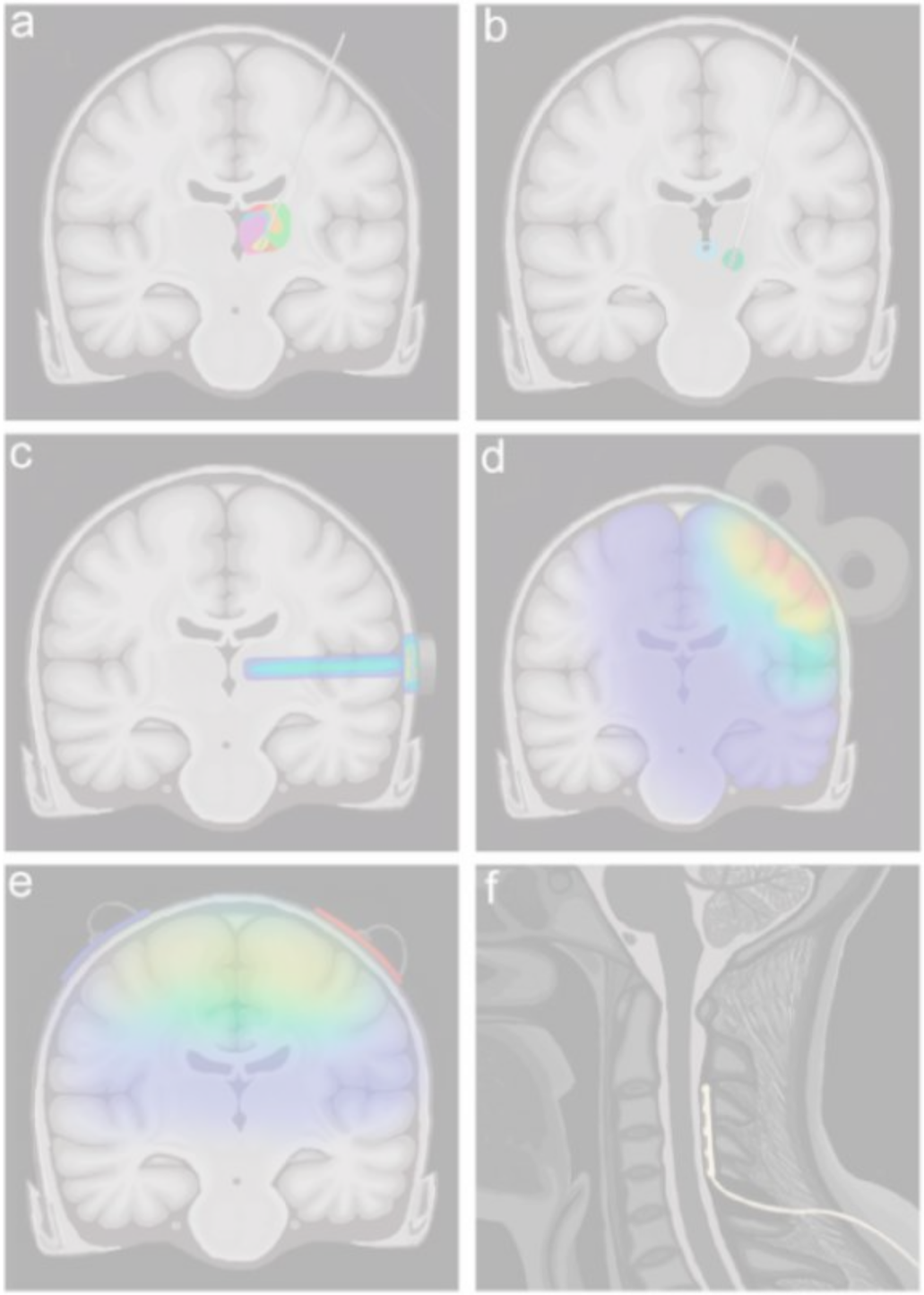
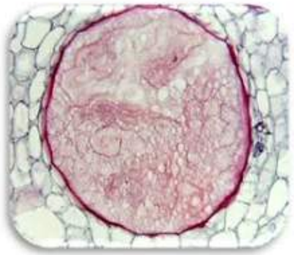
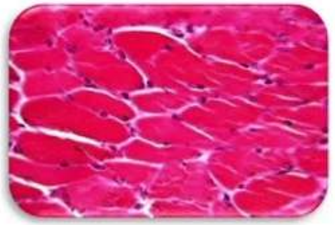
Módulo 1

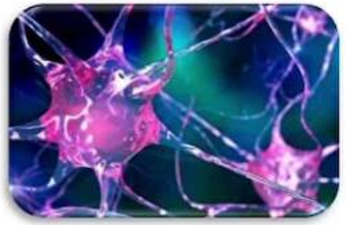
De la neurona al cerebro

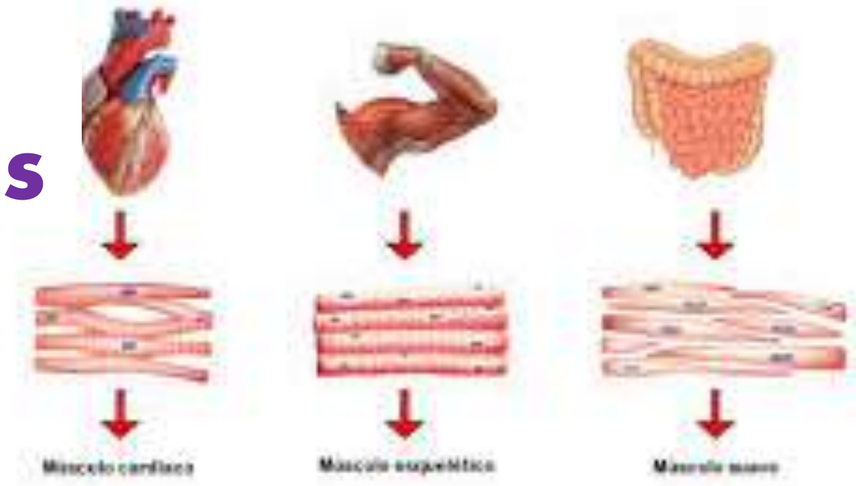


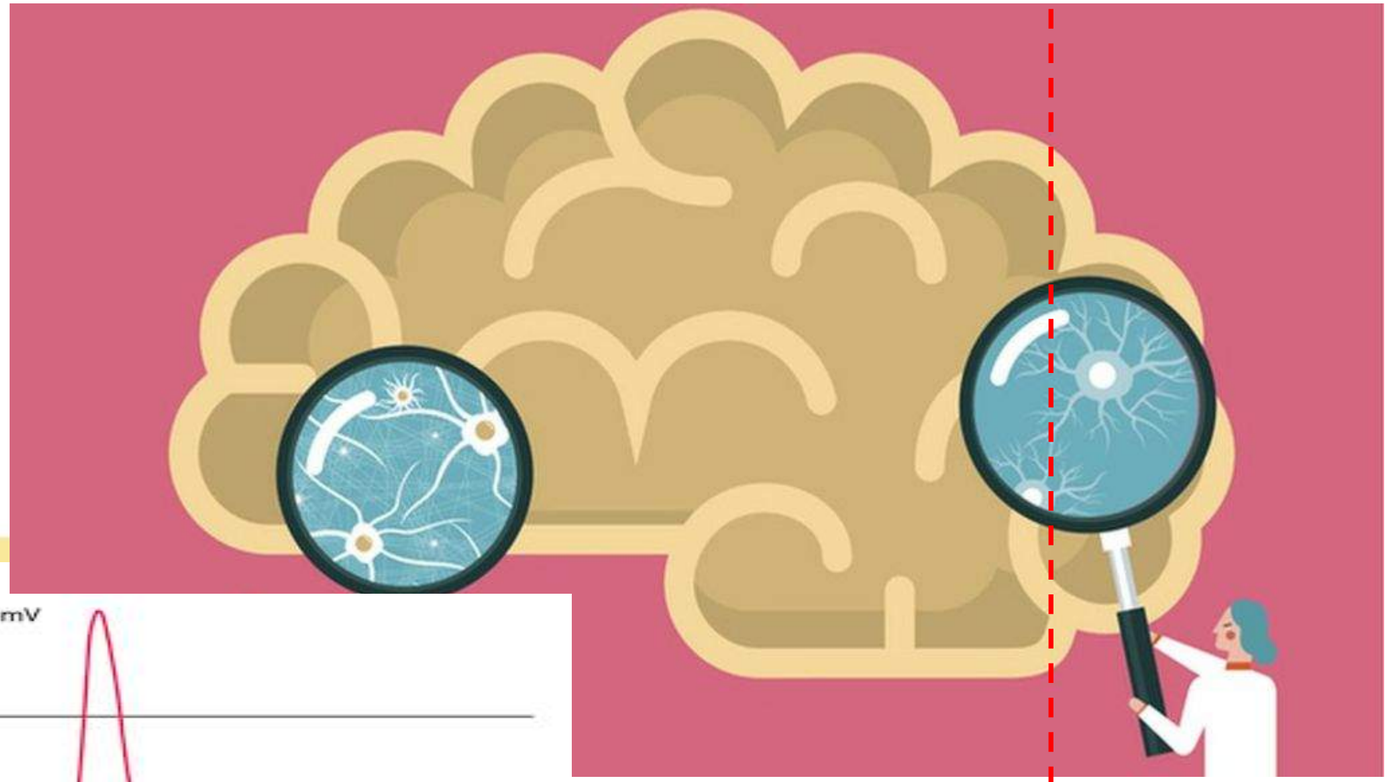
Células excitables

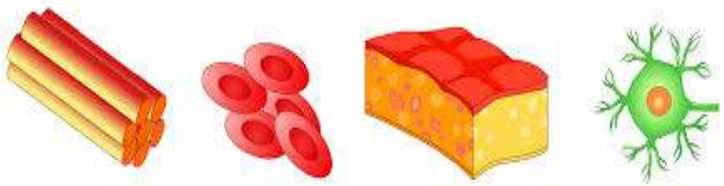














Células NO excitables

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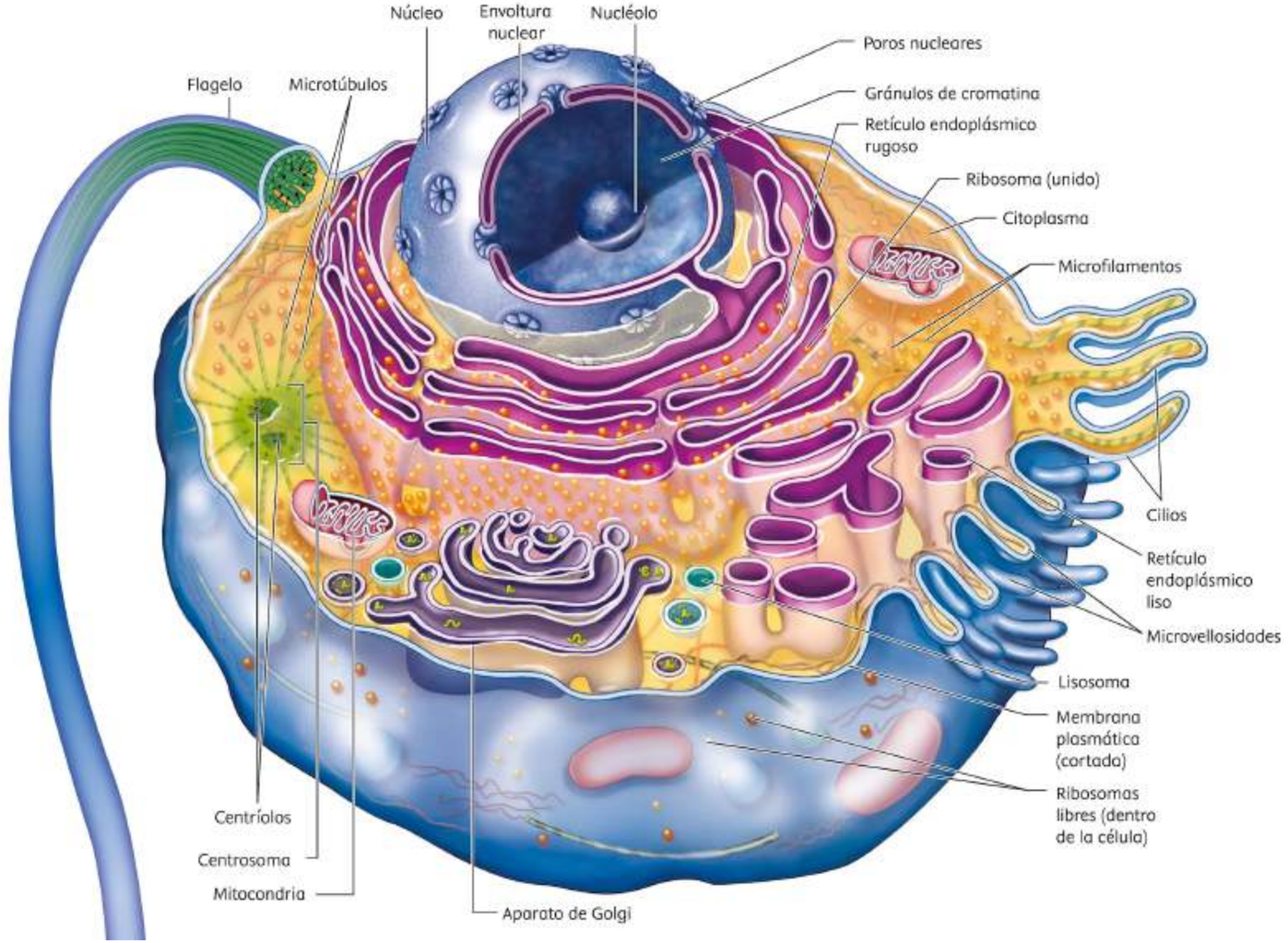
Célula Excitable



Las tres partes principales de la célula son:

1. **Membrana plasmática**: rodea toda la célula y constituye su límite externo
2. **Citoplasma**: toda la materia viva del interior de la célula (excepto el núcleo).
3. **Núcleo**: es una gran estructura limitada por una membrana, que existe en la mayoría de las células y contiene la mayor parte del código genético de las células.

