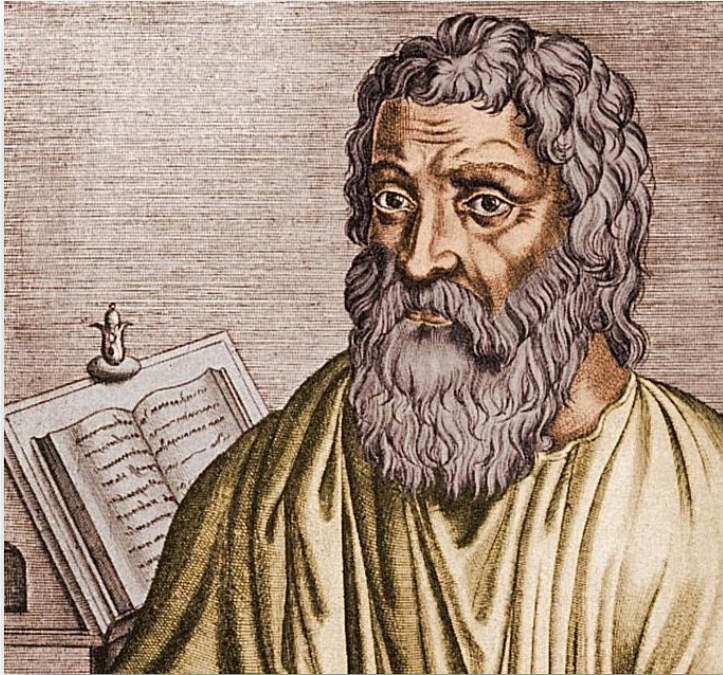


The study of the brain

Hippocrates

(460-370bc)

→ greek



First person to think that senses and intelligence were related to the brain

Trepanning



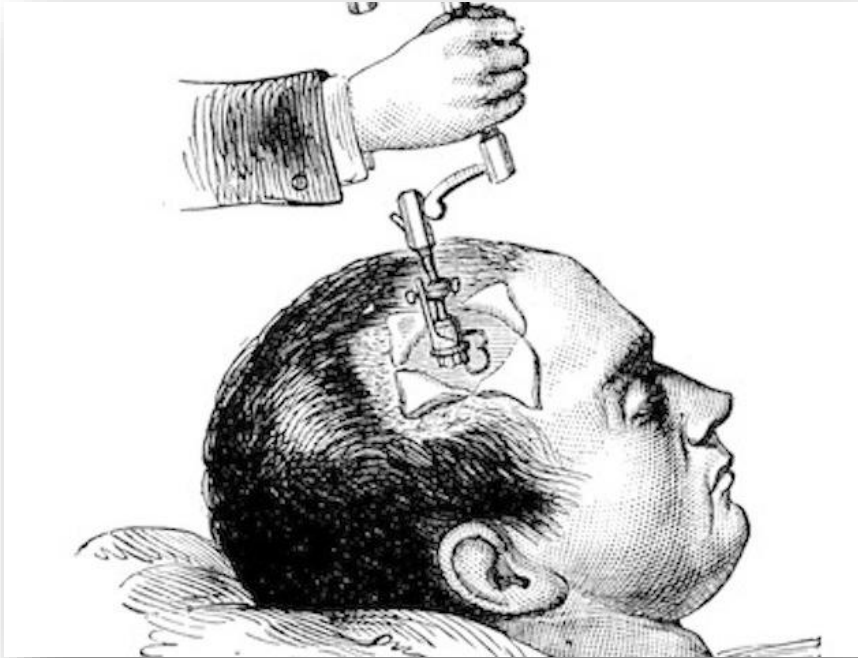
Dates back to 6000bc!!

- MAKING A HOLE
IN SKULL TO
REMOVE PRESSURE

Trepanning was used extensively in the middle ages



Trepanning



It was thought to relieve pressure
and cure mental disorders

Paul Broca (1824-1880)



Studied the frontal lobe of the cerebral cortex



Found that patients with speech defects had **growths** in that part of the brain



Proved for the first time that different parts of the brain had different functions

Electric shock therapy

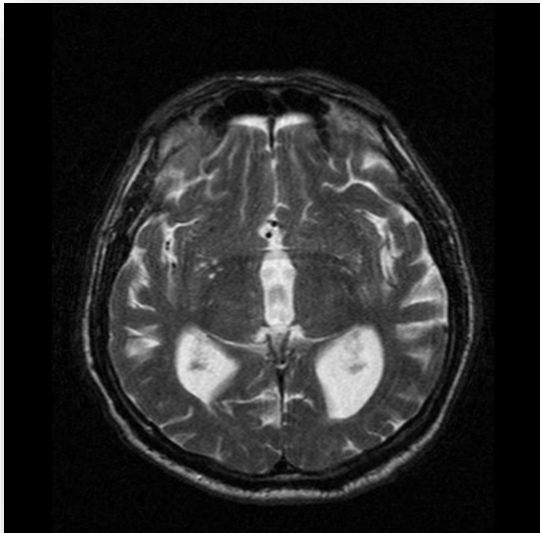


First used in 1938

100 to 150 volts
alternating current
applied to brain

A treatment for
depression and
schizophrenia

Magnetic Resonance Imaging scanner



Provides precise details of body parts, especially soft tissues, with the help of magnetic fields and radio waves

Notes:

The eye (Triple)

