MINA

Amaia Otxandorena
Xabi Simón
Laura Sarasola

ZER DA MINA?

"An unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage."

International Association for the Study of Pain (IASP) in 1986

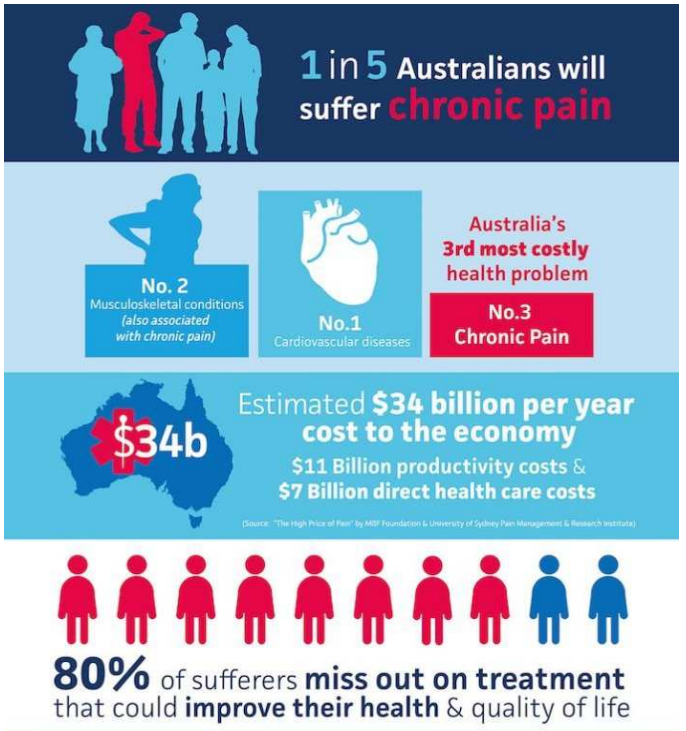
Babes-portaera adoptatzeko ezinbesteko estimulua.

MINAREN IKERKETAREN GARRANTZIA

Sendagilea kontsultatzeko arrazoi nagusien artean

Beste desgaitasun batzuen sorburu: antsietate eta depresioa

Inpaktu ekonomikoa eta soziala



The high price of pain: the economic impact of persistent pain in Australia (2007)
MBF Foundation in collaboration with
University of Sydney Pain Management Research Institute

MIN MOTAK

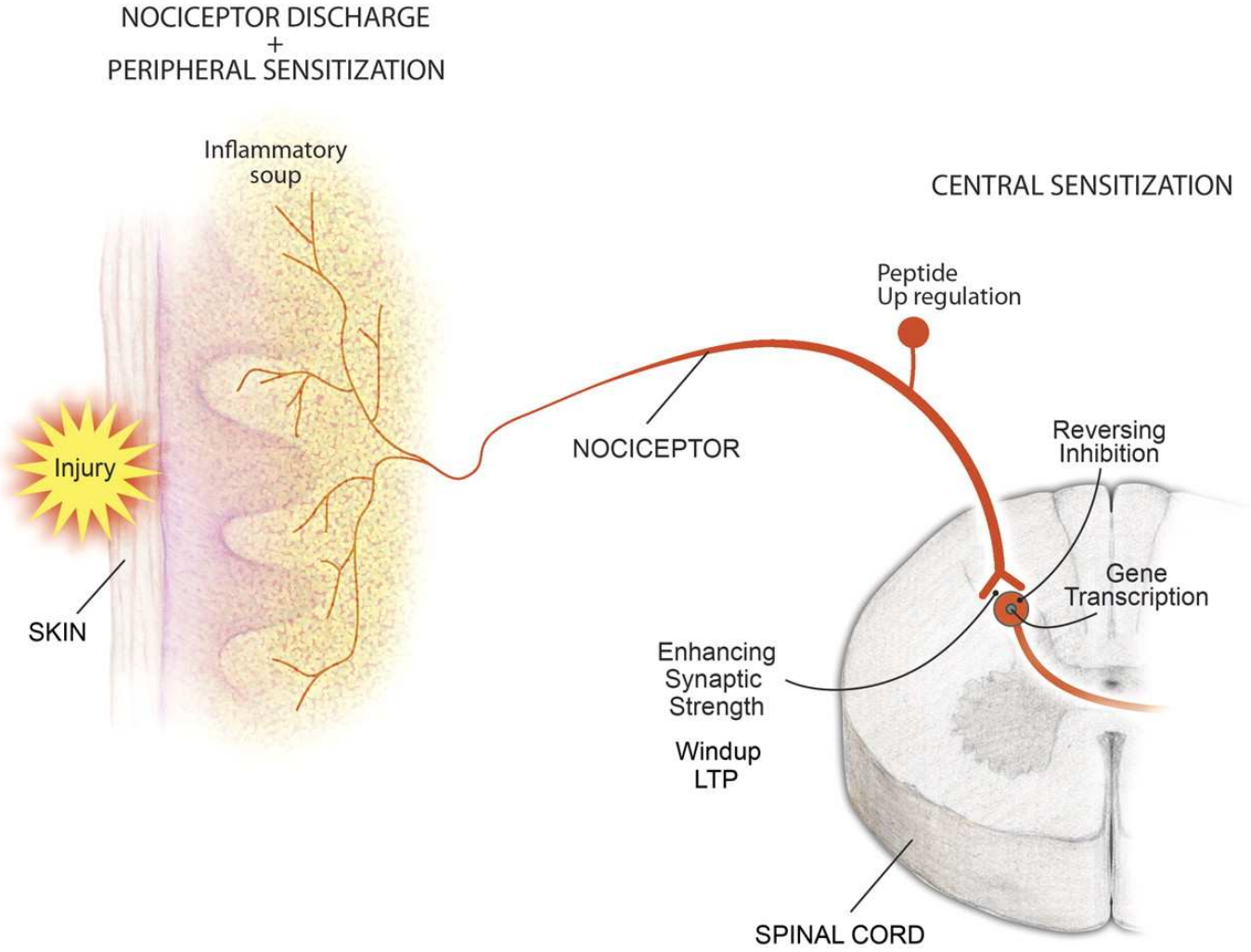
Iraupenaren arabera:

- Akutua
- Kronikoa

Etiologiaren arabera:

- Nozizeptiboa
- Neuropatikoa
- Besteak

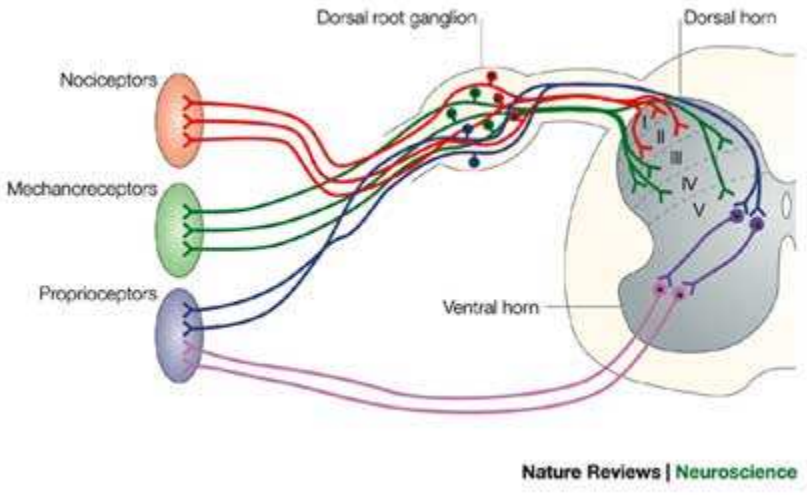
NOZIZEPTOREAK



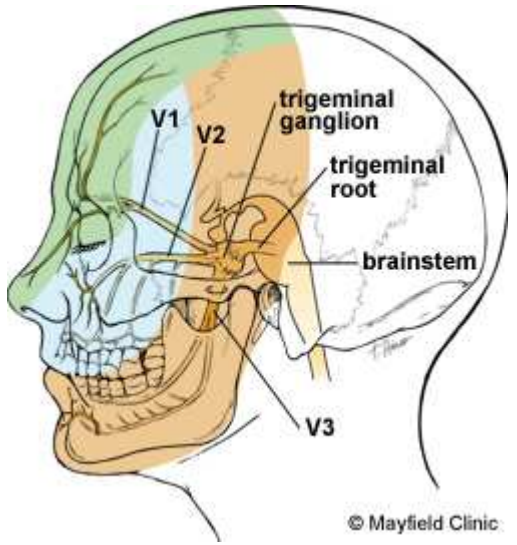
Mendell, L.M. (2011). Computational functions of neurons and circuits signaling injury: Relationship to pain behavior. *PNAS, 108*, 15596–15601.