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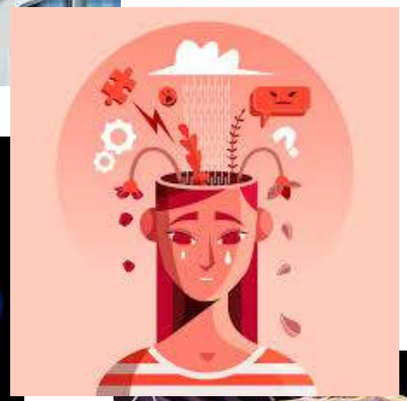
Plasticidad neuronal

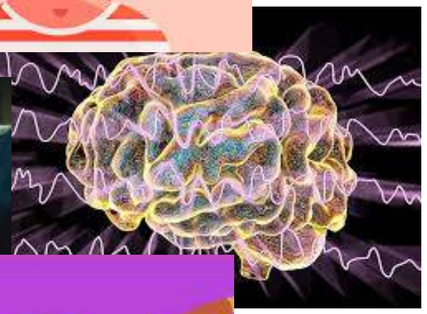


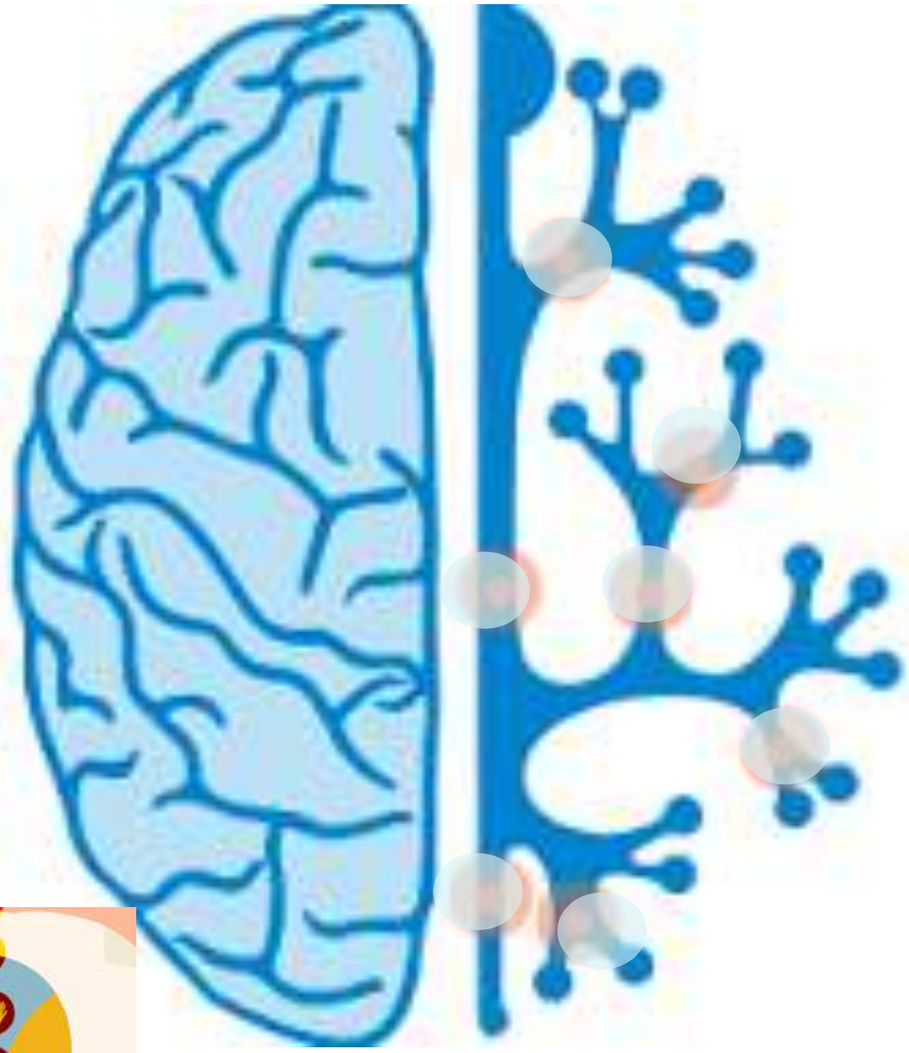




















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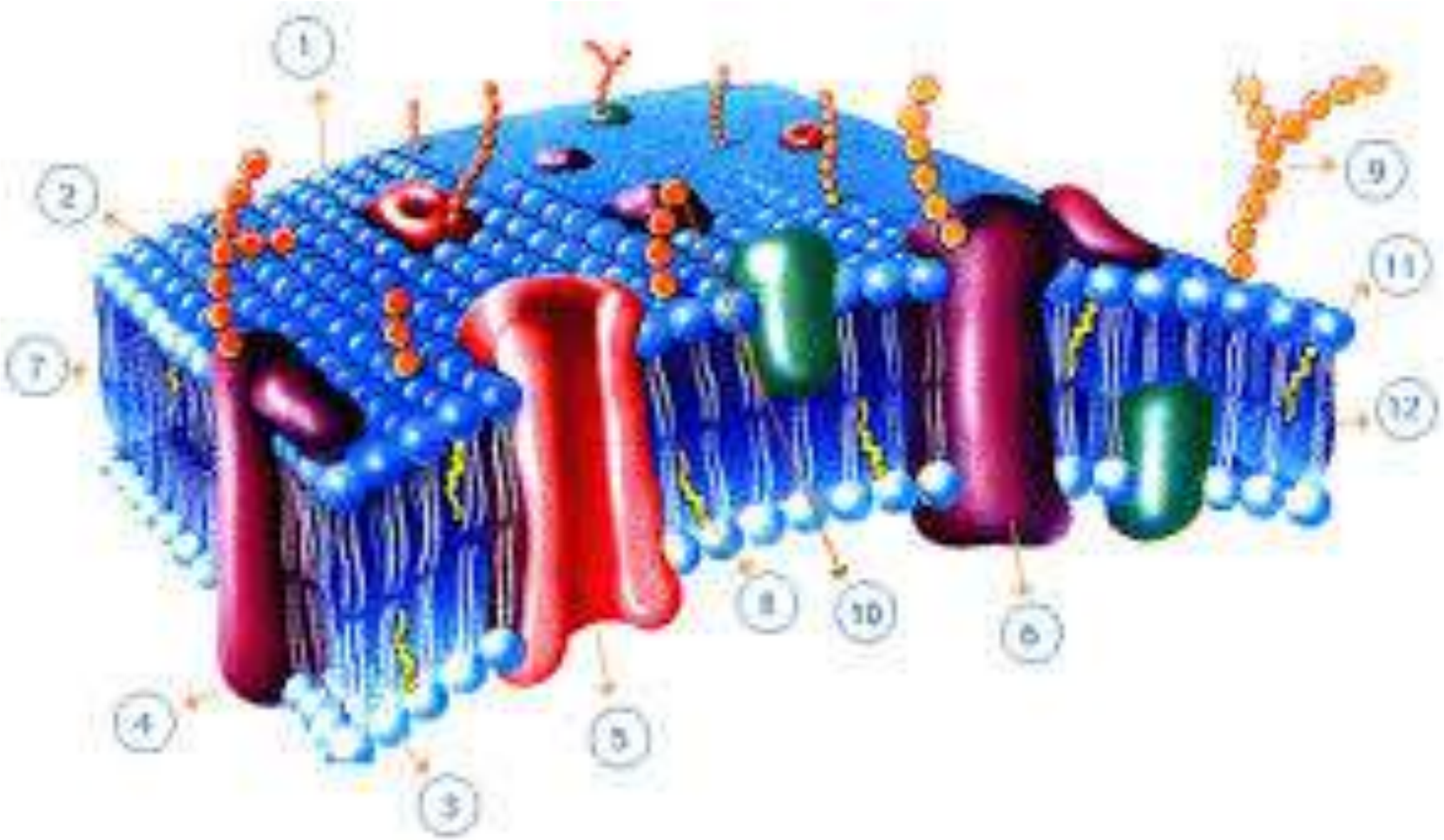
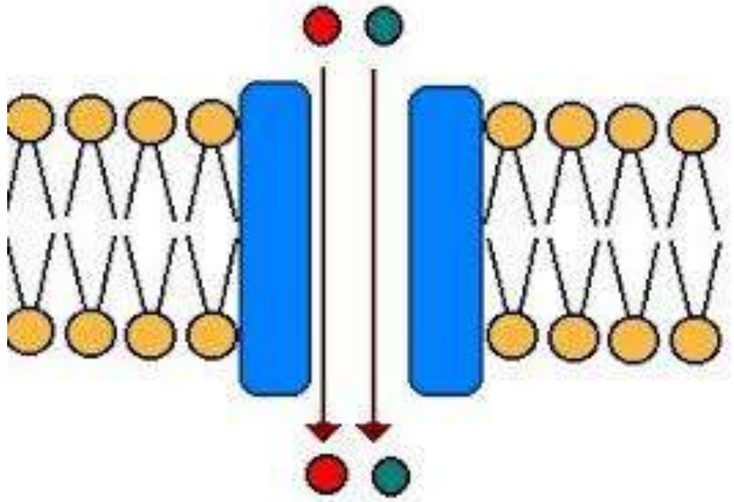
Membrana Celular Excitable





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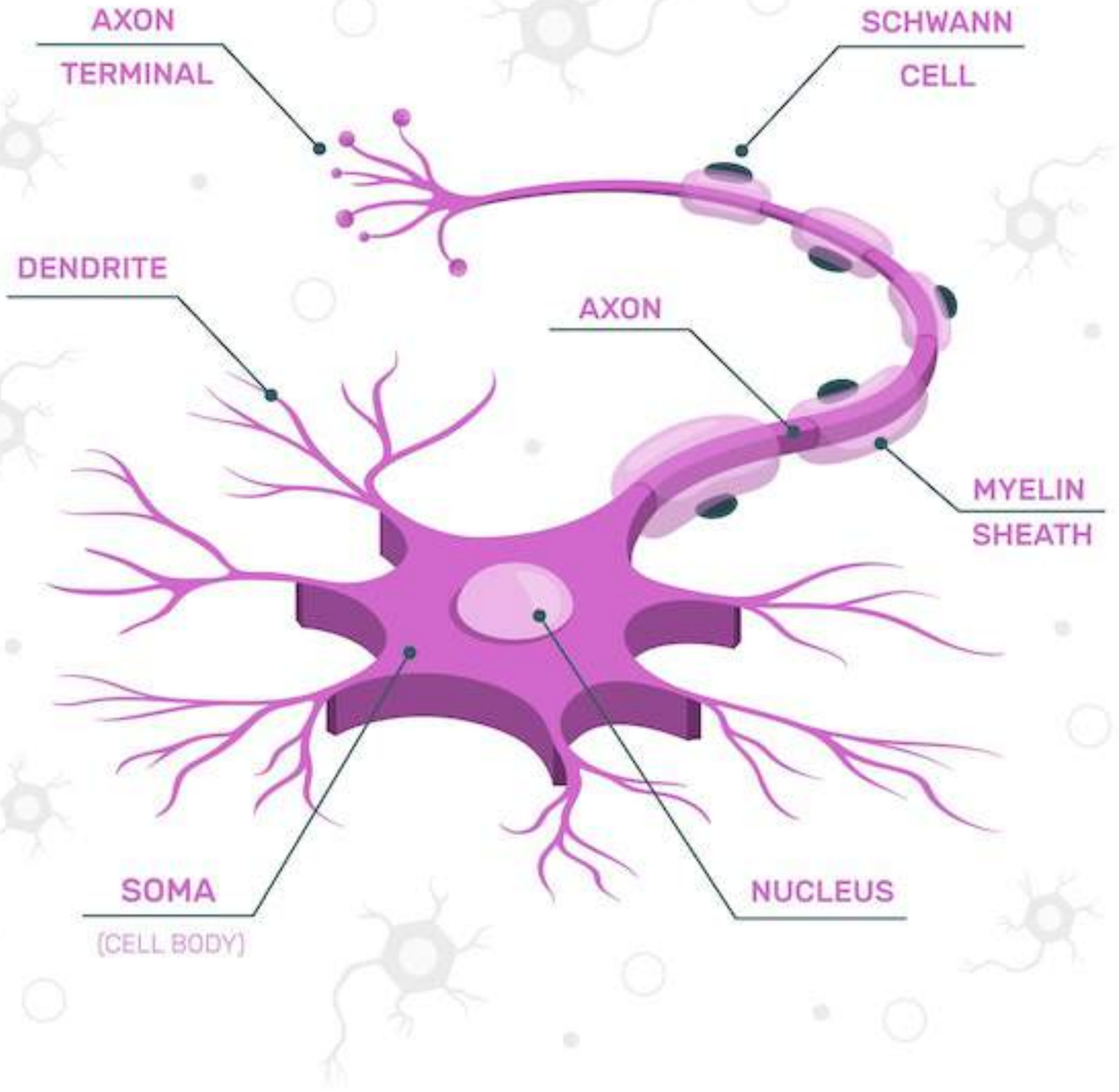
Neurona



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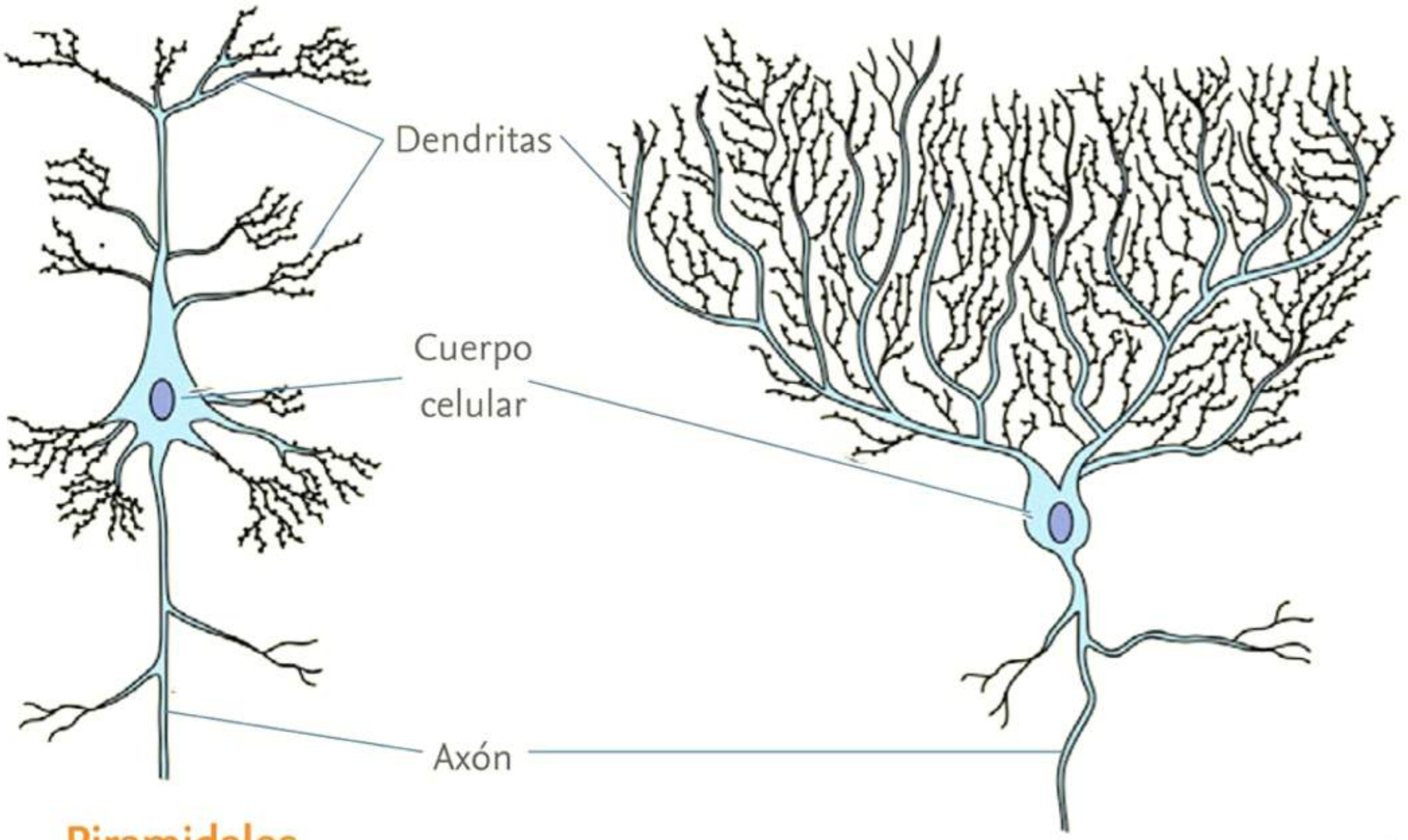

Piramidales (hipocampo)

De Purkinje (cerebelo)