Parts of the eye

The iris

The pupil

The lens

The retina

The optic nerve

Long-sightedness

Short-sightedness

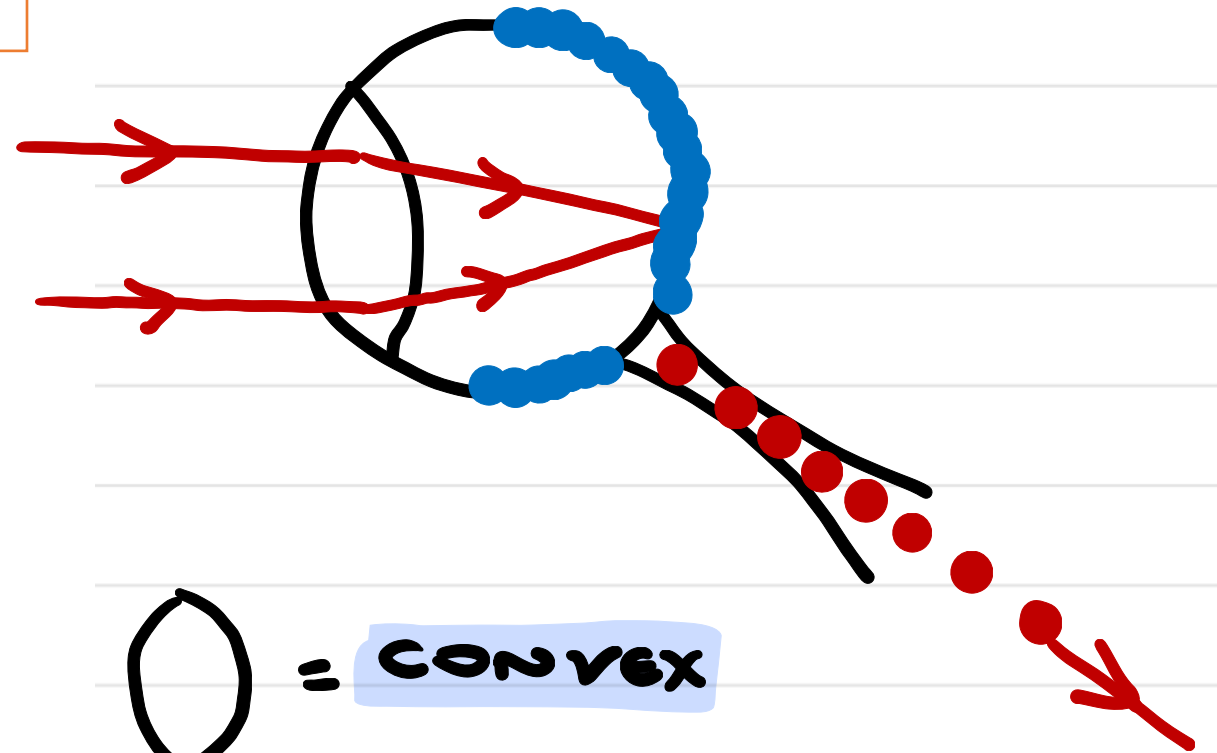
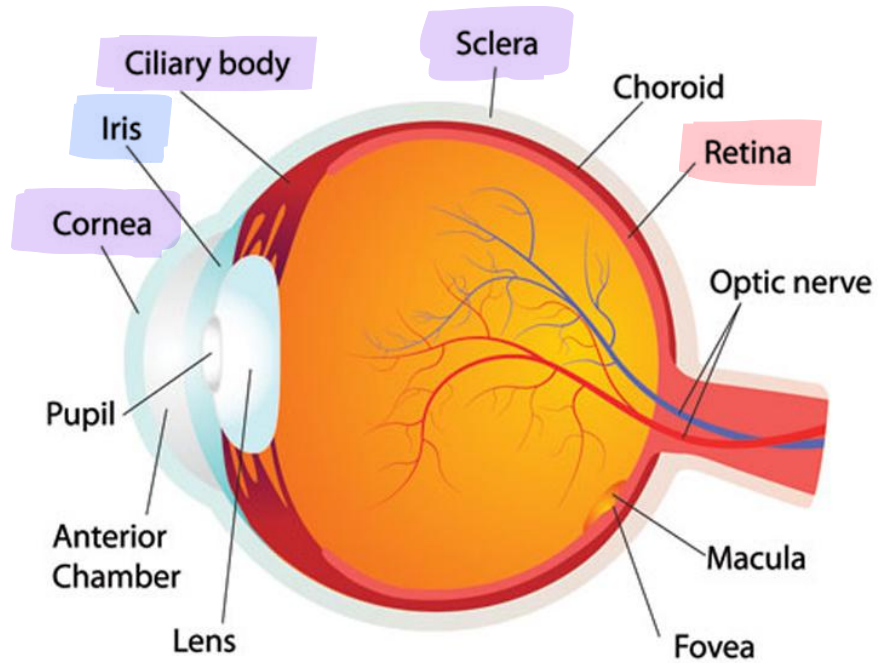
There are 10 different types of eye



The mammalian eye is the most common followed by compound eyes in insects

How Do our
Eyes Focus?
↳ Lens.

Parts of the eye

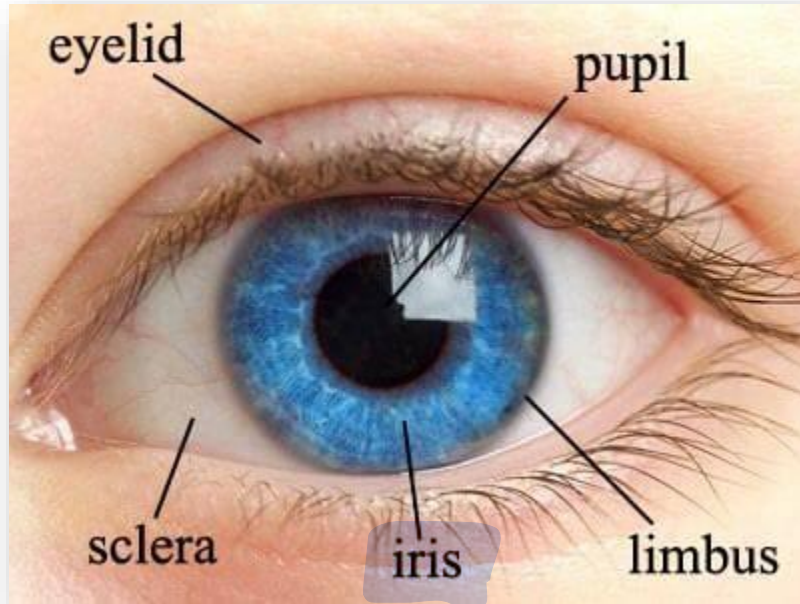


The iris



Controls amount of light that is able to get to the retina

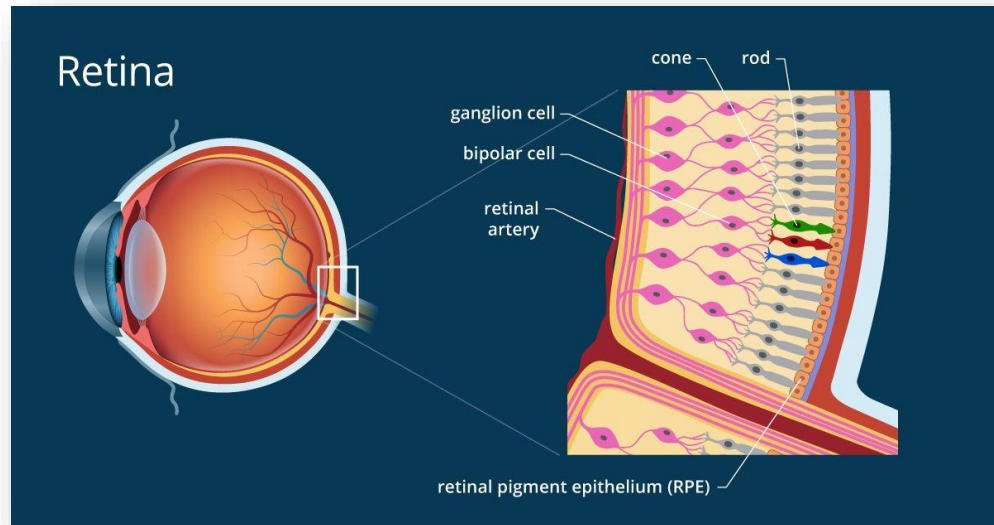
The pupil



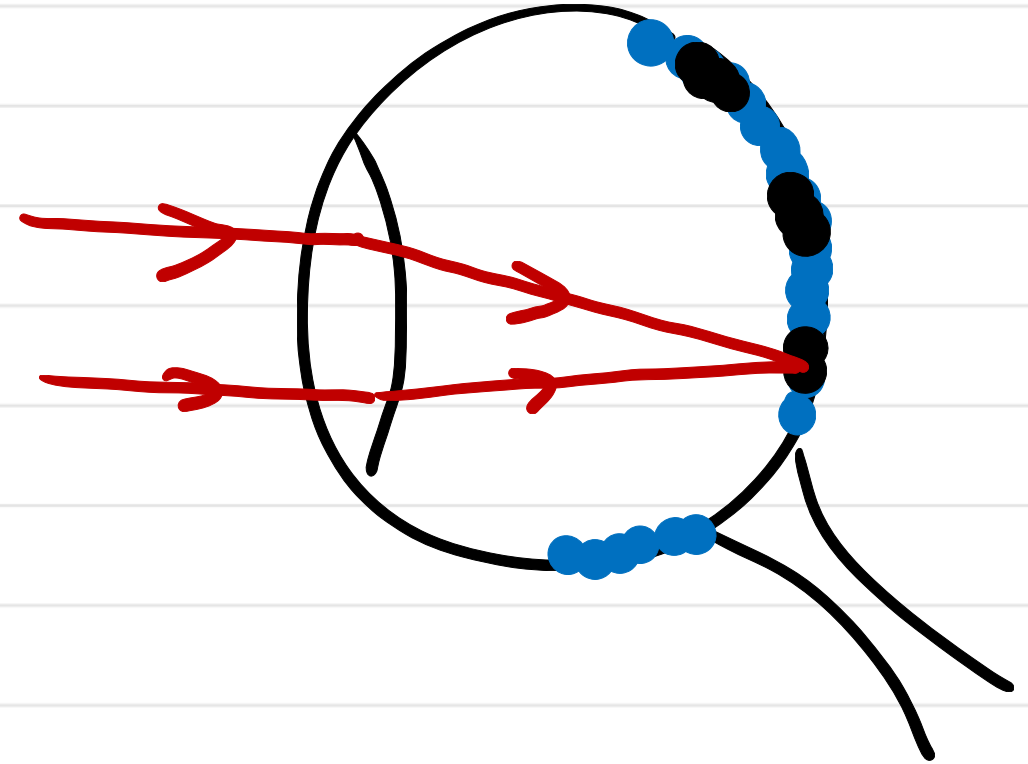
A black hole located in the centre of the iris of the eye that allows light to strike the retina