KOKAPENA

Bizkarrezur gongoilean

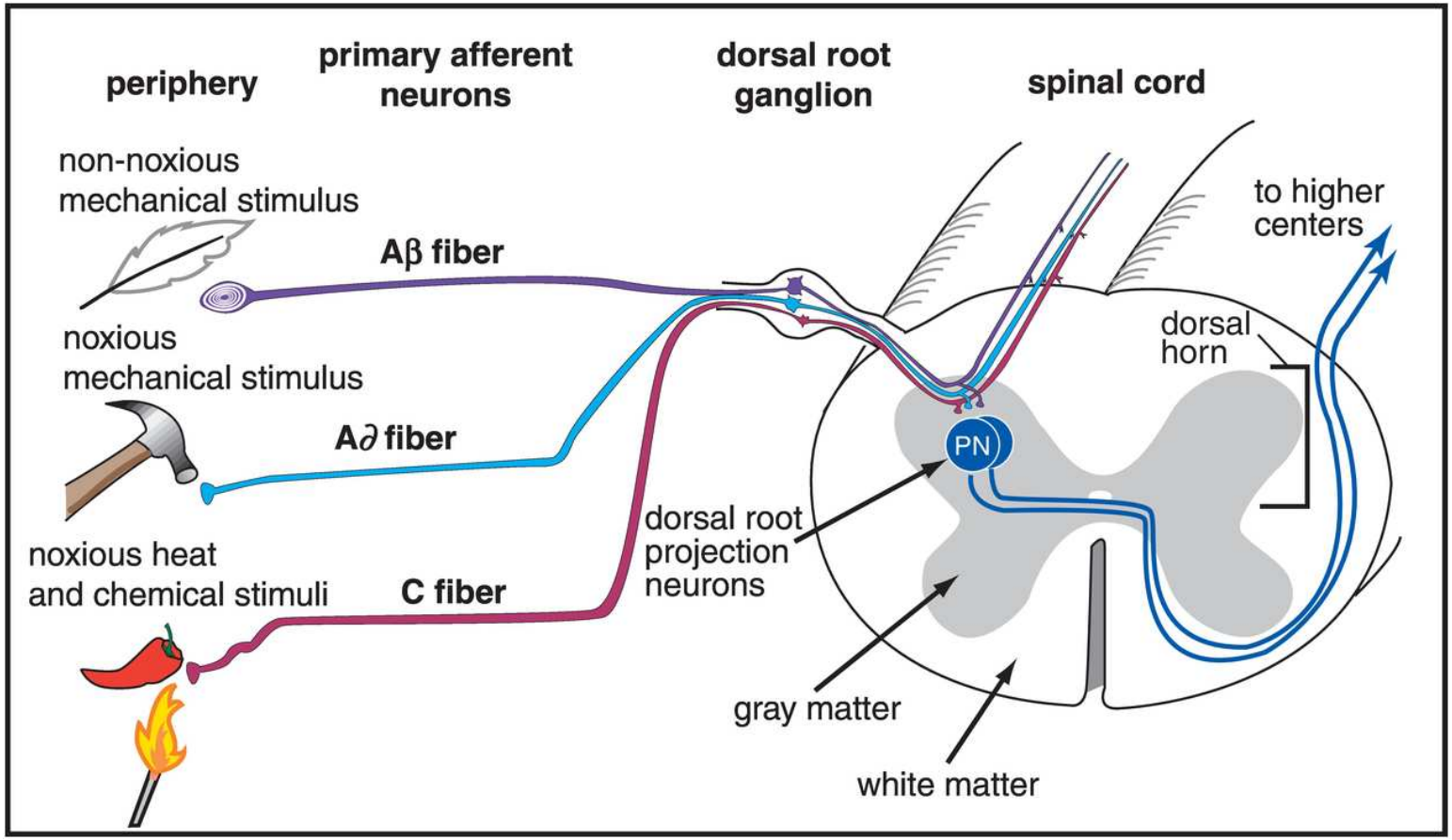


Gongoil trigeminalean



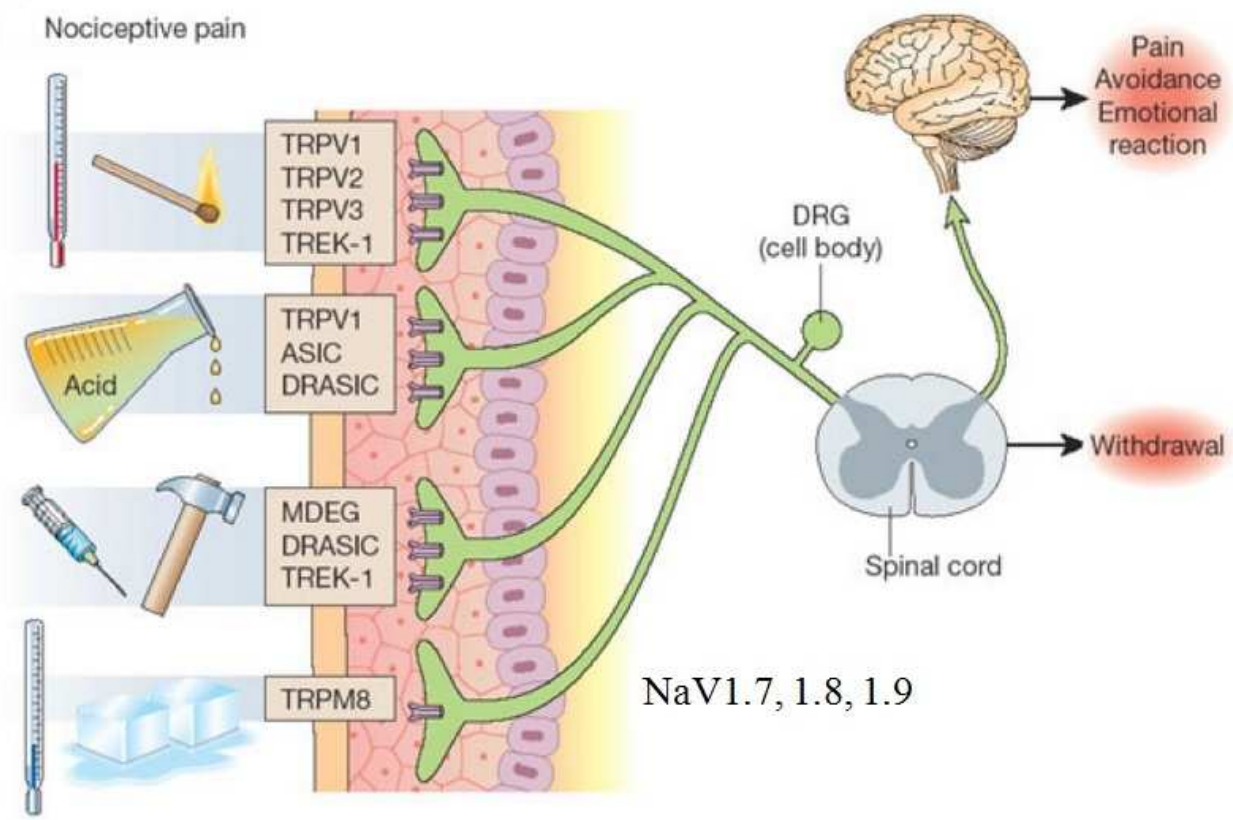
Caspary, T. et al. (2003) Patterning cell types in the dorsal spinal cord: what the mouse mutants say. *Nature Reviews Neuroscience, 4*, 289-297.

NOZIZEPTORE MOTAK



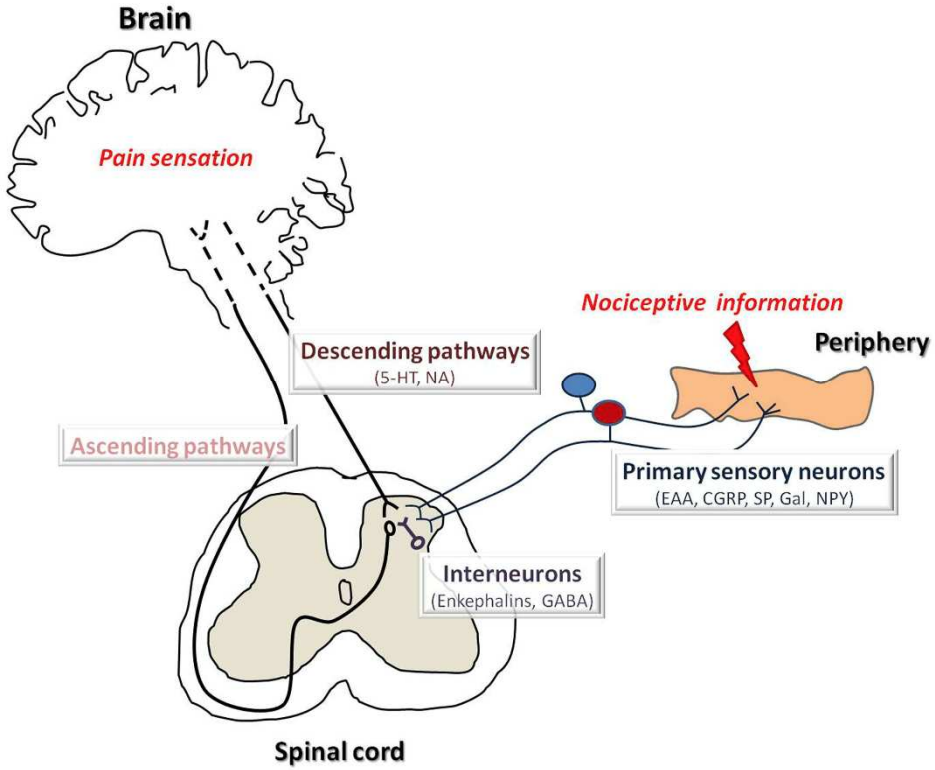
Cambridge University Press. Stahl's Essential Psychopharmacology. Stahl Online. Chronic Pain and its treatment. (http://stahlonline.cambridge.org/essential_4th_chapter.jsf?page=chapter10_summary.htm&name=Chapter%2010&title=Summary)