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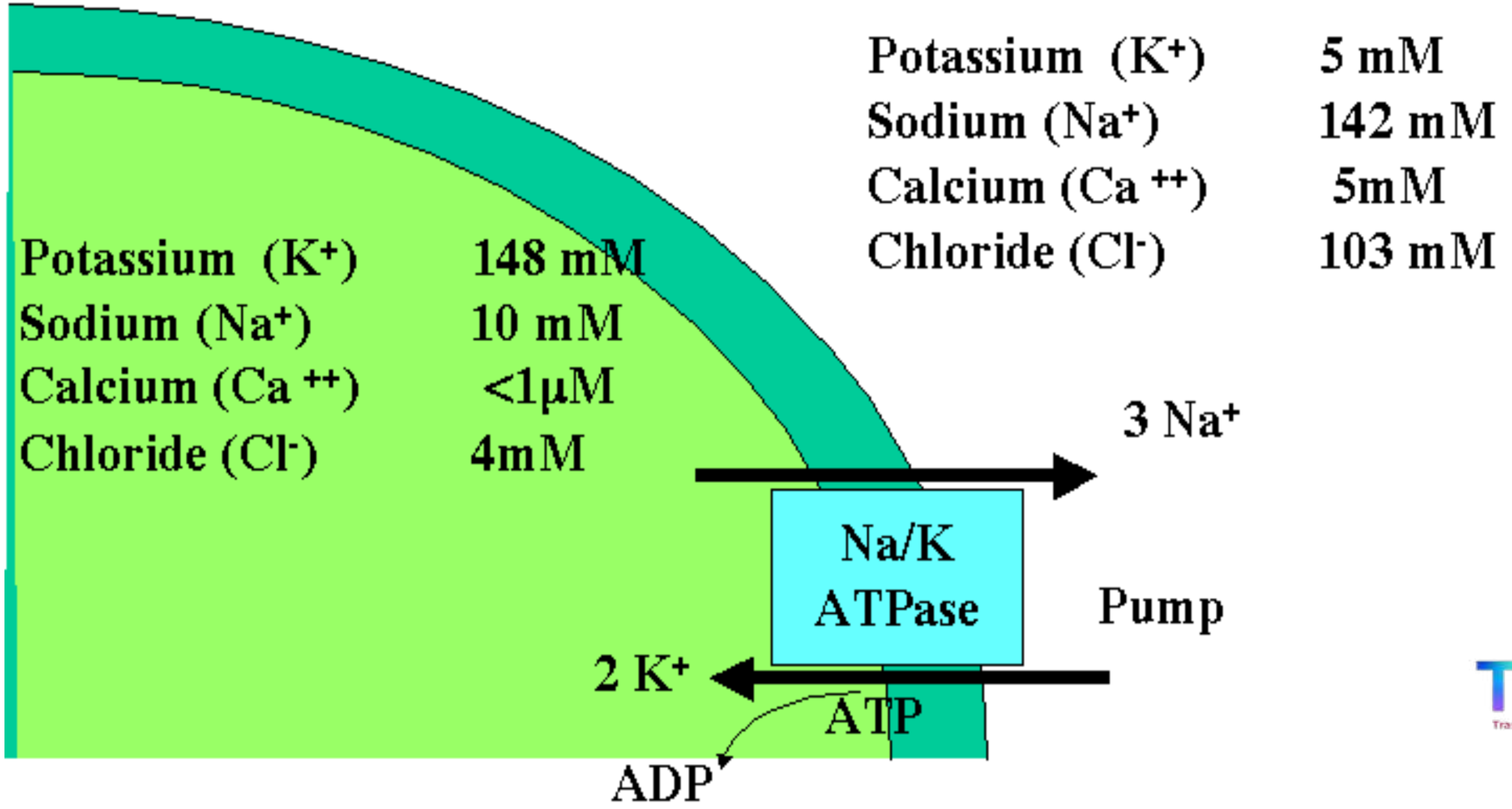
Membrane potential



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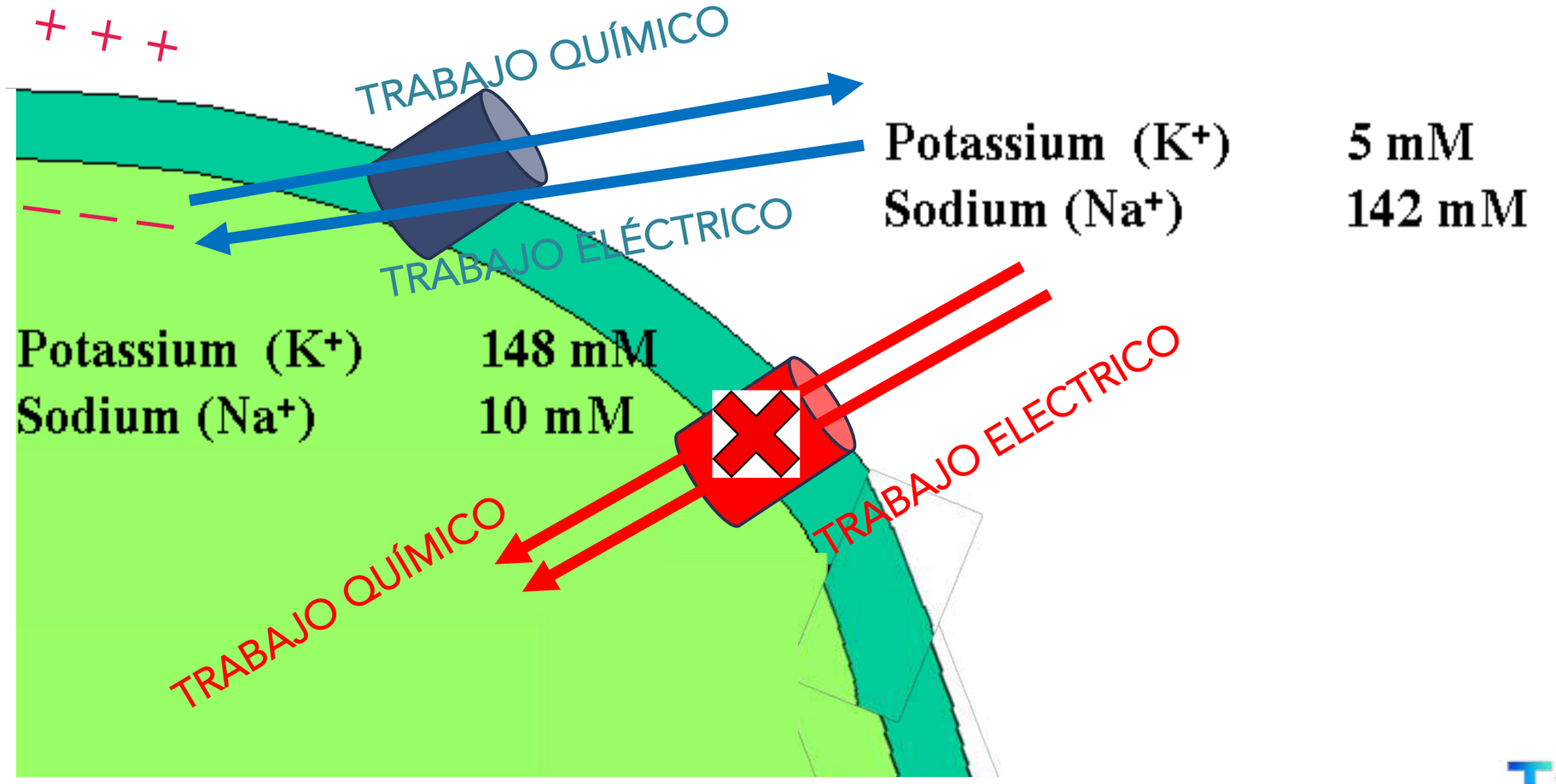

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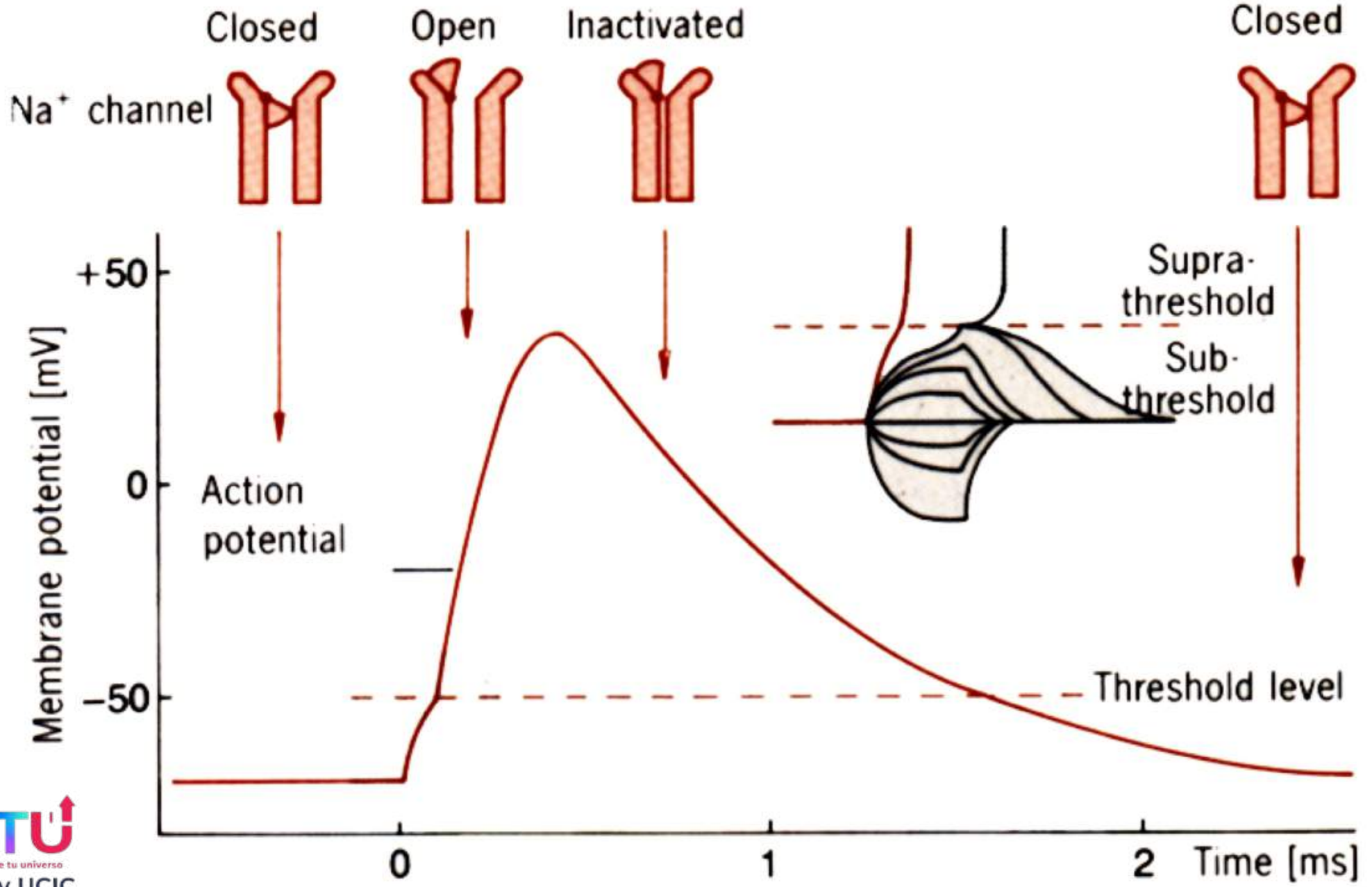

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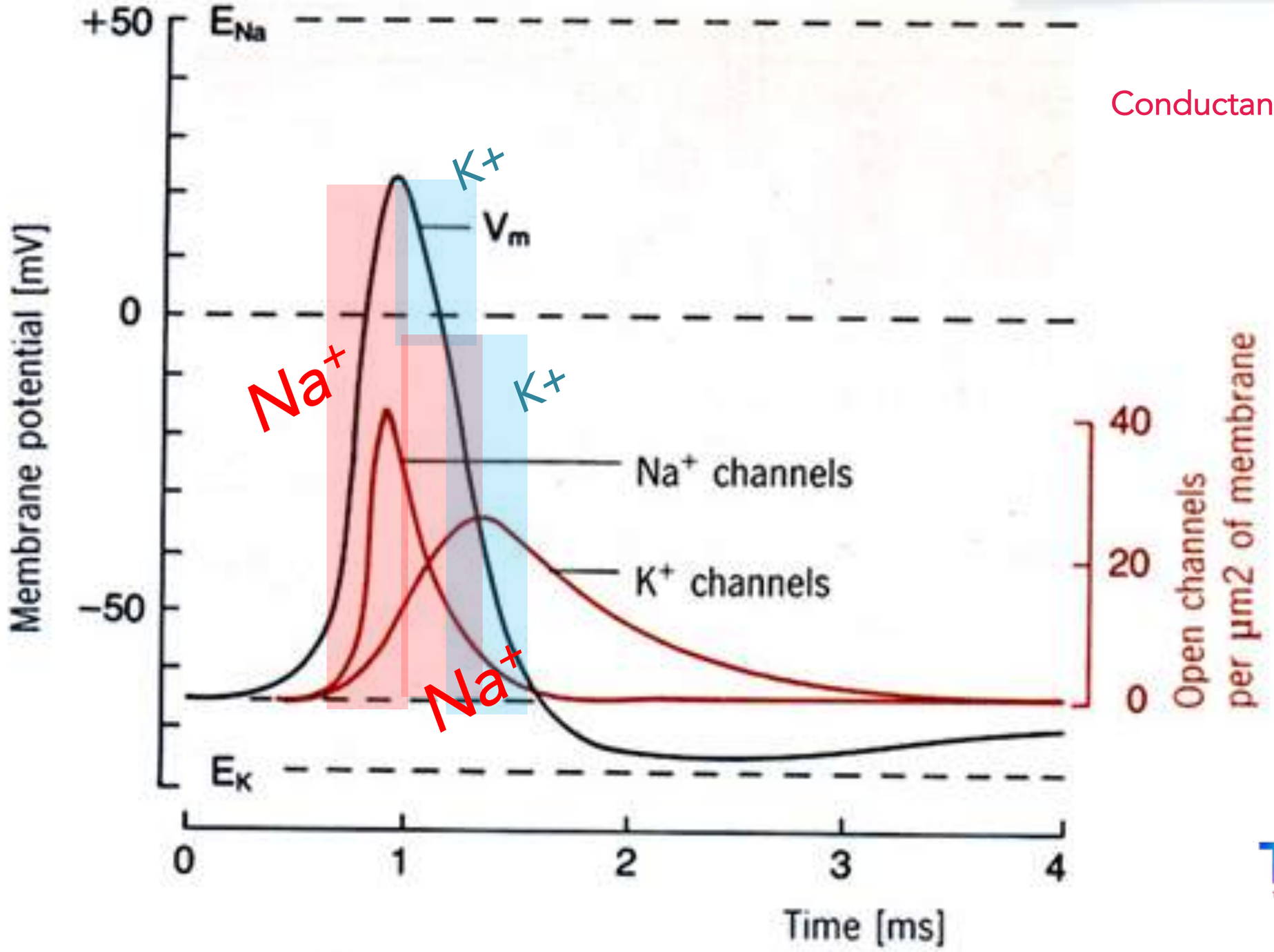
Conductancias