THE SCLERA IS
WHITE TO AID
COMMUNICATION

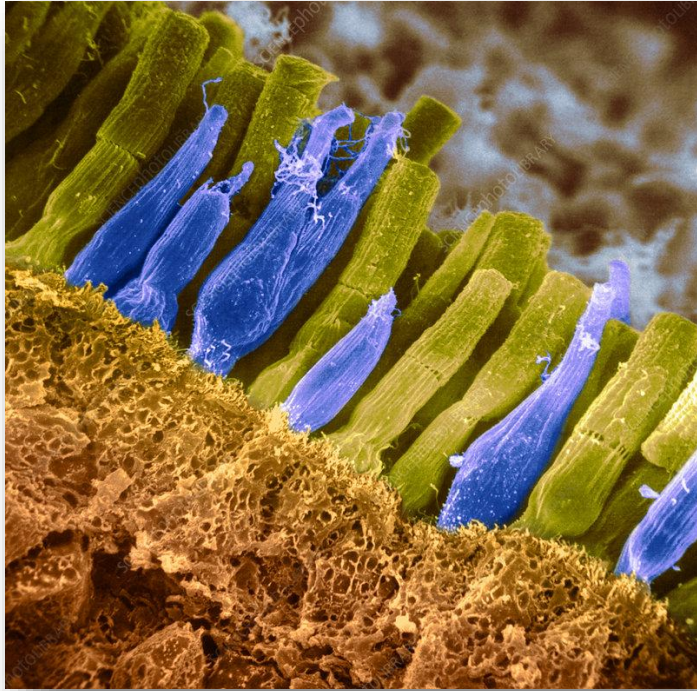
The retina



Converts images into electrical signals



Rods and cones



You have about 120 million rods in your retina. They are sensitive to light

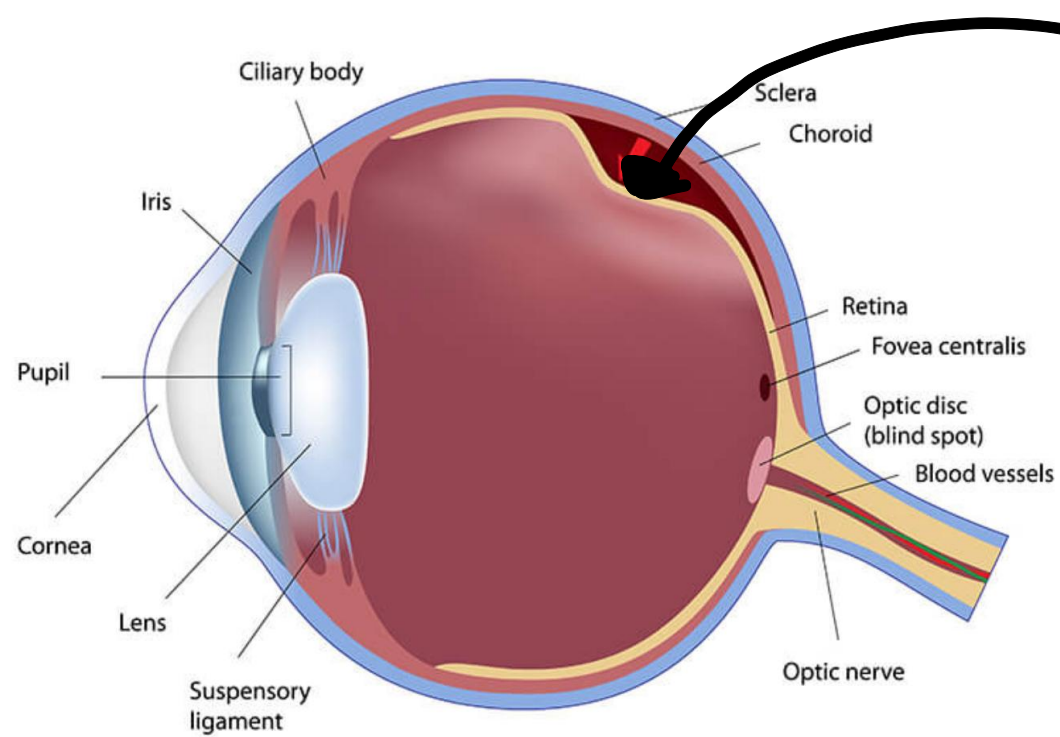
You have about 7 million cones in your retina. They are sensitive to colour

Dawn and dust



During this time colours are less vivid as your cones won't have enough light to work effectively

Retinal detachment



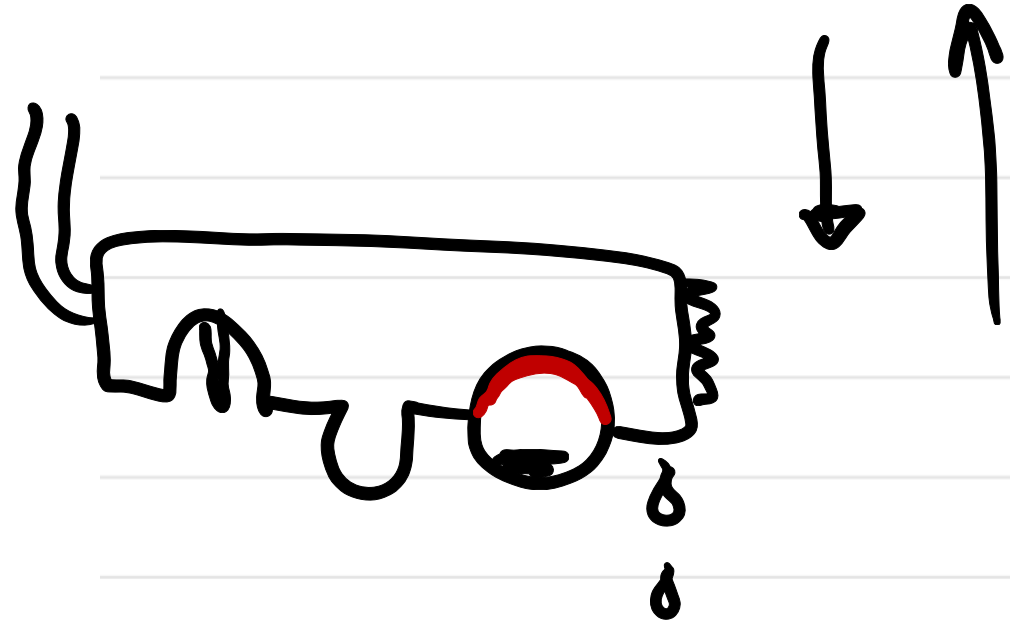
DETACHEN
RETINA

;