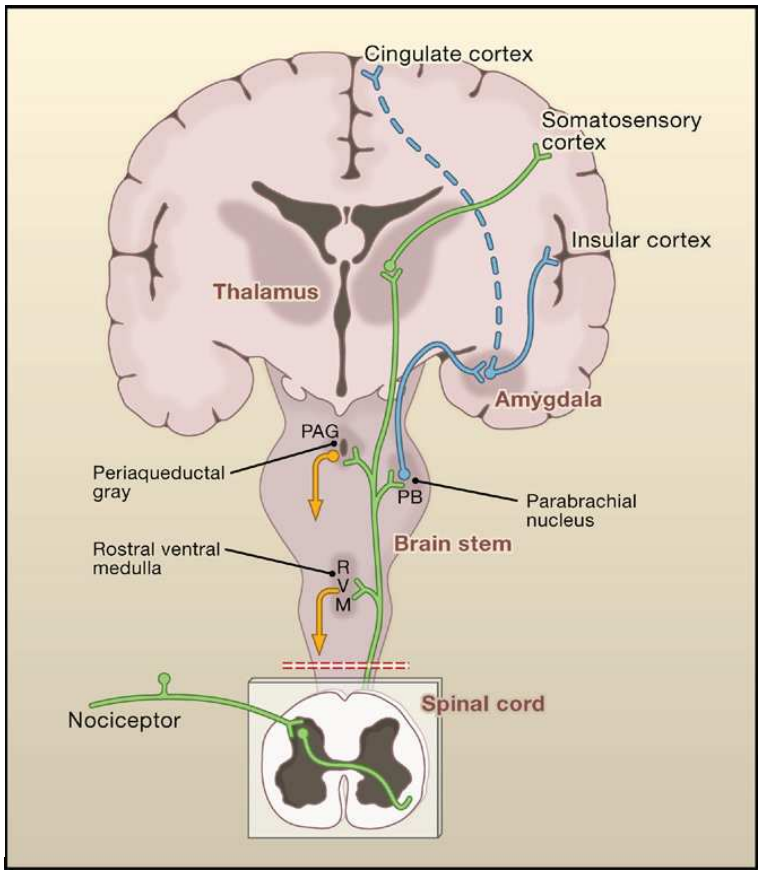
NOZIZEPTOREAK AKTIBATZEKO ESTIMULUAK



Hyperacusis Research, Auditory Nociception and Pain Hyperacusis Symposium (2016)

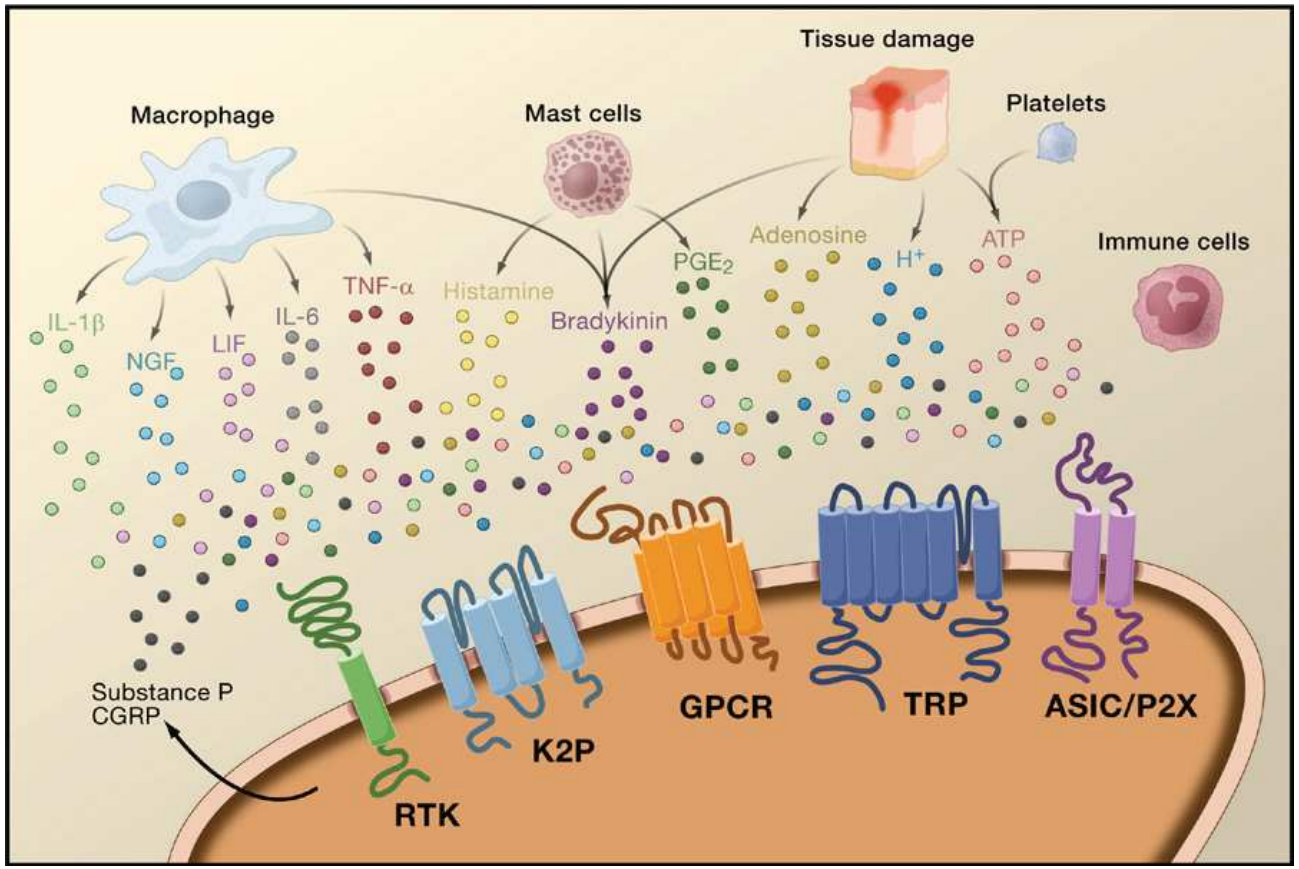
TRANSMISIOA





Basbaum, A.I., et al. (2009) Cellular and Molecullar Mechanisms of Pain. *Cell, 139*, 267-284.

MIN IRAUNKORRA



Basbaum, A.I., et al. (2009) Cellular and Molecullar Mechanisms of Pain. *Cell, 139*, 267-284.

AZTERKETA ESPERIMENTALA

Minaren ikerketarako arazoak:

- Subjetibitatea
- Muga etikoak
- Animalia modeloen erabilera: garapen translazionalerako muga?

Mogil, J.S. (2009). Animal models of pain: progress and challenges. *Nature Reviews Neuroscience, 10*, 283-294

MINAREN IKERKETA EHUN

- Neuronen arteko komunikazioaren plastikotasuna eta eraldaketa bizkarrezur muinean
- Elektrofisiologia: bizkarrezur muinera elektrodoak sartu eta seinale elektrikoak neurtzea
- Western Blot eta Immunofluoreszentzia: neurotransmisore eta hartzaileen adierazpen gunea eta kantitatea.

Jon Jatsu Azkue, MD, PhD
Neurozientzien Departamentua
Medikuntza eta Odontologia Fakultatea
Euskal Herriko Unibertsitatea

MINAREN IKERKETA EHUN

Animalia modeloa:

Sprague-Dawley arratoia

Jon Jatsu Azkue, MD, PhD
Neurozientzien Departamentua
Medikuntza eta Odontologia Fakultatea
Euskal Herriko Unibertsitatea

MINAREN SENTIKORTASUNERAKO ASALDURAK

- Hipersentikortasuna (ehunen kalteak, gaixotasunak)
  - Alodinia
  - Hiperalgesia

- Sentikortasun eza (ezgaitasun genetikoak)

FIBROMIALGIA

- Artikulazioak inguratzen dituen ehun bigunetan

- Baliaezintasun ikusezina

ZER ERAGITEN DU?

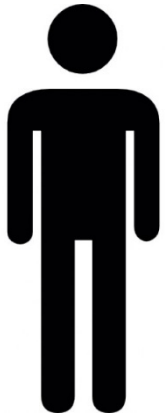
1. Mina
2. Nekezia eta lo falta
3. Gogo-aldartean eragin

GIZARTEAN ERAGINA?

%2-4 VS %0.5-1

1.000.000

GIZARTEAN ERAGINA?