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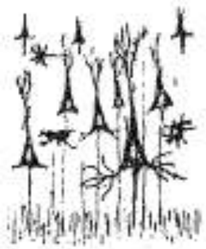
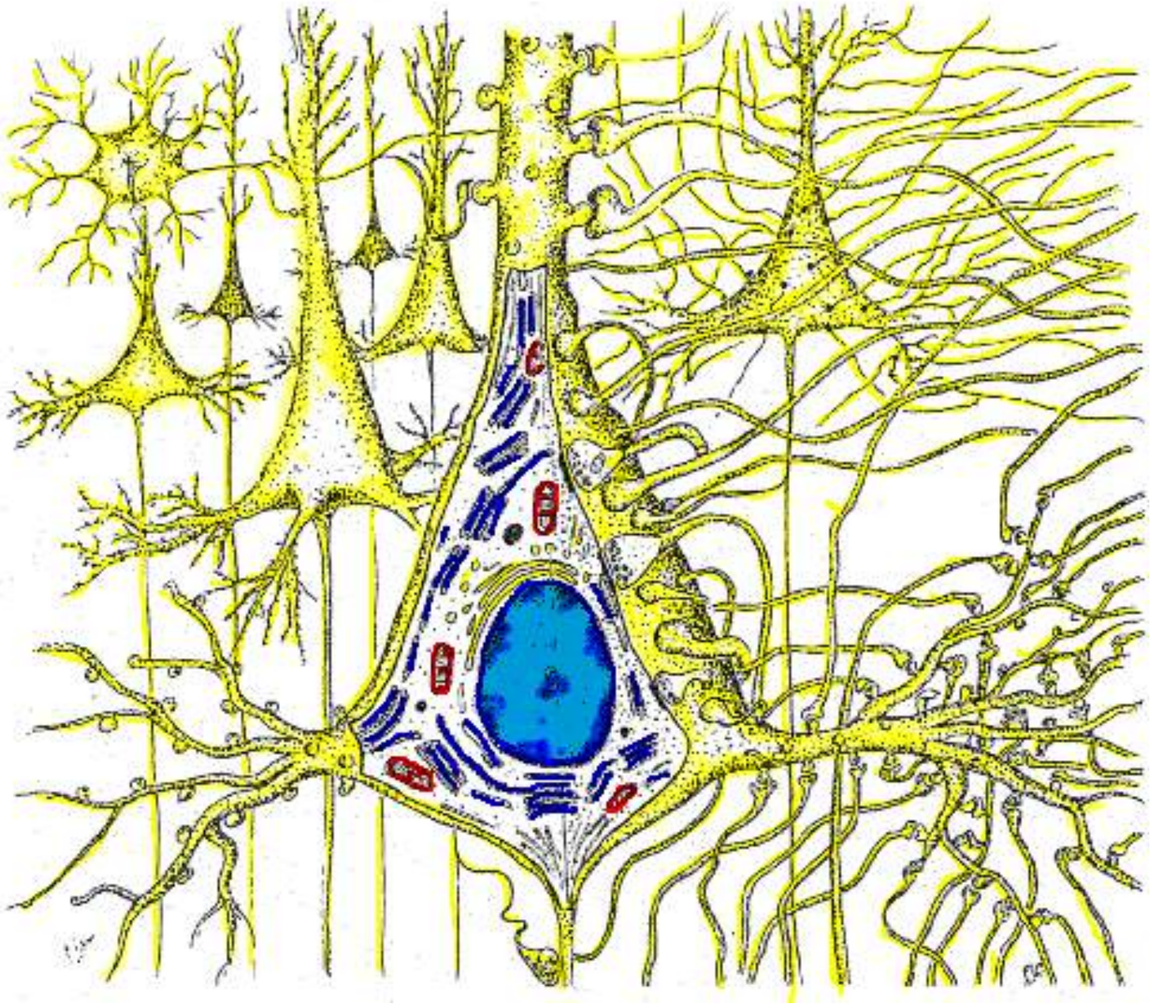
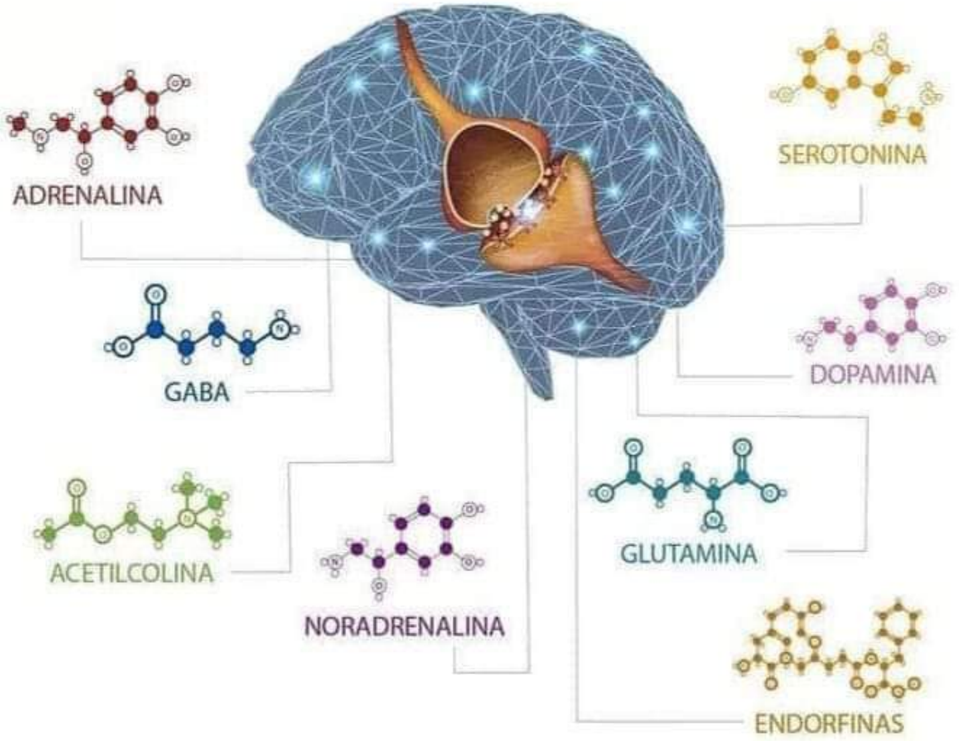
Comunicación neuronal







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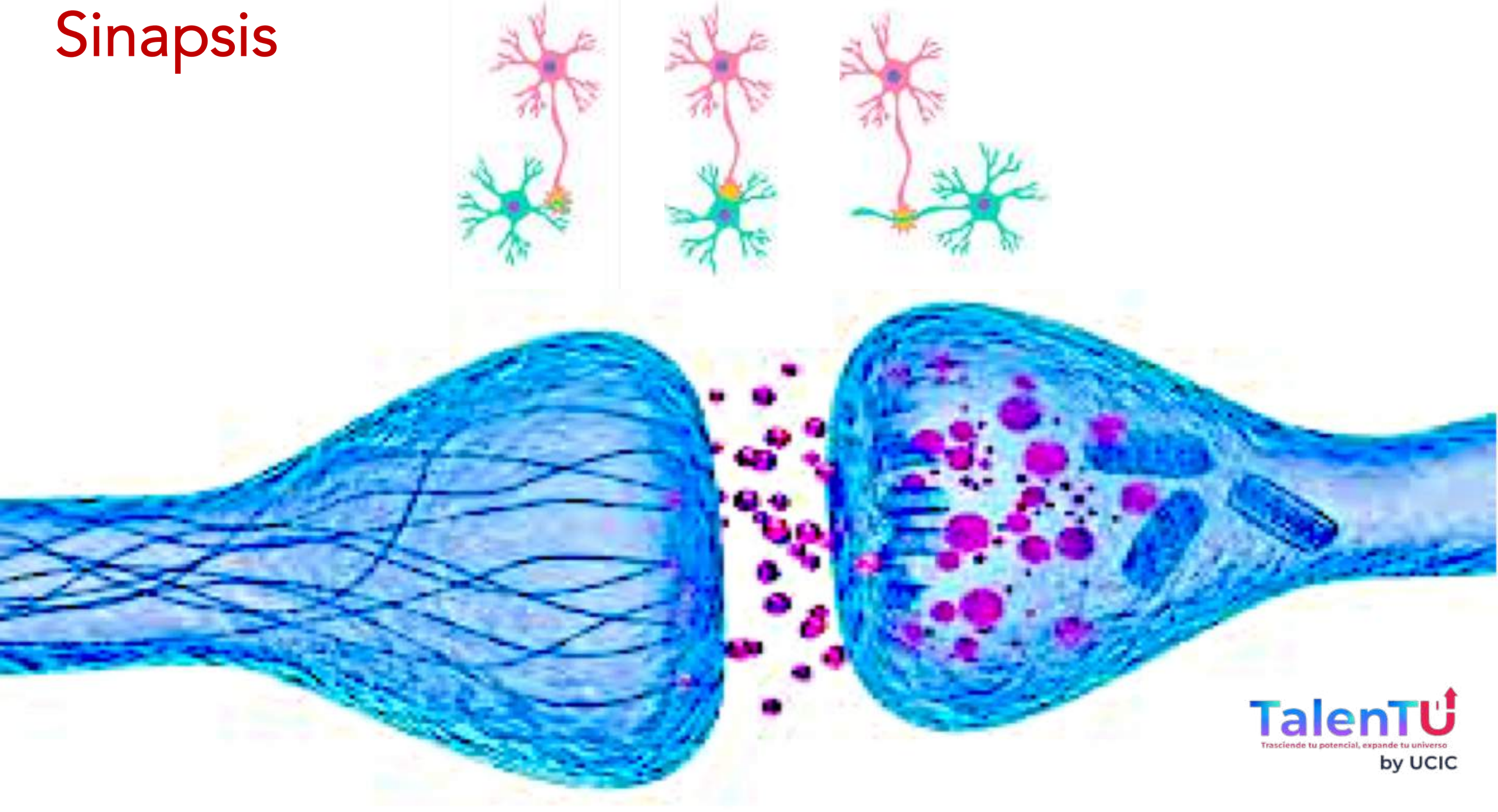
Sinapsis



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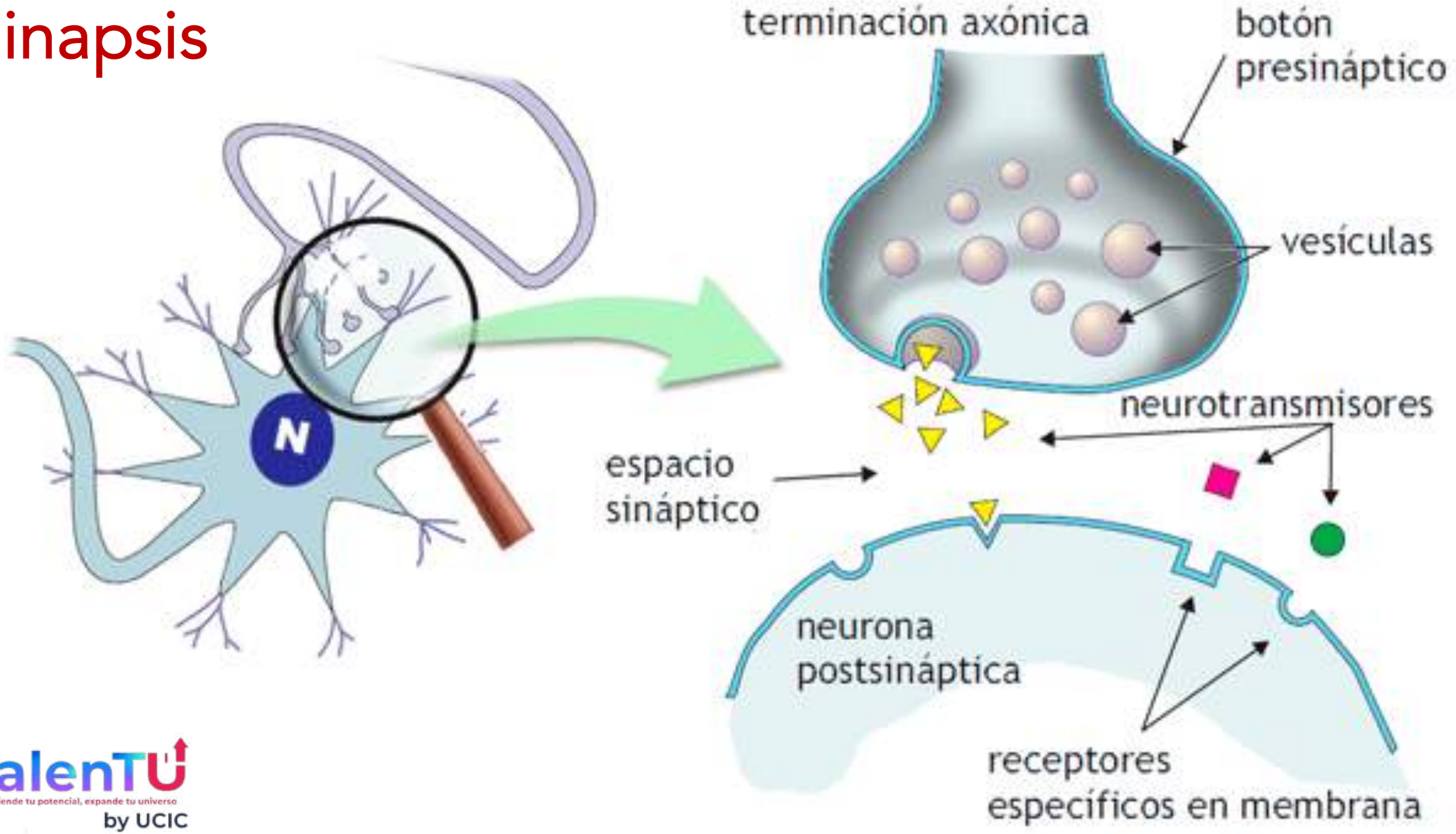
Sinapsis