Retinal detachment - boxing



* Frank Bruno

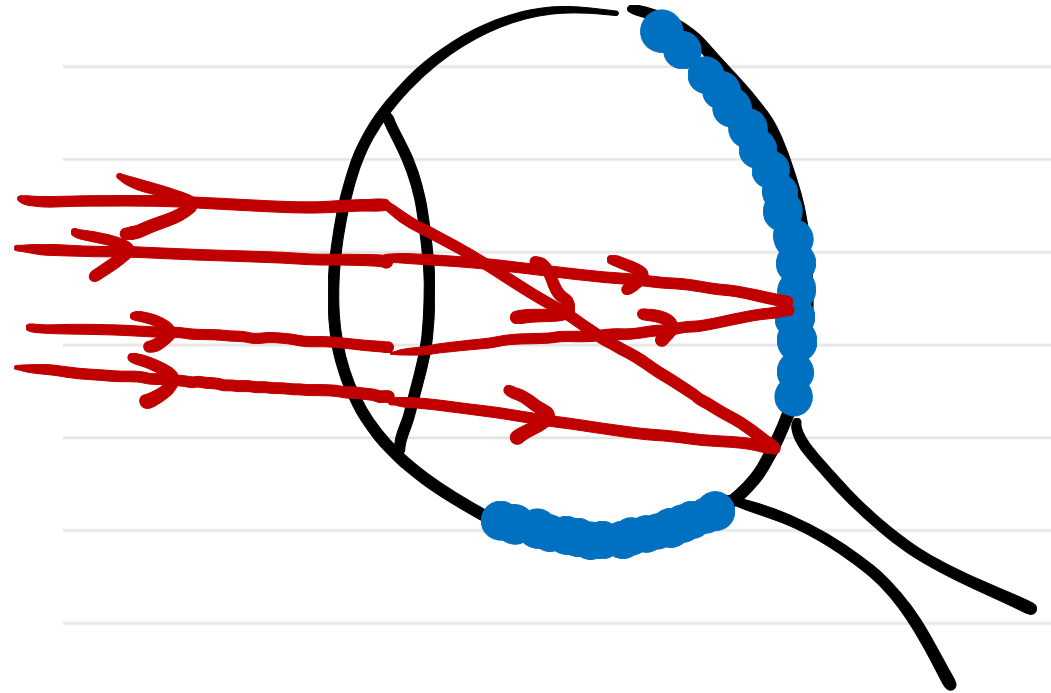
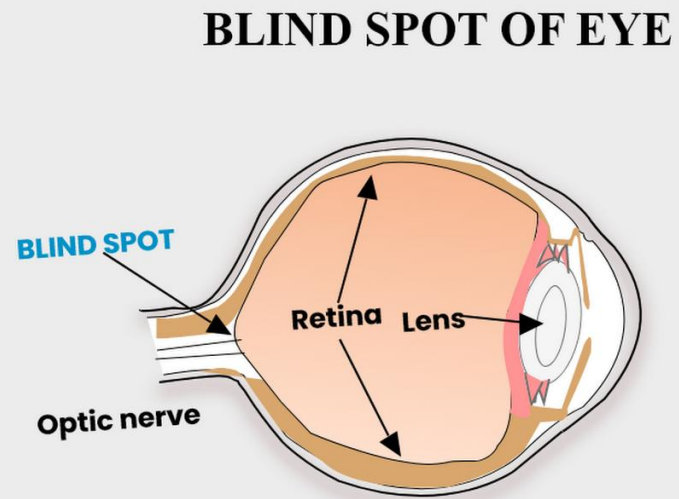