%80

20/1

8/1

ZERGATIK SORTZEN DA

- Etiologia ezezaguna

- Hainbat faktore

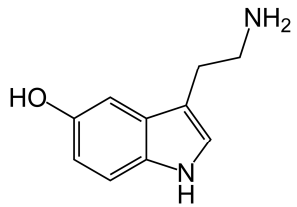
Gaixotasun infekziosoak

Trauma psikologikoak

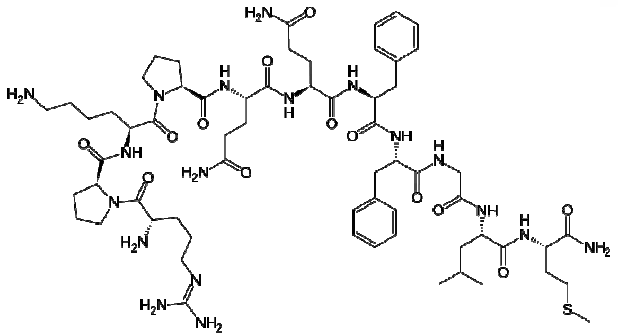
Trauma fisikoak

ZERGATIK SORTZEN DA

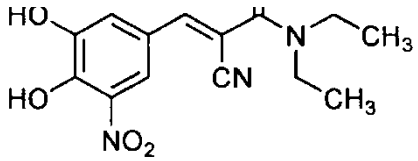
- Ezohiko maila:



Serotonina



P substantzia



COMT

Min seinaleen transmisio eta anplifikazioa

ZERGATIK SORTZEN DA?

- Mina inhibitzeko gaitasun eza
- Behar baino min gehiago nabaritu

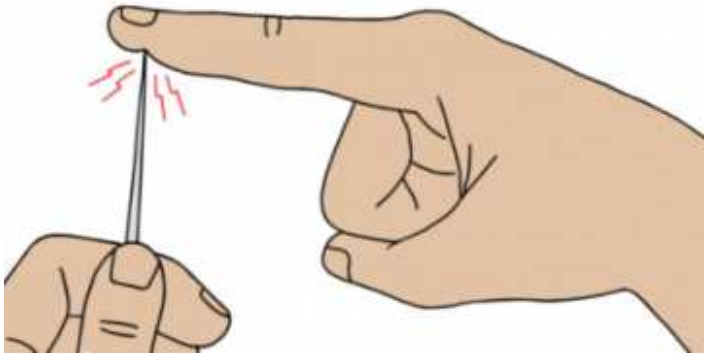
CIPA

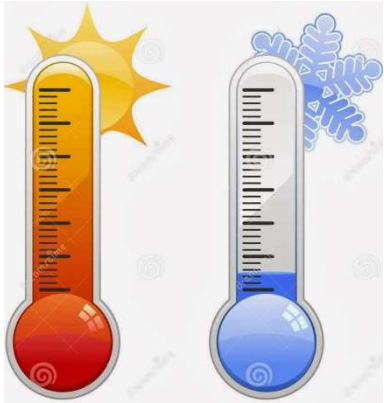
- Gaixotasun errezesibo autosomikoa

- Nerbio sistemako sortzetiko akatsa

ZER ERAGITEN DU?

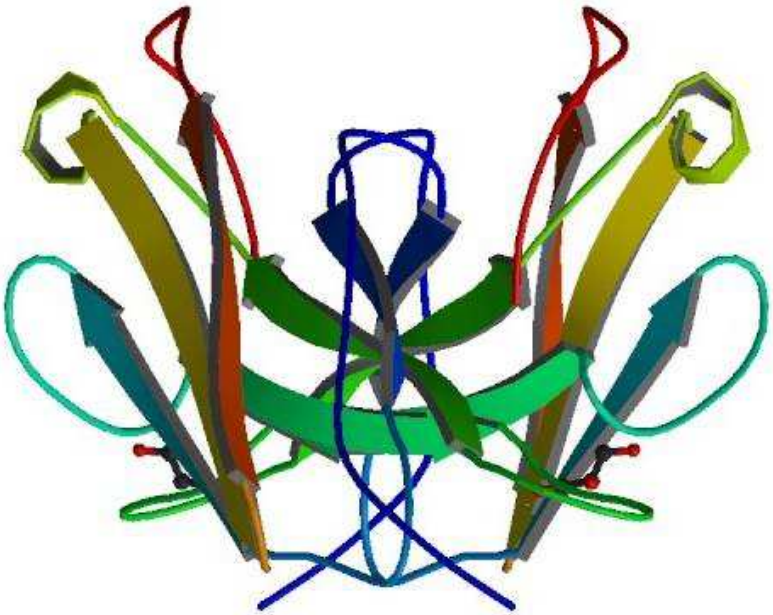
1. Min eza
2. Tenperatura eta presioa
3. Anhidrosis
4. Adimen-atzeratasuna





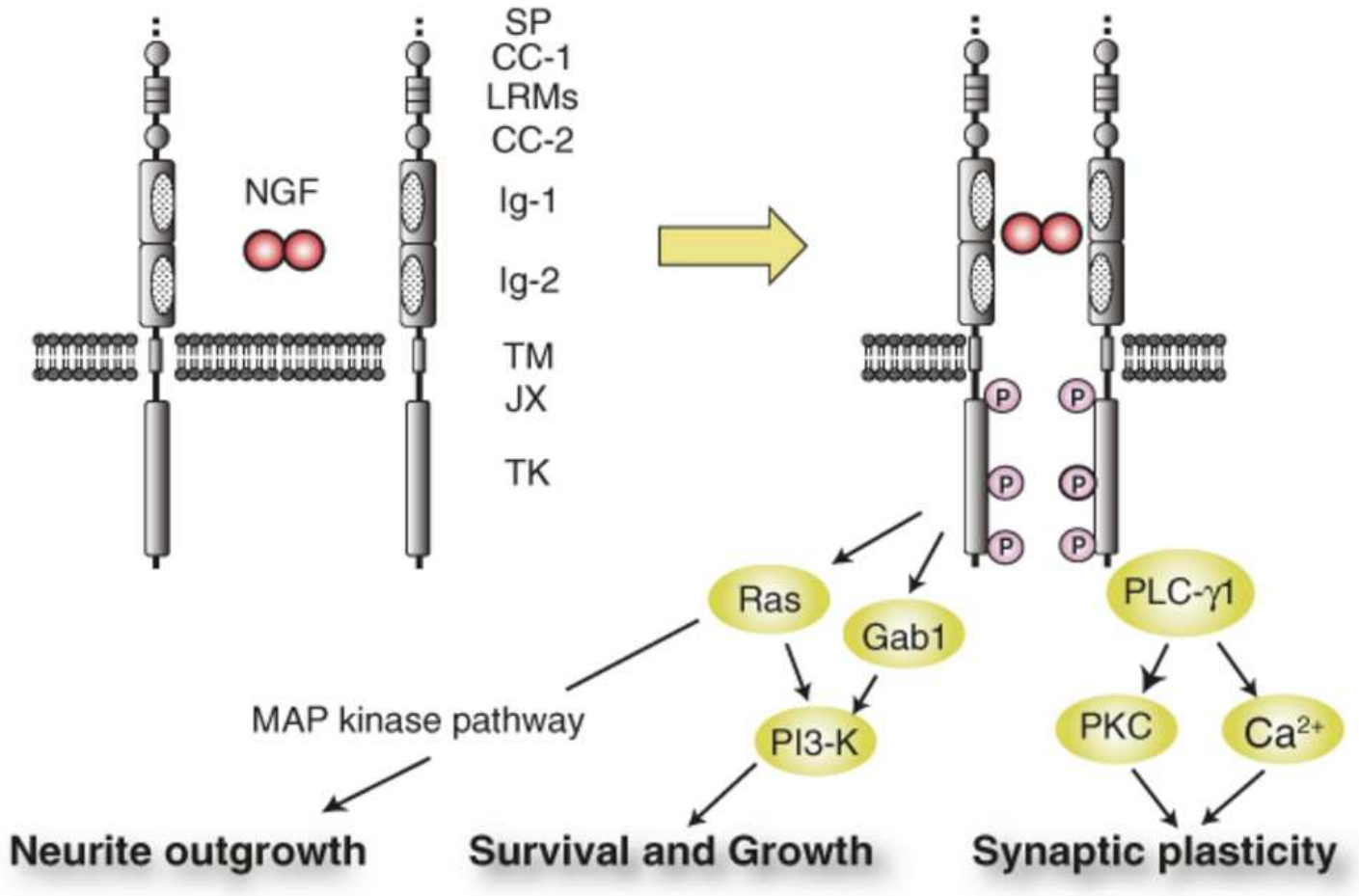
ZERGATIK SORTZEN DA?