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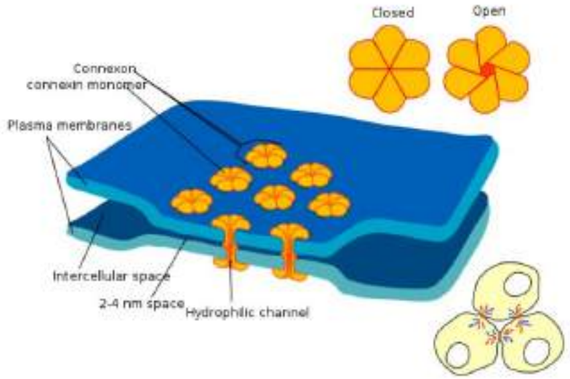
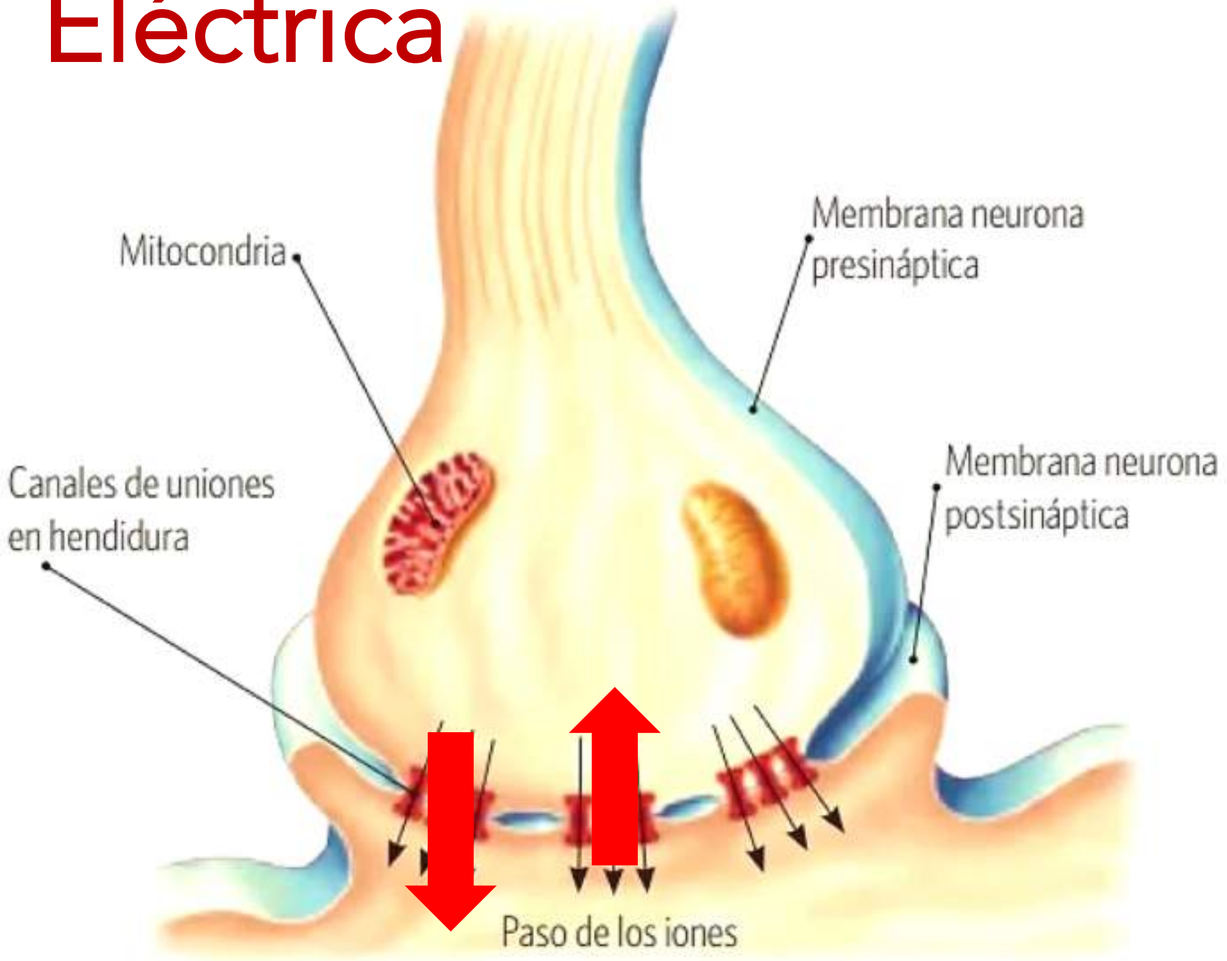
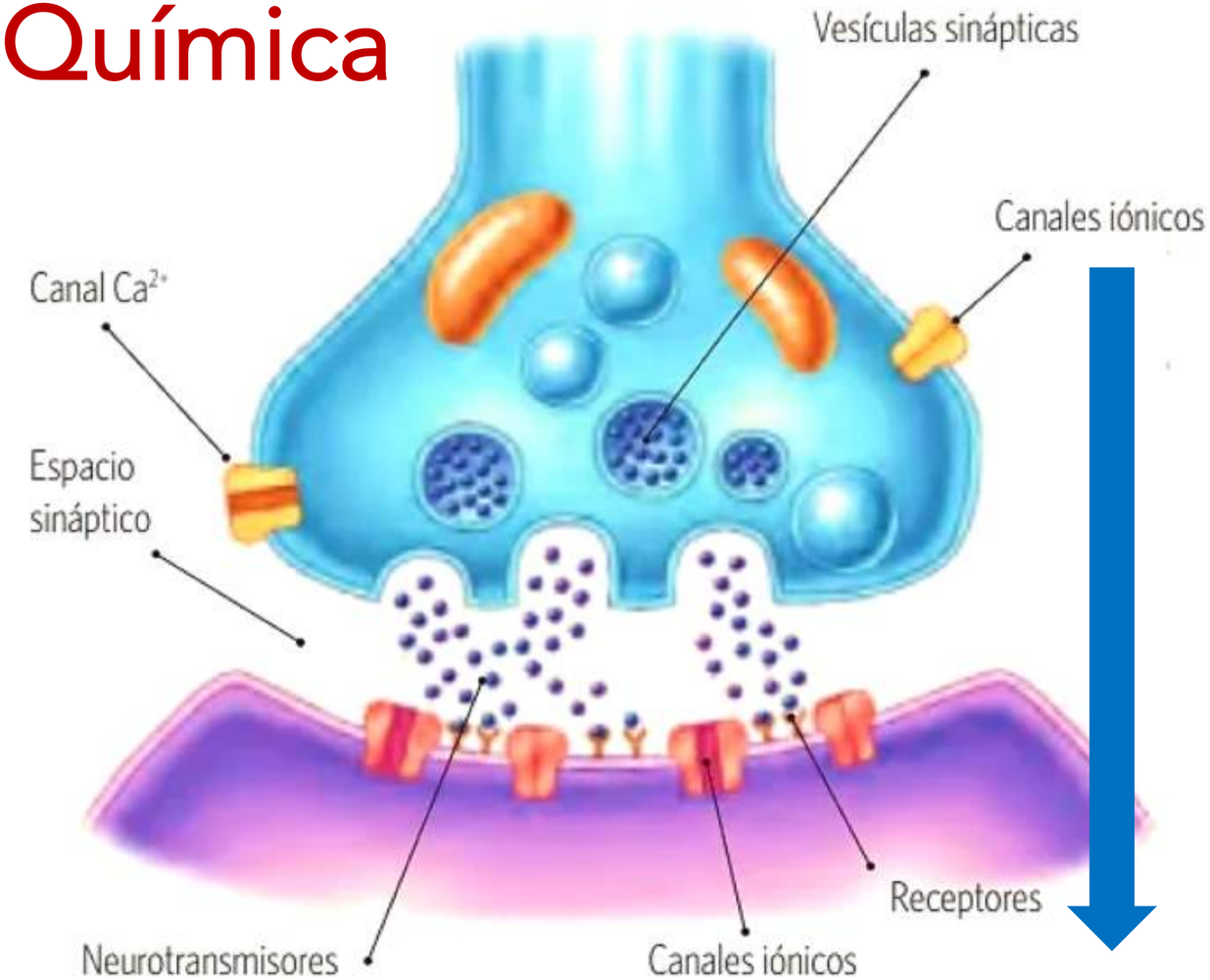
Sinapsis



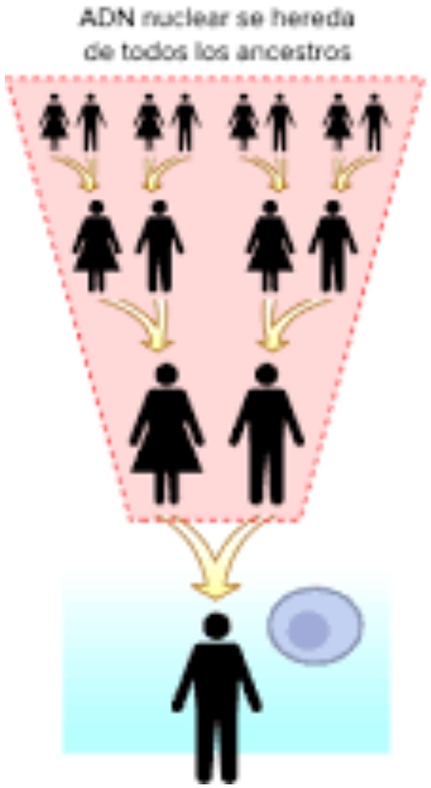
Eléctrica

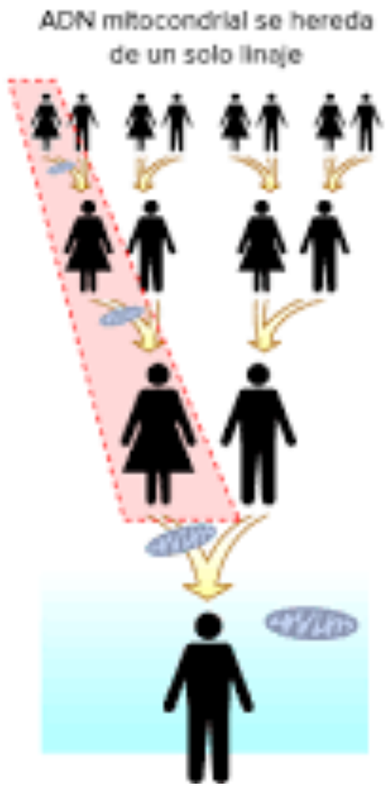


Química

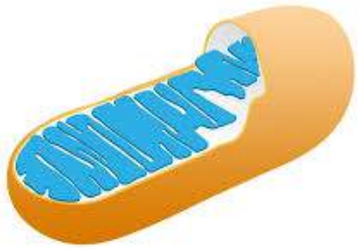


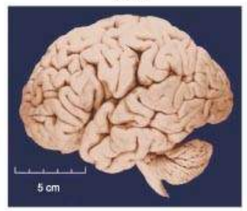
Plasticidad Neuronal

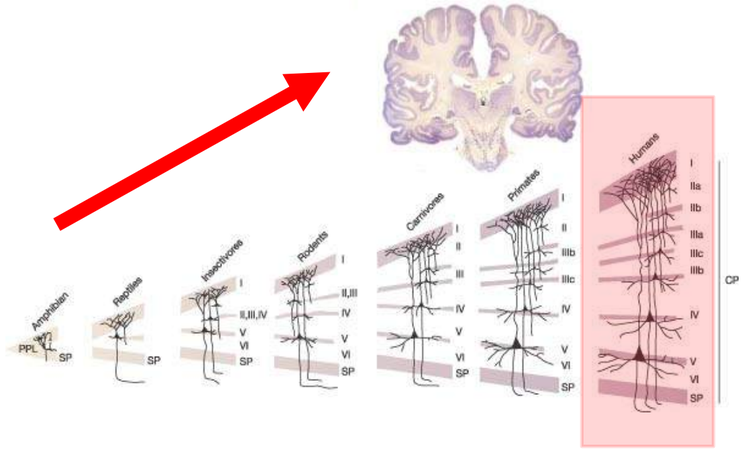


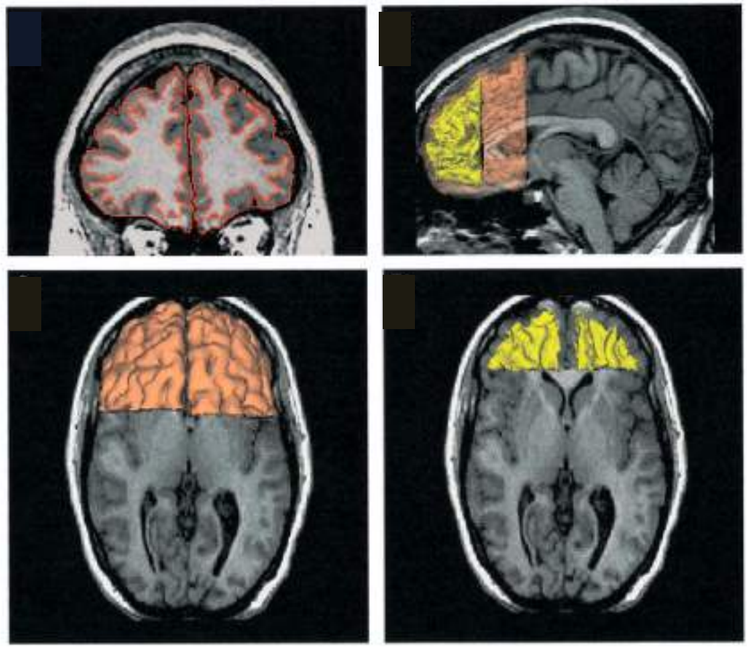


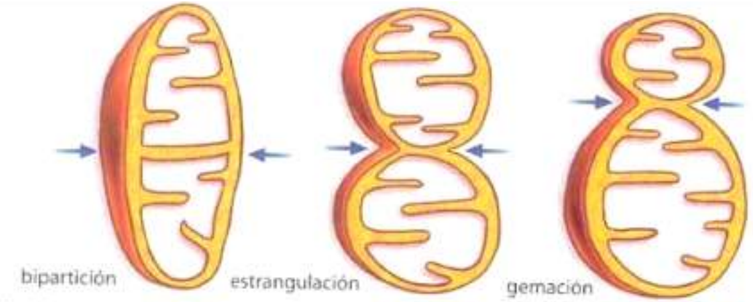












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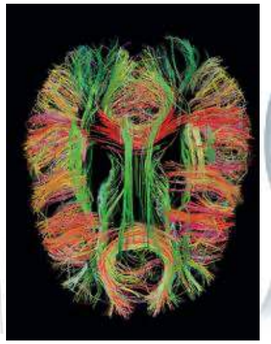
Cerebro Humano





100 000 millones
86 000 millones de neuronas





La mayoría de las neuronas
NO se regeneran.



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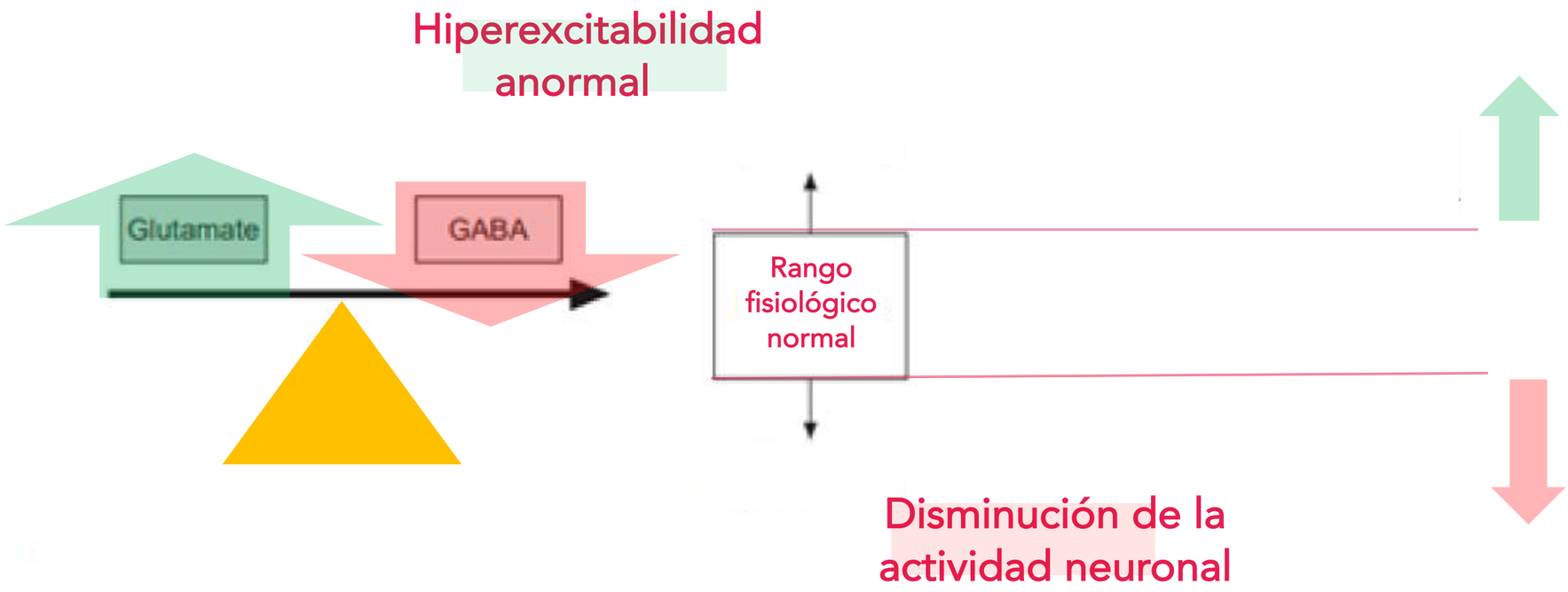
Calixto E. Un clavado a tu cerebro. 2017.

Glutamato y GABA en equilibrio



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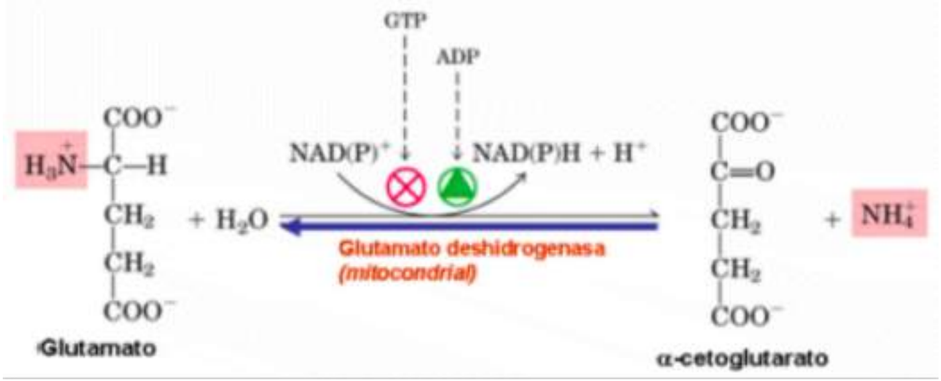
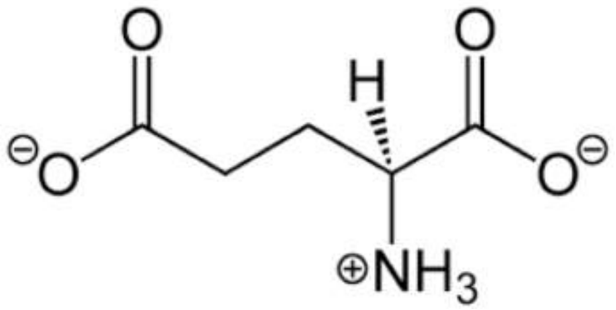
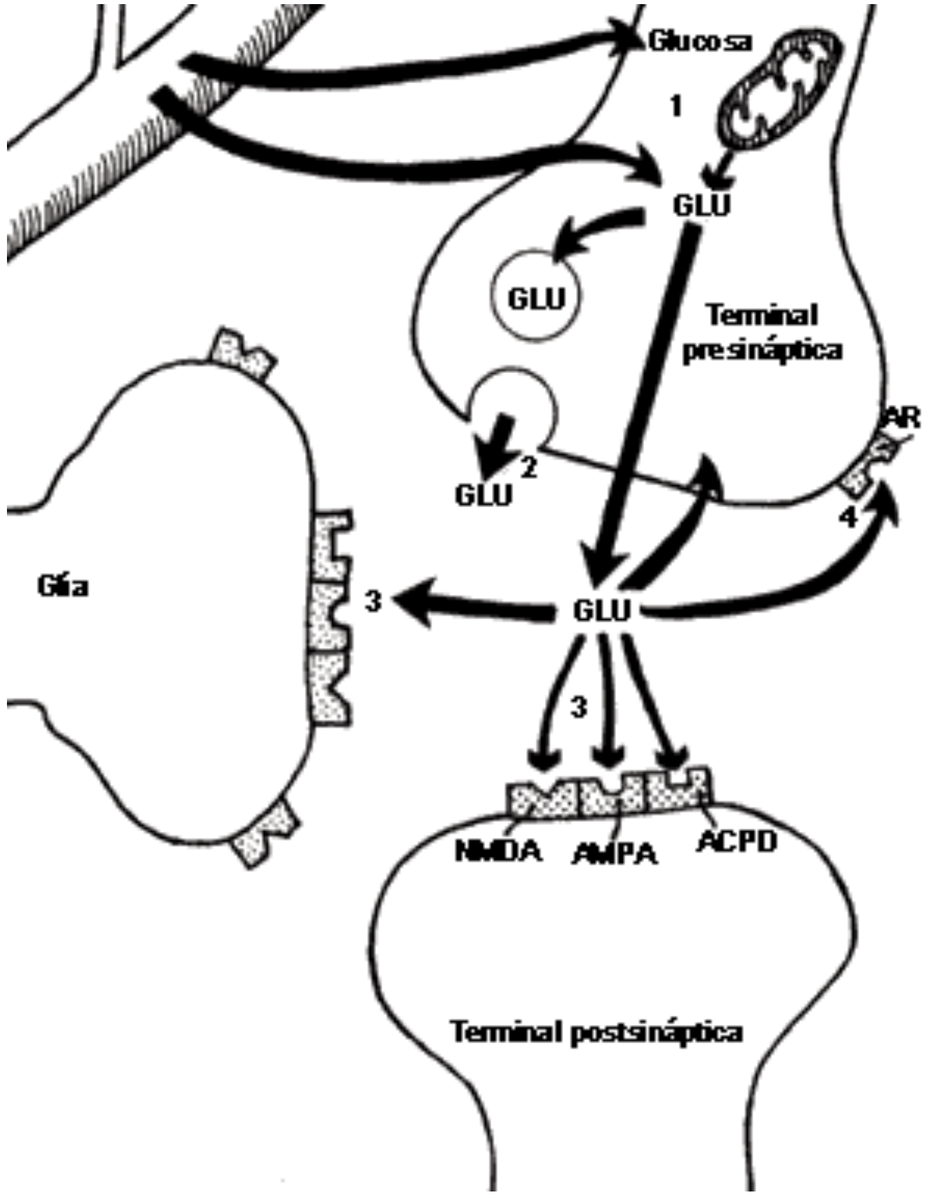




Glutamato



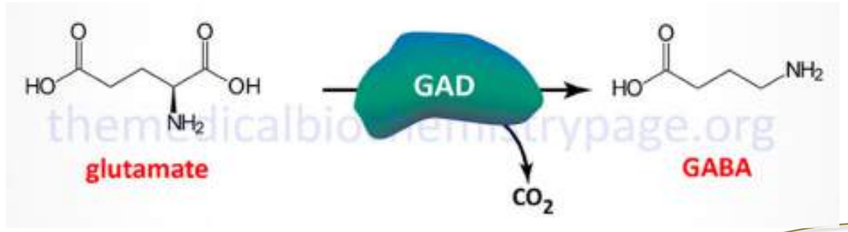
METABOTROPICOS

- mGluR1 + PLC
- mGluR2 - AC
- mGluR3 - AC
- mGluR4 -AC
- mGluR5 + PLC
- mGluR6 + Fdiest
- mGluR7 - AC
- mGluR8 - AC

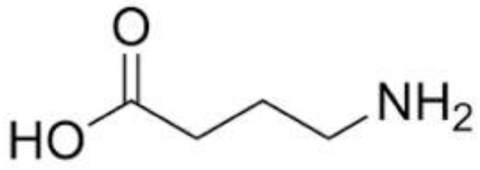
IONOTROPICOS

- NMDA
- AMPA
- Kainato

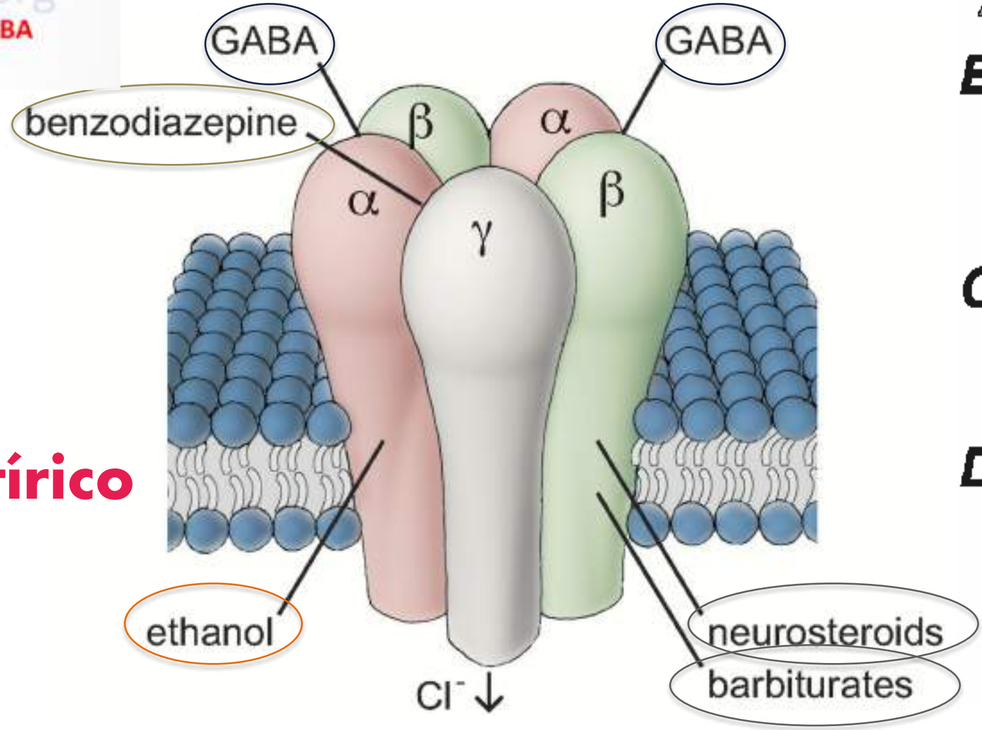
El GABA: el inhibidor más importante en el cerebro

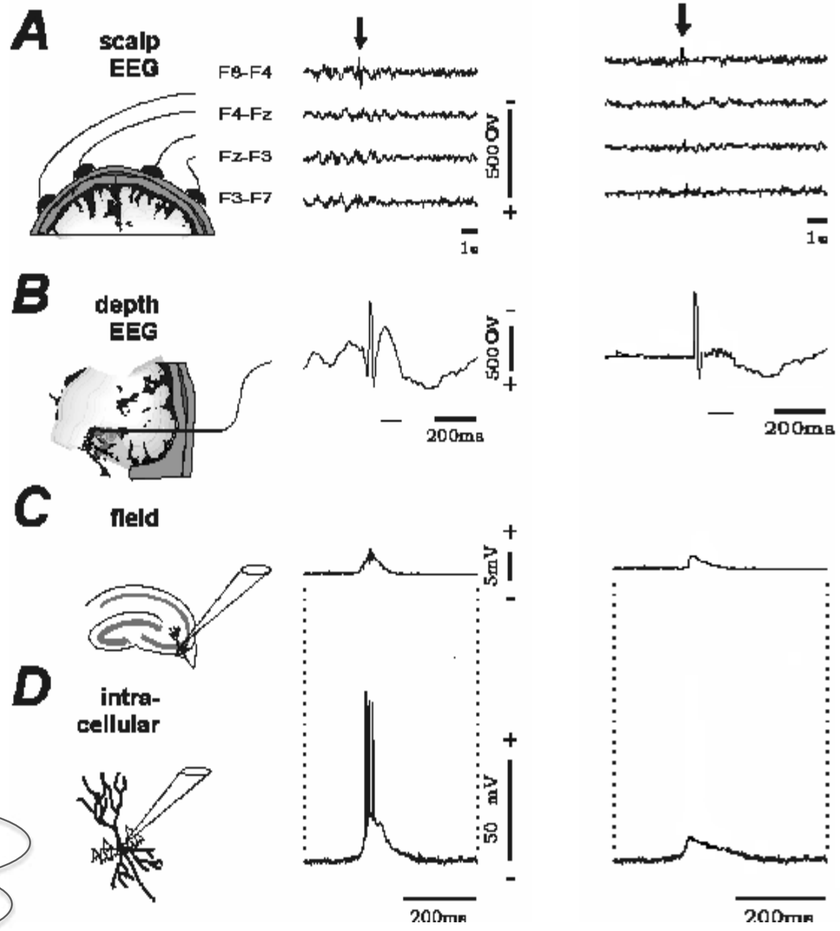






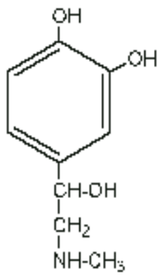
Ácido Gama Amino Butírico (GABA)

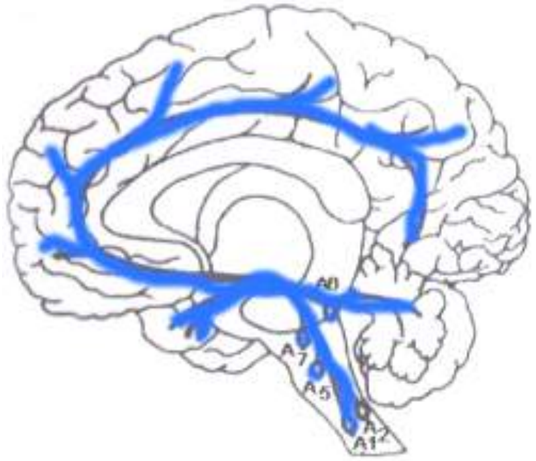




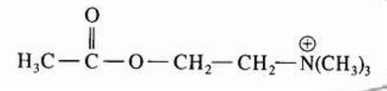
Fuente: MIKKO UUSI-OUKARI AND ESA R. KORPI PHARMACOLOGICAL REVIEWS 62 (1): 98-127.

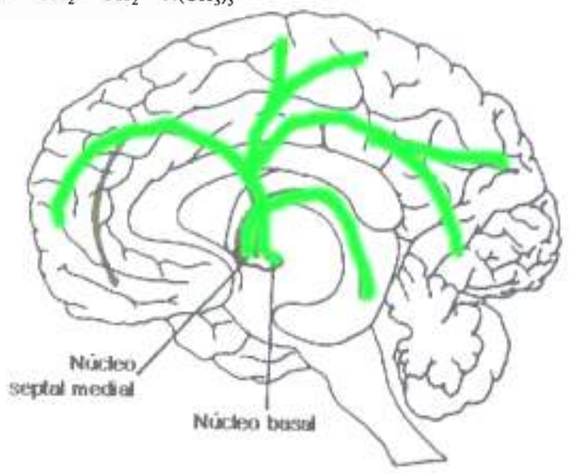
Noradrenalina



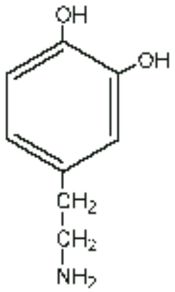


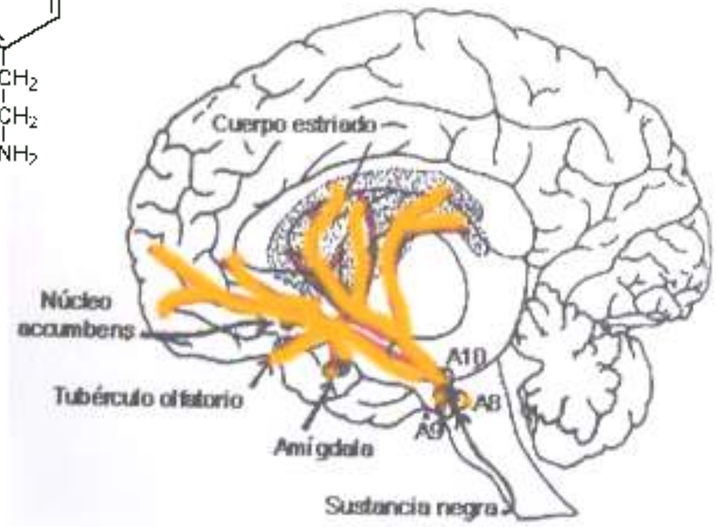
Acetilcolina



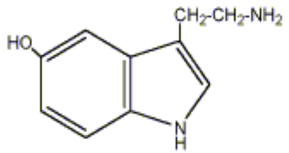


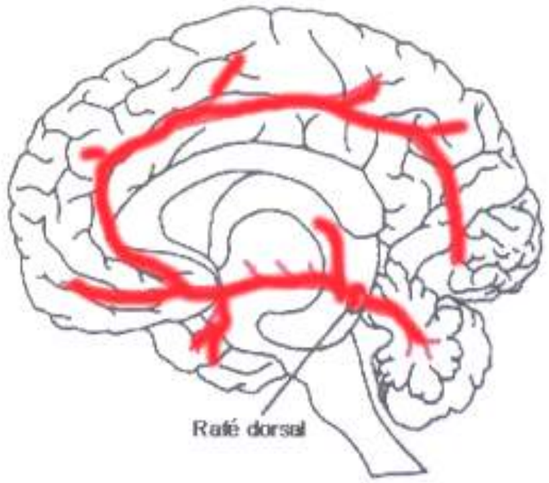
Dopamina





Serotonina /opiáceos





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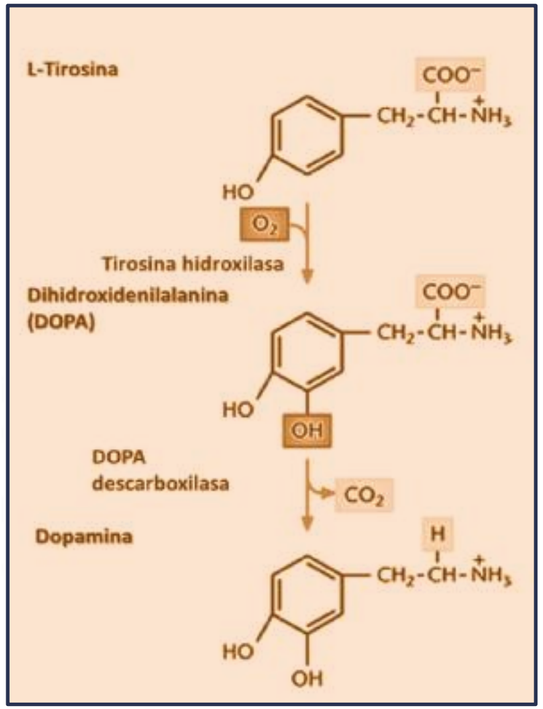
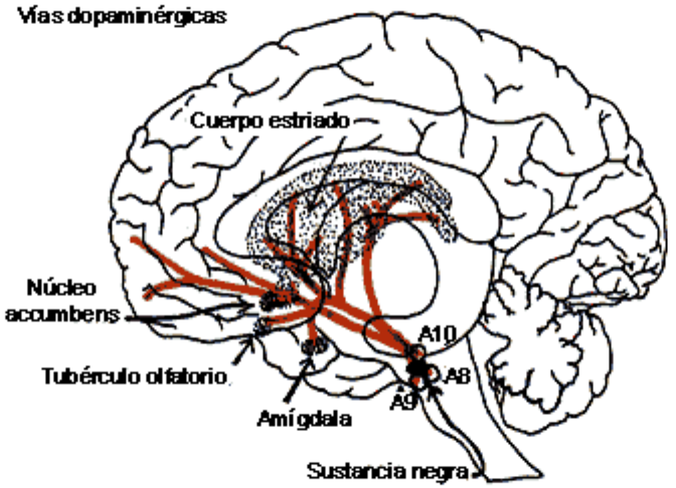
Dopamina





Familia D1

D1 +AC/ PLC

D5 +AC Hipotálamo/ Hipocampo

Familia D2

D2 -AC / +PLC inhibe IK+/Ca2+

D3 -AC

D4 -AC Corteza cerebral

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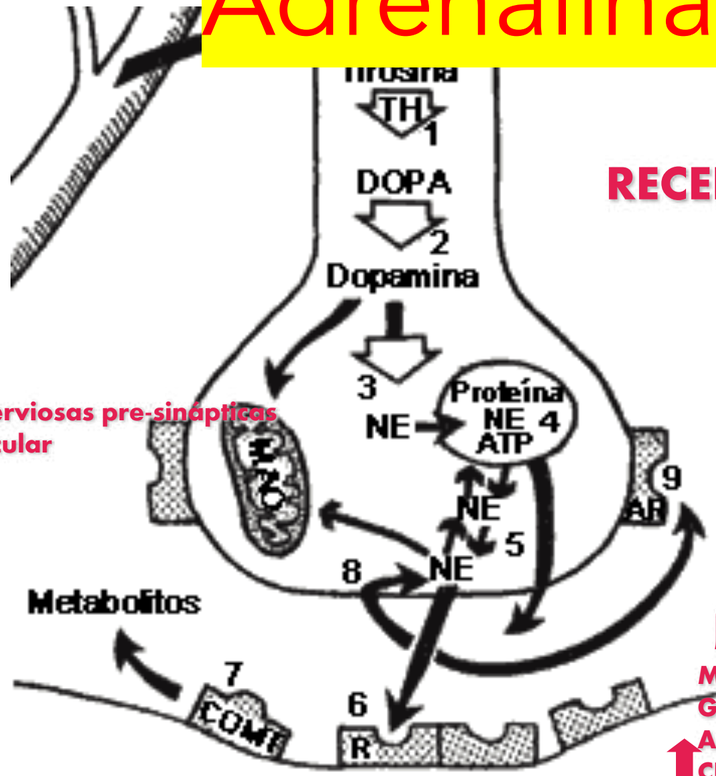
Adrenalina Noradrenalina



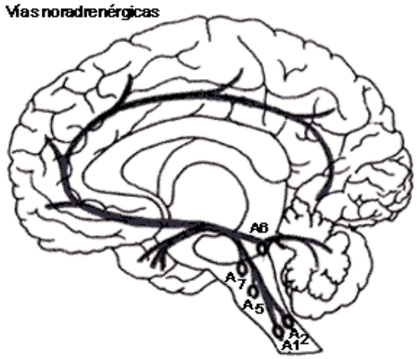
RECEPTORES ADRENERGICOS

α1 α2

Terminaciones nerviosas pre-sinápticas
Músculo liso vascular
Glándulas
Plaquetas
Adipocitos
Cerebro

β1 β2 β3

Músculos lisos
Músculo cardiaco
Adipocitos
Cerebro



α1

↑ Gq
↑ IP_3-DAG
↑ Incremento de Ca^{2+} CONTRACCION Y SECRECIÓN

β1

Músculo cardiaco y Aparato yuxtaglomerular
Gs
↑ AMP_c
CRONOTROPICO, DROMOTROPICO, INOTROPICO +
LIBERA RENINA

β2

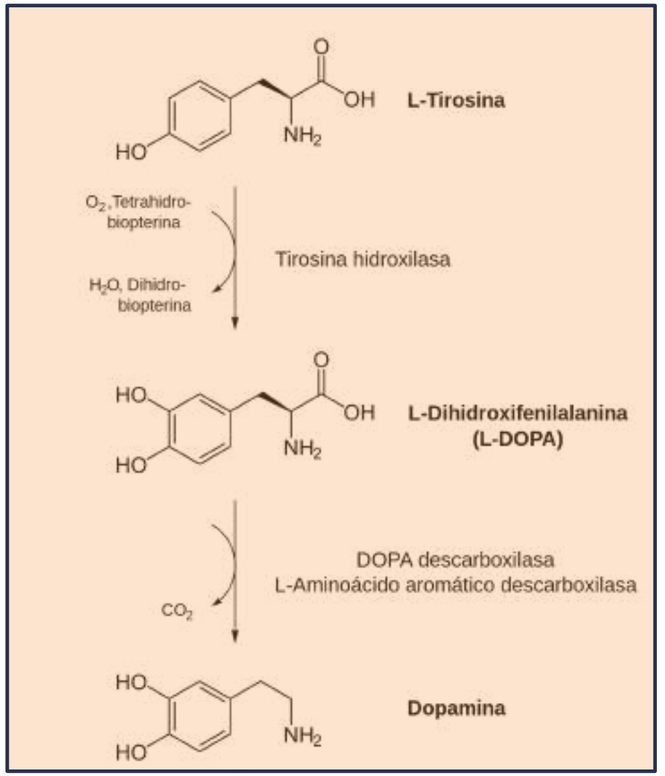
Músculo liso
Gs
↑ AMP_c
RELAJA MÚSCULO LISO, GLUCOGENOLISIS,
CRONOTROPICO, DROMOTROPICO, INOTROPICO +

α2

Gi
↓ AMP_c
Liberación de neurotransmisor
(contracción por receptor postsináptico)

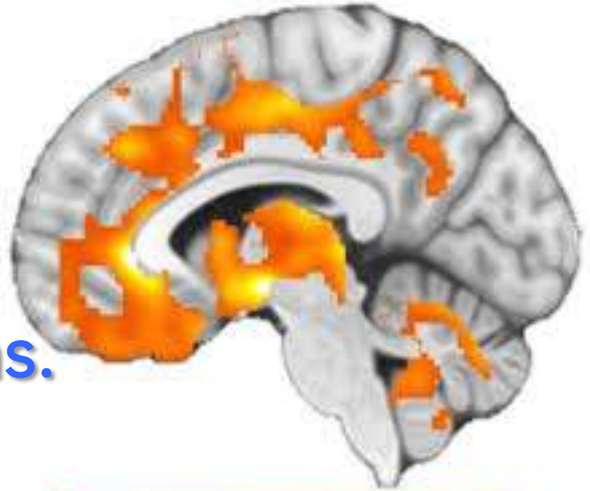
β3

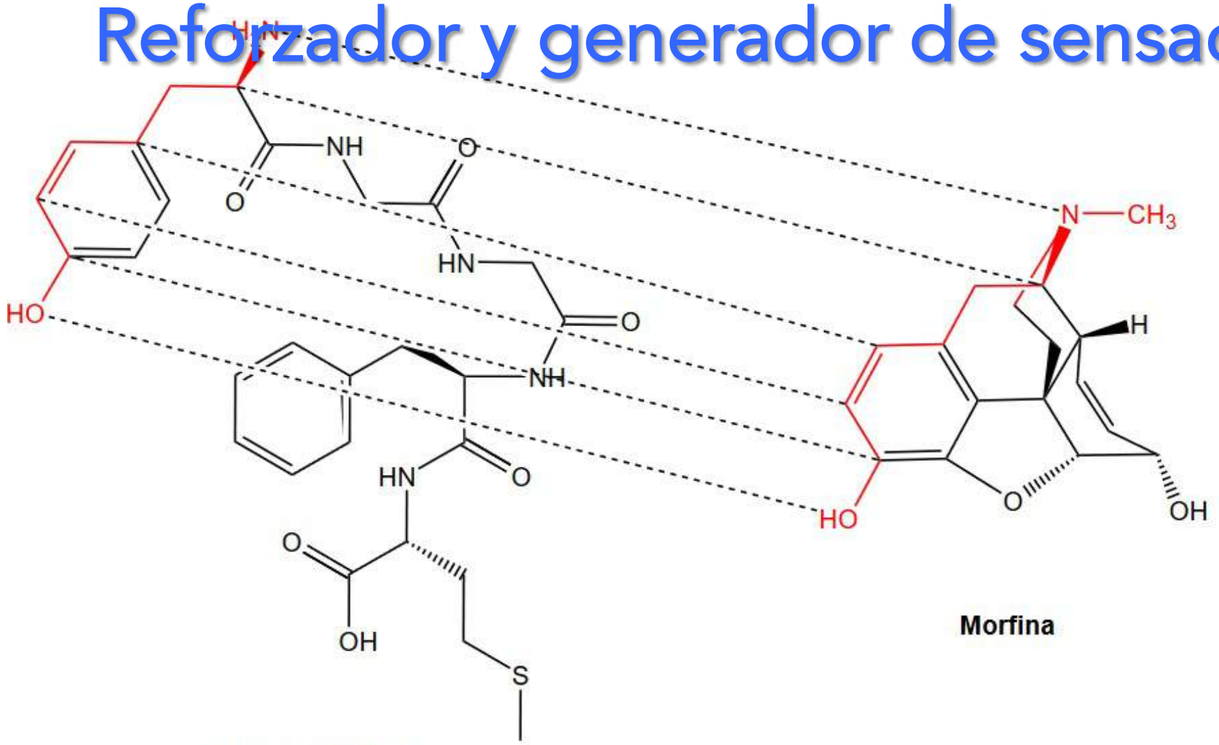
Adipocitos
Gs
↑ AMP_c
LIPOLISIS y TERMOGÉNESIS



Endorfinas

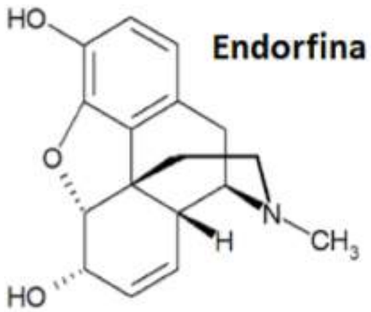
Reforzador y generador de sensaciones placenteras.





Met-encefalina

Morfina



Endorfina

RECEPTOR	CARACTERISTICAS
Mu (μ)	Analgesia supraespinal Depresión respiratoria Euforia Sedación moderada
Kappa (κ)	Analgesia espinal Sedación intensa Miosis
Sigma (σ)	Alucinaciones Disforia Estimulación psicomotora

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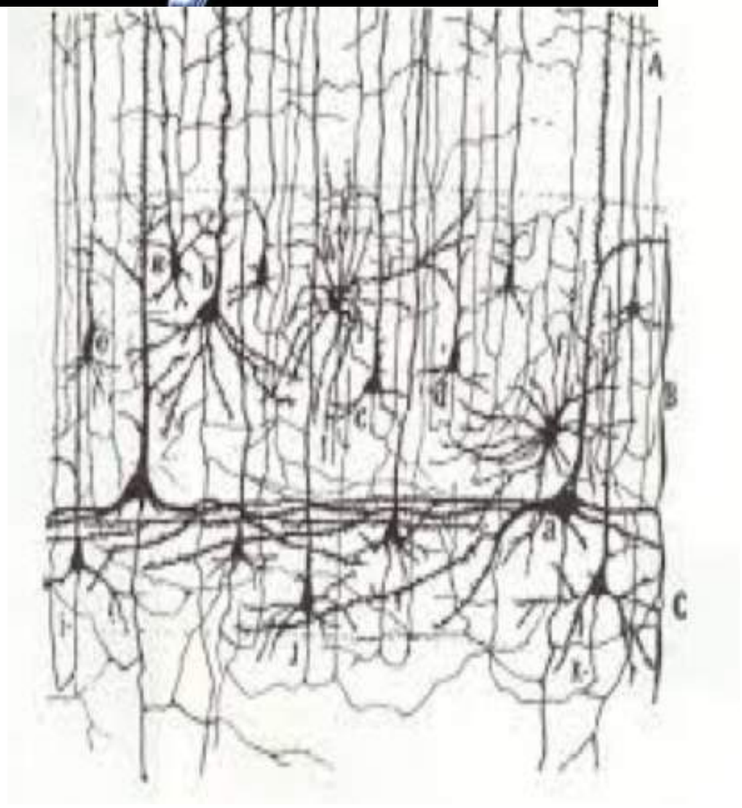
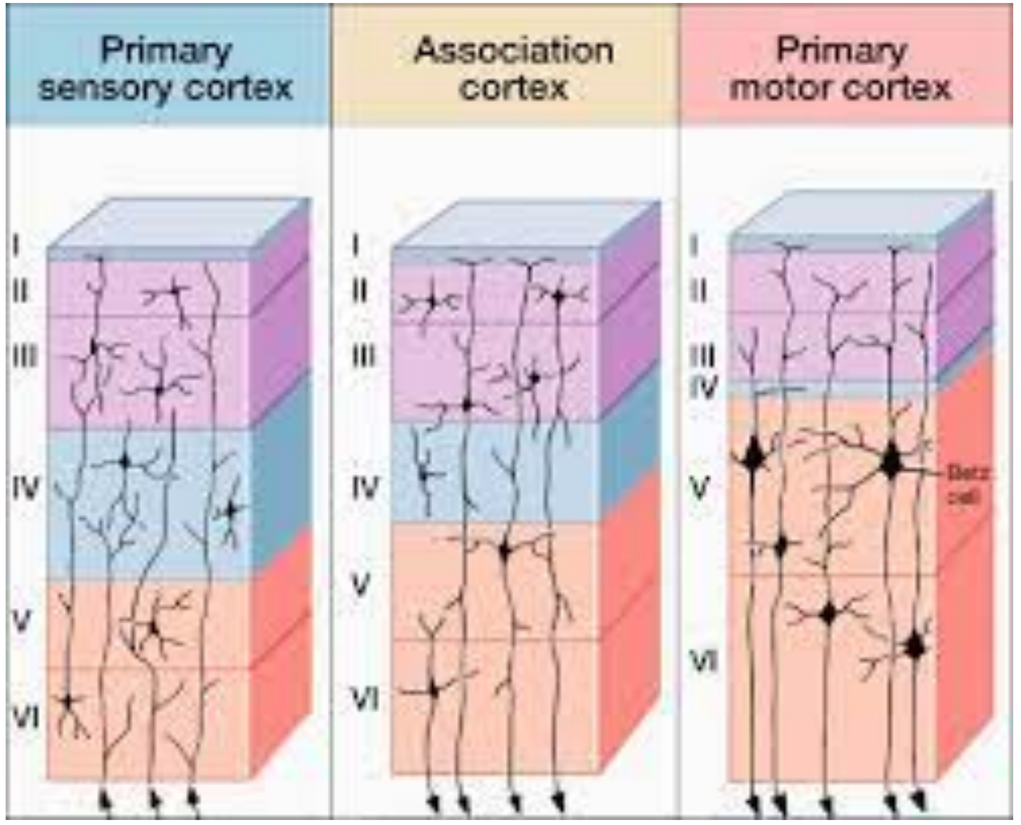
Cerebro Humano