The optic nerve

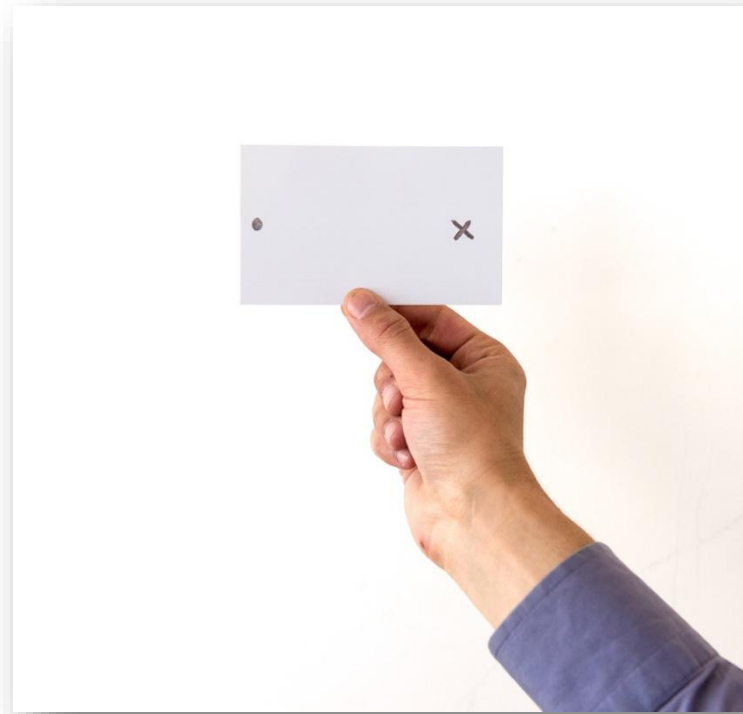


Electric signals travel along the optic nerve to the brain

Blind spot



Finding our blind spot



Cross goes
on nose side



Dot goes on
ear side



Look at cross

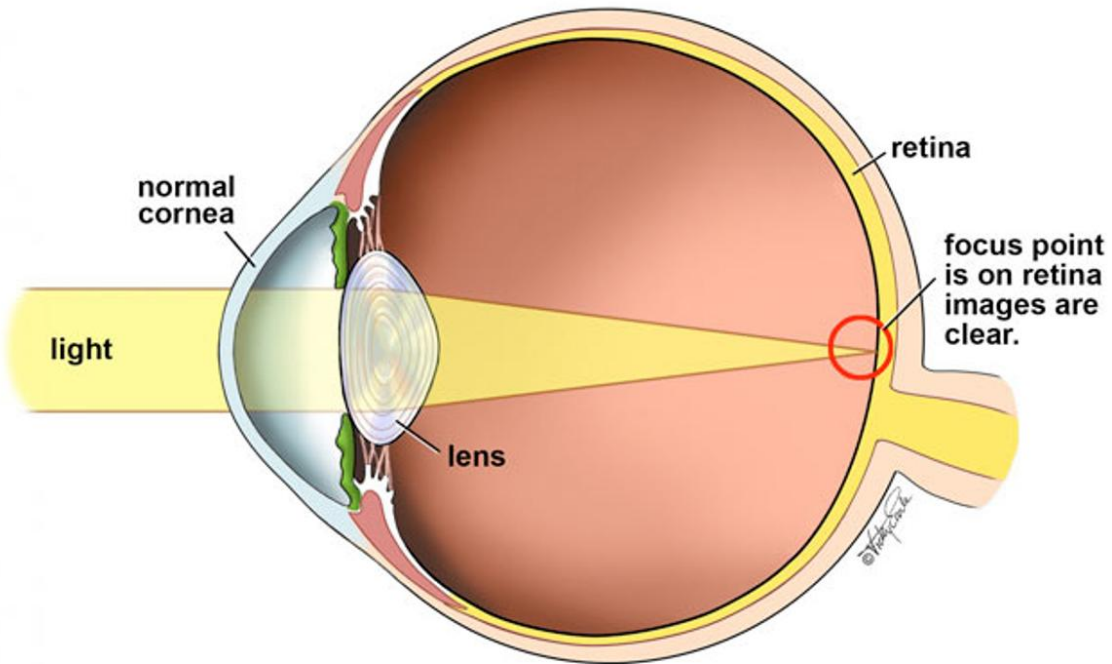


Move paper
away

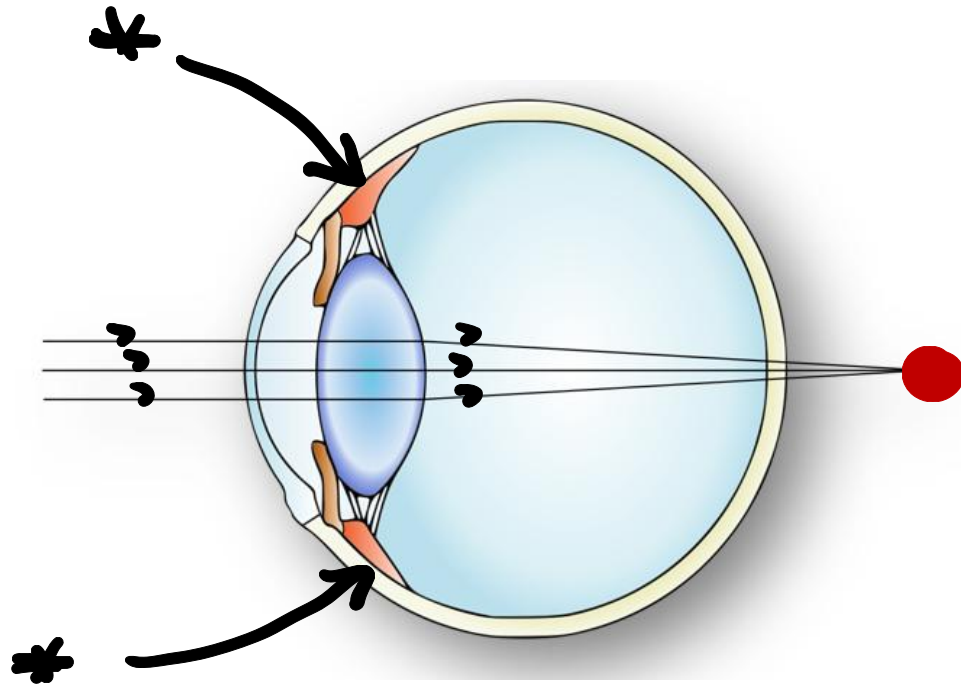


Dot will
disappear!!!