- NTRK1 genean mutazioak
- TrkA ez funtzionala



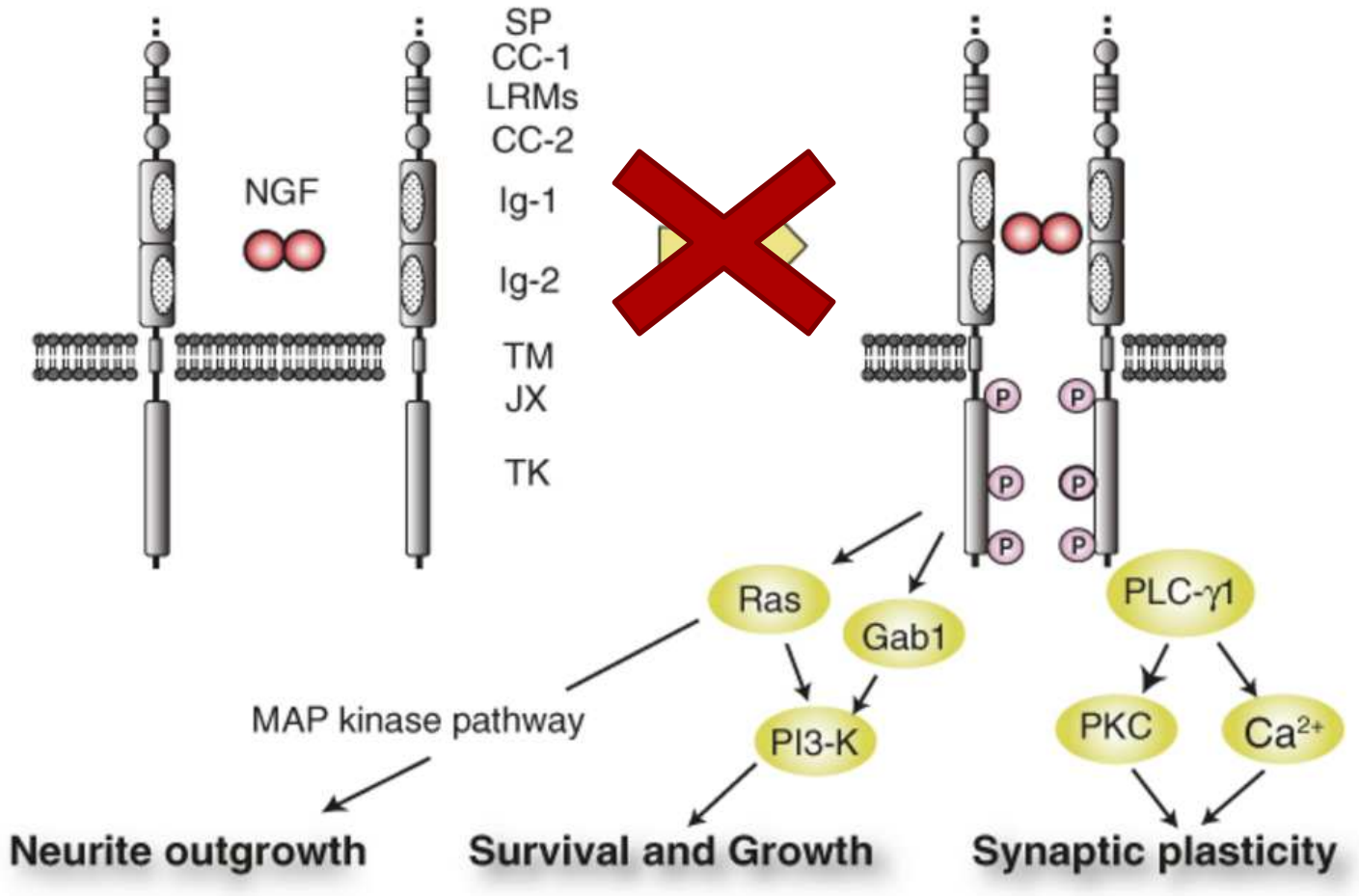
Berman, H. (2003). Announcing the worldwide Protein Data Bank. *Nature Structural Biology*, *10*(12).

ZERGATIK SORTZEN DA?



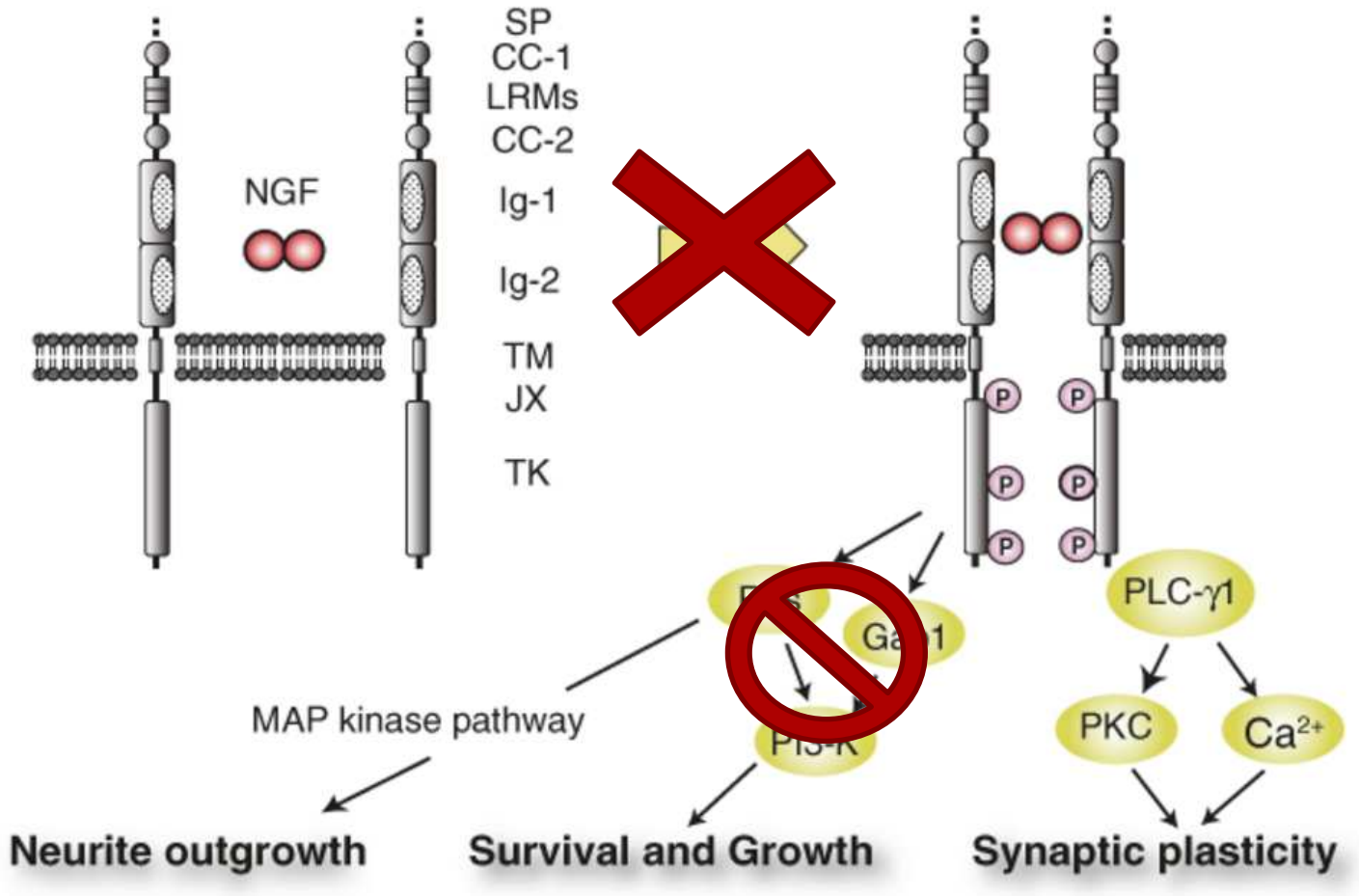
Y, Indo (2012). Nerve growth facto rand the physiology of pain: lessons form congenital insesitivity to pain with anhidrosis. *Clinical Genetics*, *82*(4).

ZERGATIK SORTZEN DA?



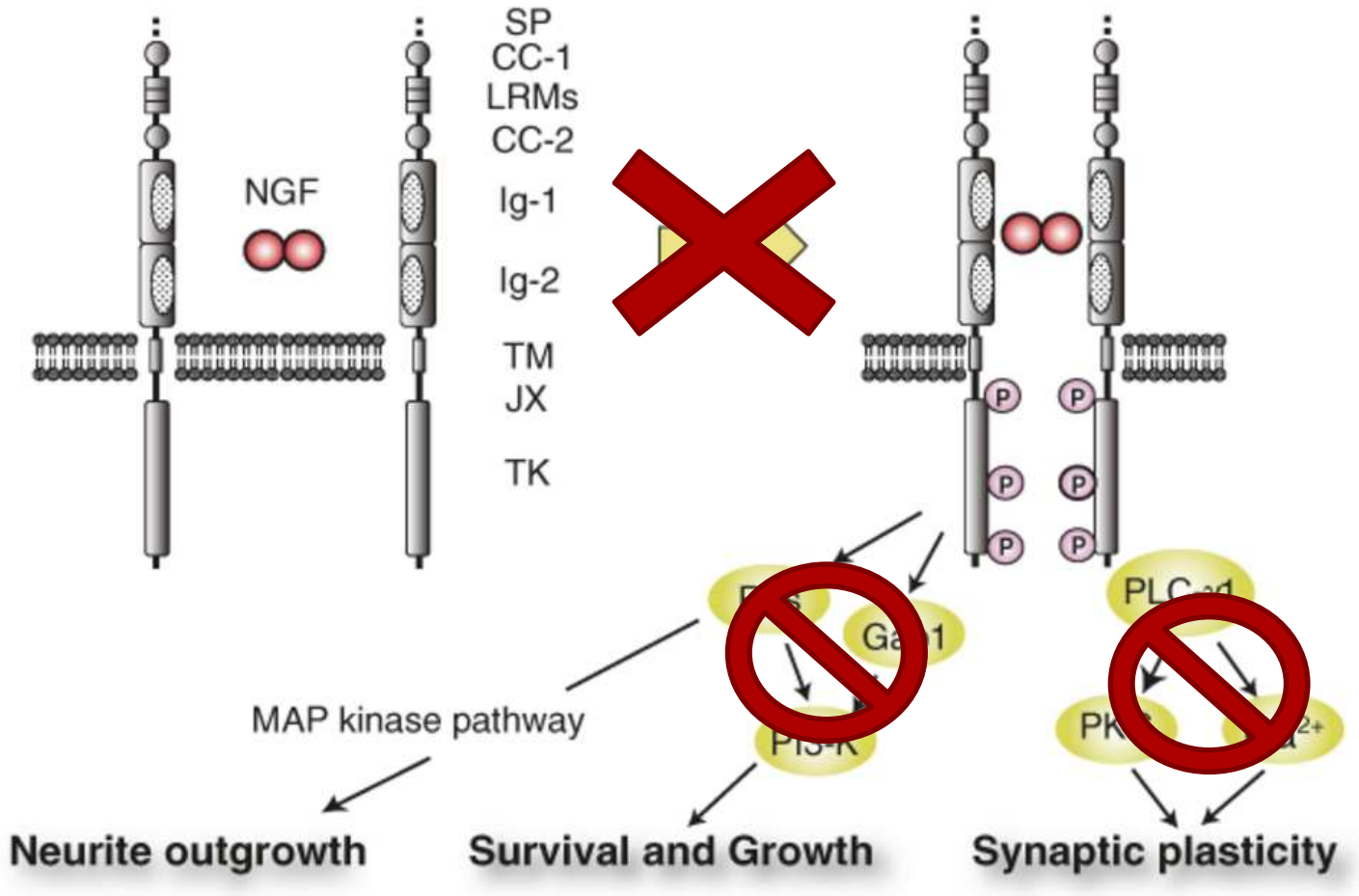
Y, Indo (2012). Nerve growth facto rand the physiology of pain: lessons form congenital insesitivity to pain with anhidrosis. *Clinical Genetics*, *82*(4).

ZERGATIK SORTZEN DA?



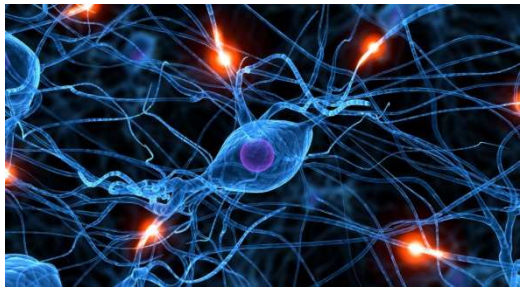
Y, Indo (2012). Nerve growth facto rand the physiology of pain: lessons form congenital insesitivity to pain with anhidrosis. *Clinical Genetics*, *82*(4).

ZERGATIK SORTZEN DA?



Y, Indo (2012). Nerve growth facto rand the physiology of pain: lessons form congenital insesitivity to pain with anhidrosis. *Clinical Genetics*, *82*(4).

ZERGATIK SORTZEN DA?



NTRK1 gene mutatua

↓

TrkA akastuna

↓

Zenbait faltatu

↓

Neurona aferente primarioak | **Gongoileko neurona sinaptikoak** | **Burmuineko neuronak**

↓

CIPA

Berman, H., Herick, K. eta Nakamura, H. (2003). Announcing the worldwide Protein Data Bank. *Nature Structural Biology*, *10*(12), 980.

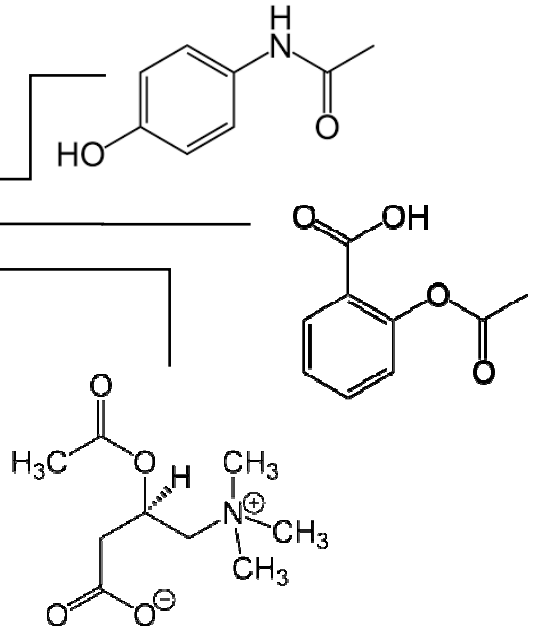
TRATAMENDUA

1. Antigorputzen presentzia
2. MRI eta CT erresonantzia magnetikoak
3. Nerbio kondukzio eta elektromiografia

- Tratamendu farmakologikoa
- Tratamendu psikologikoa
- Neuromodulazioa

Ez opiodeoak

- N-azetil saliziliko
- Parazetamol
- N-azil Karnitina
- Azido alfa lipoiko
- Klonidina
- NGF inhibitzaileak

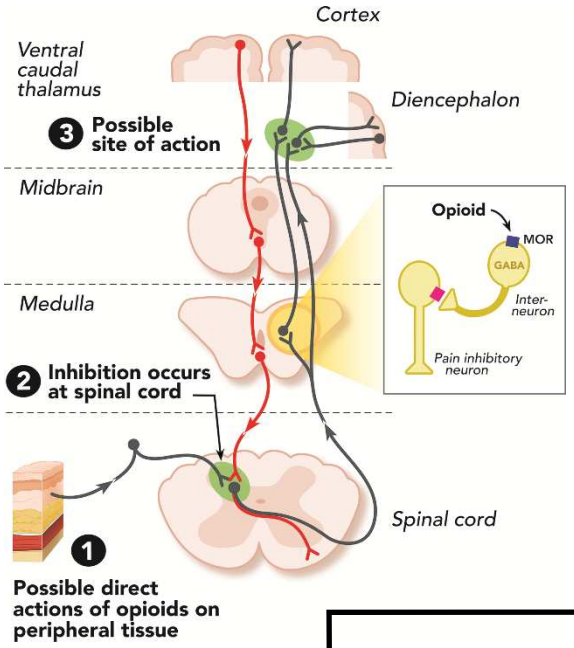


Opiodeoak

Kanabinoideoak

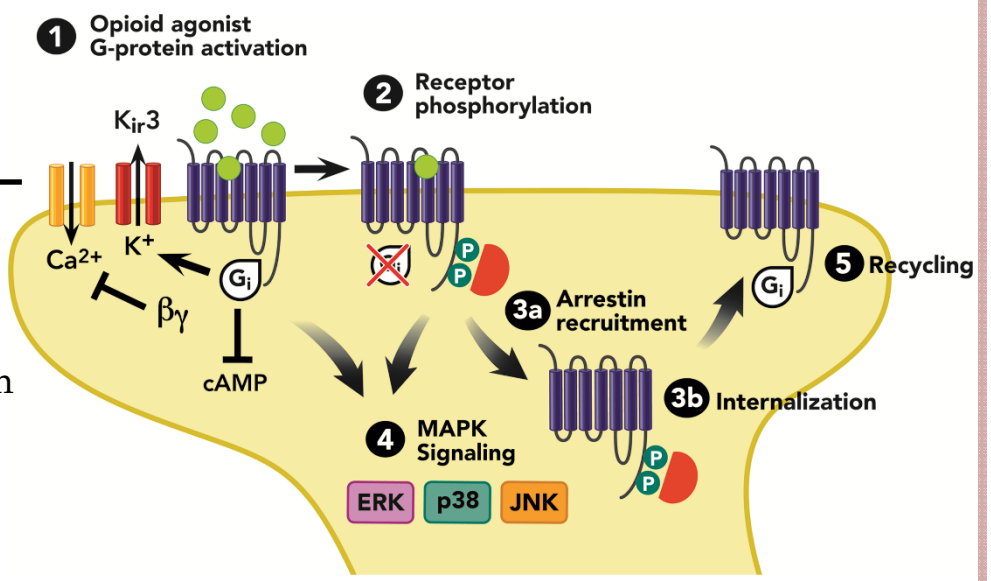
- Morfina
- Metadona
- Oxikodona

Sistema opiodeoa



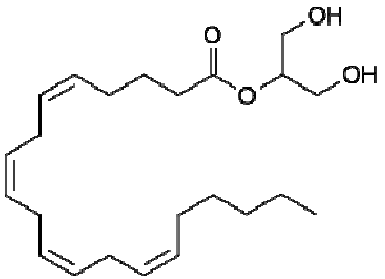
- GPCR bidezko seinaleztapena
- Lau motatako hartzaile daude:μ, κ, δ eta ORL-1

Hiperpolarizazioaren bidez zelula inhibitzen da



Al Hasani, R. (2011). Molecular mechanism of opioid-dependent receptor signaling and behavior, Anesthesiology. 115

Sistema endokanabinoideoa



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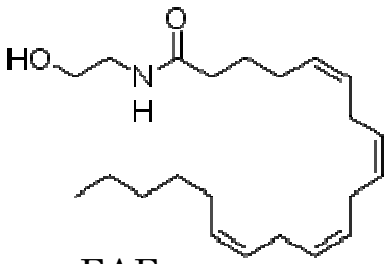
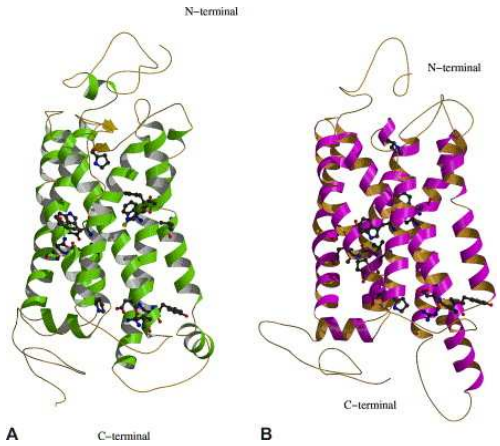
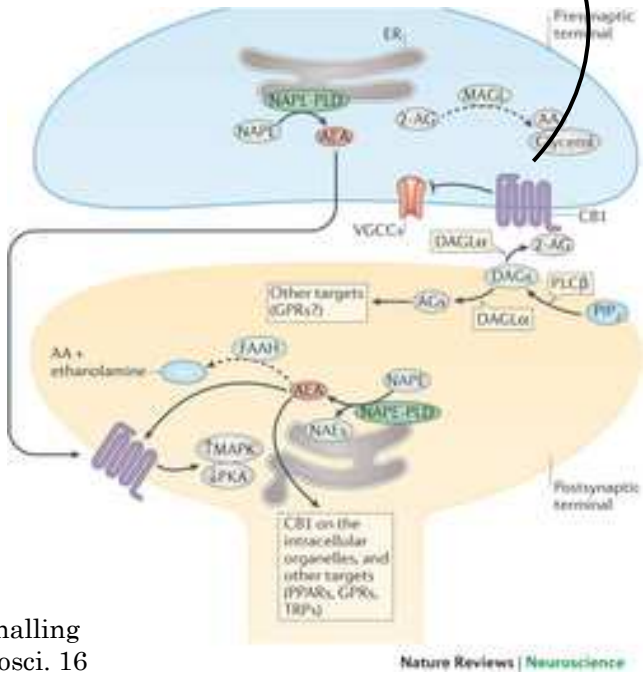


EAE



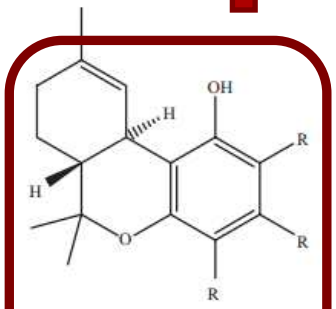
GPCR bidezko seinaleztapena

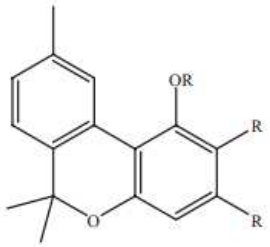
Hartzaileak neurona presinaptikoetan daude lokalizaturik

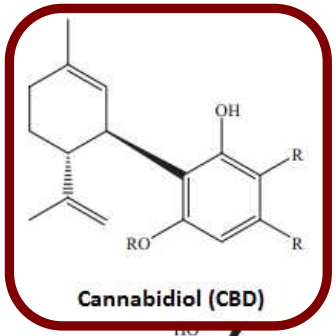


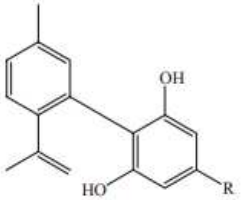
Di Marzo, V., (2015). Endocannabinoid signalling and the deteriorating brain. Nat Rev Neurosci. 16

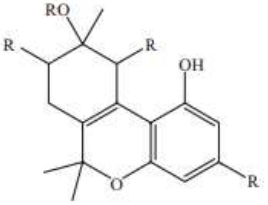
Kanabinoideoak

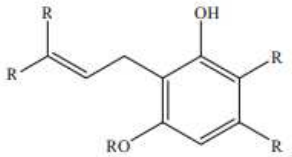

Tetrahydrocannabinol (THC)

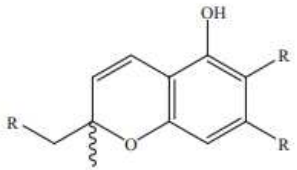

Cannabinol (CBN)

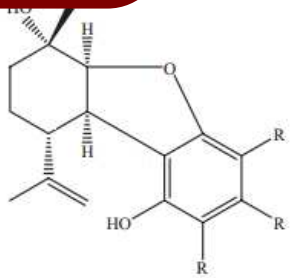

Cannabidiol (CBD)

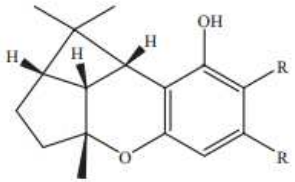

Cannabicyclol (CBL)


Cannabitriol (CBT)


Cannabigerol (CBG)

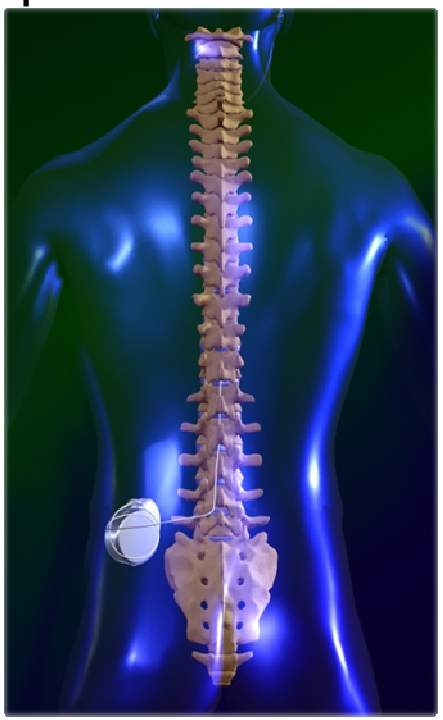

Cannabichromene (CBC)


Cannabielsoin (CBE)


Cannabinodiol (CBND)

Neuroestimulazioa

1. Bizkarrezurraren estimulazio elektrikoa



Singapore General Hospital. Neurostimulation: spinal cord stimulation.

2. Nerbio periferikoen estimulazioa

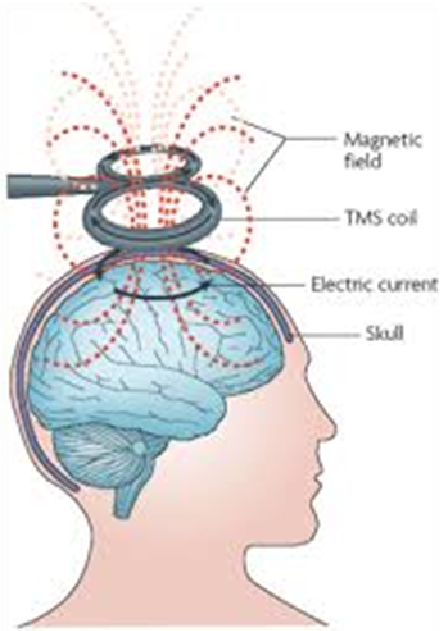
Lee H., et al., (2015) Importance of Peripheral Nerve Stimulation in pain management. Abilogic.

Boltai menpekokanalen modulazioa neurona inespezifikoetan

↓

Estimulu lokalizatua patofisiologiaren arabera

3. Transcraneal magnetic stimulation



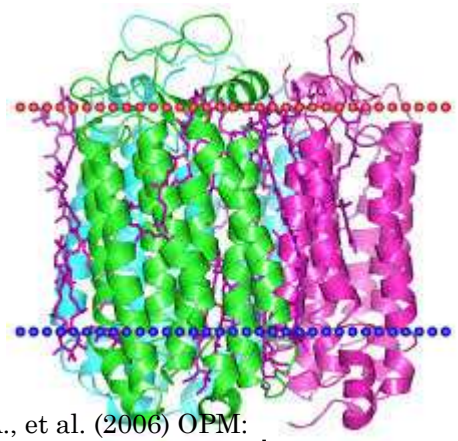
Riding M.C., et al., (2007) Is there a future for therapeutic use of transcranial magnetic stimulation? Nat Rev Neurosci. 8

Optogenetika

- Neuronen estimulazio espezifikoa

- C. reinhardtii → Channelrhodopsin-2 (ChR2)
- N. pharaonis → Halorhodopsin (NpHR)

Kato H.E., et al., (2012). "Crystal structure of the channelrhodopsin light-gated cation channel". Nature. 482



Lomize M.A., et al. (2006) OPM: Orientations of Proteins in Membranes database.

Polarizazioa

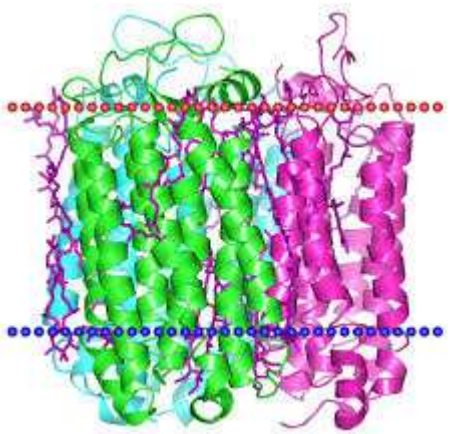
Depolarizazioa

Argi menpeko modulazioa

Optogenetika

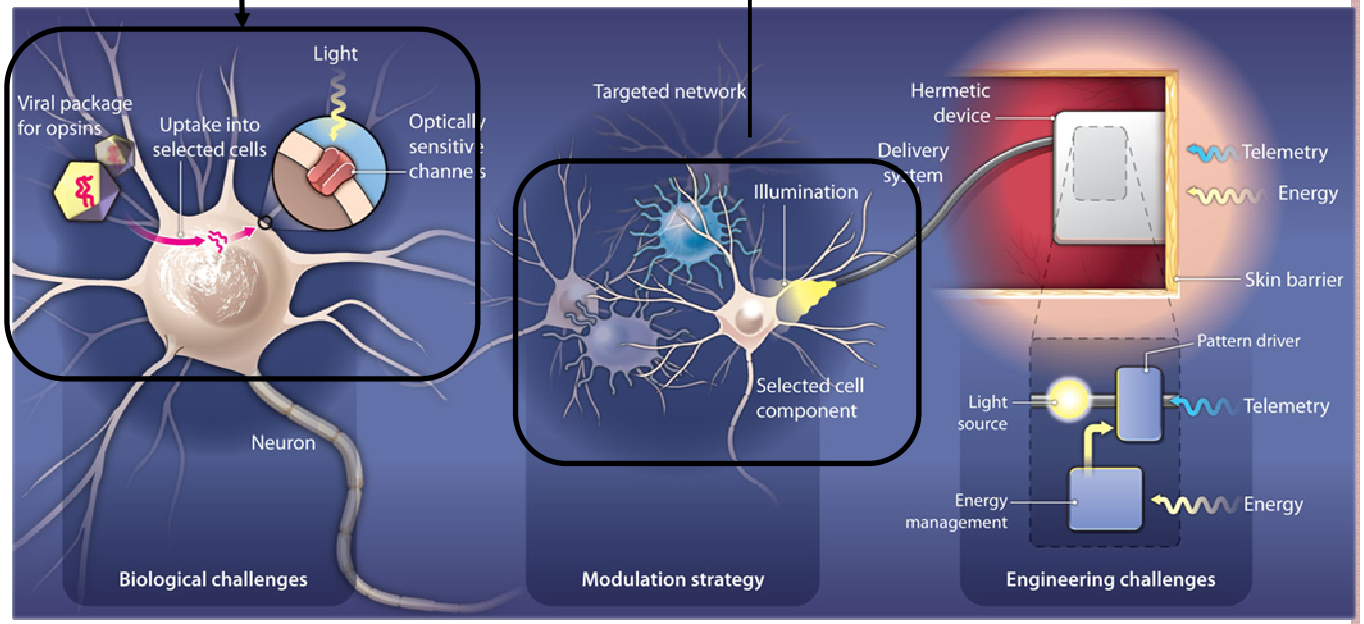
- Neuronen estimulazio espezifikoa

- C. reinhardtii → Channelrhodopsin-2 (ChR2)
- N. pharaonis → Halorhodopsin (NpHR)



Terapia genikoa

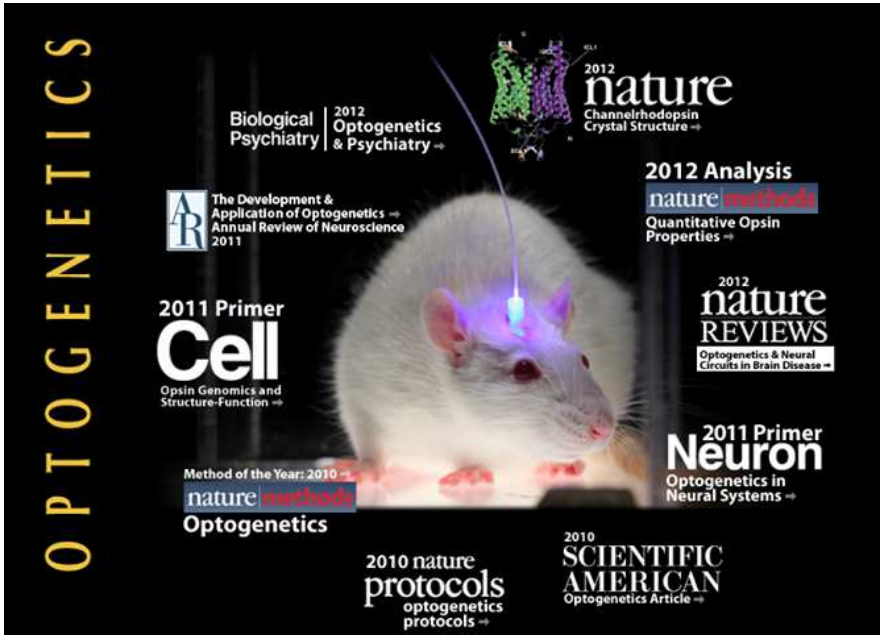
Argi dispositibboen bidezko erregulazioa



Optogenetika

- Neuronen estimulazio espezifikoa

- C. reinhardtii → Channelrhodopsin-2 (ChR2)
- N. pharaonis → Halorhodopsin (NpHR)



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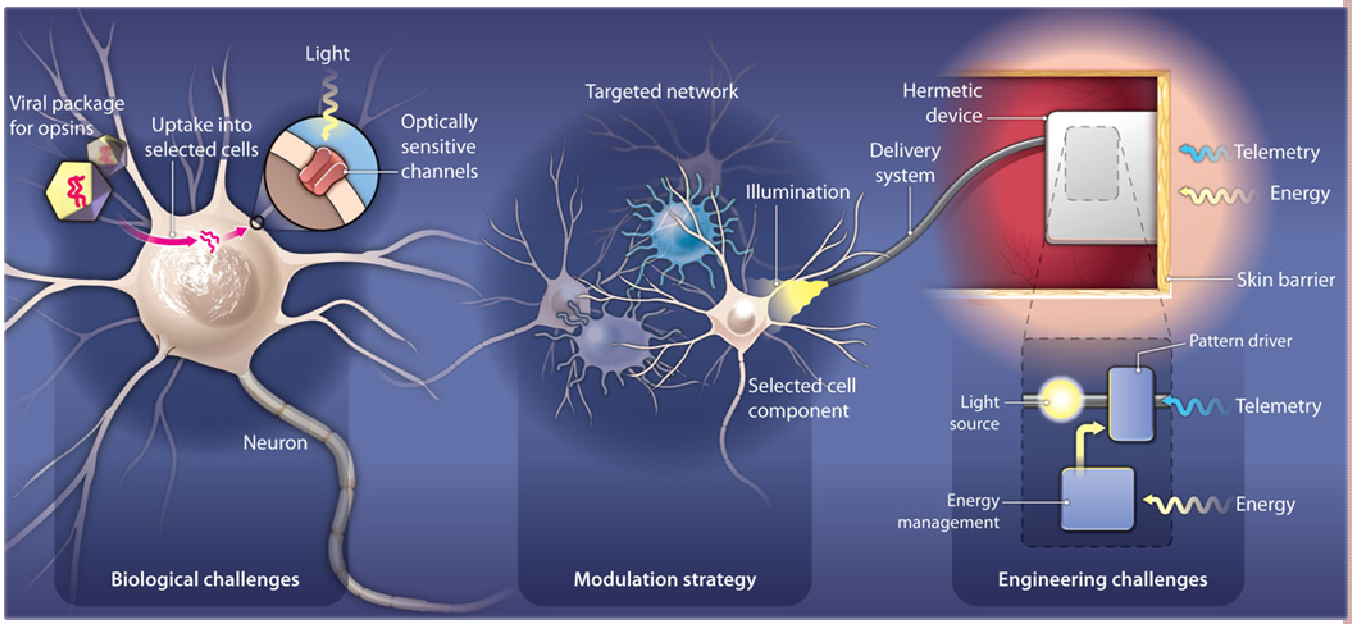

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