

Nervous Coordination

BRAIN:-

→ Main component of CNS:- Brain

→ weight of Brain:- $\frac{14}{3}$ Kg
pounds lb

depend
body weight Gender

→ Protection of Brain:-

Hard
(Cranium)

Soft
(Meninges)

3 layers

Dura mater (external)

Arachnoid matter (central)

Pia mater (internal)

connect with skull

CSF

liquid in the AP

connected with neurons

acts/work like cushion provide nutrient to Brain

→ Parts of Brain:-

Forebrain
(1st position)

Mid Brain
(2nd position)

Hind Brain
(3rd position)

largest

Size of the Brain

FOREBRAIN:-

→ Largest part of Brain

→ Division

① Telencephalon

→ control body left part
→ half

Right cerebral hemisphere / cerebrum

Left cerebral hemisphere / cerebrum

control Body right part

②

Diencephalon

coordination / communicate 2 cerebrums

→ large band of axon
corpus callosum

→ oligodendrocytes (produce myelin)

* cerebrum (right or left):-

→ outer (highly convoluted) (grey matter)

→ inner (less convoluted) (white matter)

→ myelin sheath only

Present in sensory or Inter neuron
formed myelin

M.Z

Lower Product

Connect with neurons

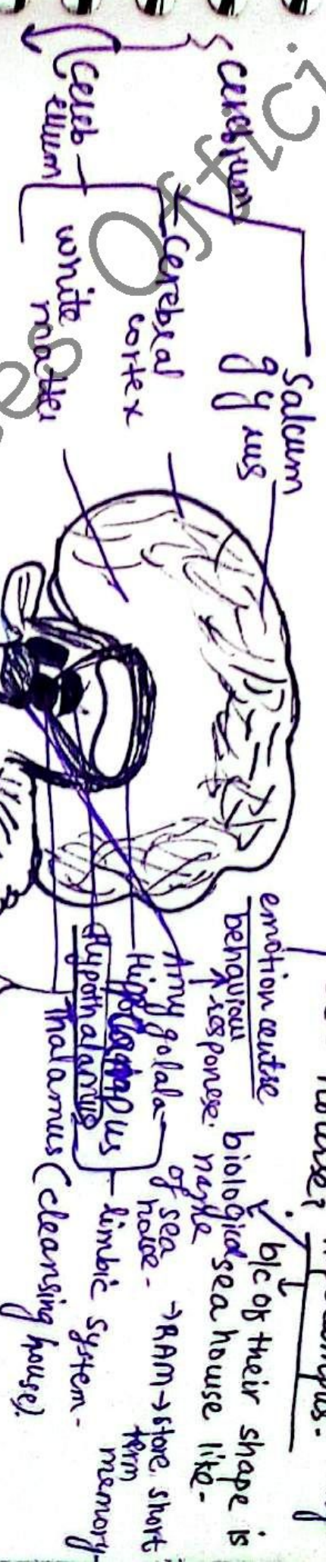
→ not in Inter neuron
Schwann cells

→ myelin sheath only

STB mod
growth along with emotion

Q) The part of Brain that assembles

Sea house?
 required for learning → store long term memory
 hippocampus.
 RAM



Mid brain, pons, medulla

emotions, behaviour, biological response, memory

limbic system - memory

Homeostatic centre

ADH - social hormone

Mid brain, pons, medulla

Thermoregulation

Neuro-secretory cells

ADH - social hormone

Mid brain, pons, medulla

Thermoregulation

Neuro-secretory cells

ADH - social hormone

hipocampus (long term memory).