20/20 vision



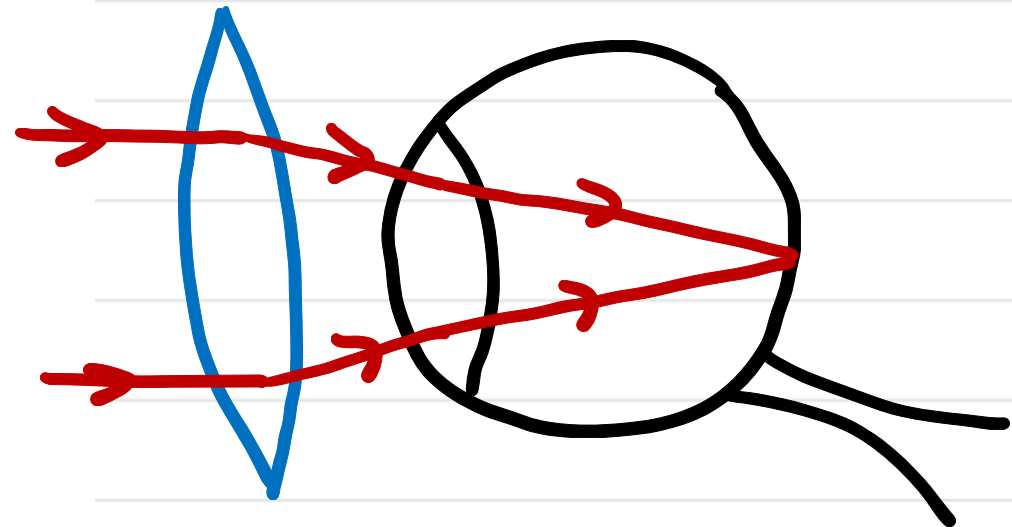
Long-sightedness



Hyperopia = Long-sightedness

NEED READING GLASSES

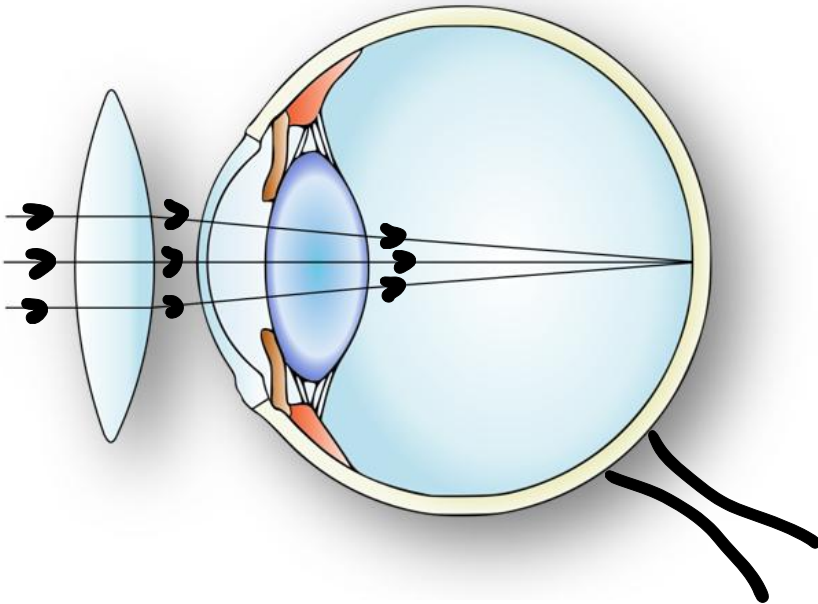
FOCAL POINT BEHIND RETINA



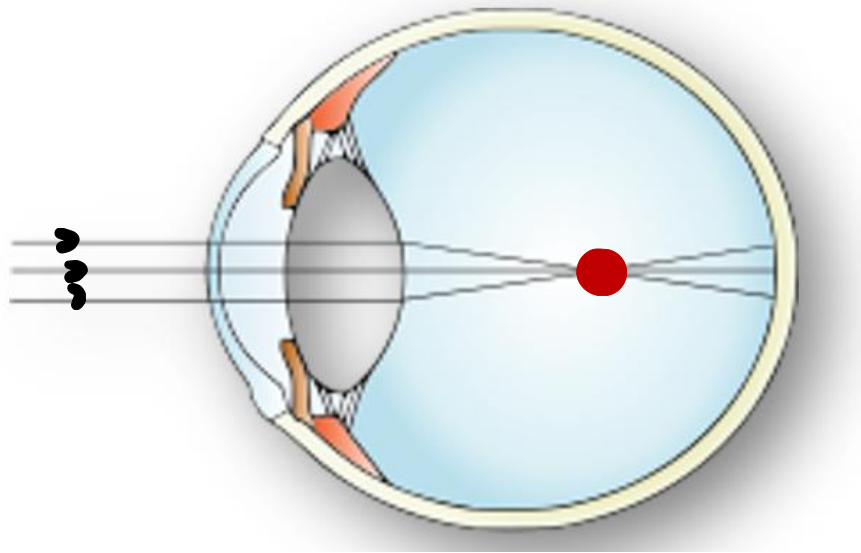
CONVEX LENS
CONVERGES LIGHT

Long-sight corrected

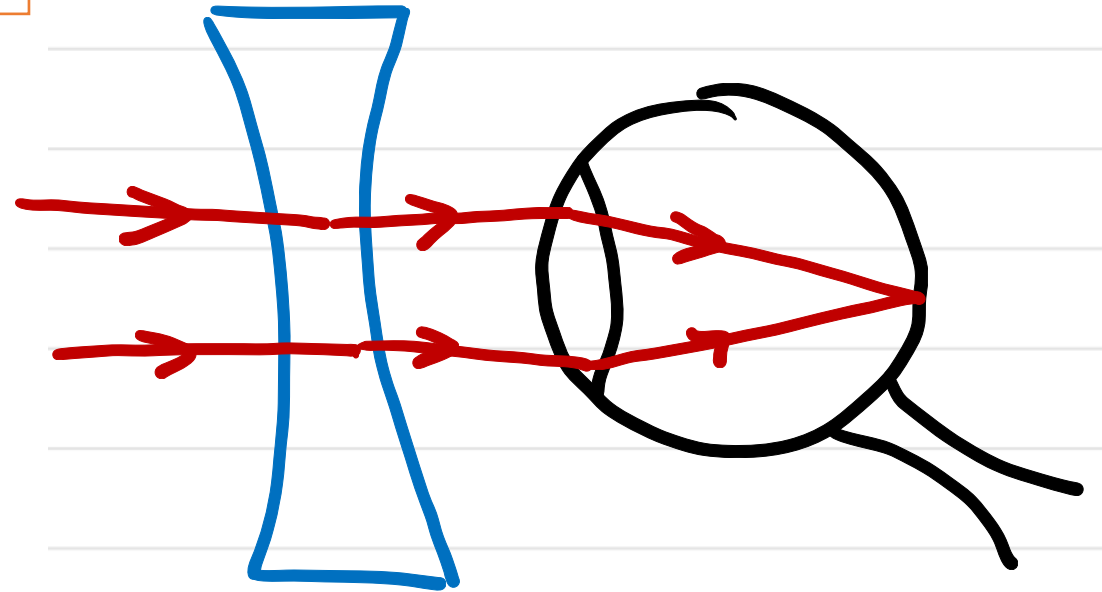
- SHARP IMAGE
ON RETINA.



Short-sightedness

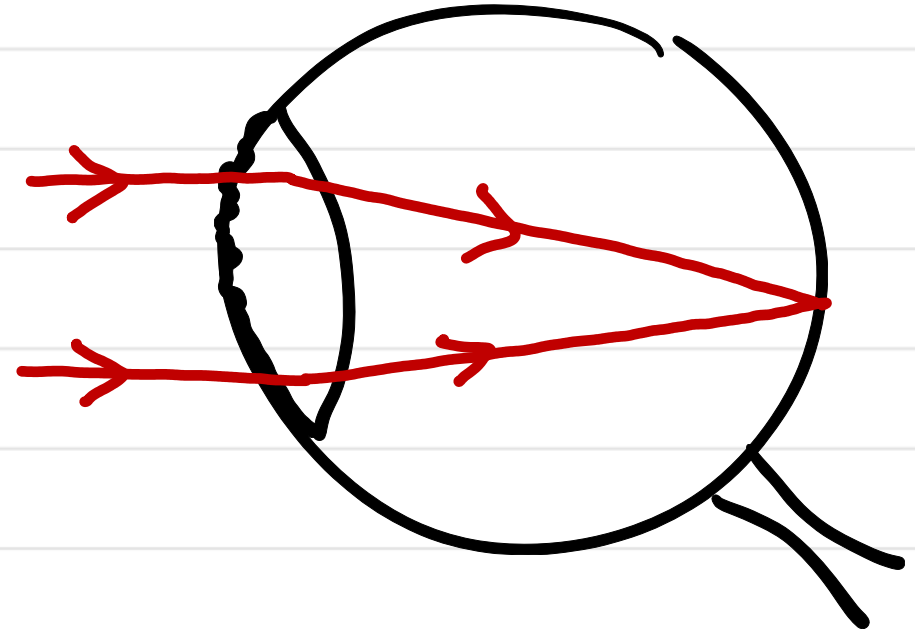
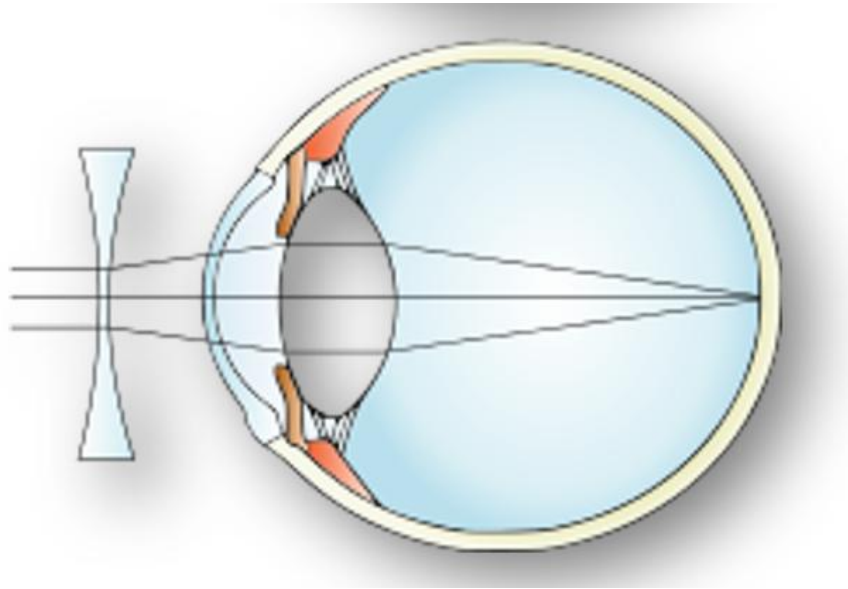


Myopia = Short-sightedness



CONCAVE LENSES
DIVERGE LIGHT

Short-sight corrected



Summary: parts of the eye

Part	Function
Cornea	Transparent part of eye. Refracts light through pupil
Lens	Sits behind the cornea. Refracts light. Changes shape by process called accommodation
Iris	Coloured muscle that surrounds pupil. Controls amount of light getting in
Ciliary body	Made up out of ciliary muscles which contract and relax to change shape of lens
Choroid	Layer of eye found between retina and sciera. Provides oxygen and nourishment to cells in retina
Retina	Layer of receptors found at back of eye
Fovea	Specific part of retina responsible for sharpest vision
Sciera	The white part of your eye. Protects the rest of the eye
Optic nerve	Passes electric impulses from eye to the brain

Notes:

Control of body temperature (Triple)