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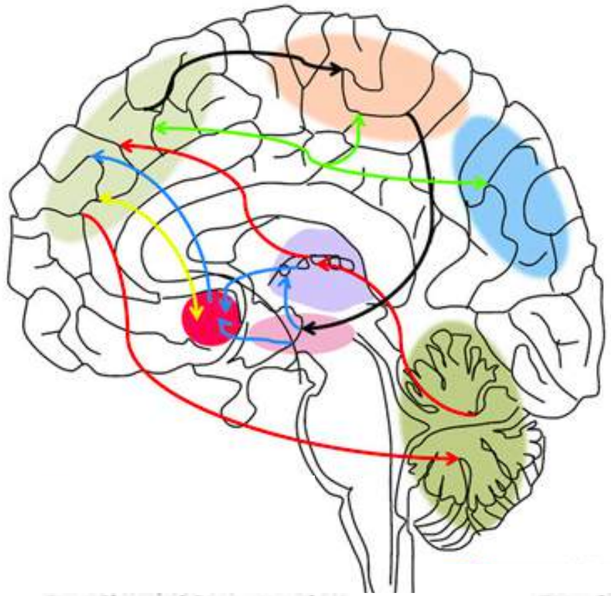
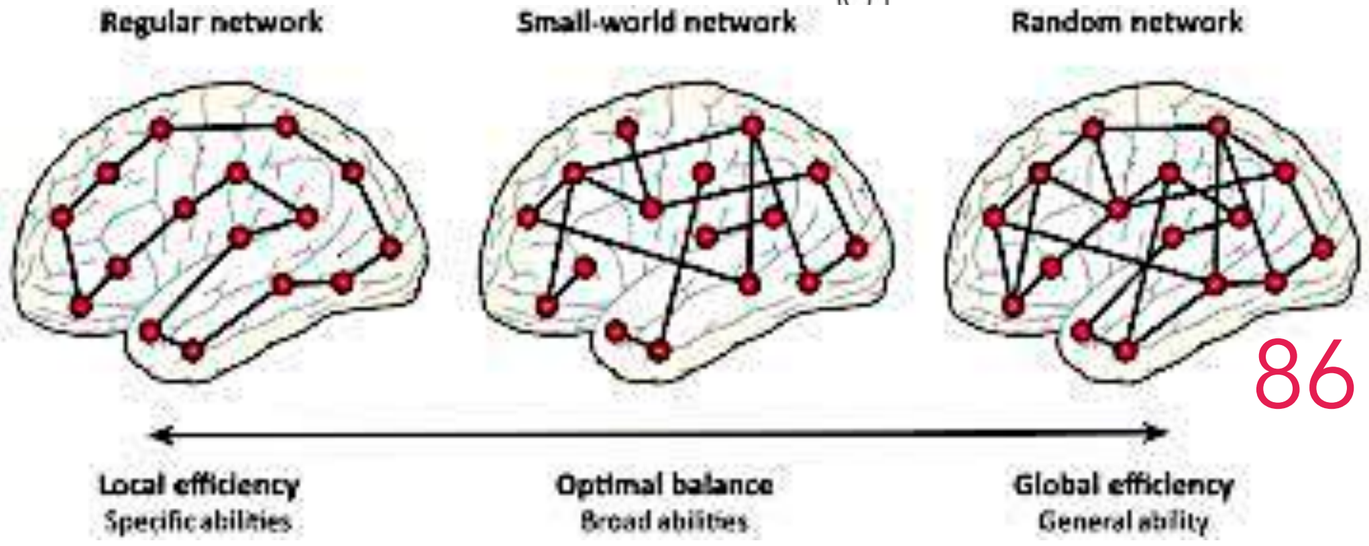
Cerebro Humano







86 mil millones de neuronas

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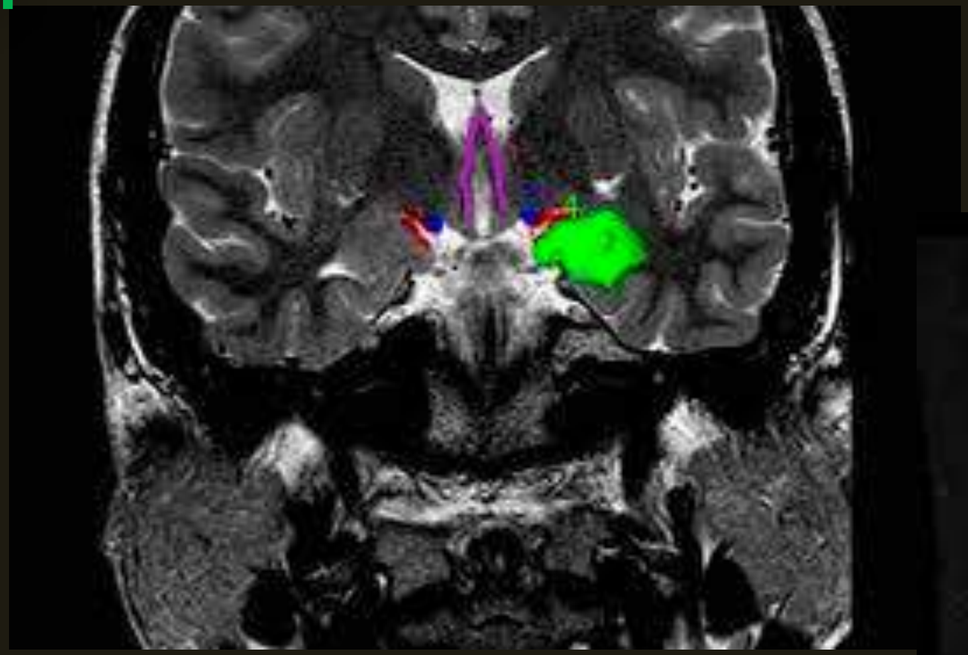
Cerebro Humano

Amígdala Cerebral





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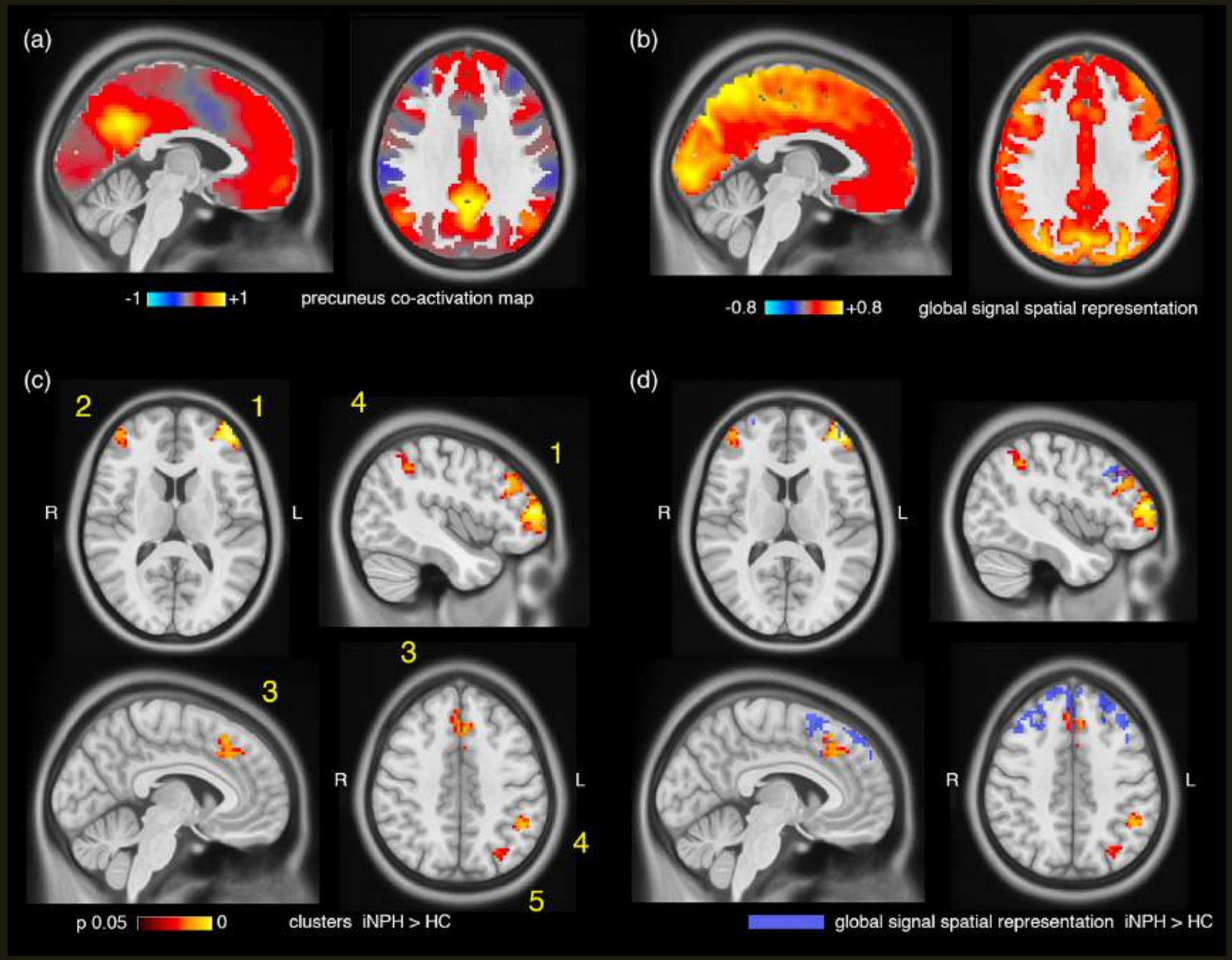
Giro del Cíngulo

Cerebro Humano



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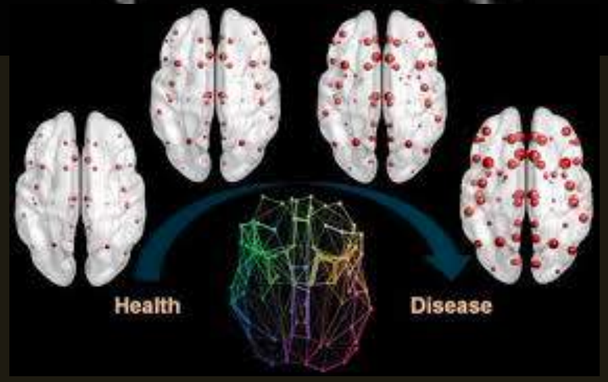
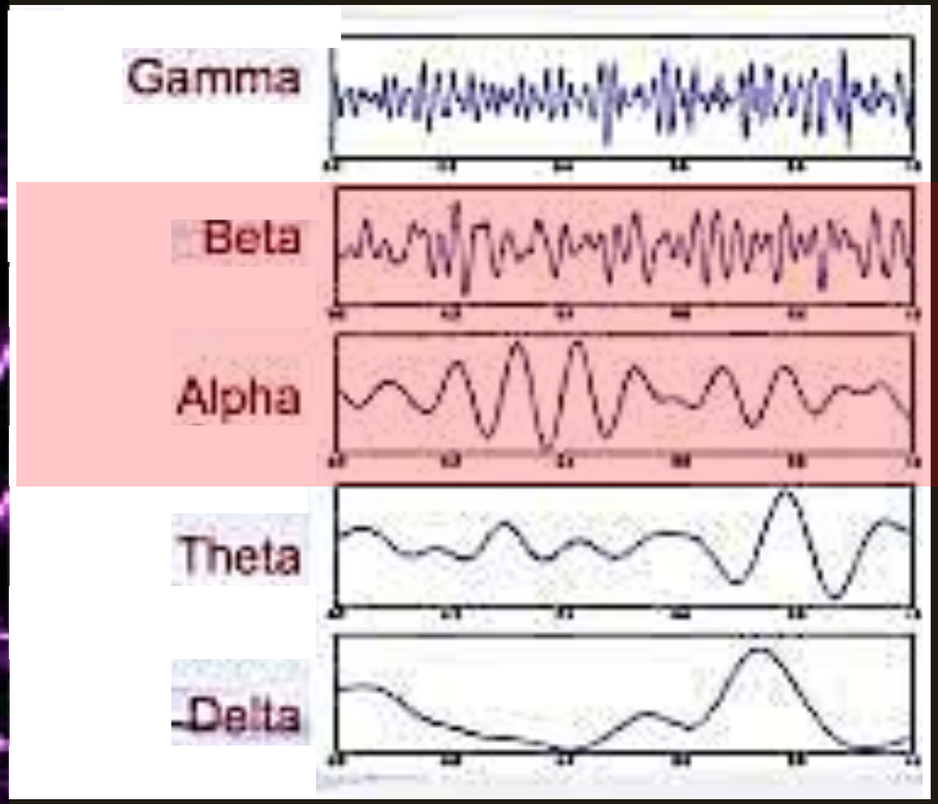
Cerebro Humano

EEG







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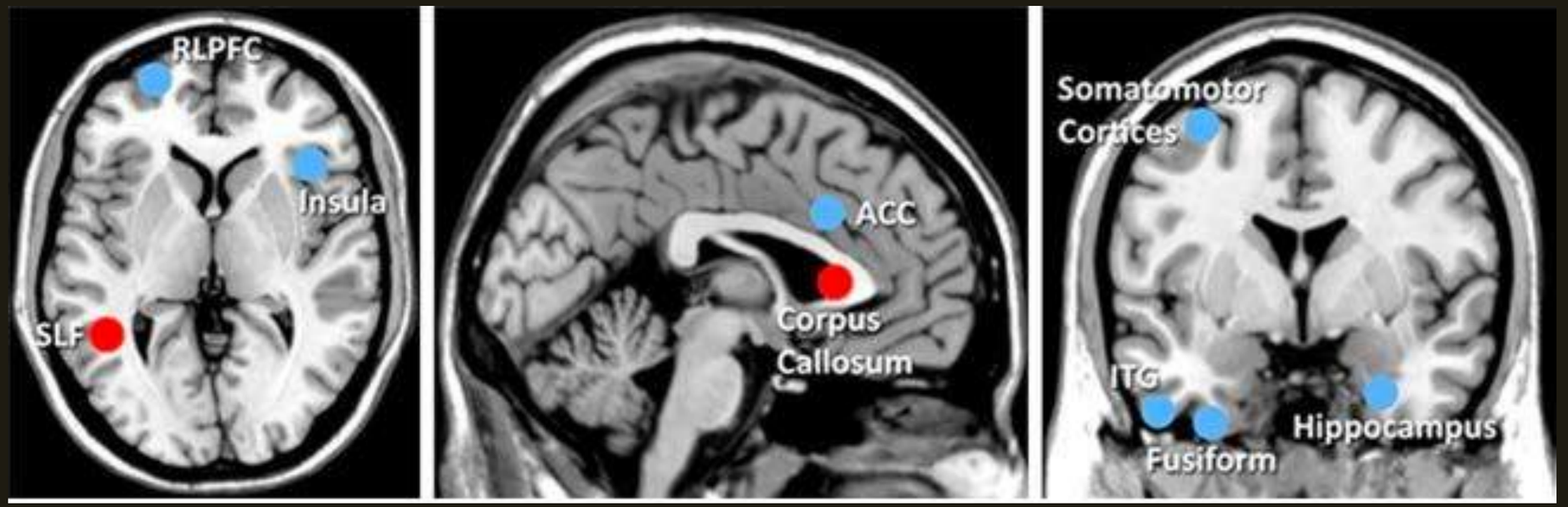
3 redes neuronales



Red ejecutiva central (CEN) regulación de arriba hacia abajo de la atención
corteza prefrontal (PFC) y la corteza parietal.
Red de prominencia (RP), orientación atencional de abajo hacia arriba,
ínsula anterior, la corteza cingulada anterior dorsal (ACC), la amígdala y el mesencéfalo.
Red neuronal por defecto (DMN) regiones corticales de la línea media,
con la corteza cingulada posterior (PCC) y la PFC medial.

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FIN del Tema 1.
De la Neurona al Cerebro

DR. EDUARDO CALIXTO

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