Q) oligodendrocytes mostly which found in:
A) grey matter B) white matter C) Both D) None

Date: _____

→ Grey matter (cerebral cortex)

- most sophisticated (most active)
- Information processing centre.
- made intelligence/Reasoning/short-term memory.
- No. of Neurons (average):

→ 10-50 Billion

→ 25 age (maximum neurons)

1) Frontal lobe (decision making)
phineas gage incident

2) Temporal lobe:-
(Speech or hearing)

Broca's area, Wernicke's area, calculation, language
Neurons increased

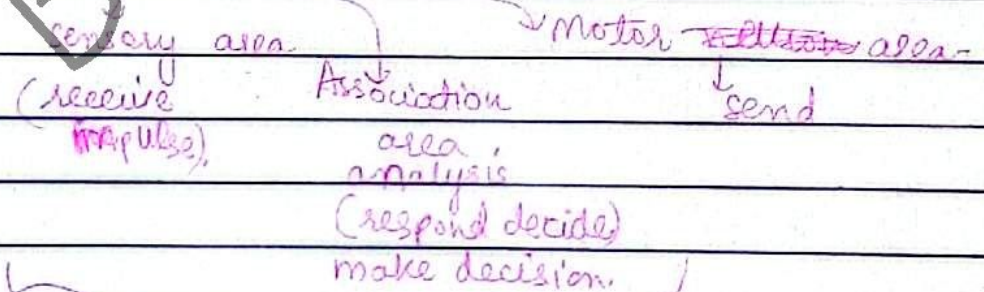
3) Parietal lobe:- (short term memory)



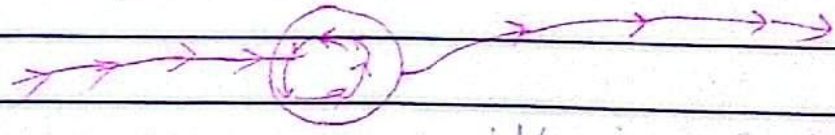
4) Occipital lobe (vision) (Control speech and

* Every part has (3) divisions:-

* Cerebrum is the largest part of the brain!



They all have interneurons



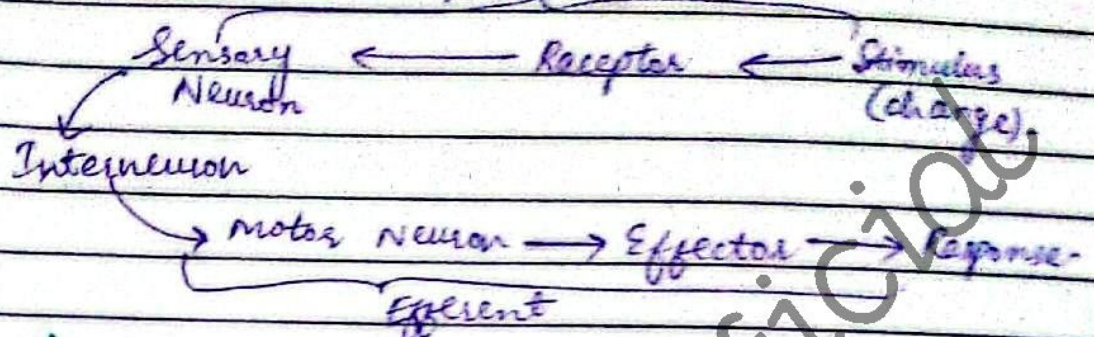
midbrain → thalamus
Thal → MB

M.Z

Zener Product

Page No.

Nervous System → Nervous coordination pathway



Receptors:-

- modified neuron-
- modified epithelial cells-
- surface cells-
- Receive stimulus-
- act as a Transducers-

MOST ABUNDANT RECEPTORS:-

- Pain receptor (Noice receptor) detect tissue damage.

Different forms of energies

Electrochemical signals

1) Photoreceptor → light

2) Mechano receptor → Touch
→ Pressure.

3) Pain receptor →

4) olfactory receptors → Smell

5) Gustatory → Taste

6) Carotid/Aortic bodies → Blood CO_2 & H^+

7) Thermoreceptors → change of Temp → Heat (high)
→ cold (low)

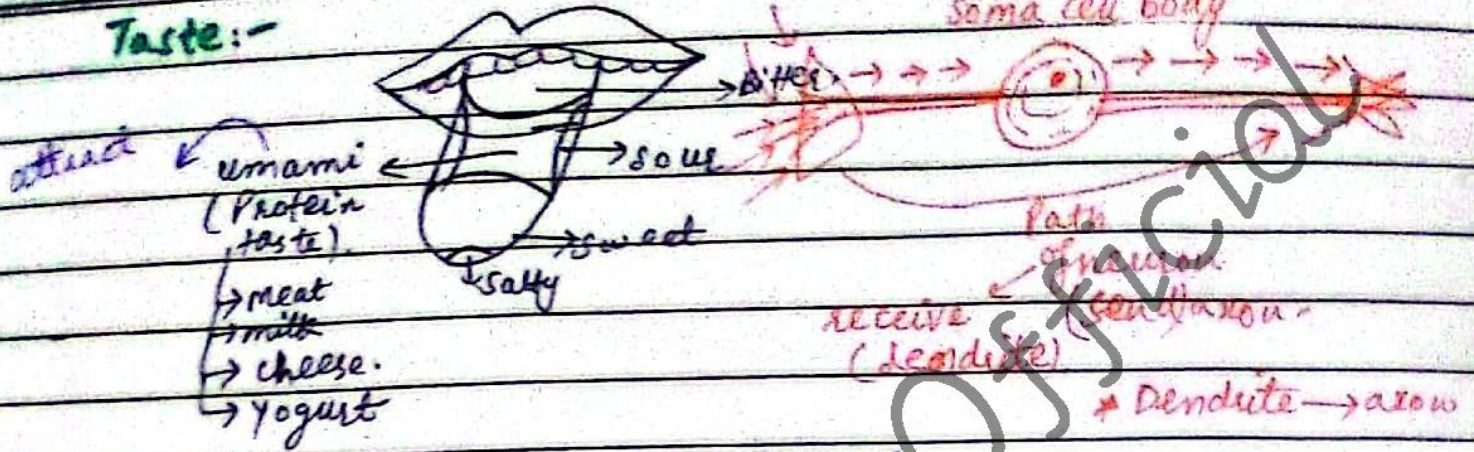
chemo receptors-

M.Z

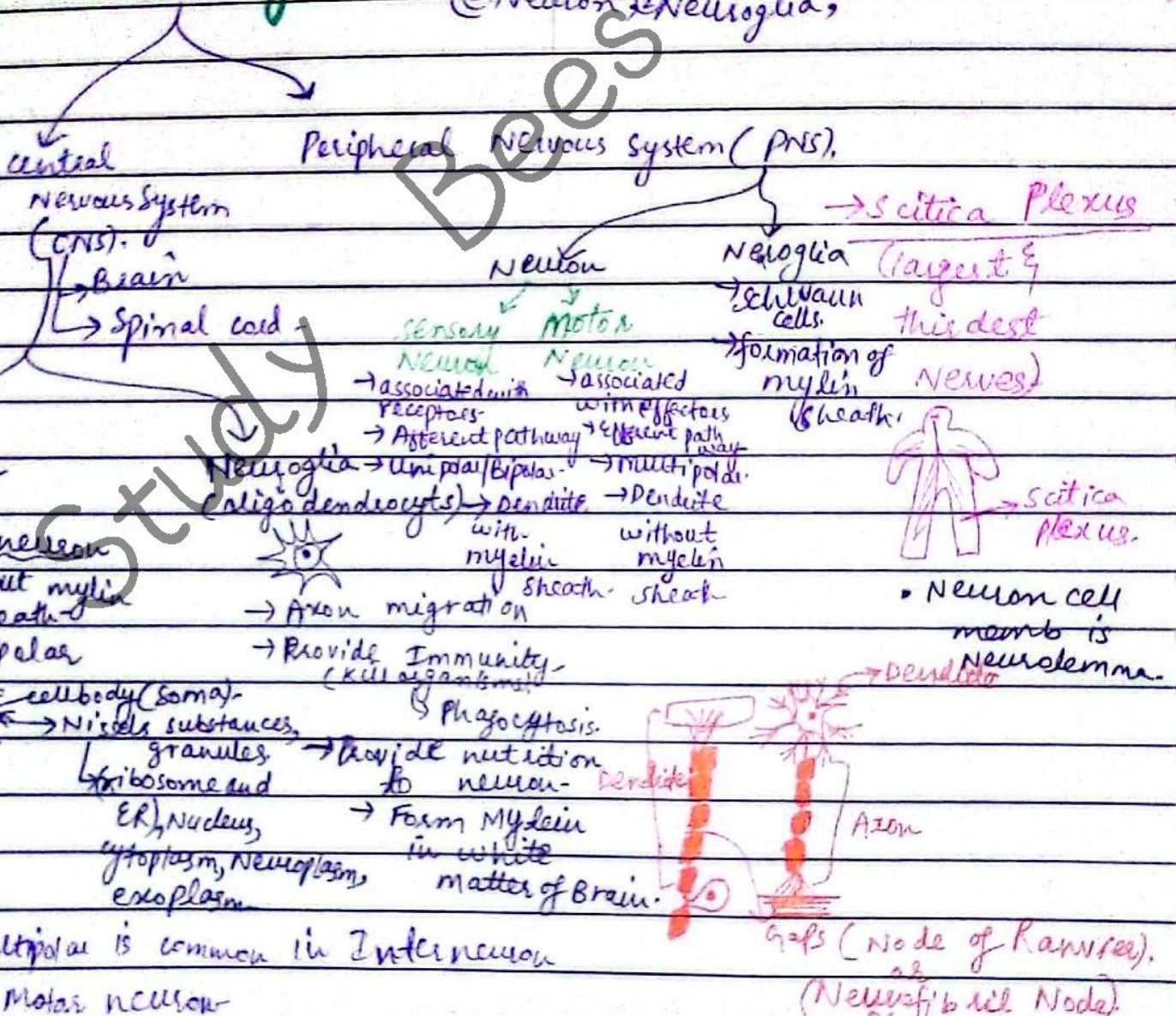
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Food anticipation
(sight, smell, touch, taste, hear).
Date: _____

Taste:-



Nervous System:- (made up of Neuron & Neuroglia)



Axon → sends impulse away
 Dendrite/dendron → brings impulses
 Date: _____

Nerve Impulse → Electrochemical Signal

(Generated & conducted by the neuron)

RMP:-

→ non-stimulated state: Resting membrane potential,

Voltage:- -70mV (-40mV to -90mV)

→ Ions distributed:-

(Na/K) $\times 30$ $\times 10$

	Inside	Outside
Na^+	less	more (10 times)
K^+	more (30 times)	less
-ve ions $\text{SO}_4, \text{PO}_3, \text{Cl}$	more	less (negligible)

outside (more)
 $\text{Na} = 0.5\text{M}$
 $\text{K} = ?$
 Inside:
 $\text{Na} = ?$
 $\text{K} = 0.05\text{M}$

more
 $\text{Na} = ?$
 $\times 10$
 $\text{Na} = 0.3\text{M}$
 $\text{K} = ?$
 $\times 30$
 more

more $\div 10$ less $\times 30$

- (A) $0.5 \div 10 = 0.05\text{M}$
 (B) $90 \times 30 = 30\text{M}$
 (C) $0.3 \times 10 = 3\text{M}$
 (D) $5 \times 30 = 35\text{M}$

AMP:- Stimulated state

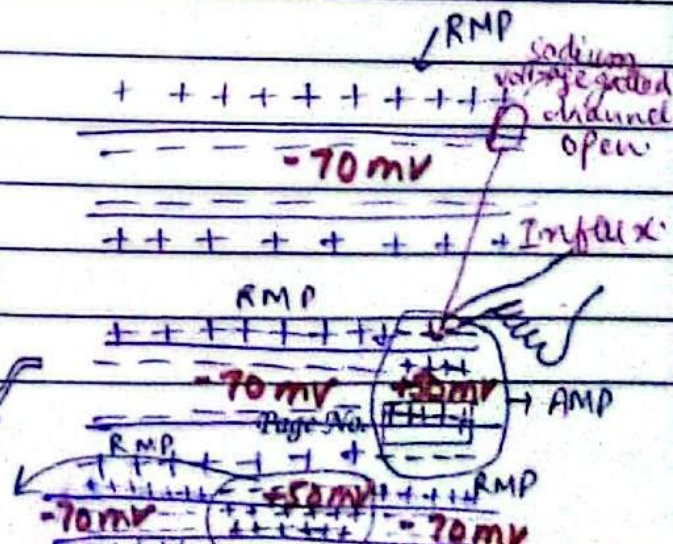
- Disturbance of RMP.
- Temporary
- Localized

Duration: 10-30 sec-

Voltage:-

RMP = -70mV change
 AMP = $+50\text{mV}$ into

M.Z
 Zener Product



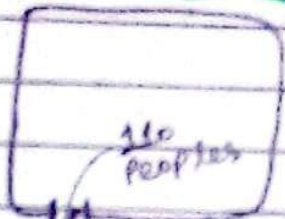
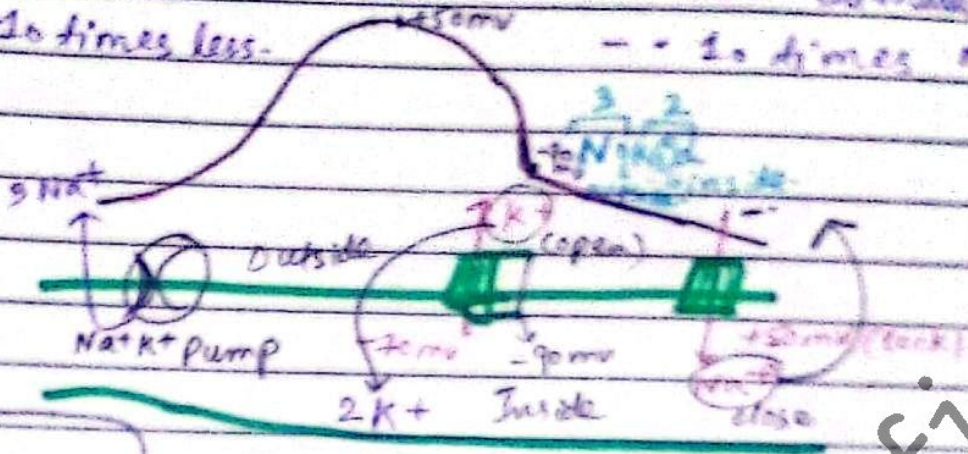
Influx of Sodium

At RMP

- Na leakage channel
- without stimulus
- 10 times less

At AMP

- Na voltage gate channel
- with stimulus
- 10 times more



100 people limit

Q) How many Na⁺ ions move outside the cell membrane, when 90mM K⁺ ions move inside by Na⁺K⁺ pump?

Ans) $\frac{Na}{K} = \frac{3}{2} = x$

$2x = 270$

$x = 270/2$

$x = 135$ Na⁺ ions

4 PHASES:-

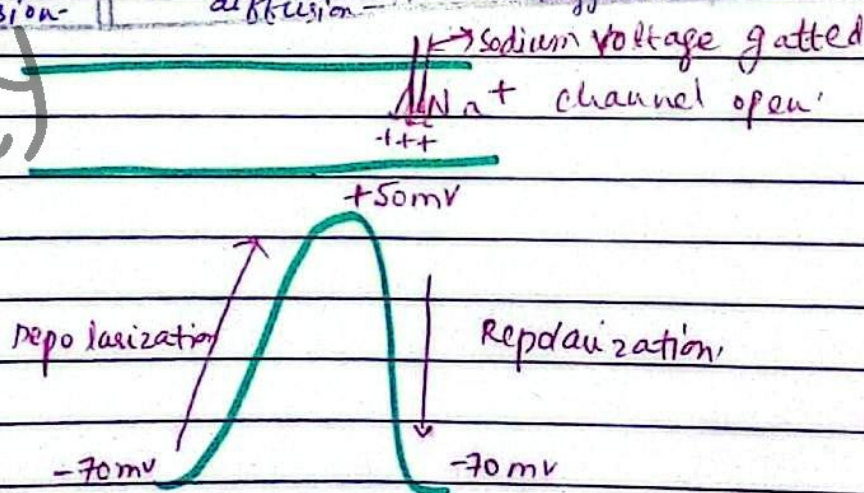
1) Depolarization

2) Repolarization

3) Hyperpolarization

4) Refractory Period.

	Depolarization	Repolarization	Hyperpolarization	Refractory Period
Voltage Change	-70 mV to $+50 \text{ mV}$	$+50 \text{ mV}$ to -70 mV	-70 mV to -90 mV (maximum limit)	-90 mV to -70 mV
Channel	Sodium voltage gated channel open	Potassium voltage gated open channel	Potassium voltage gated channel started to closed	Sodium-Potassium Pump
Flow of Ions	Influx of Sodium ions. (10 times more than RMP)	Efflux of K^+ ions	Excess Efflux of K^+ ions	3 Na^+ outs 2 K^+ ins
Processes	Passive, facilitated Diffusion	Passive facilitated diffusion	Passive facilitated diffusion	Active



→ at -70 mV , Na^+ channel open (K^+ gate closed)

→ at $+50 \text{ mV}$, Na^+ channel closed (K^+ gate open).

→ 3 Na⁺
→ 2 K⁺

→ 10 Na⁺ K⁺ case, ÷ by 2

Date: _____

How many ATPs are required to move 135 M Na⁺ outside the Neurolemma?

$$135/3 = \boxed{45 \text{ ATPs}}$$

How many ATPs are required to move 10 K⁺ ions inside the Neurolemma?

$$10/2 = \boxed{5 \text{ ATPs}}$$

How much energy is required to move 30 Na⁺ ions inside and 20 K⁺ ions outside the Neurolemma?

$$1 \text{ ATP} = 7.3 \text{ kcal/mole}$$

$$\rightarrow 30/3 = 10 \text{ ATPs}$$

$$\rightarrow 20/2 = 10 \text{ ATPs}$$

$$10 \times 7.3 = \boxed{73 \text{ kcal/mole}}$$

a) 7.3 kcal/mole

c) 0.73 kcal/mole

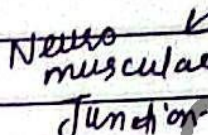
b) 73 kcal/mole

d) 730 kcal/mole

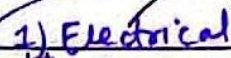
103. Date:

Types:-

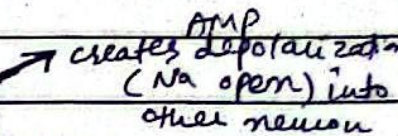
- 1) Nerve to Nerve
- 2) Receptor to Sensory Neuron
- 3) Motor Neuron to muscles
- 4) Motor Neuron to glands



Best way



2) chemical synapse:-



by hyperpolarization (K open).

~~inhibitory~~
 brain ke
 neurons
 cells
 mka (Halo 2ination).

- low cause of (learning, anxiety)-
Pavlovian-

sleep

2-91
Acetylcholine
↑ epinephrine

- in brains of Invertebrates.

don't transmit
impulse from 1
neuron to another

Inhibitory

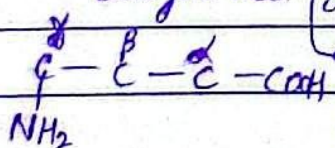
Happy

Excitatory → saltatory → cause halcyon

- cause depolarization
- in Post synaptic

→ 

gamma amino $\rightarrow$ acetylcholine
GABA
Butyric acid $\rightarrow$ (glutamate) $\rightarrow$
 β α glycine $\rightarrow$



↓
Simple test
amino acid

block
signals

→ open / allow K^+
gated open channel
also open
thyroid channel.

→ IPSP (inhibitory post synaptic potential)

→ open/allow Nat gated
open channel-

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→ EPSP → excitatory post synaptic potential

→ **Biogenic Amine** — not neuropeptide
↓ epinephrine, non-epinephrine, dopamine, serotonin
is not a biogenic amine

release of neurotransmitters
(Exocytosis)