Optimum temperature

Hyperthermia

Vasodilation

Sweating

Hypothermia

Vasoconstriction

Goosebumps

Shivering

Frostbite

How Your Body

Keeps A Stable State

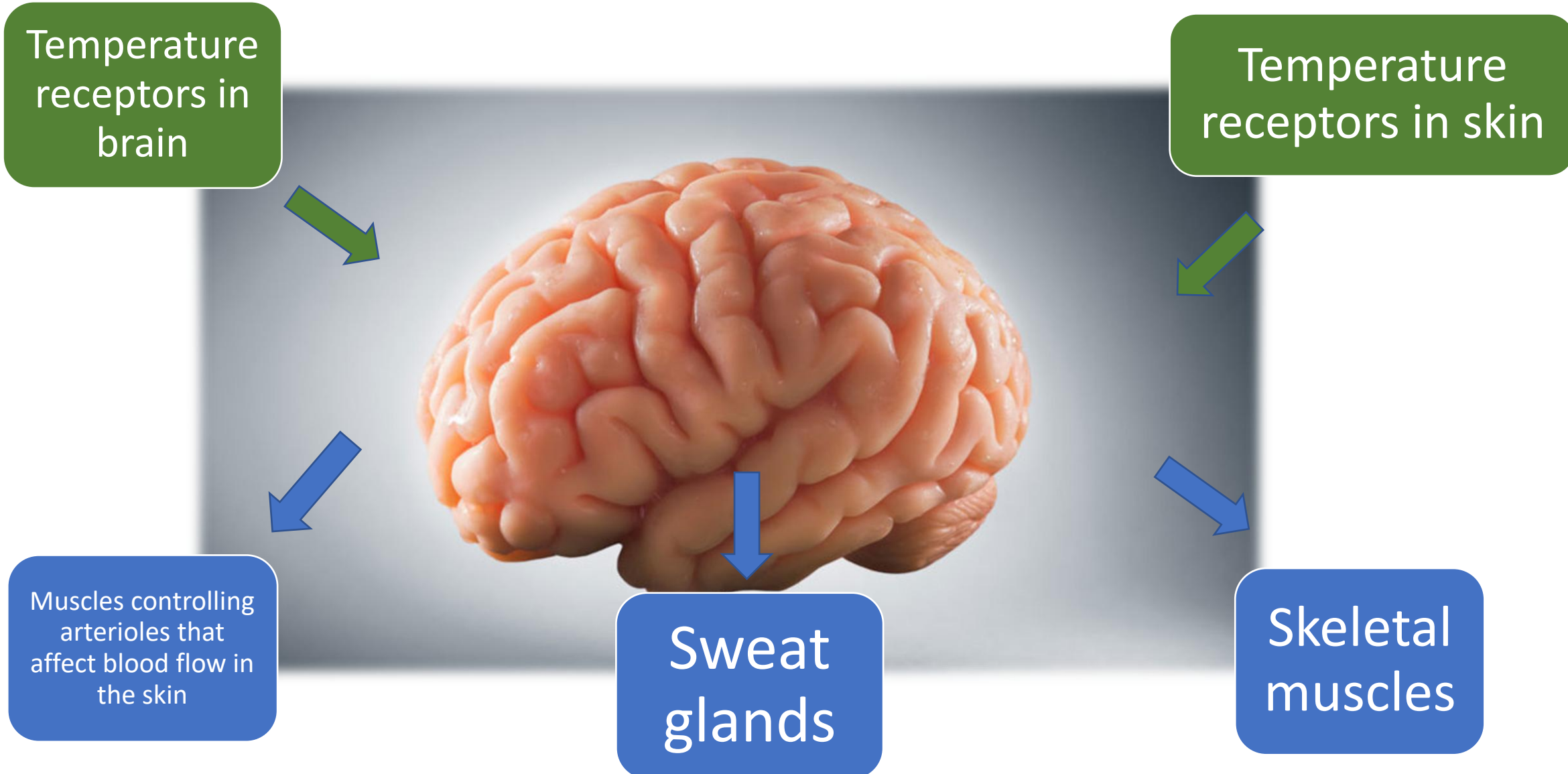


Impulses

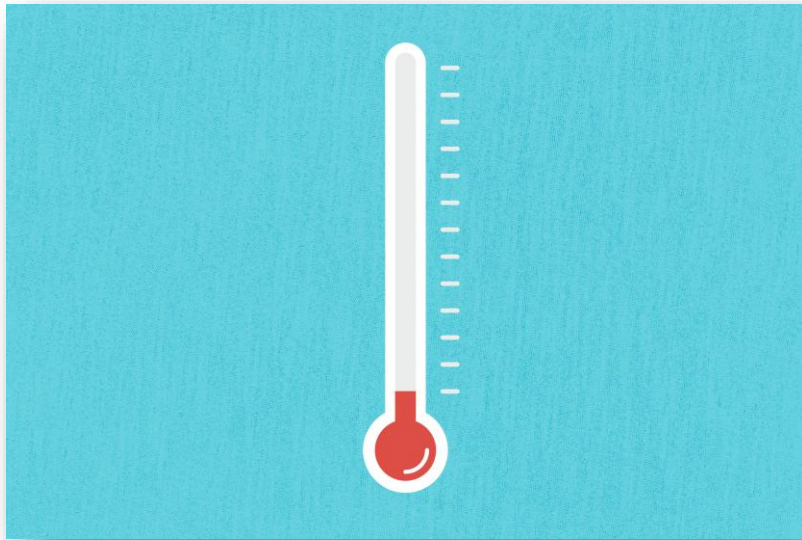


Hormones

Control of body temperature (thermoregulatory system)



Optimum temperature



Your body works best at
36.5-37.5°C

BIOLOGICAL
CATALYST.

ENZYMES work best
at about 37°C

* AMYLASE

* PROTEASE

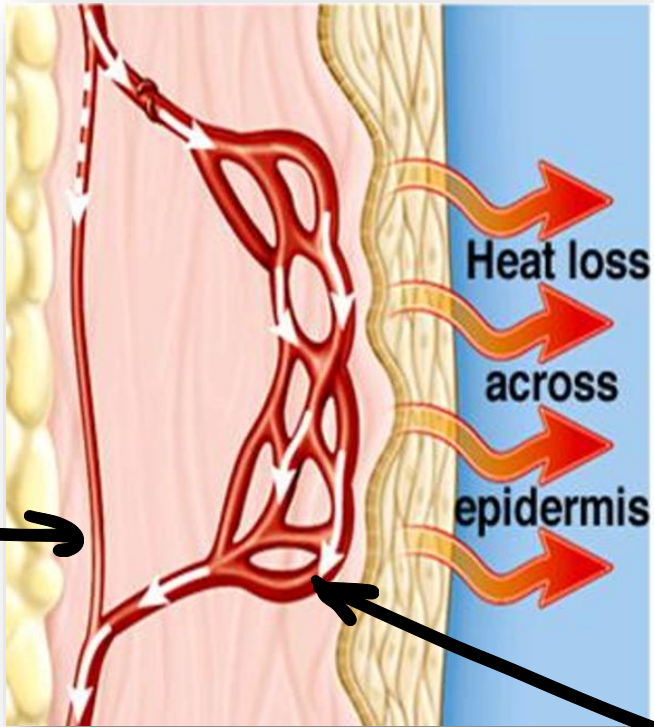
* LIPASE

(above 38.5 °C)



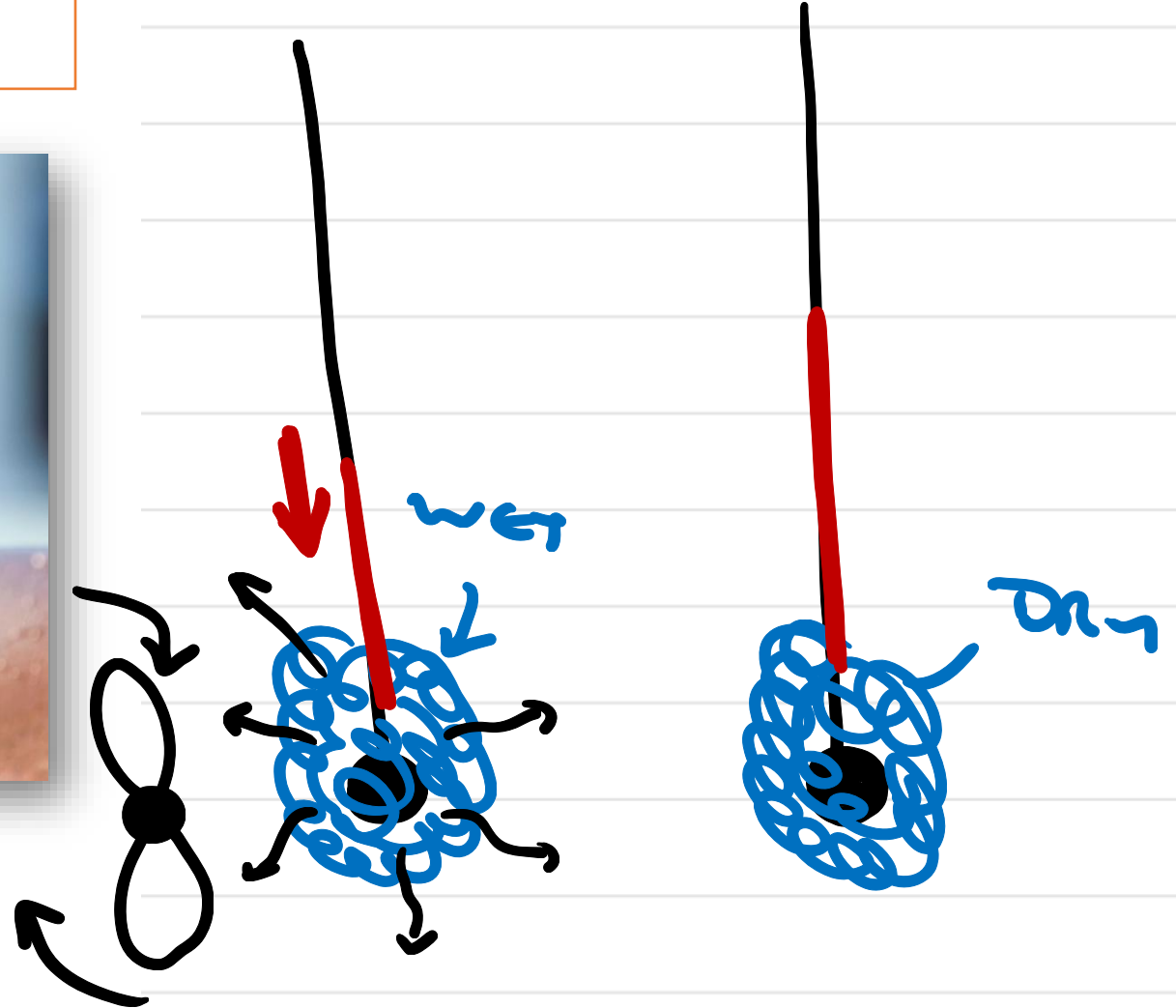
Hyperthermia

Vasodilation



- Effective Heat Transfer

Sweating



Blushing



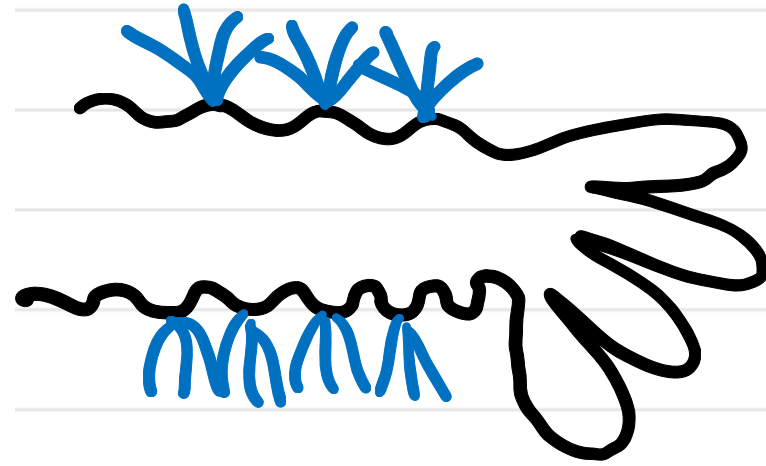
Evaporating water
Takes (Heat) Energy
from you so
it cools you
down.

Too cold

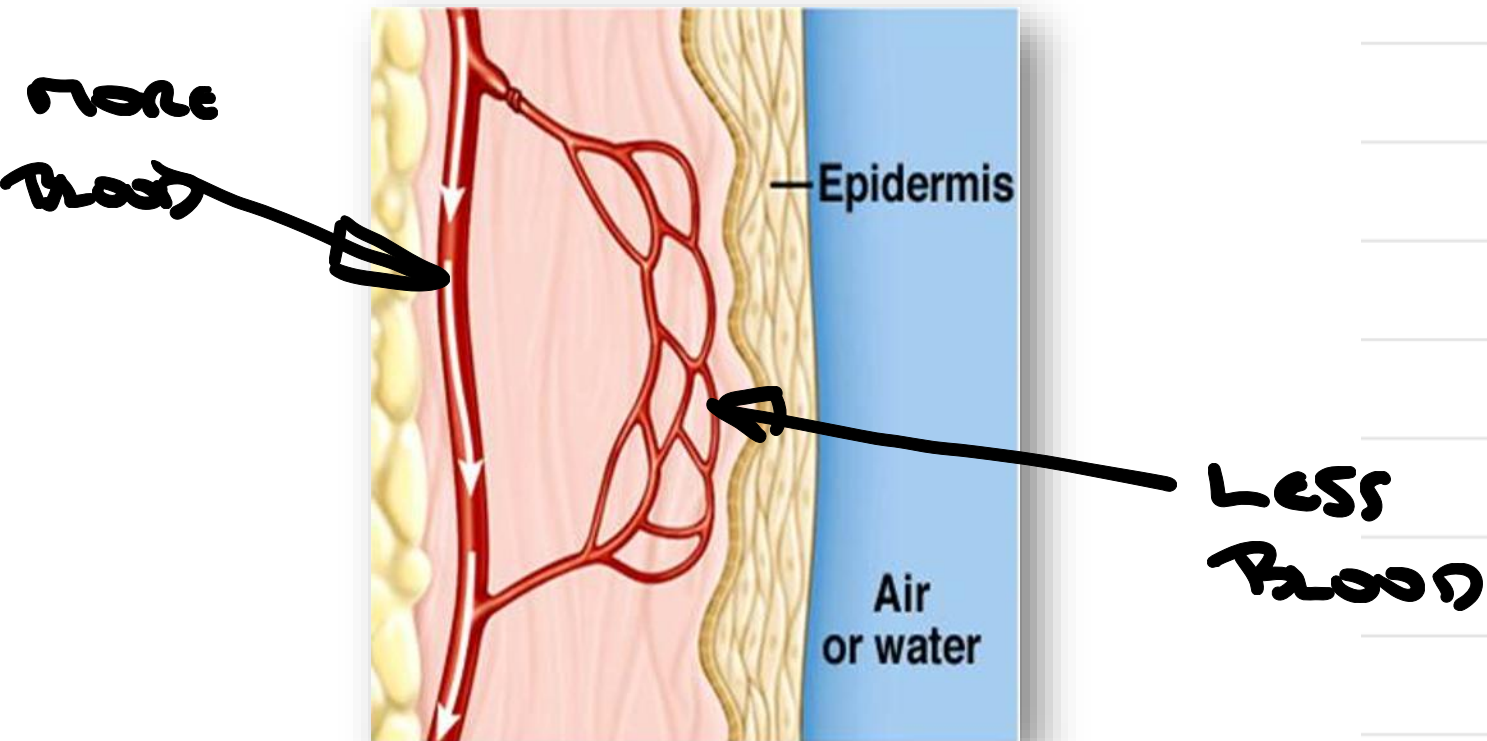
(below 35 °C)



Hypothermia



Vasoconstriction



Goosebumps



Shivering



Frostbite



- CELLS ON EXTREMES
STARVED OF
BLOOD/O₂

Ranulph Fiennes (explorer)



The hand of Ranulph Fiennes!!



Notes:

Practice Questions

Question	Answer
Define homeostasis	KEEP CONDITIONS INSIDE BODY TO STABLE STATE
What is vasodilation?	CAPILLARIES NEAR SURFACE DILATE SO <u>MORE</u> BLOOD GOES IN TO SURFACE
What is a control centre?	PART OF CNS THAT MAKE KEY DECISION
What is the reflex arc?	AUTOMATIC RESPONSE
Why do we get goosebumps?	TRAPPED AIR → INSULATION

Notes: