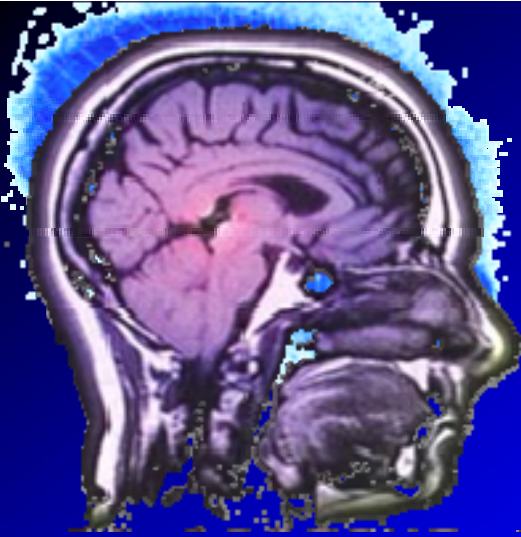


Introducción a las Neurociencias
PB-5636



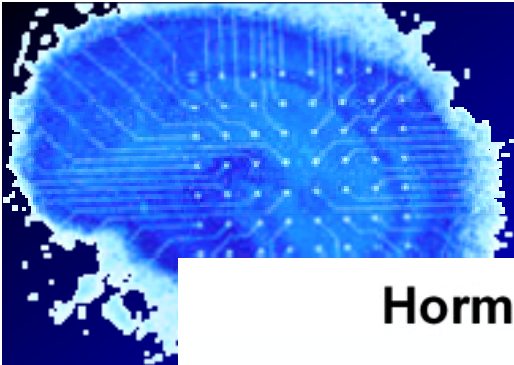
El Cerebro y la Neurona

Ricardo Silva Bustillos, Ph.D., C.C.E.

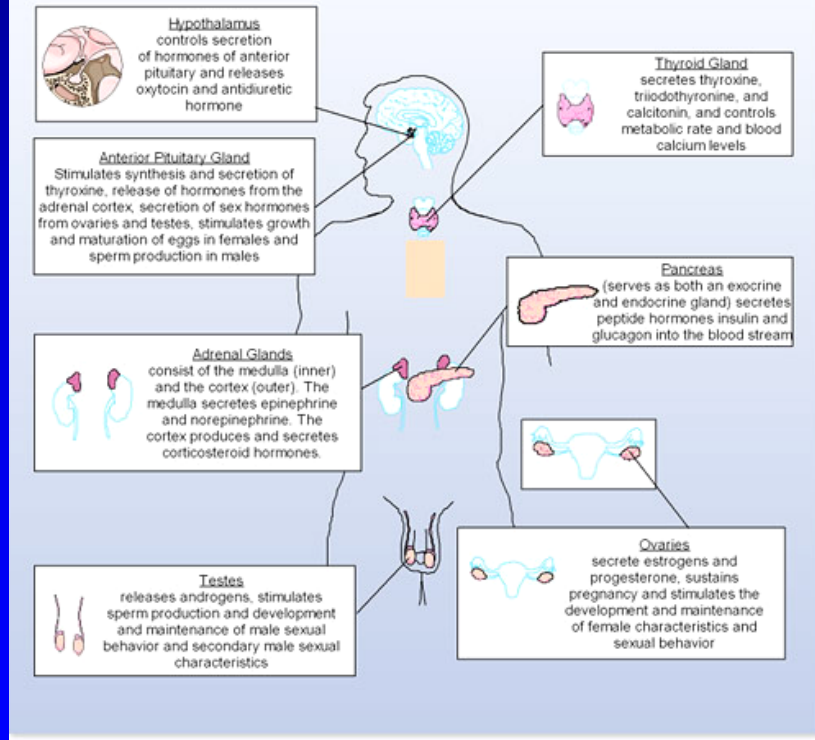


Cerebro - Computadora

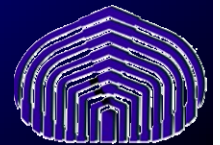
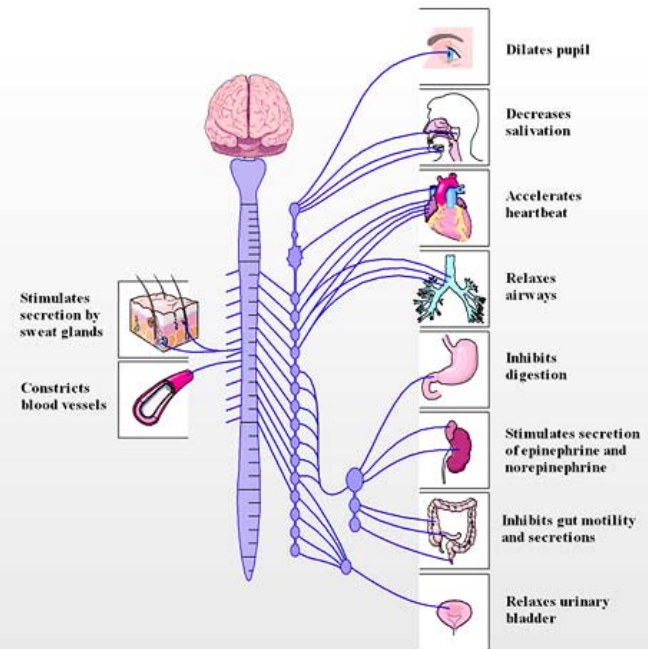




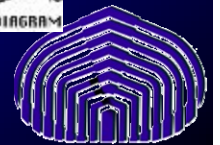
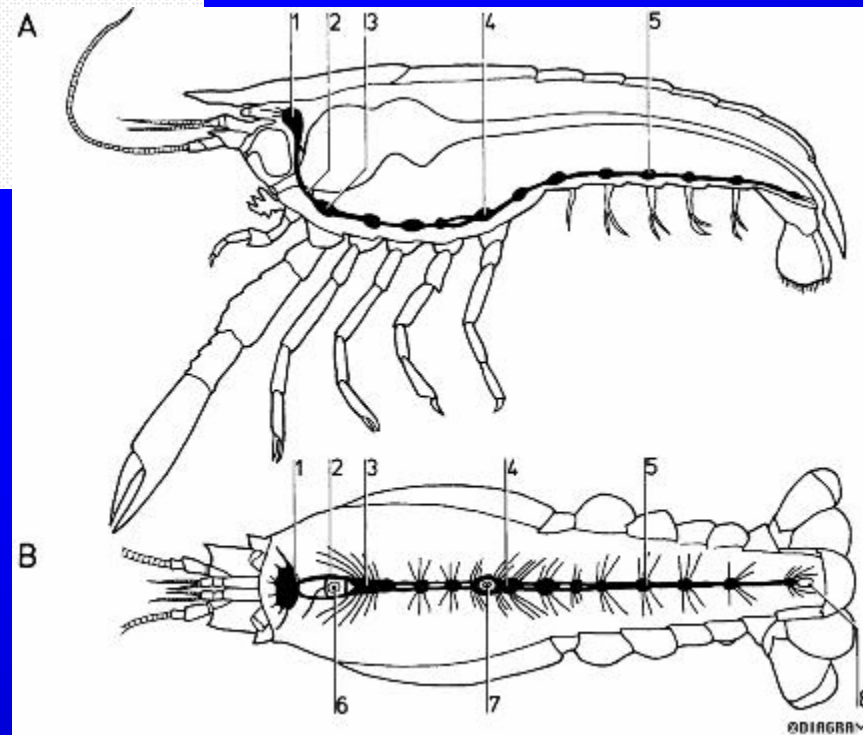
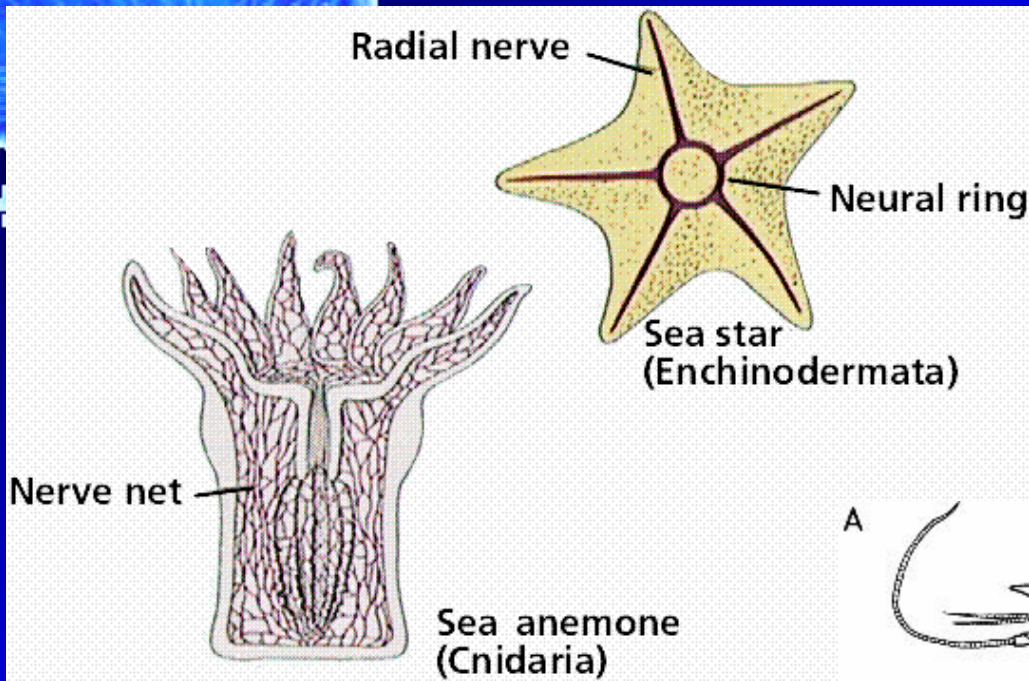
Hormone Action

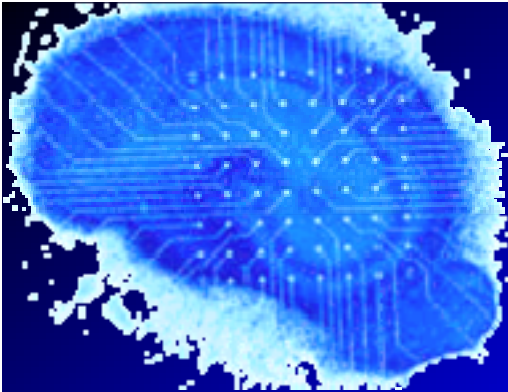


Sympathetic Nervous System

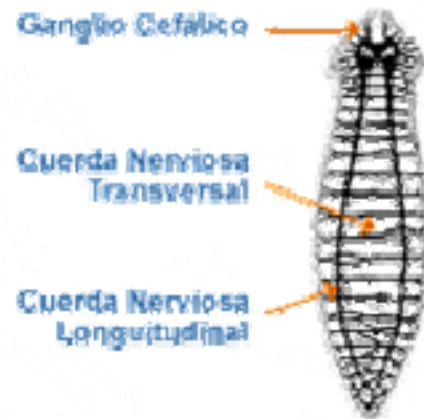


Evolución



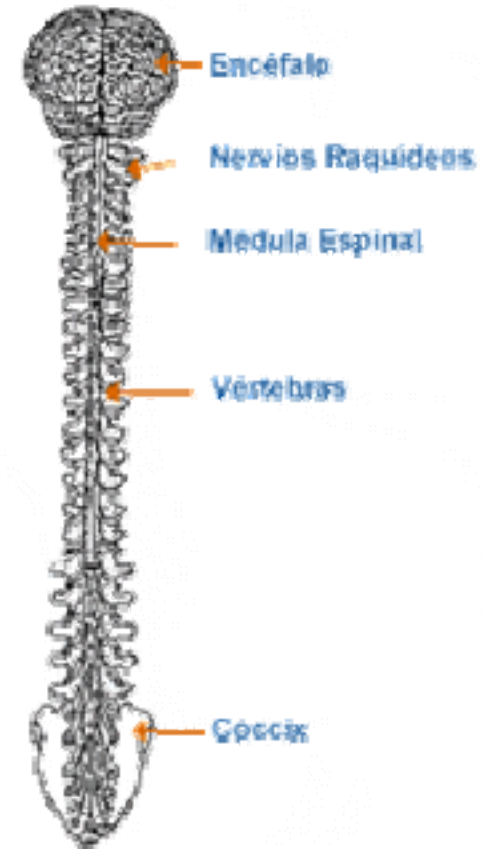


SISTEMA NERVIOSO RETICULAR

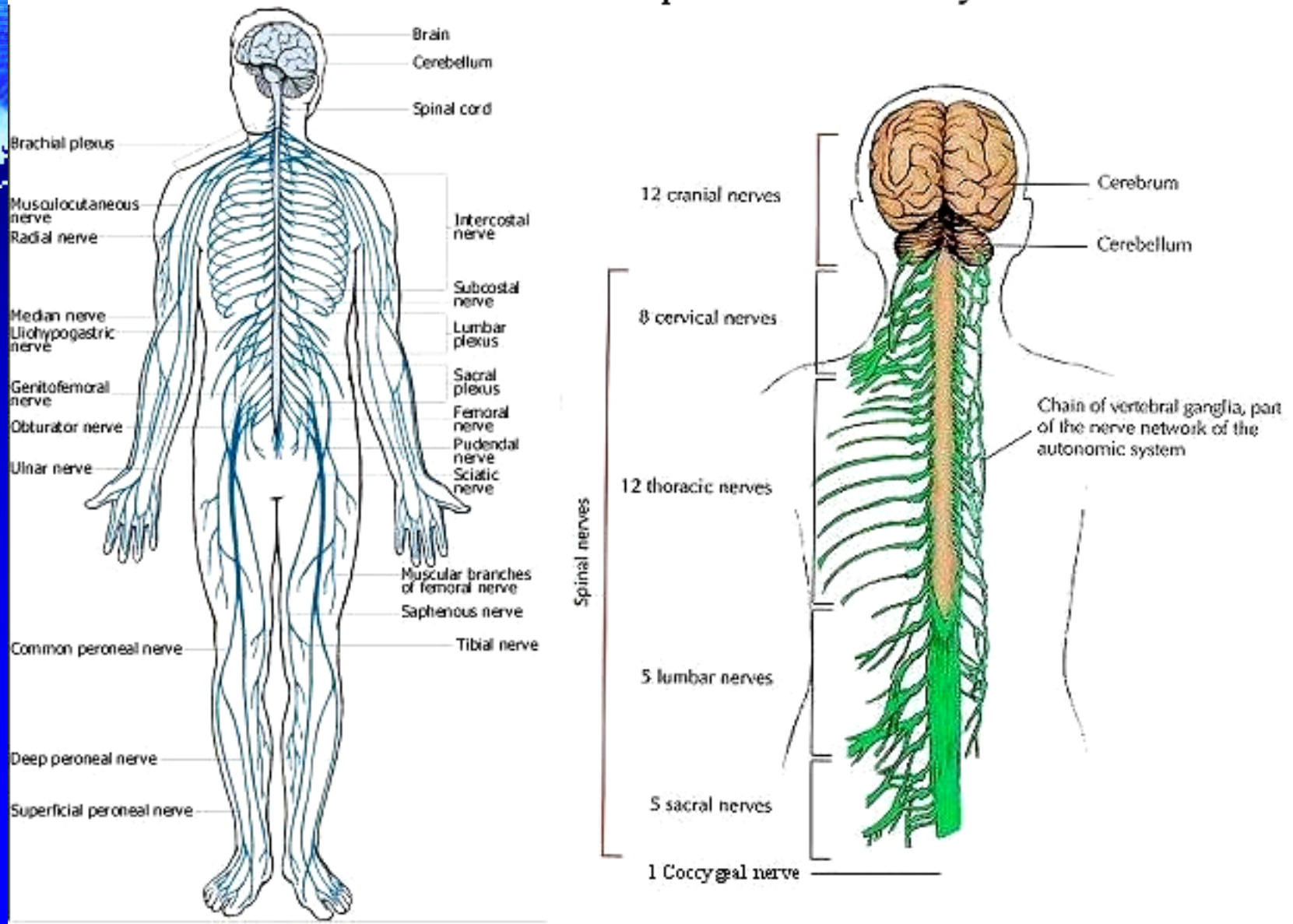


SISTEMA NERVIOSO GANGLIONAR O SEGMENTADO

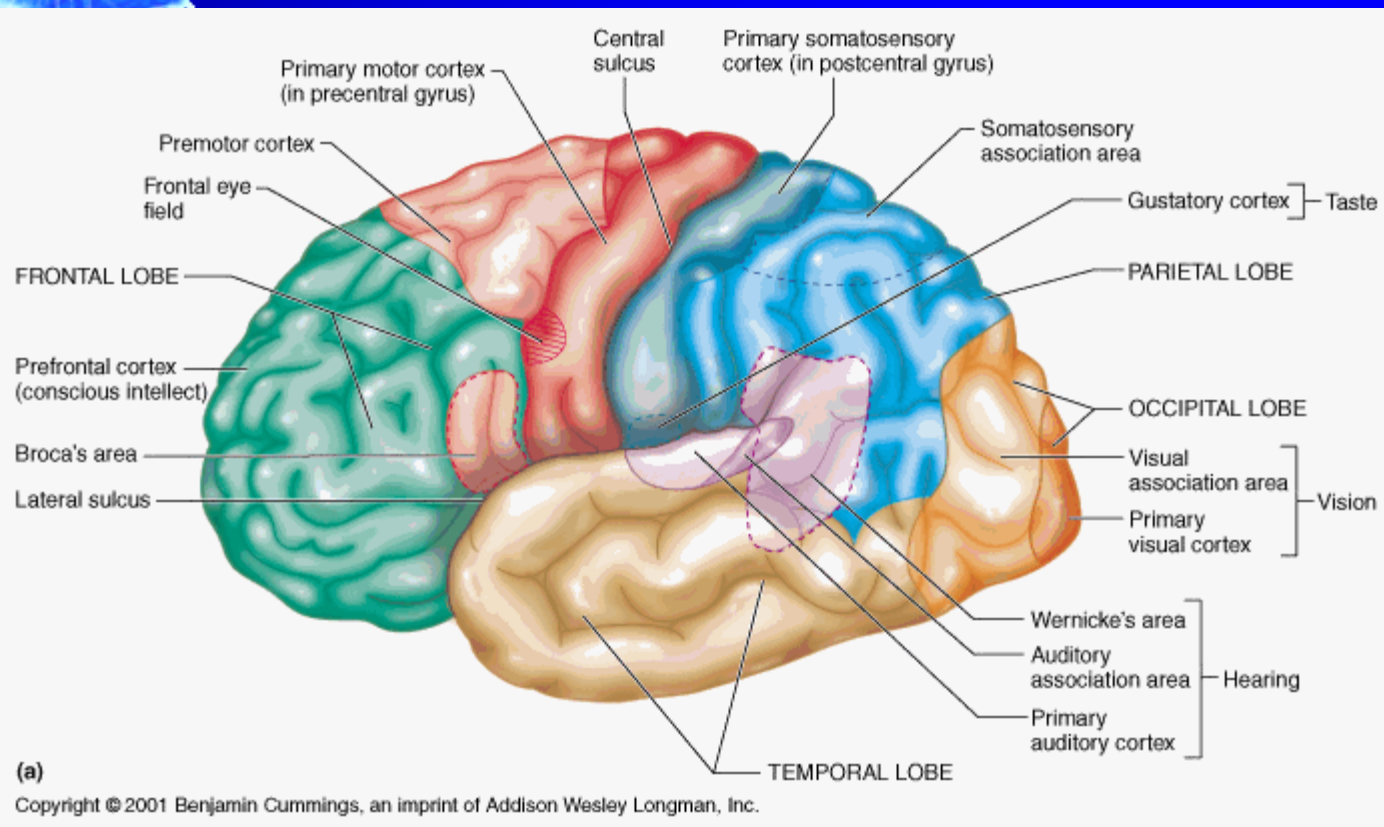
SISTEMA NERVIOSO ENCEFÁLICO



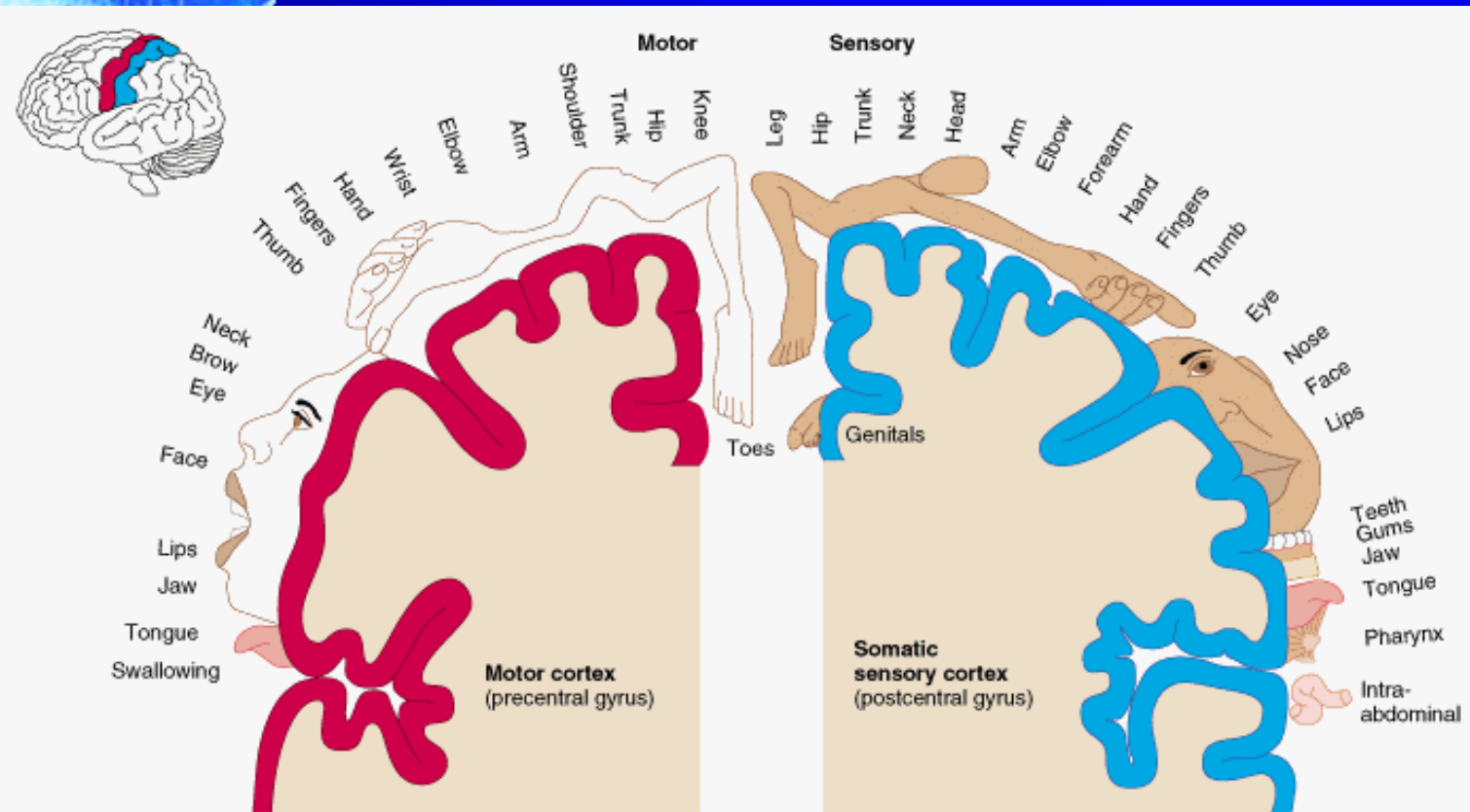
The Central and Peripheral Nervous Systems



Areas de Asociación



Mapeo Corporal

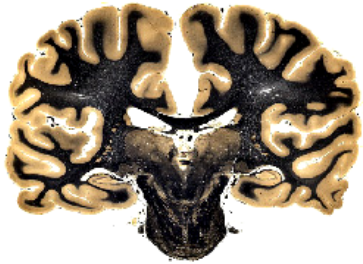


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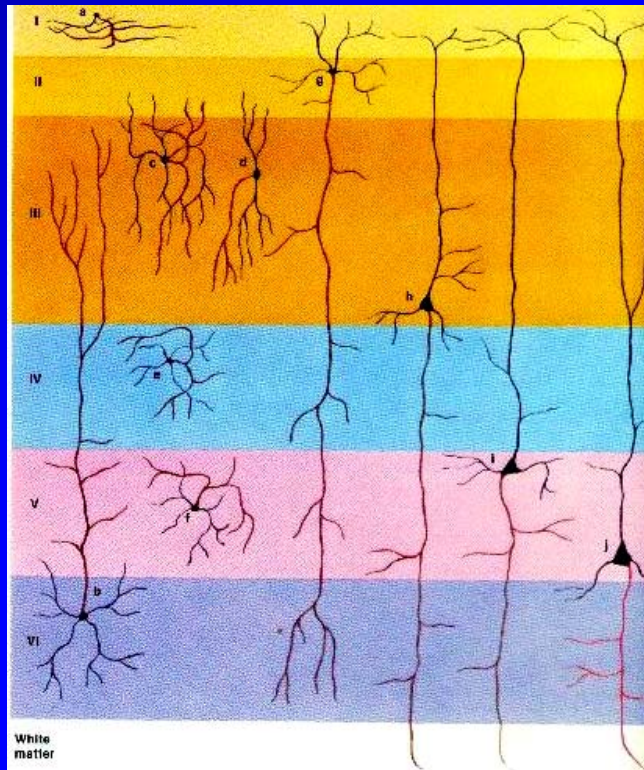
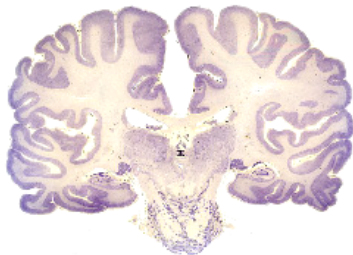


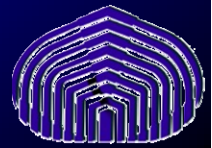
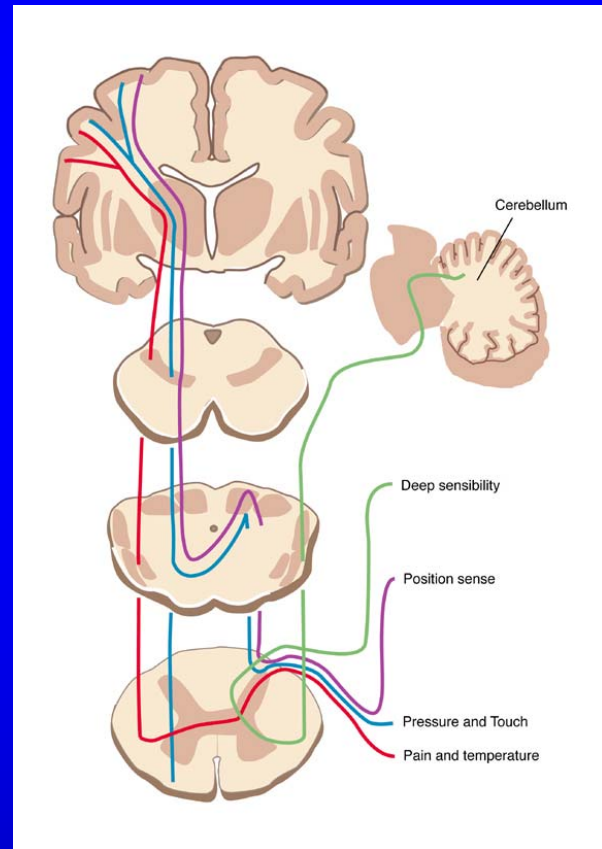
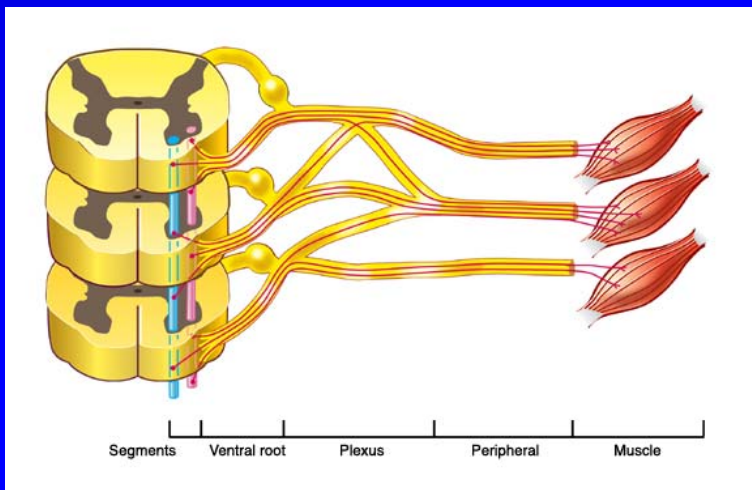
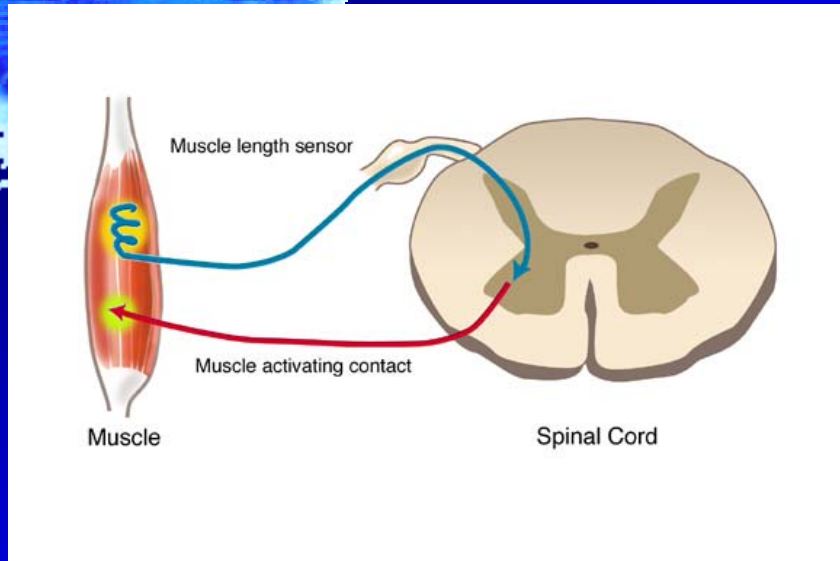
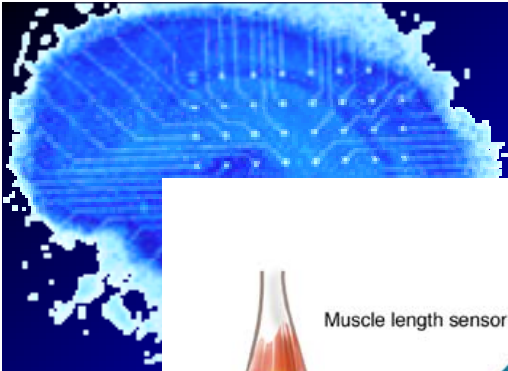
Organización Columnar

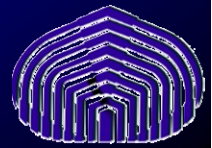
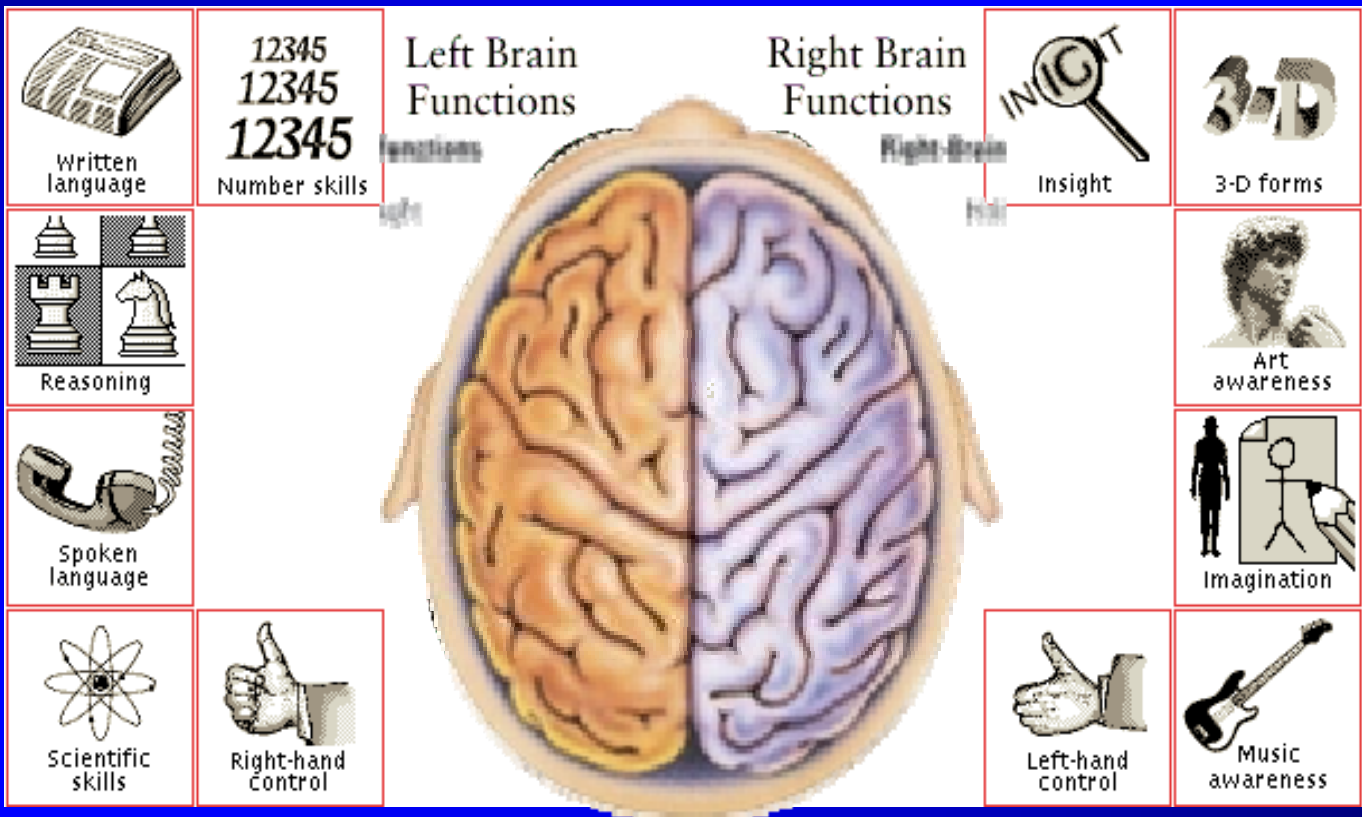
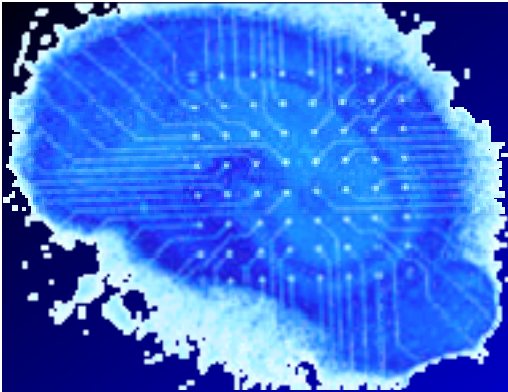
HUMAN CORONAL BRAIN SECTION
STAINED FOR AXONS

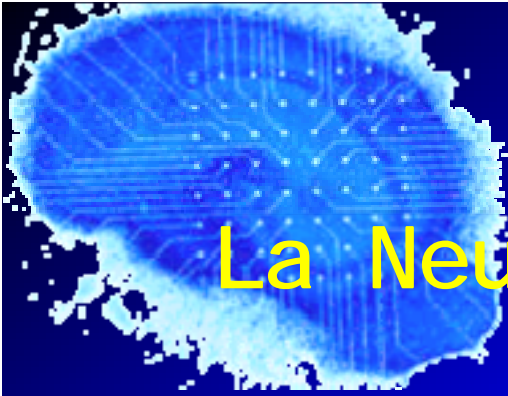


HUMAN CORONAL BRAIN SECTION
STAINED FOR CELL BODIES

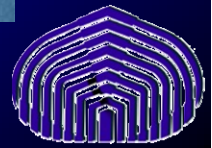
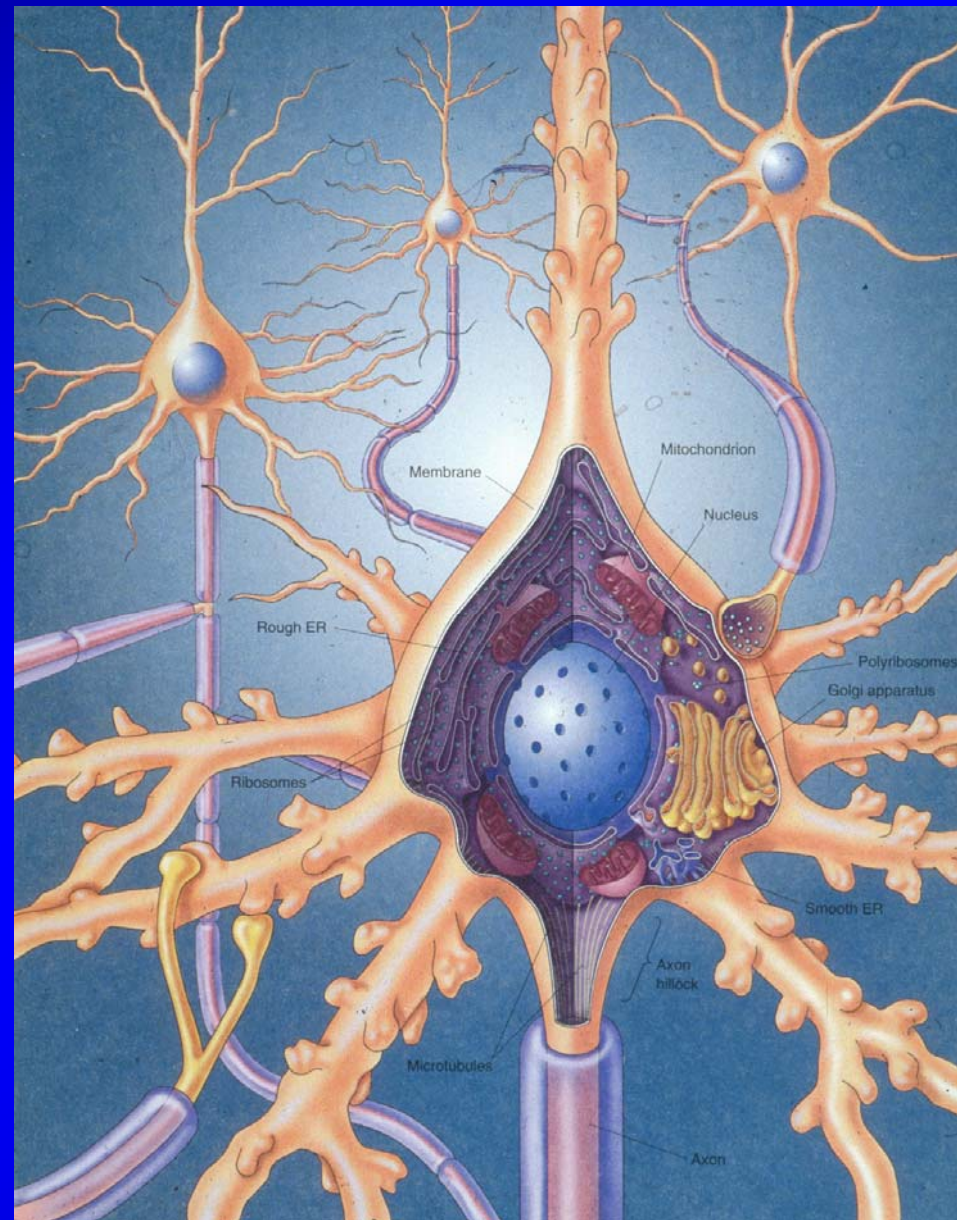


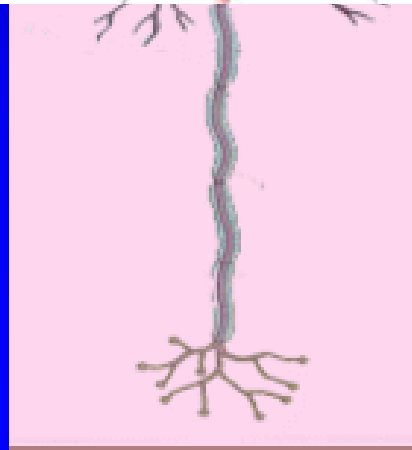
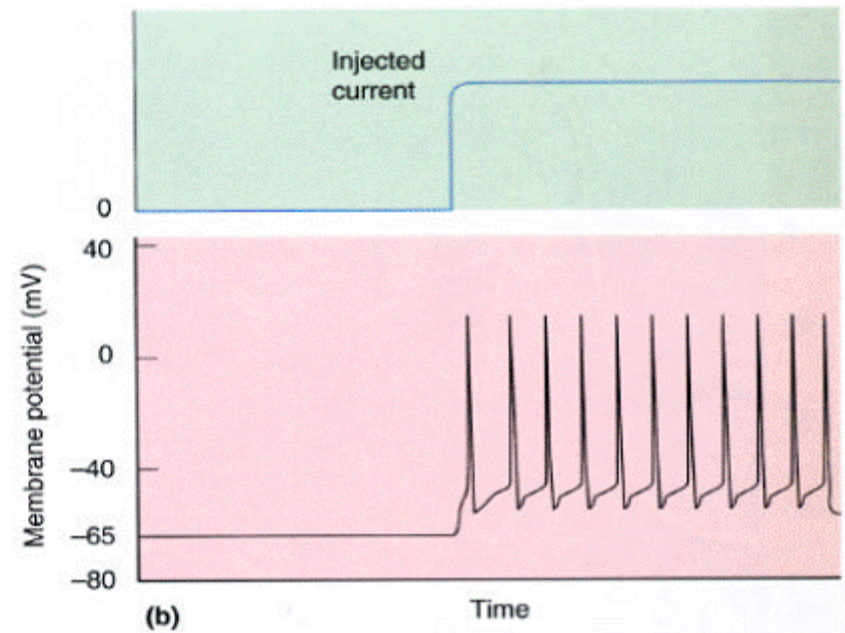
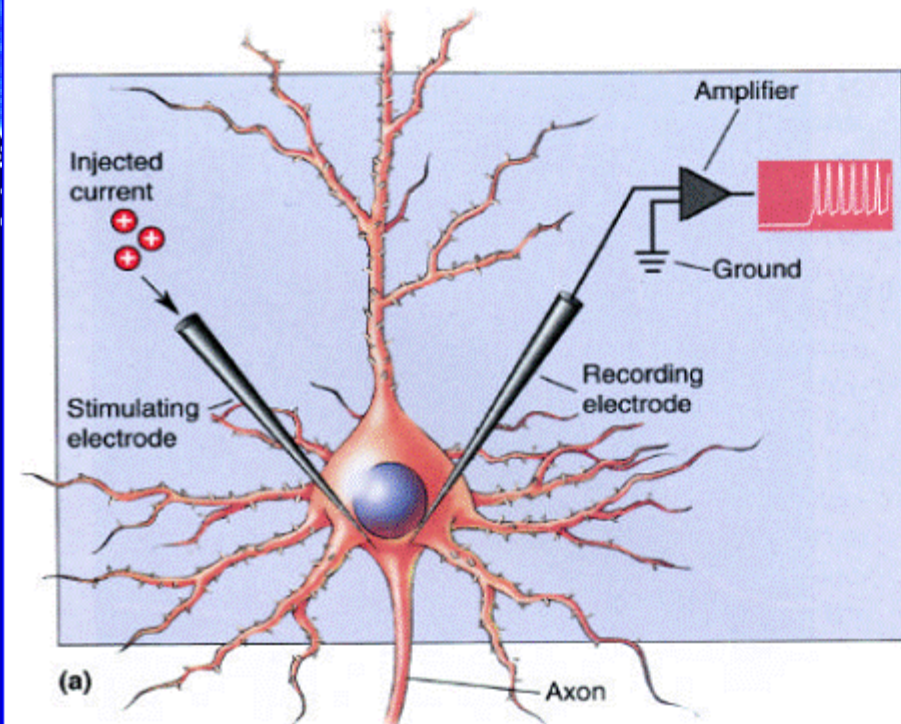




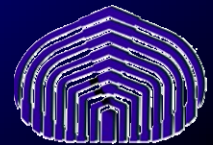
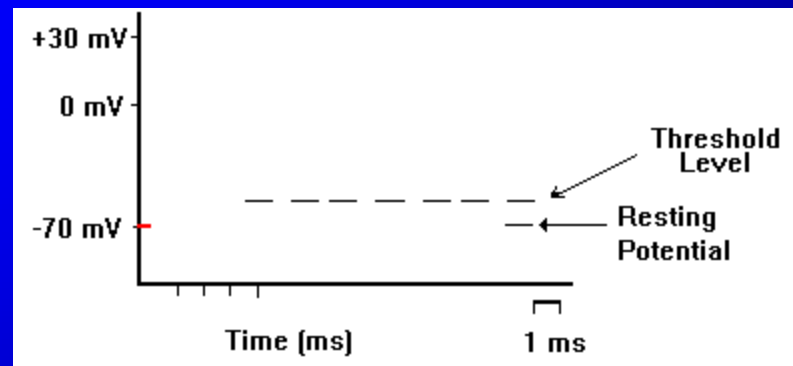


La Neurona

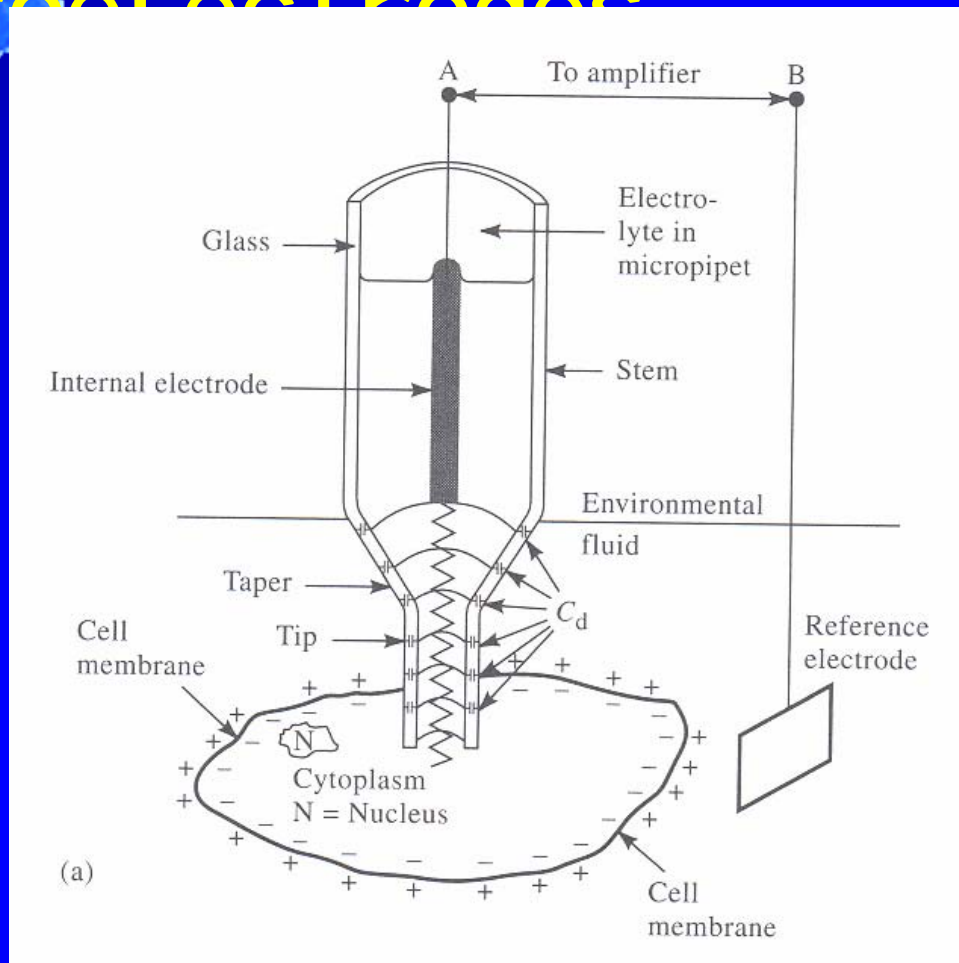


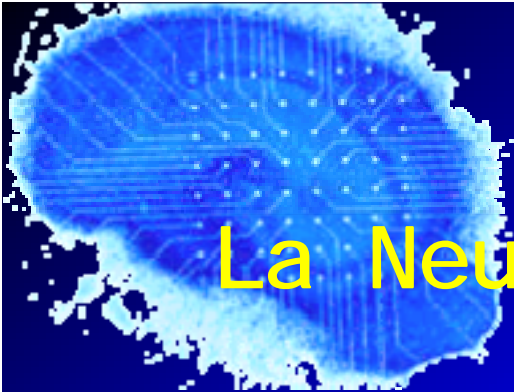


Potencial de Acción

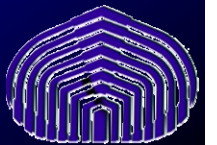
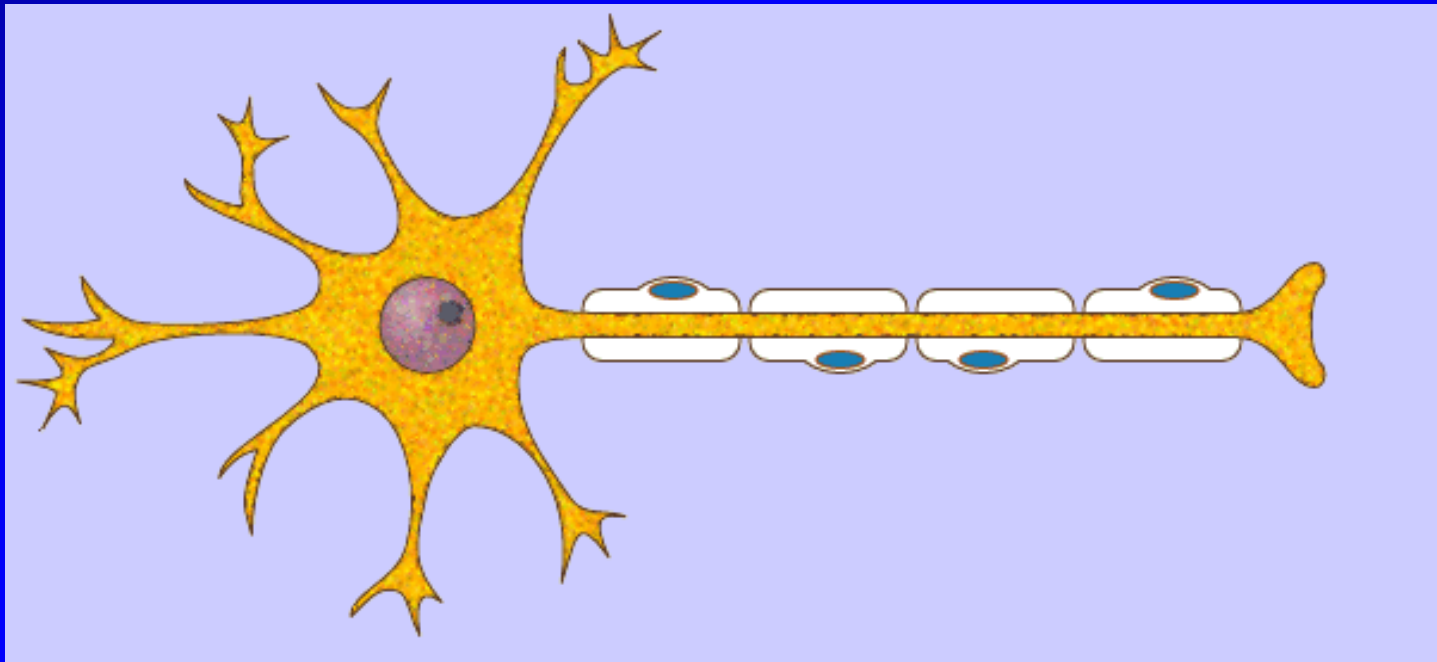


Intra-cellular Microelectrodes

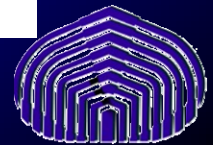
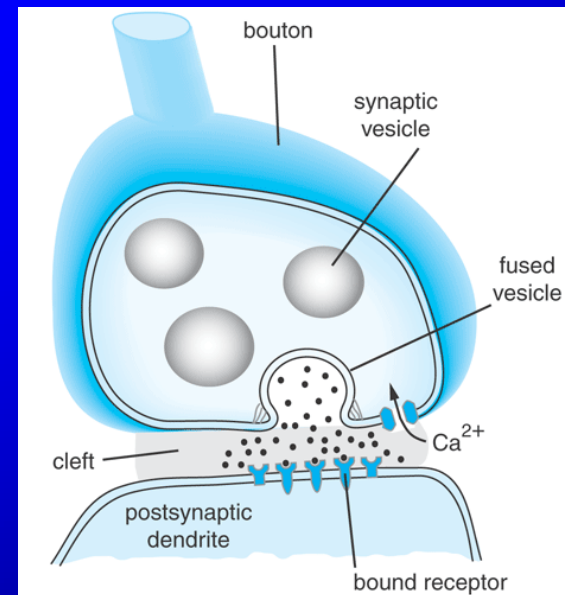
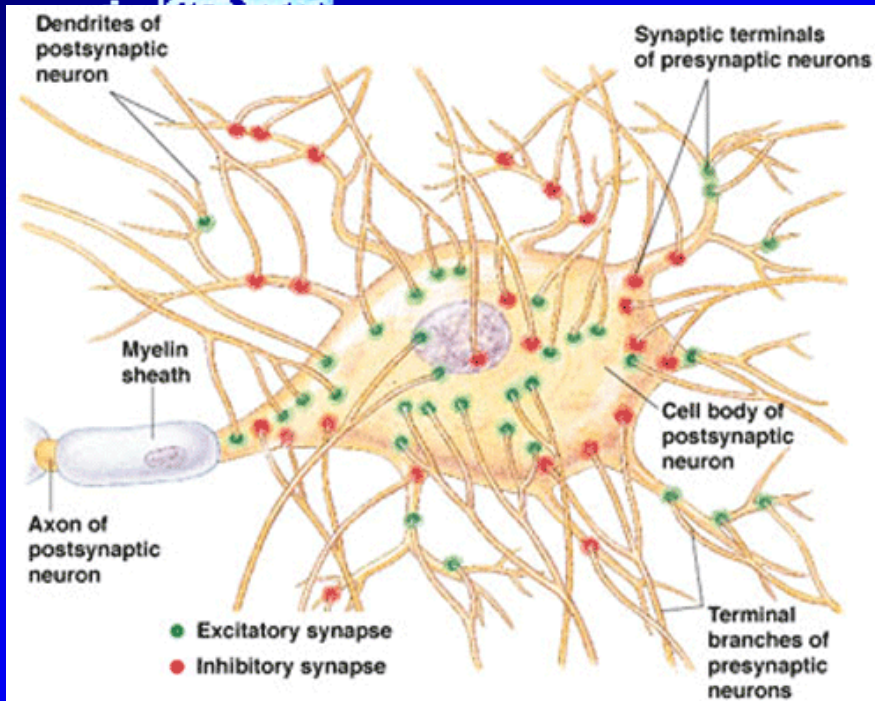
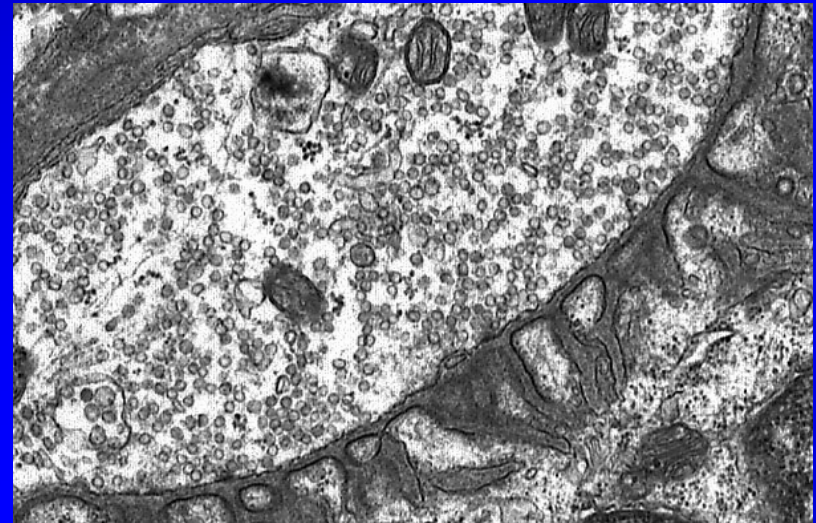


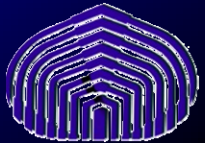
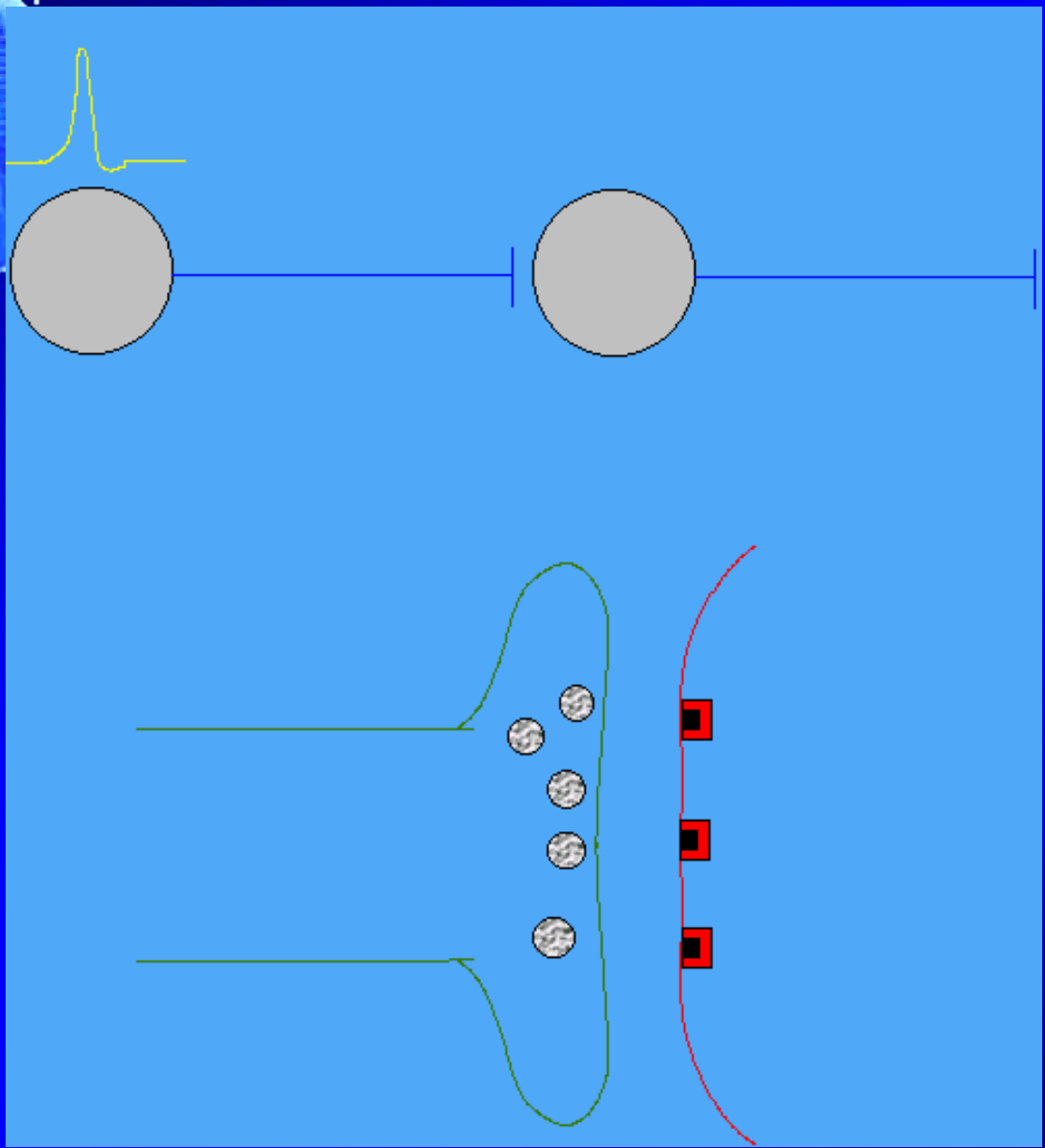
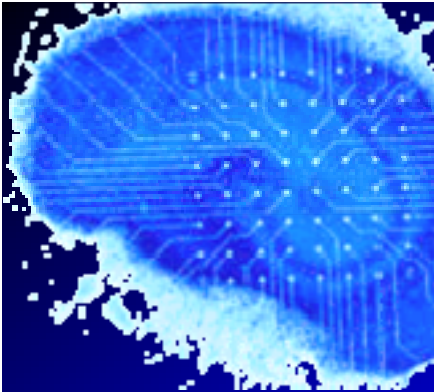


La Neurona

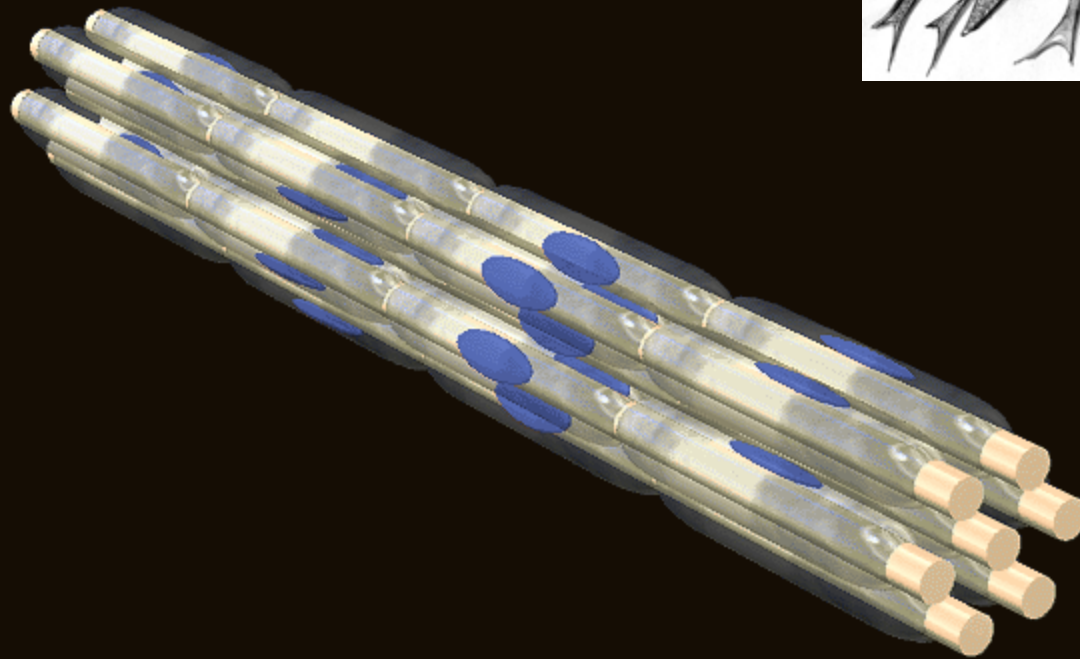
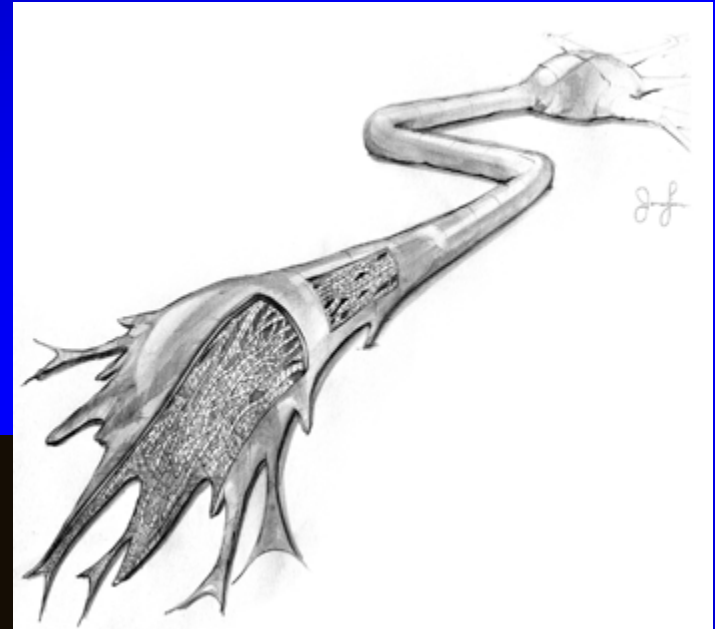


La Sinapsis



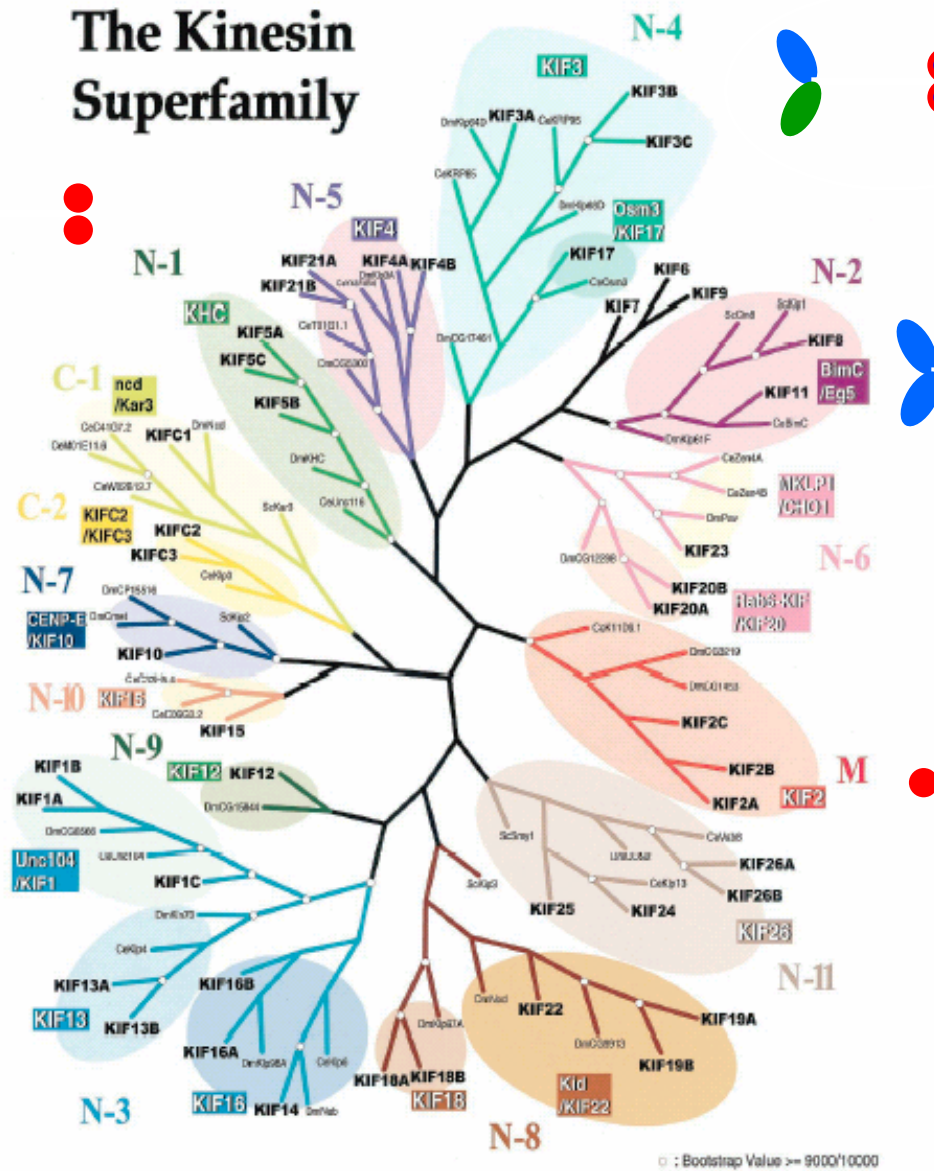


El Axón

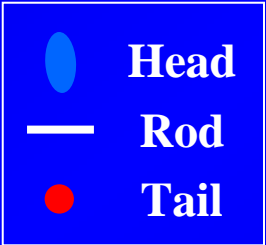


44 genes humanos

The Kinesin Superfamily

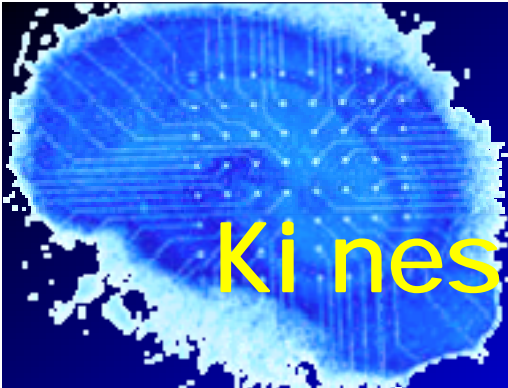


KIF3A/

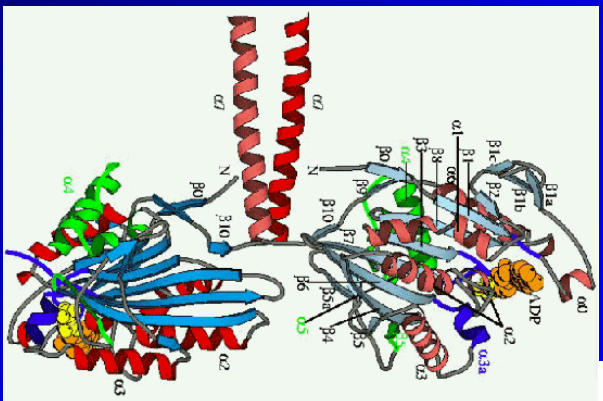
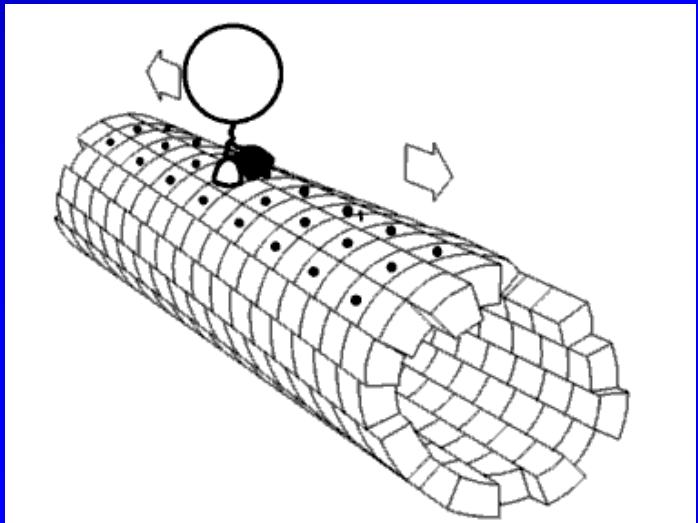


© : Bootstrap Value >= 9000/10000

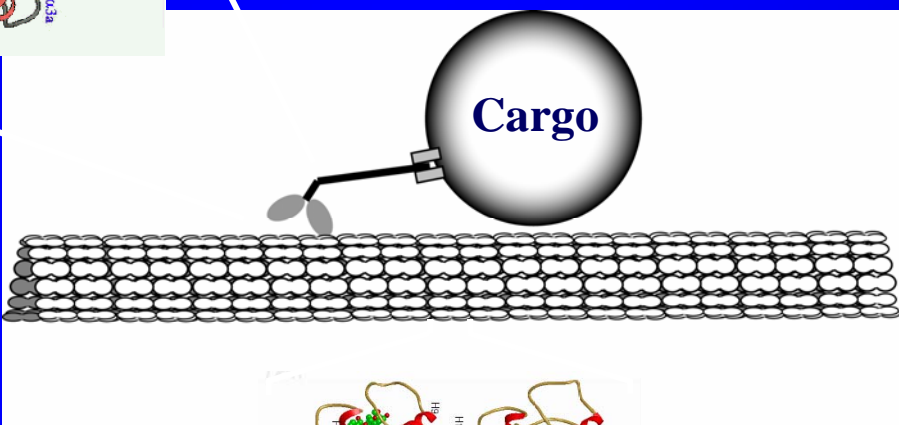




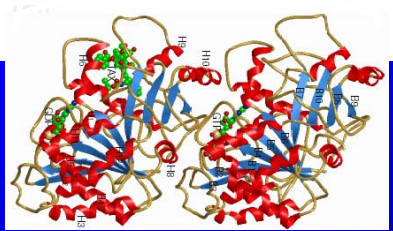
Ki nesi nas



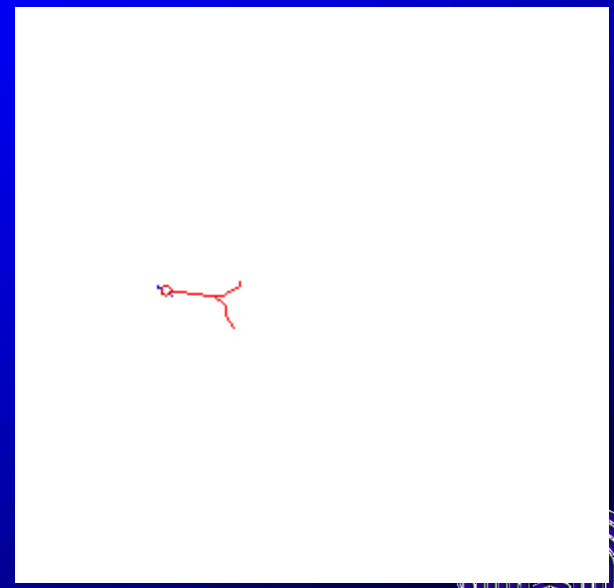
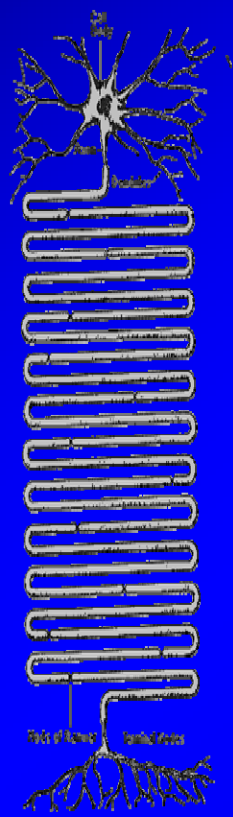
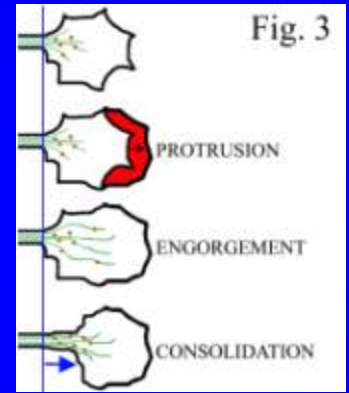
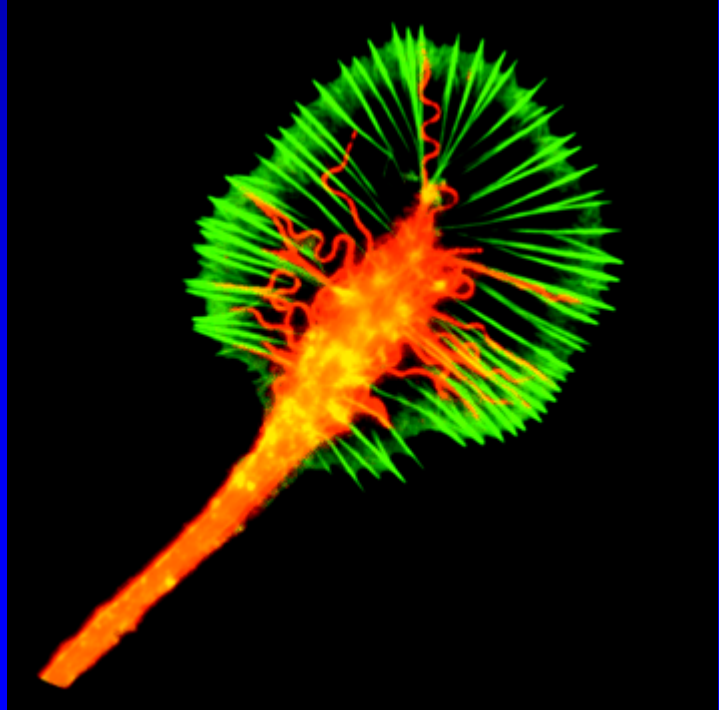
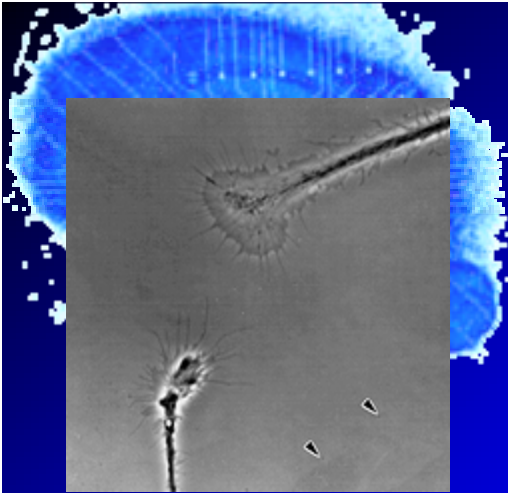
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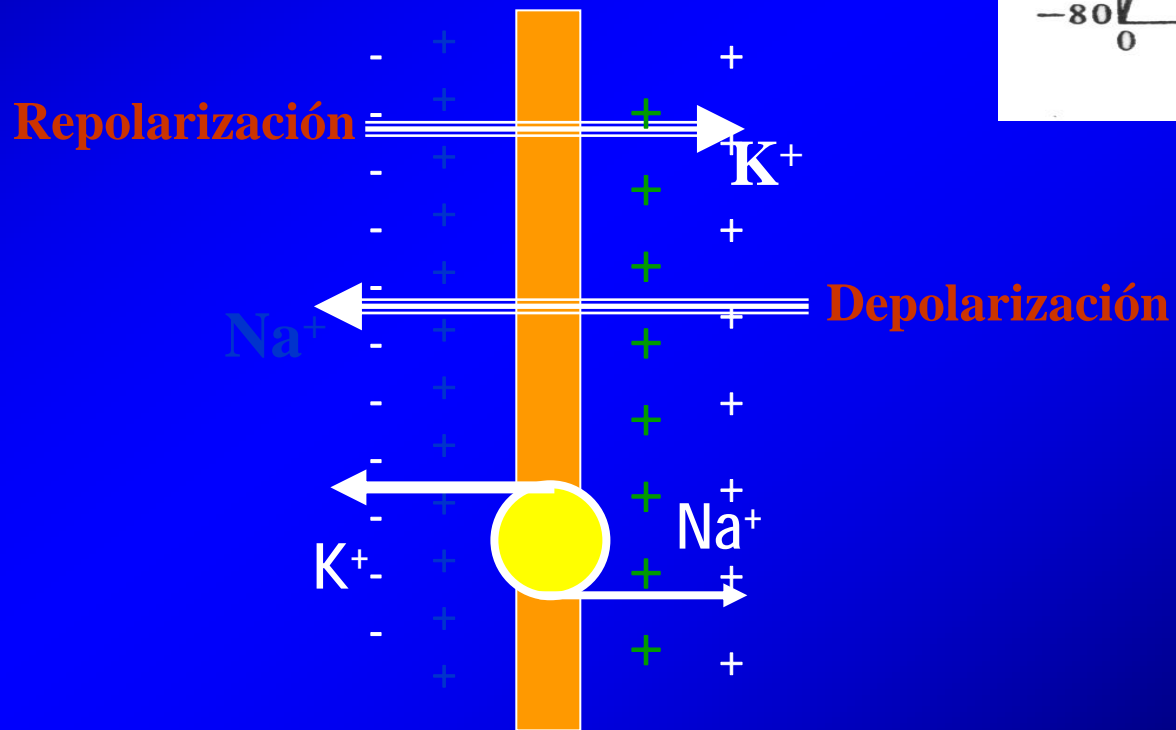
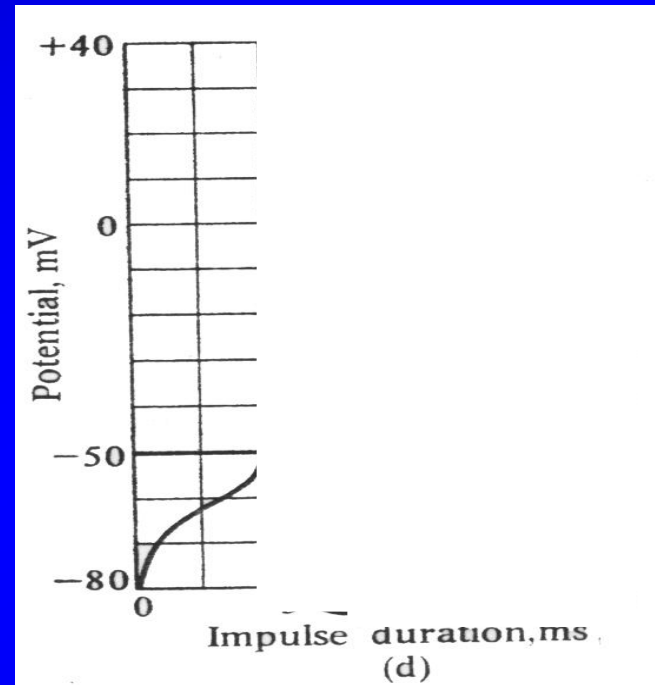


25 nm

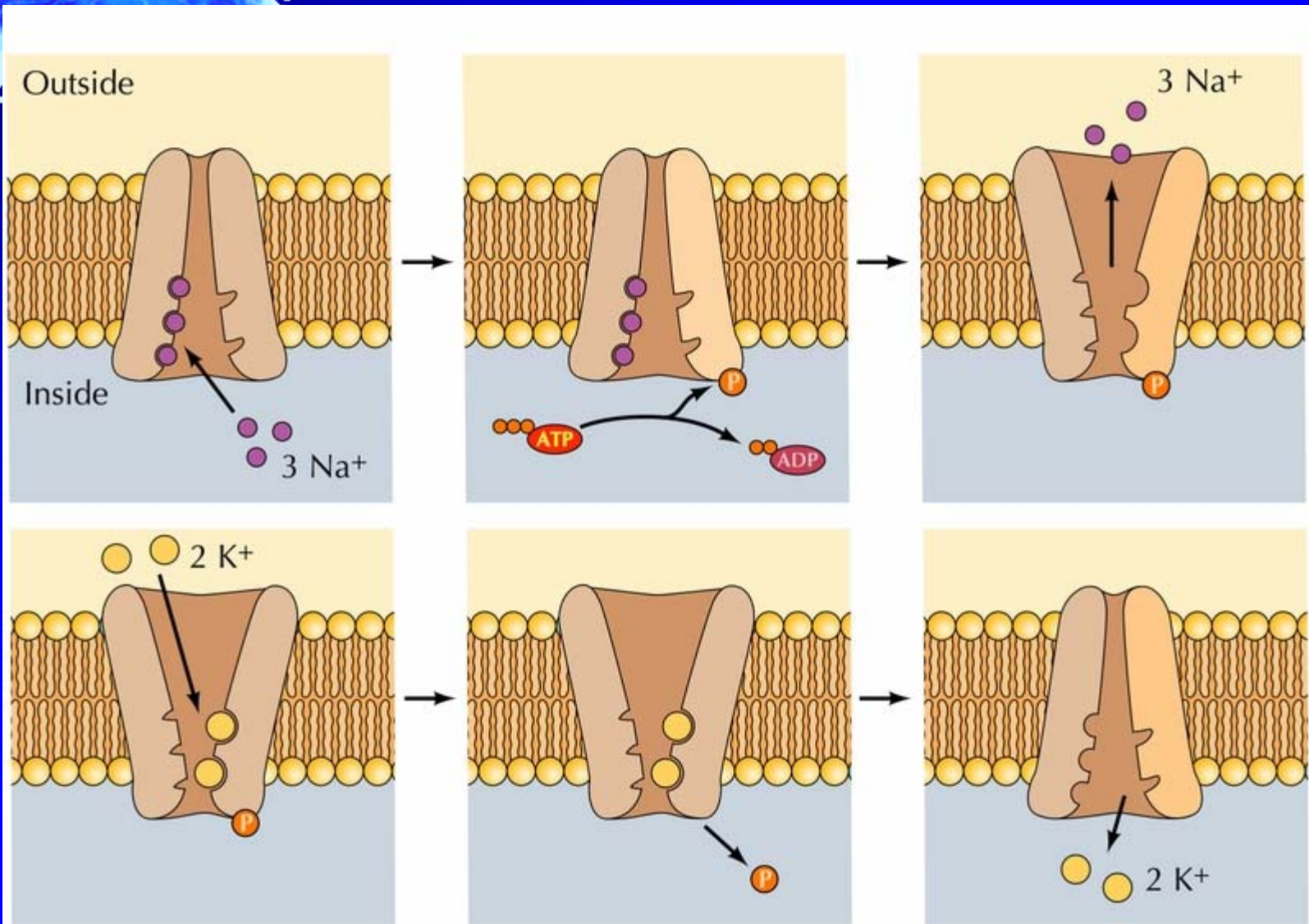


8 nm



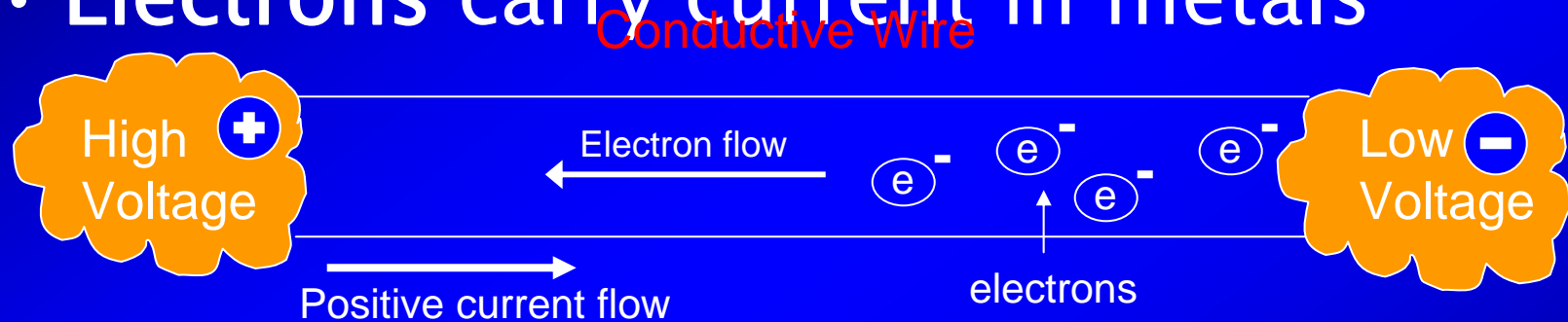


Na-K ATP-asa

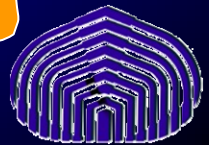
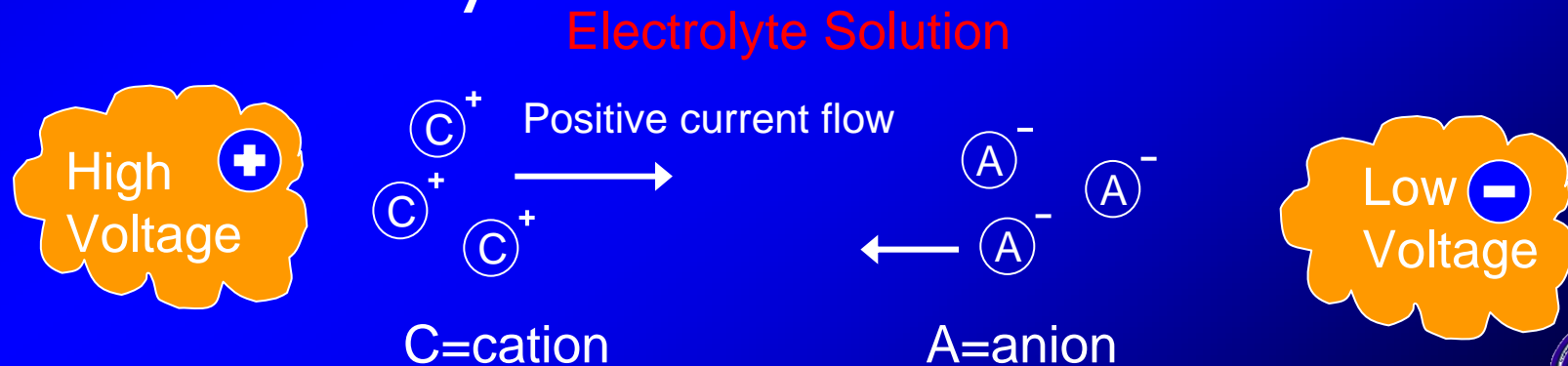


Corrientes Metálicas e Iónicas

- Electrons carry current in metals



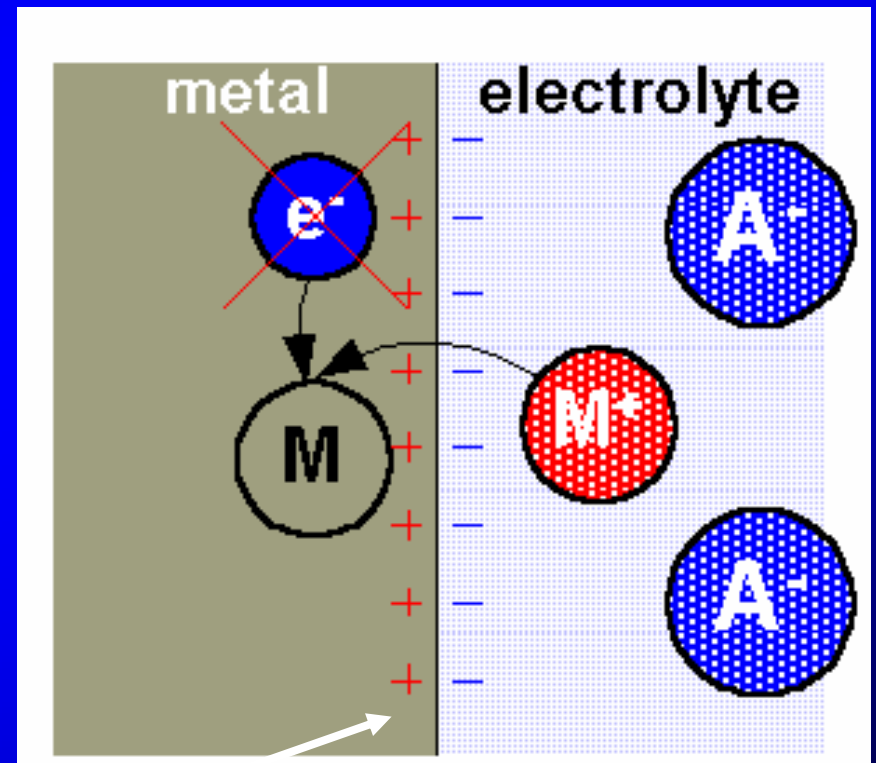
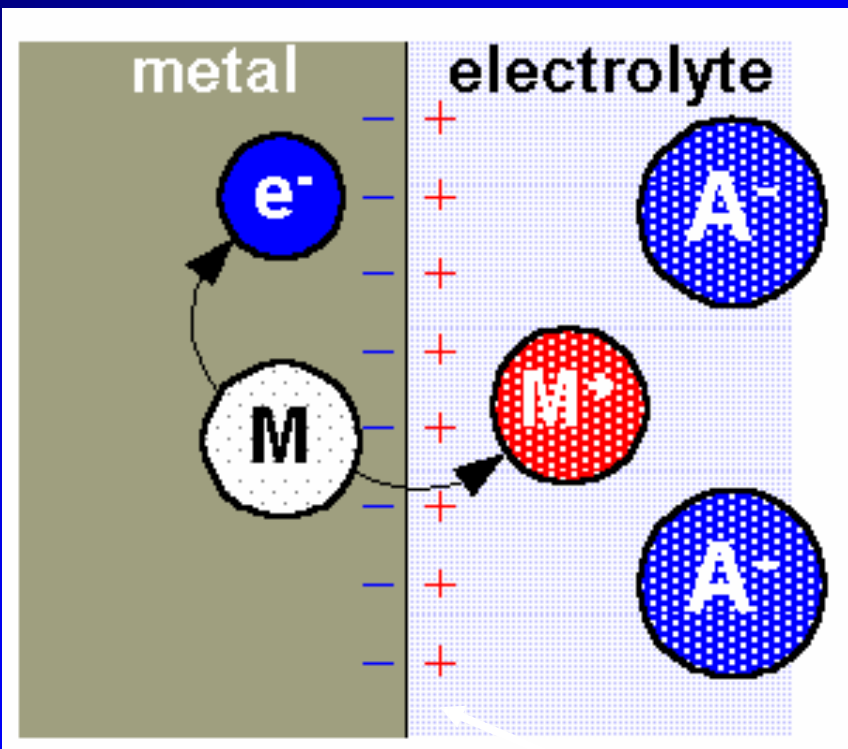
- Ions carry current in solution



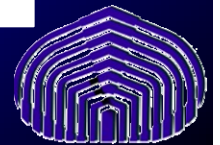
Interface Electrodo-Electrolyte

Anode (oxidation dominates)

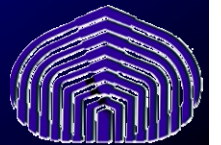
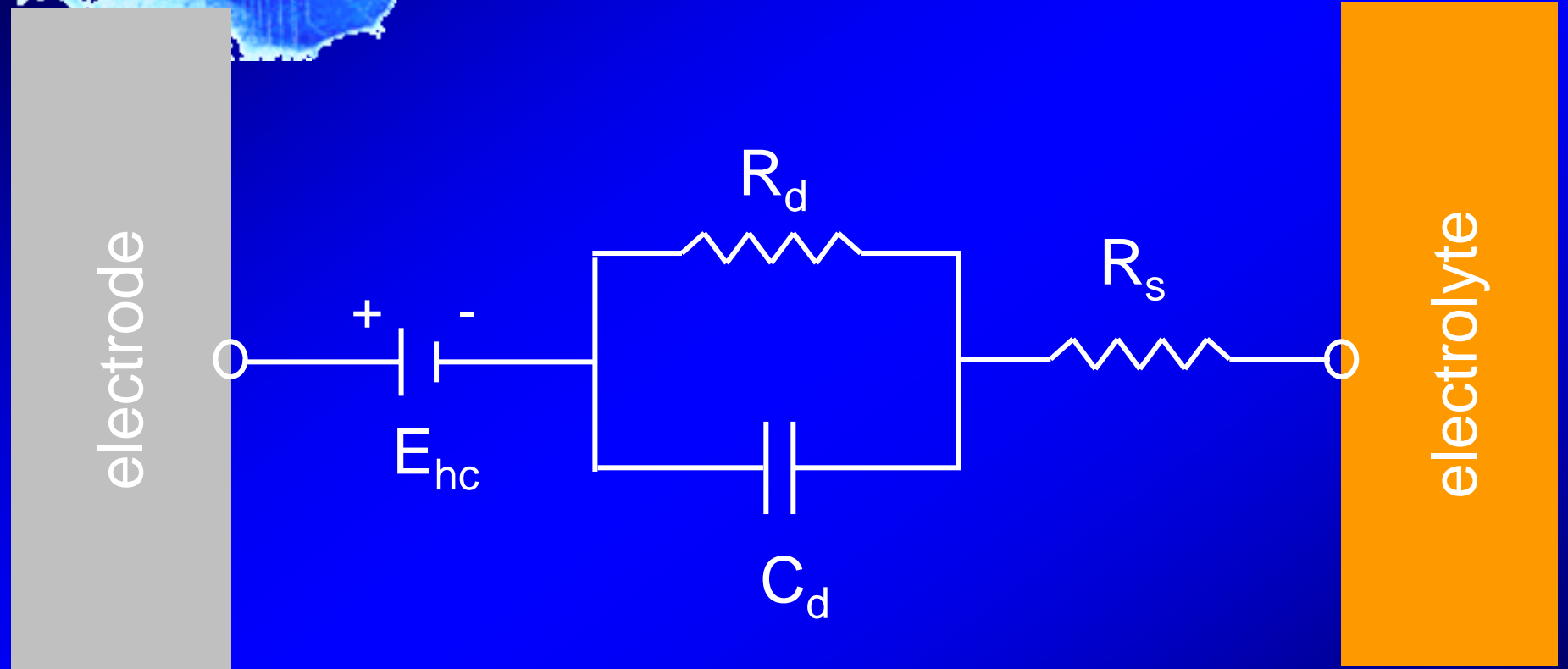
Cathode (reduction dominates)

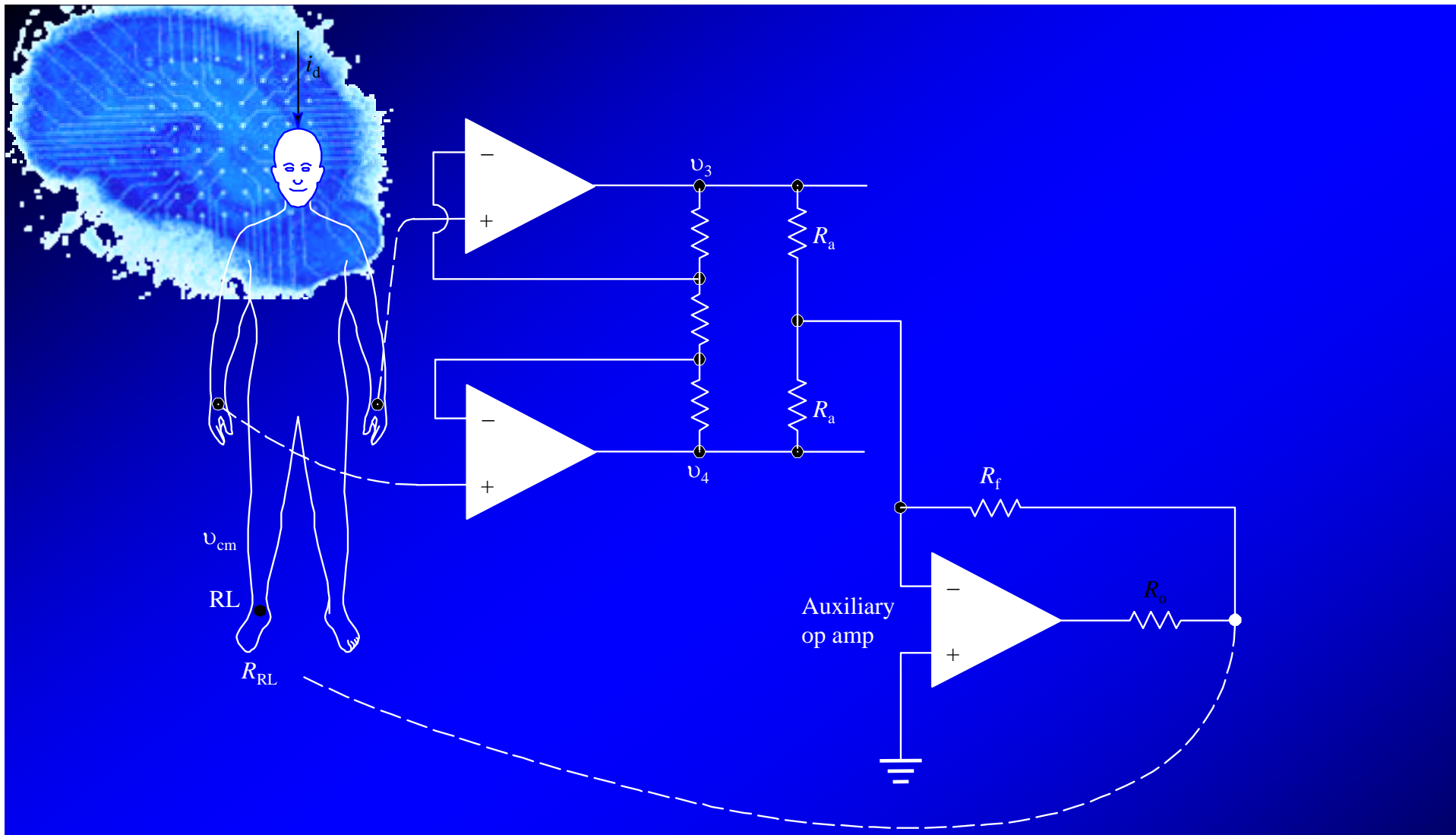


E_{hc} caused by charge separation



Modelo Circuital



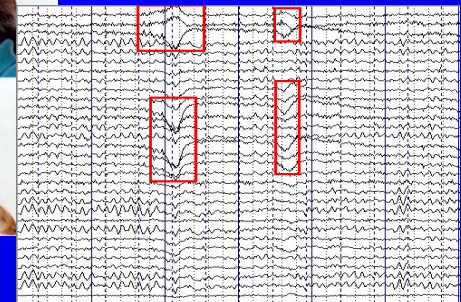
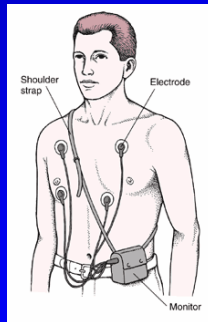
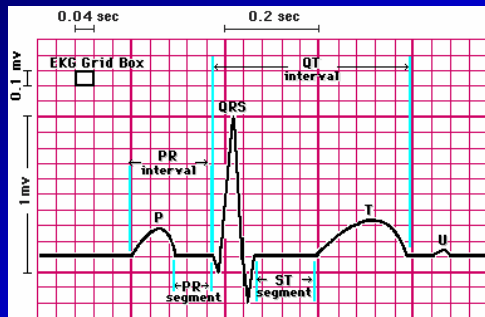


Amplificador con Sistema de Manejo de la Pierna Derecha

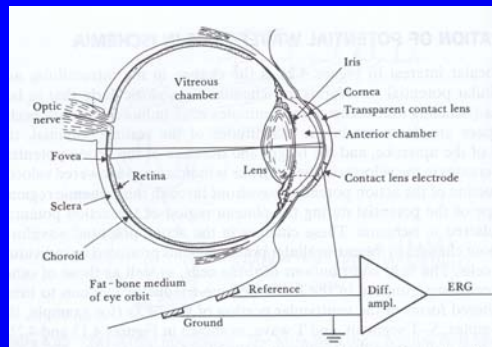
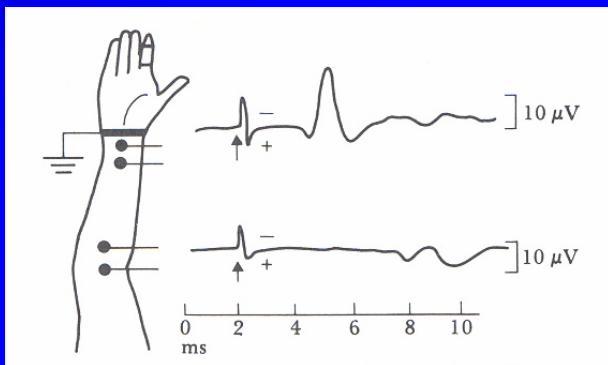


Biopotentials

Electrocardiogram (ECG)

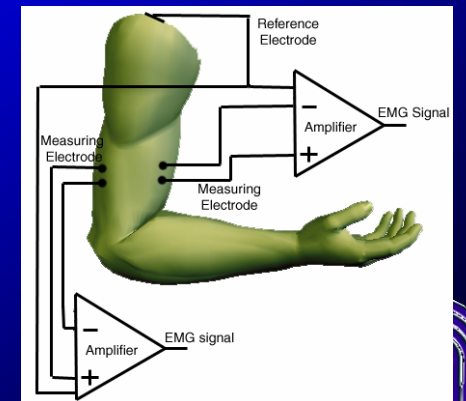


Electroneurogram (ENMG)



Electroretinogram (ERG)

Electromyogram (EMG)

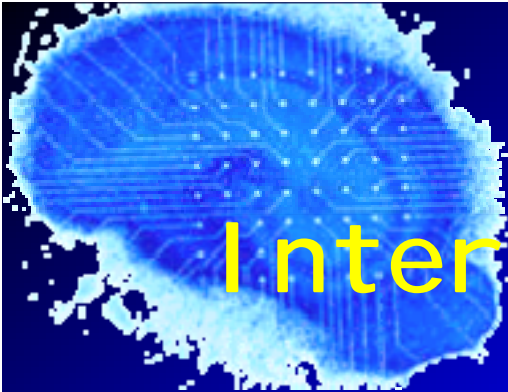


TENS

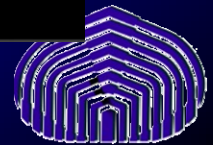
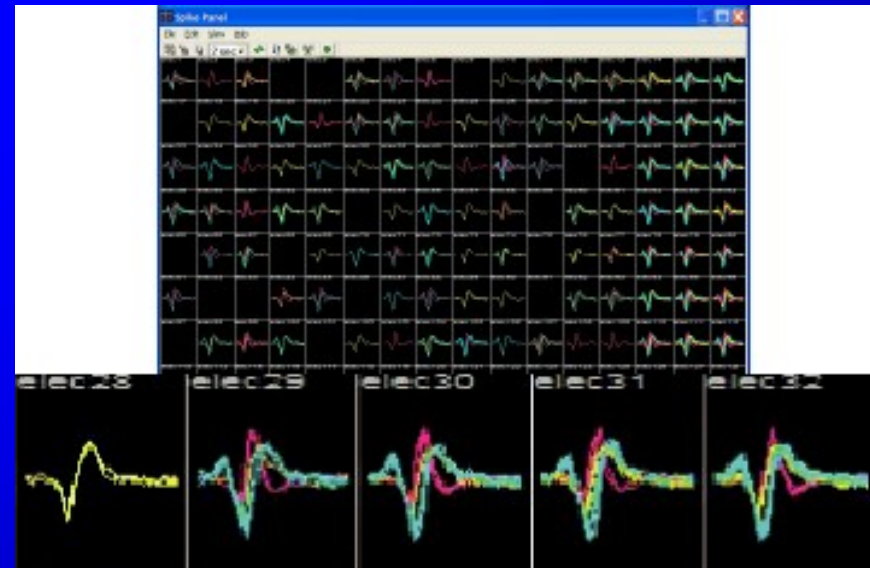
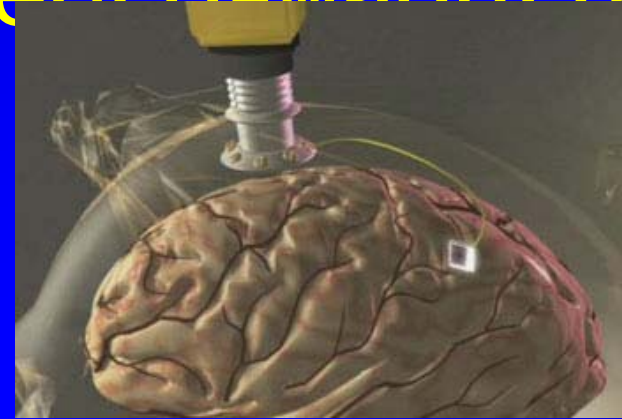


Interfaces Cerebro-Computadora



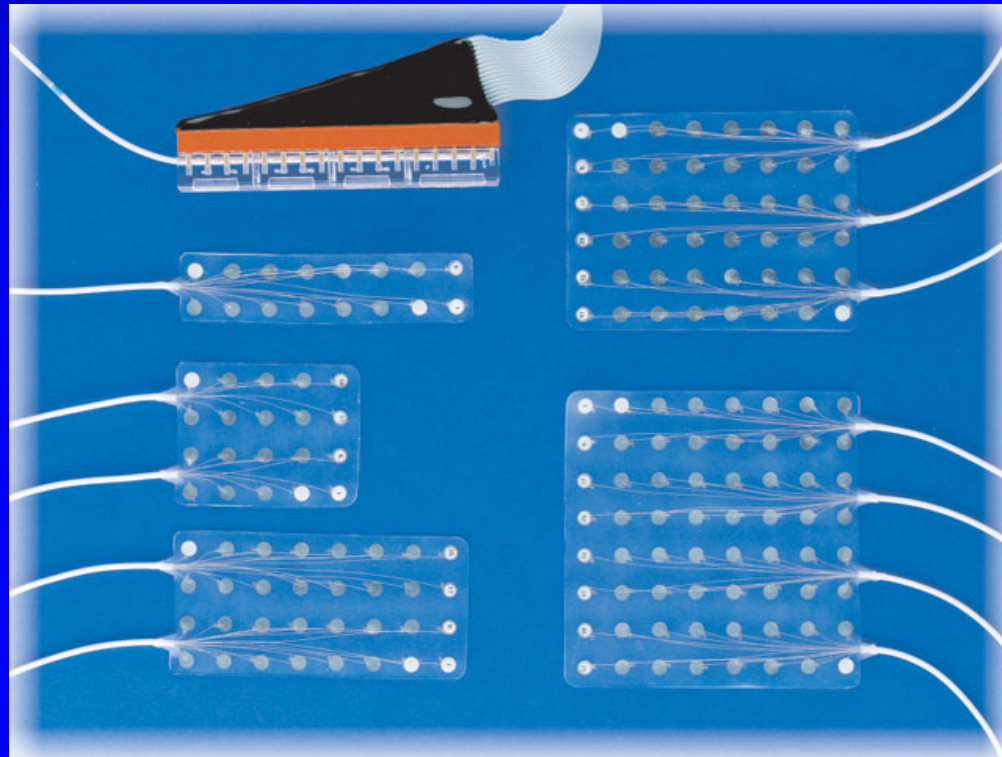


Interfaces Cerebro-Máquina



Epilepsy Monitoring Electrodes

Subdural Electrodes



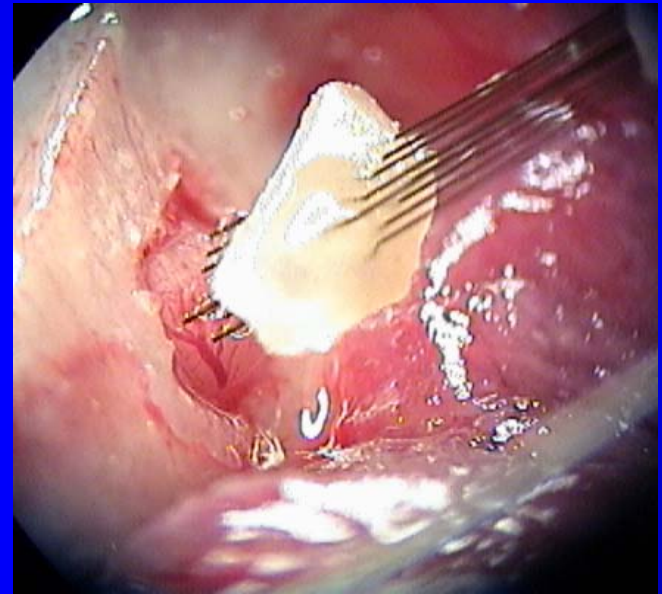
Courtesy of Ad-tech Medical



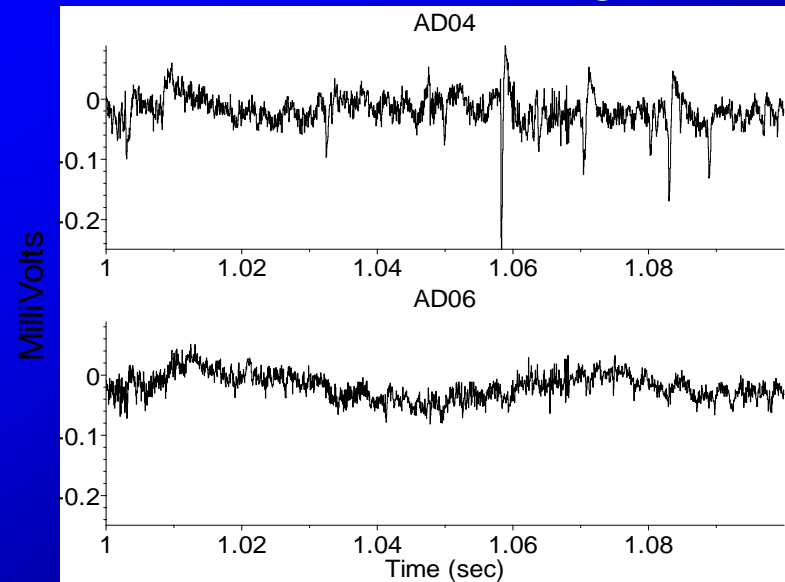
Hand-fabricated Arrays

Micro-wire electrode array

View during implant

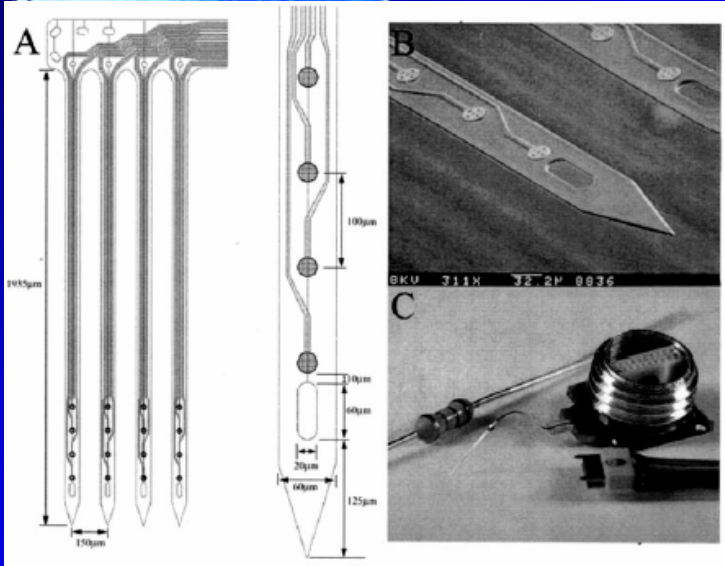


Neural Recording

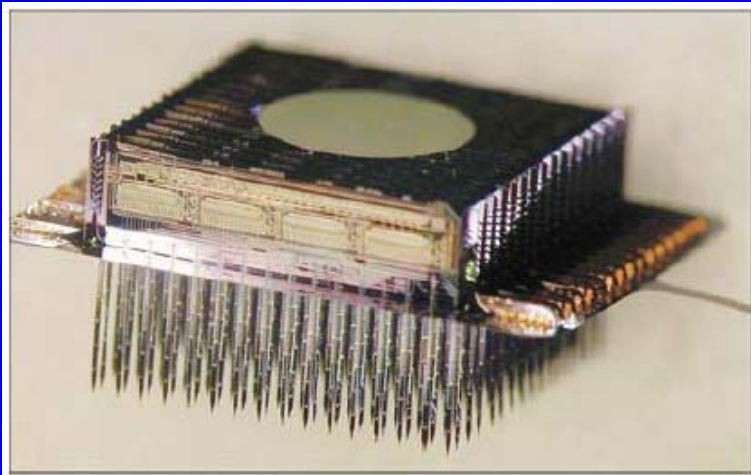
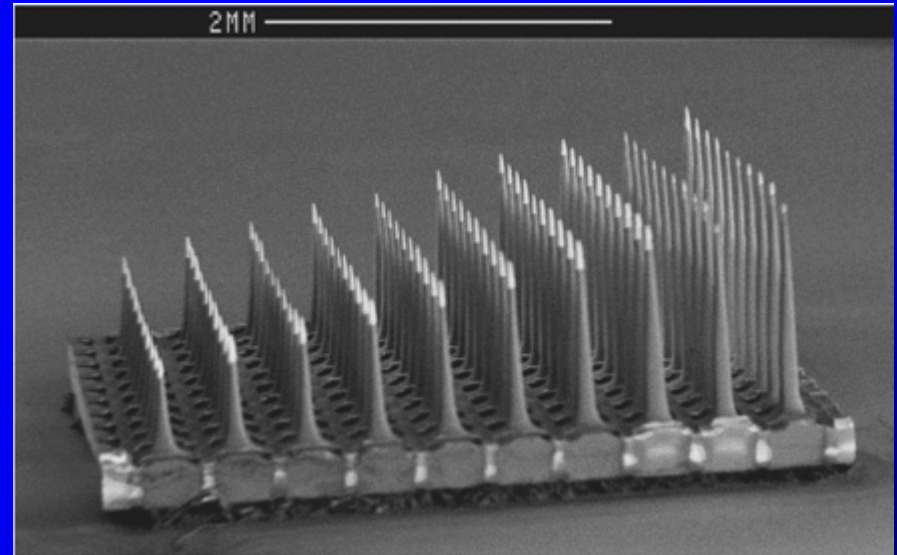


Micro-machined Electrodes

University of Michigan

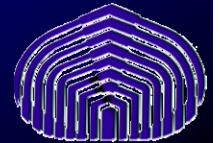
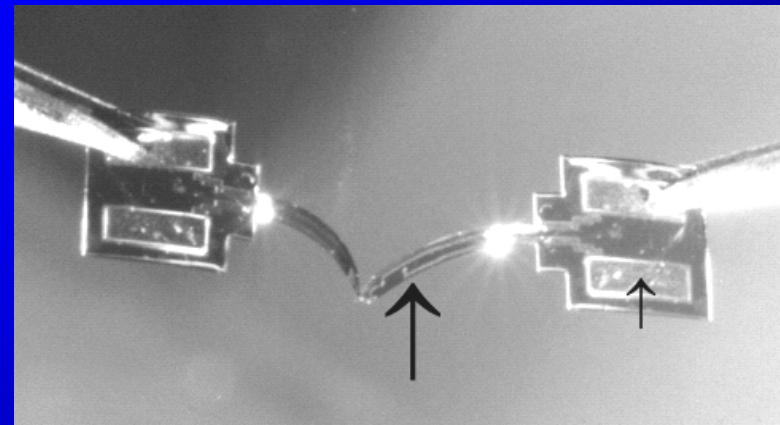
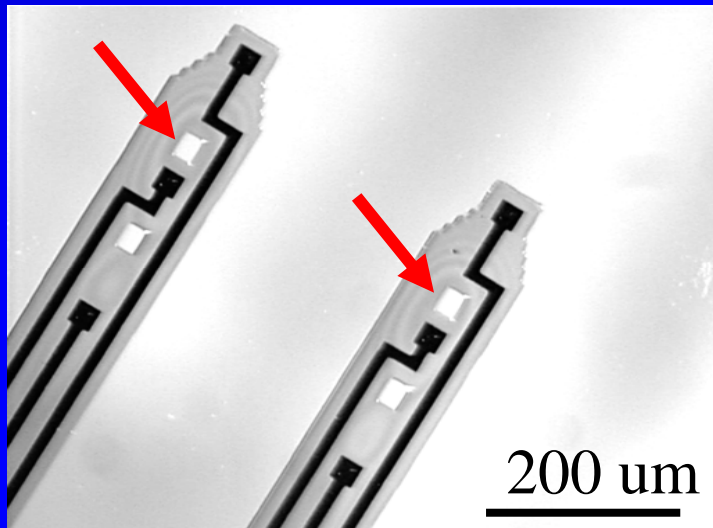
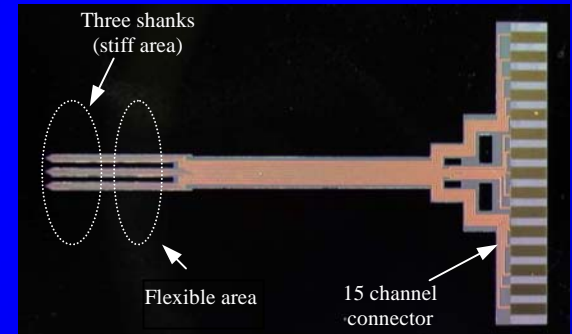
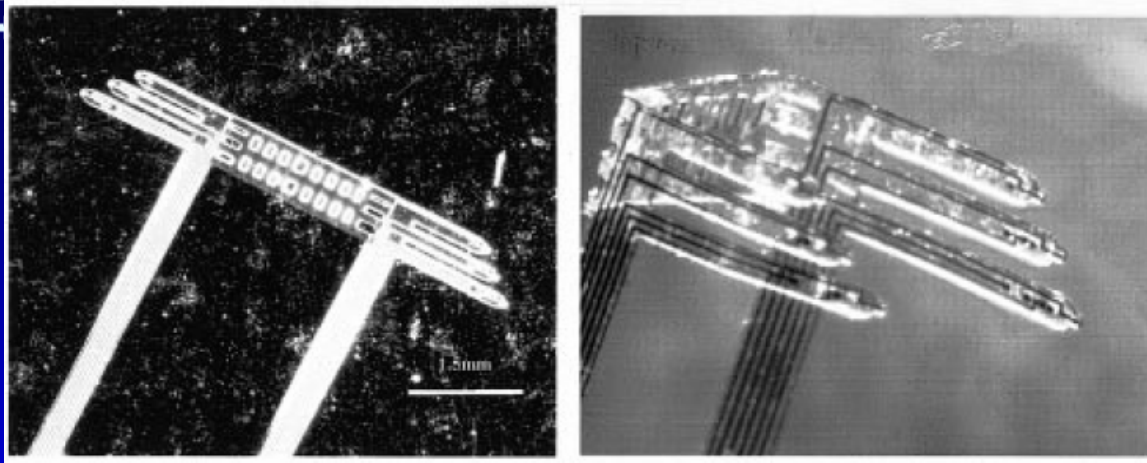


University of Utah



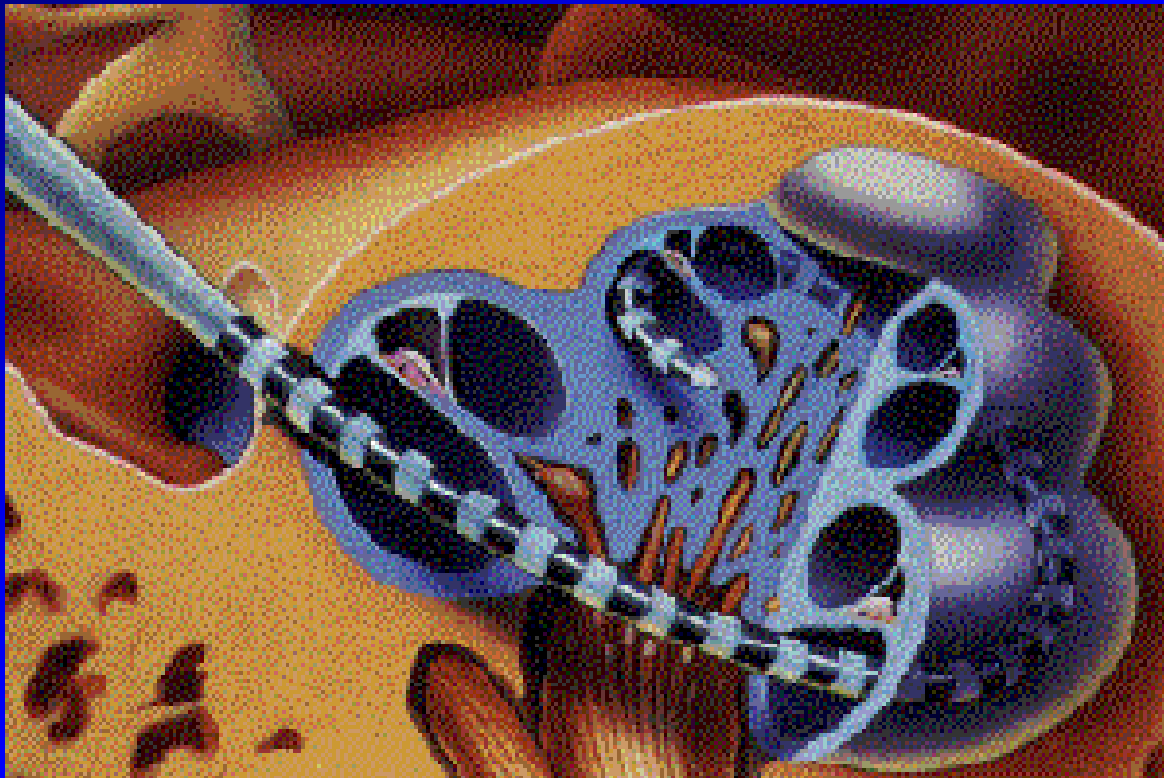
Polymer-based Electrodes

Arizona State University



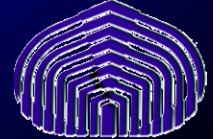
Cochlear Implant Electrodes

Cochlear Corporation's Nucleus Electrode

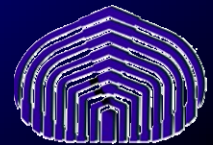
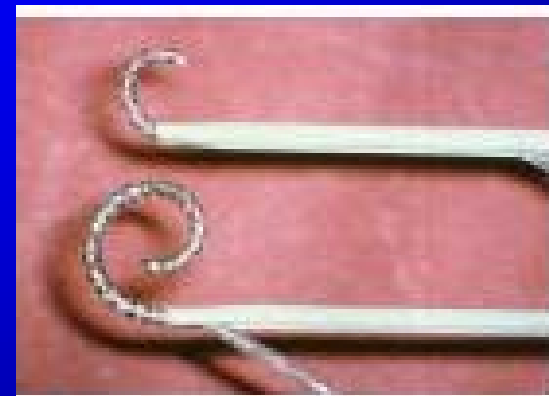
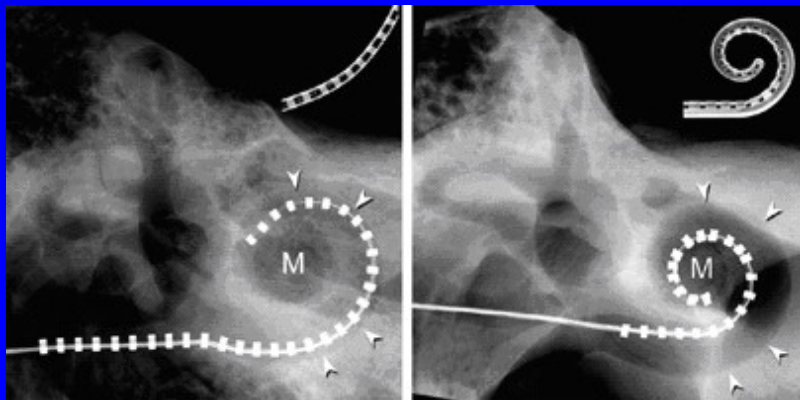
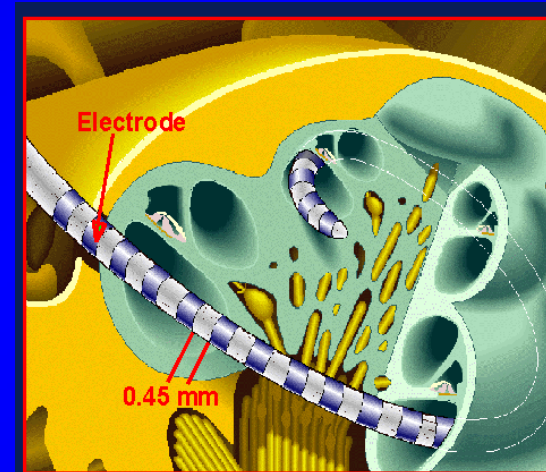


Pt bands

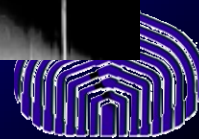
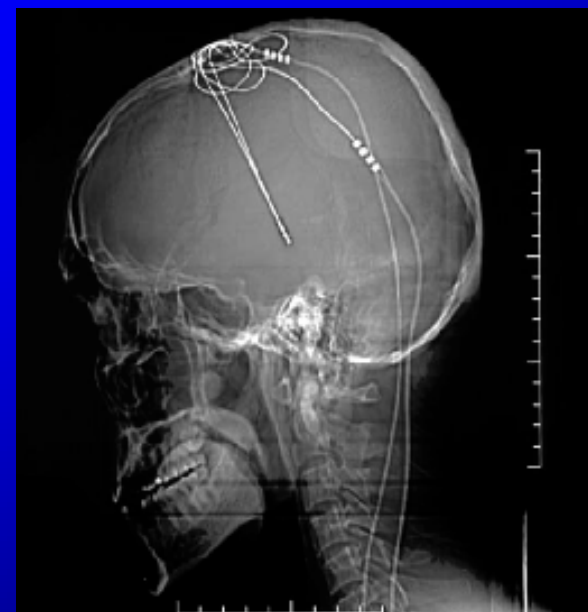
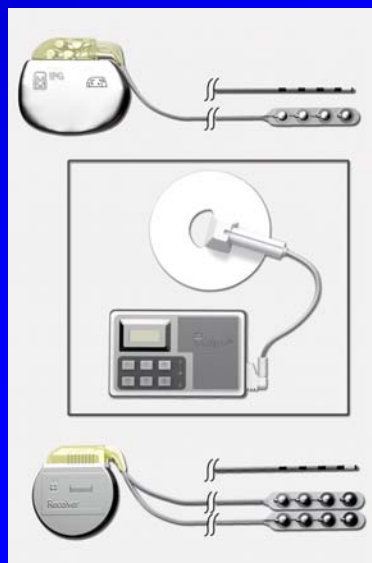
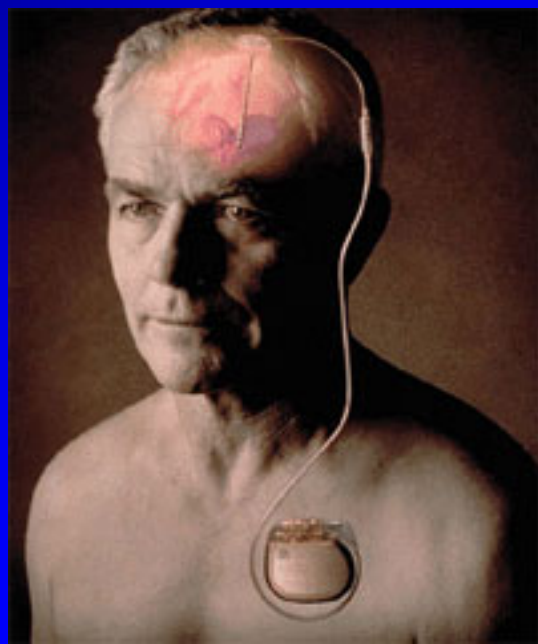
Silicone elastic carrier

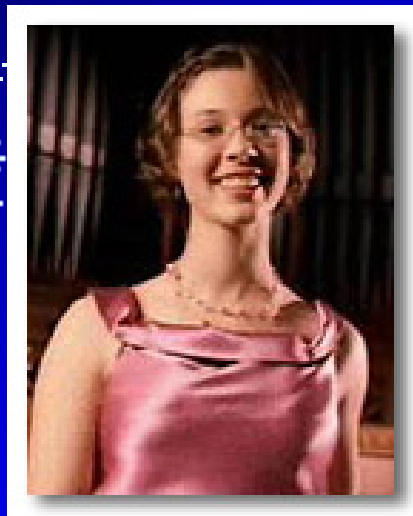
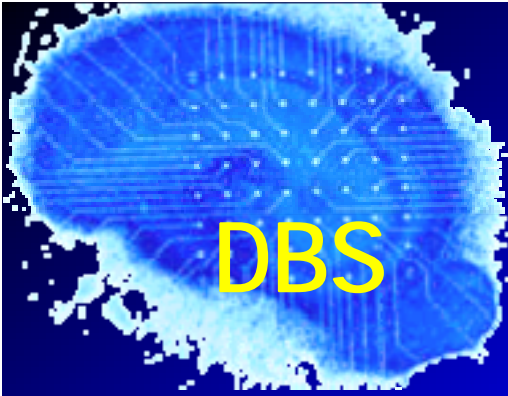


Implante Coclear

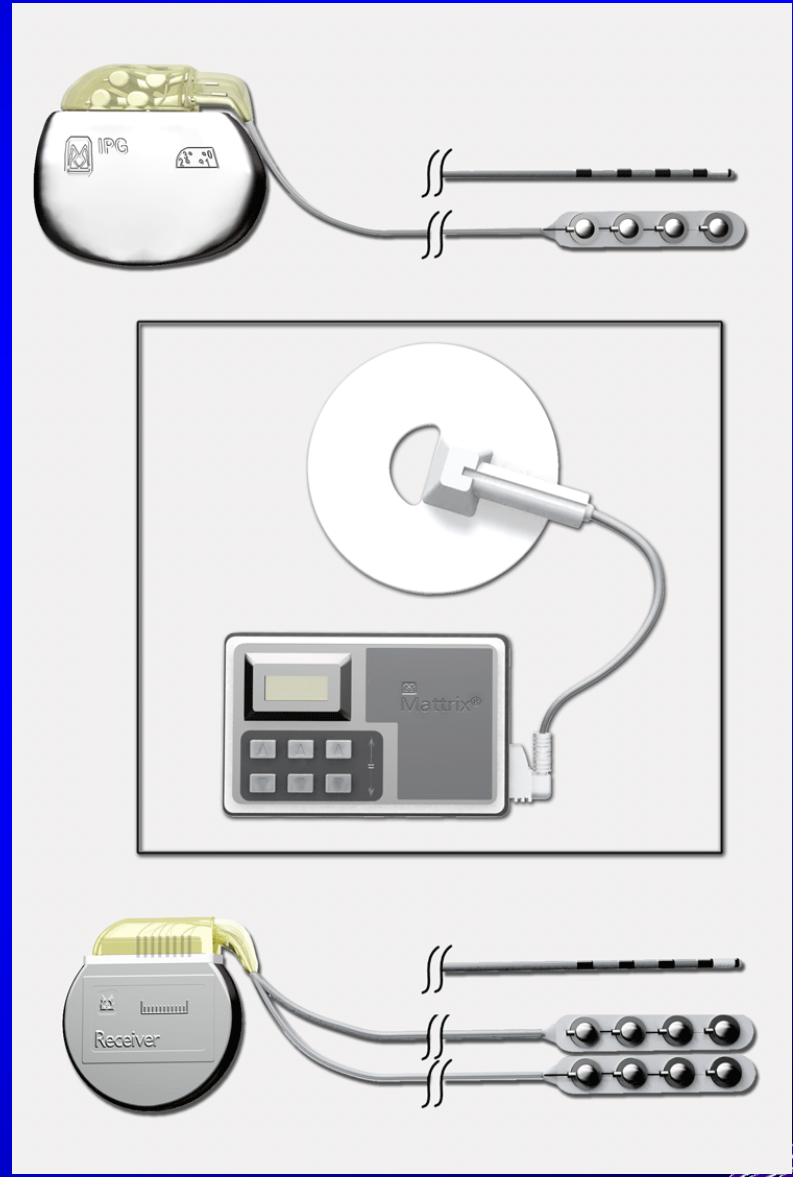
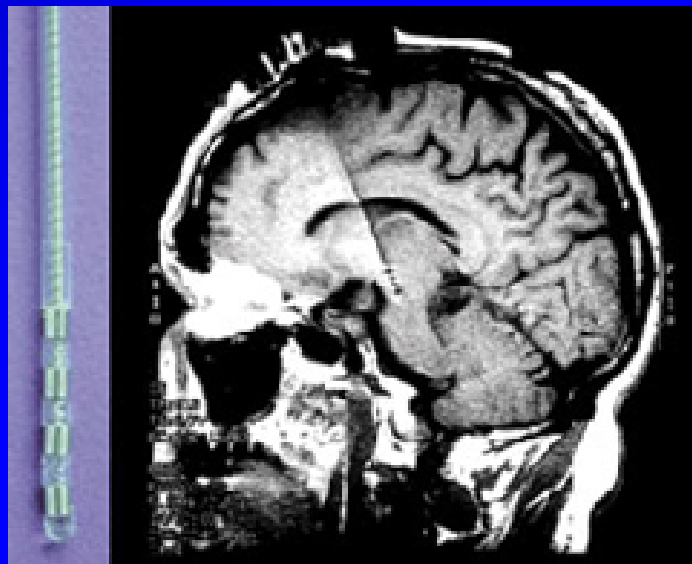


Estimulación Cerebral Profunda

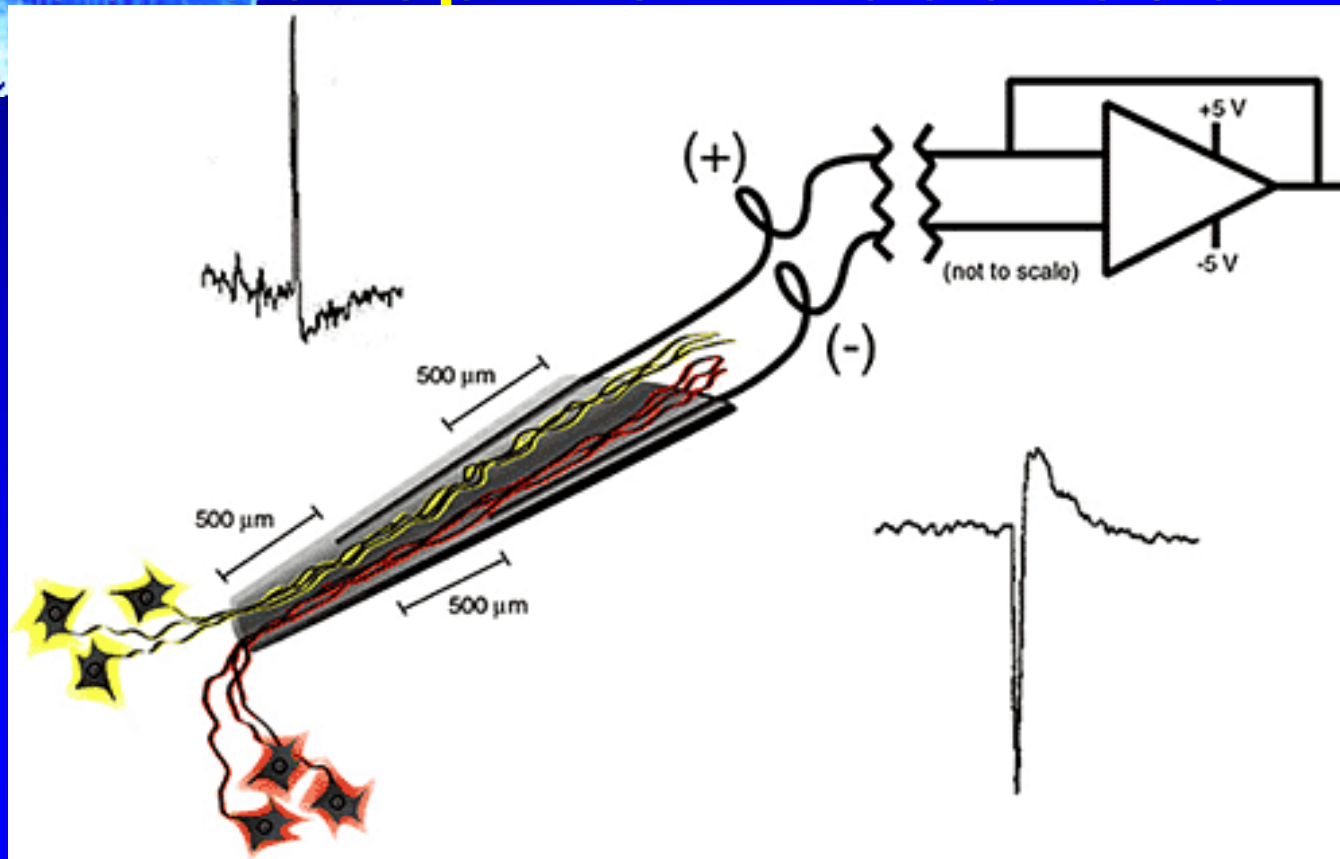




Rebecca Harris

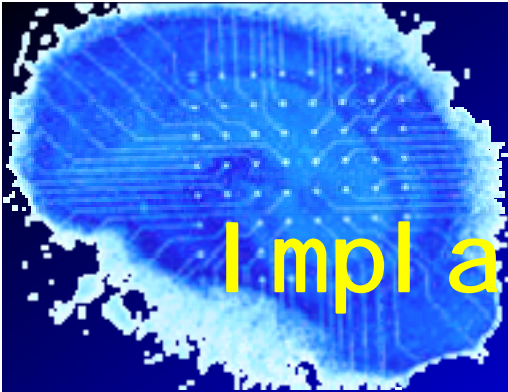


Neurotrophic Electrode

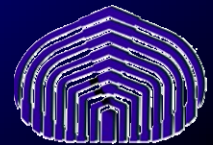
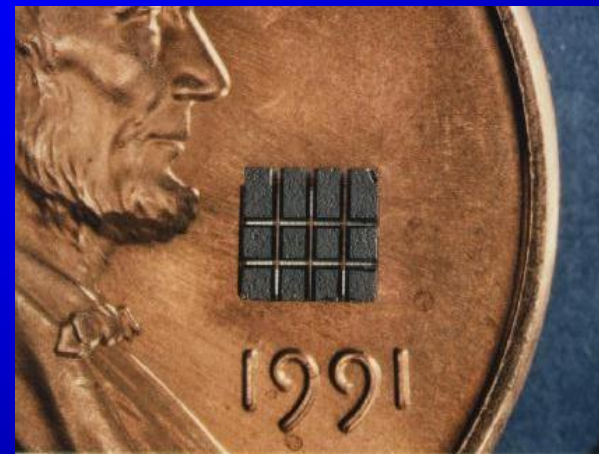
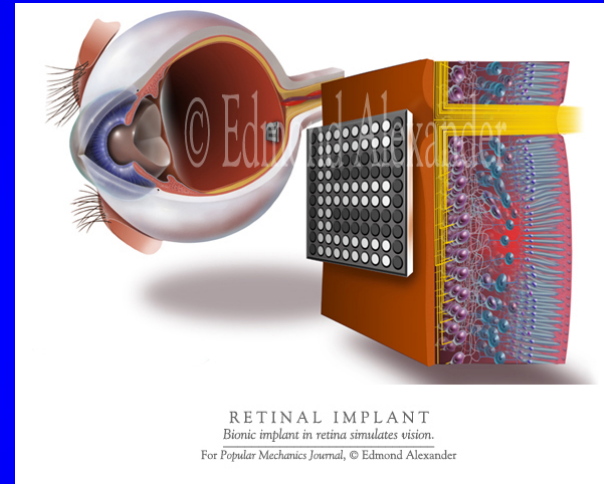
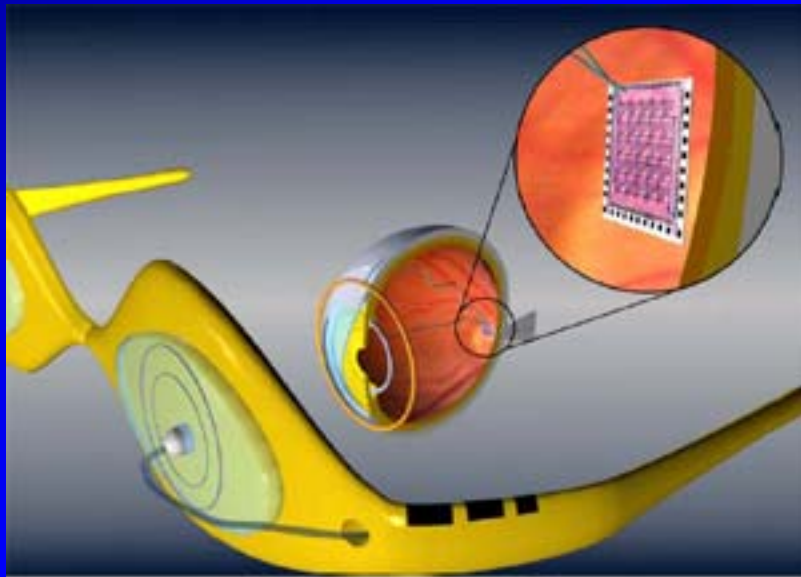


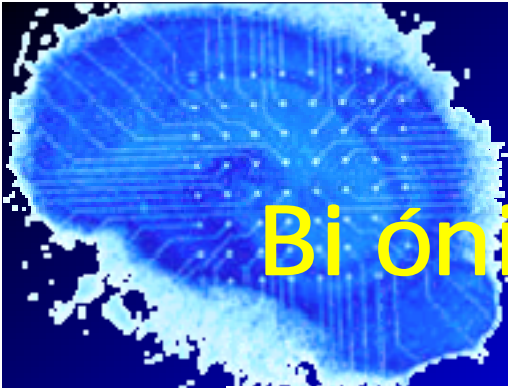
Kennedy's Neurotrophic Electrode



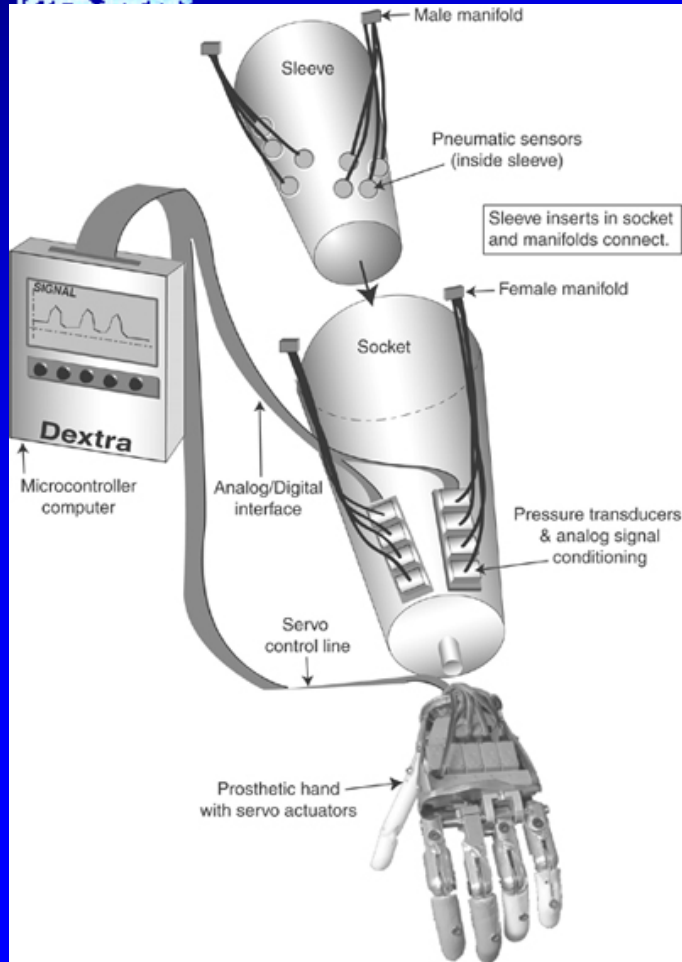
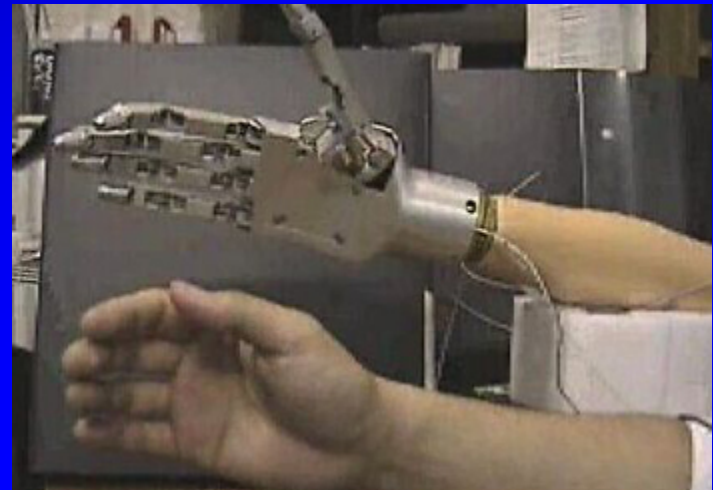


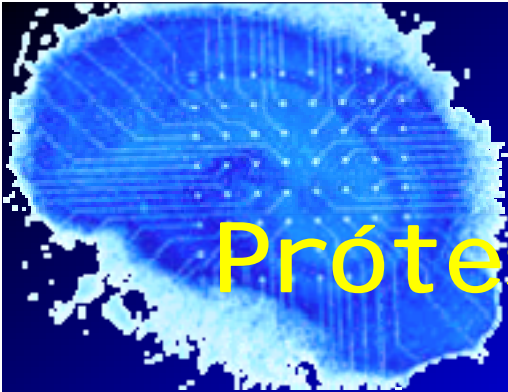
Implante Retinal





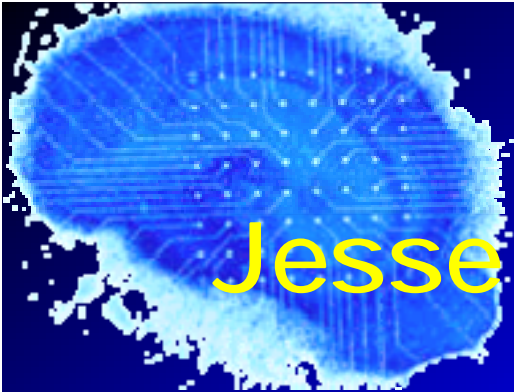
Bi ón i ca





Prótesis Inteligentes

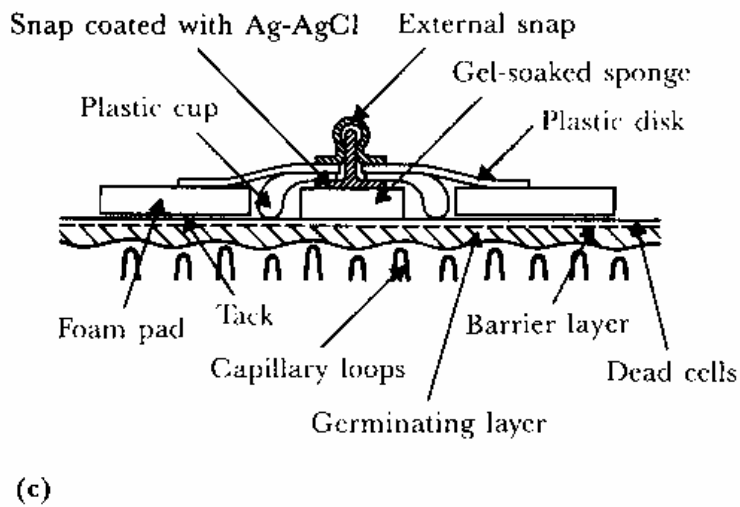
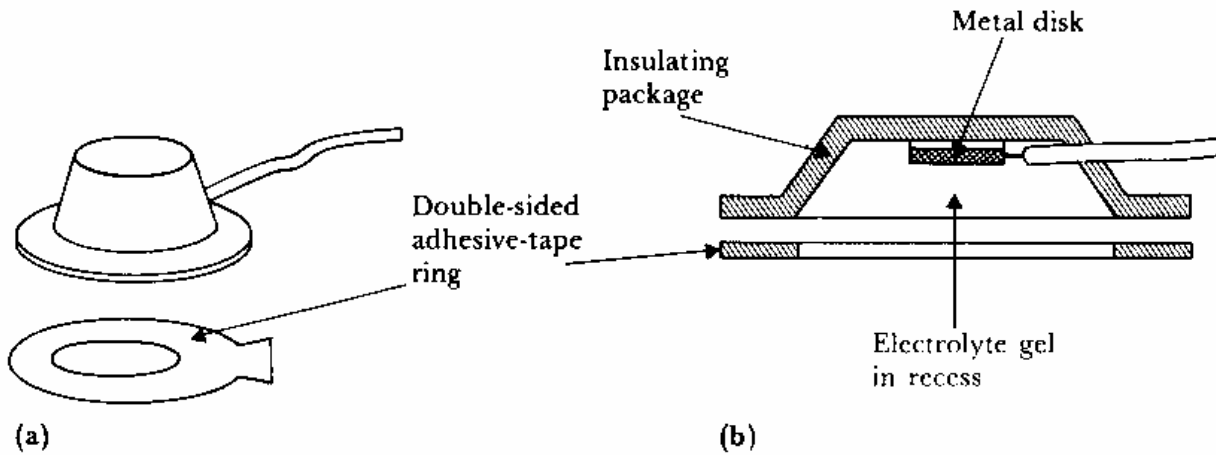




Jesse Sullivan

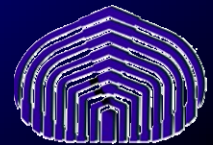


Floating Electrodes

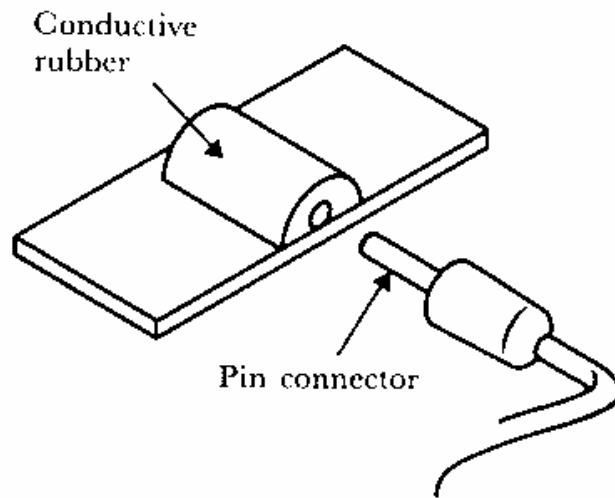


ice motion
electrode/electrolyte

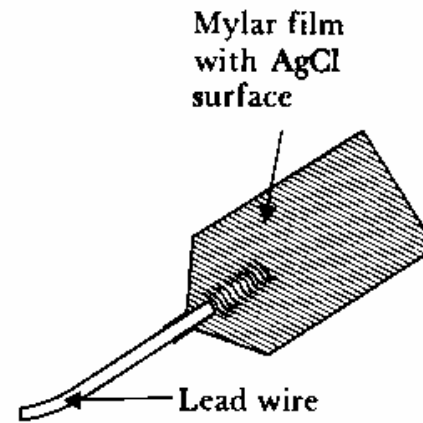
nded by gel and
kin



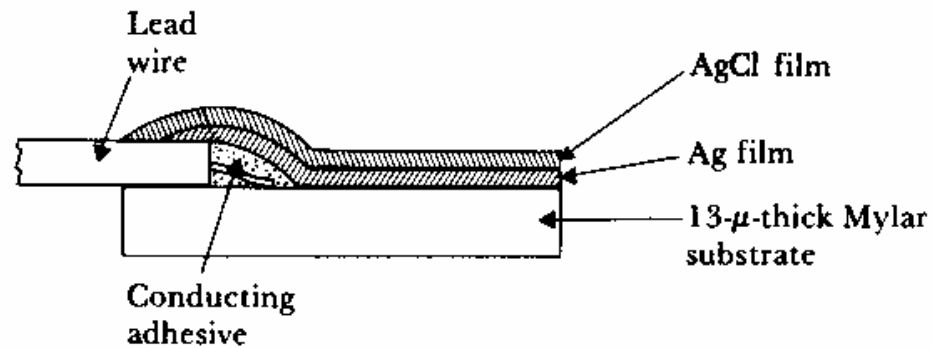
Flexible Electrodes



(a)



(b)



(c)

Designed to better match body curvature

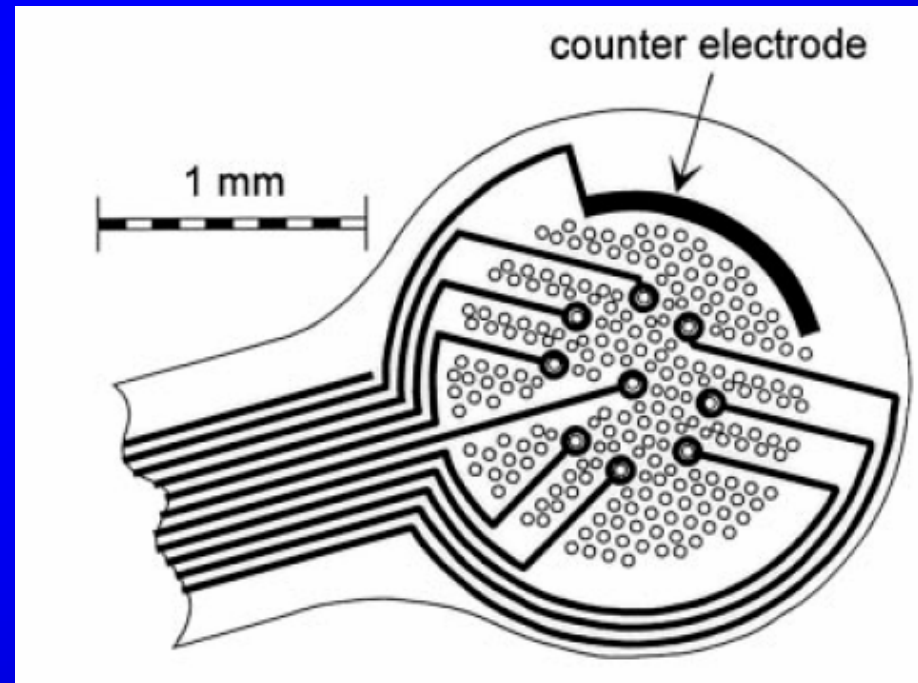


Nerve Electrodes

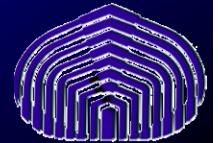
Cuff Electrode



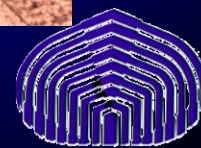
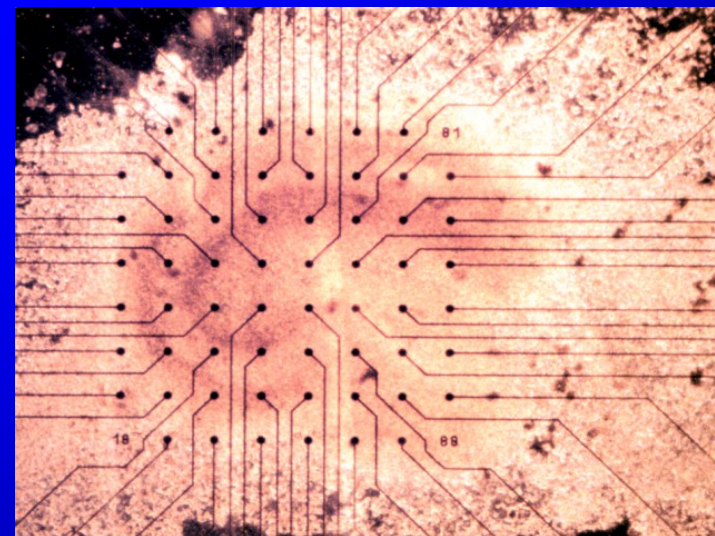
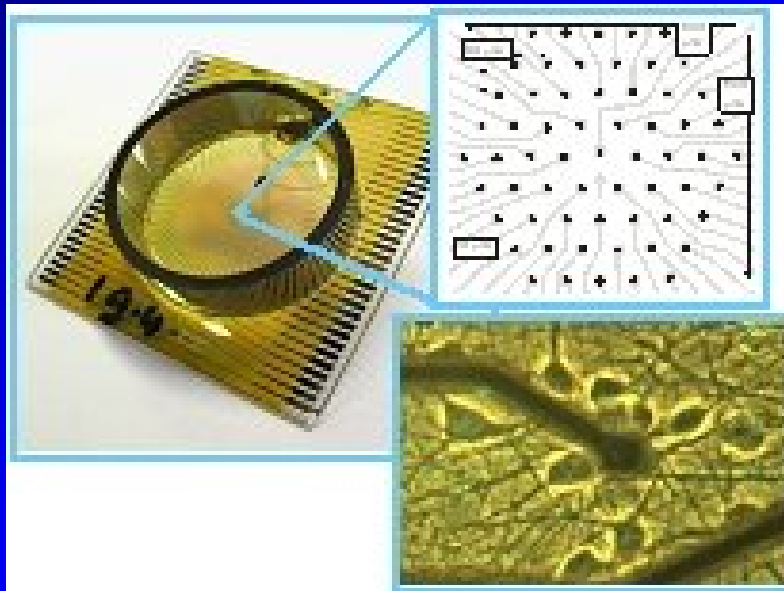
Perforated Electrode



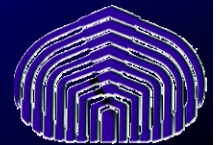
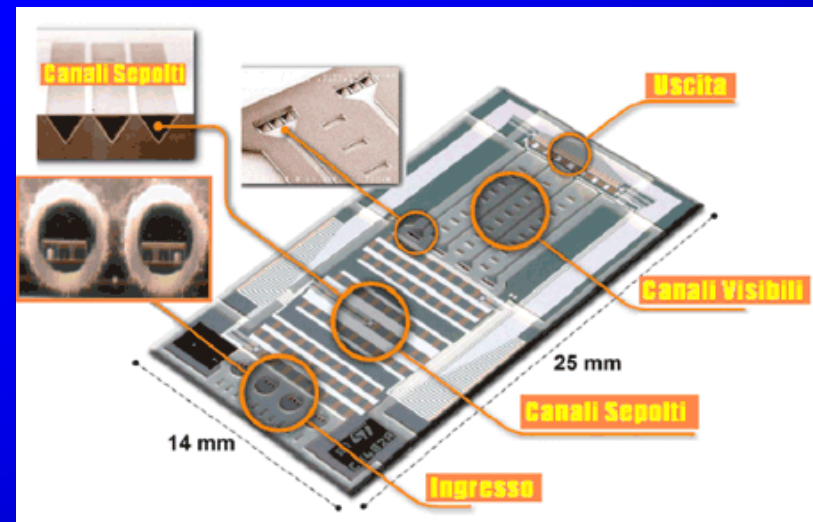
- Stimulation: functional electrical stimulation to restore motor/sensory function
- Recording: human-computer interfacing/neuroprostheses



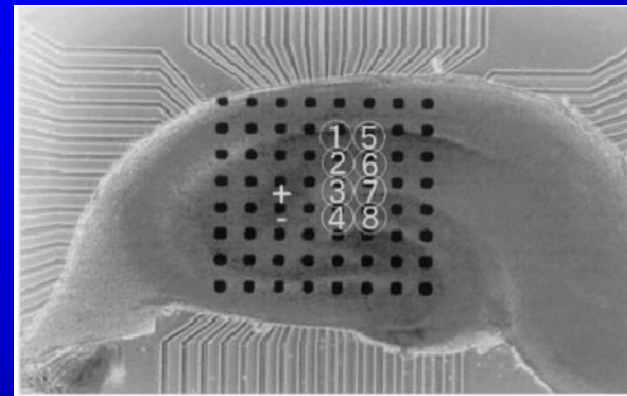
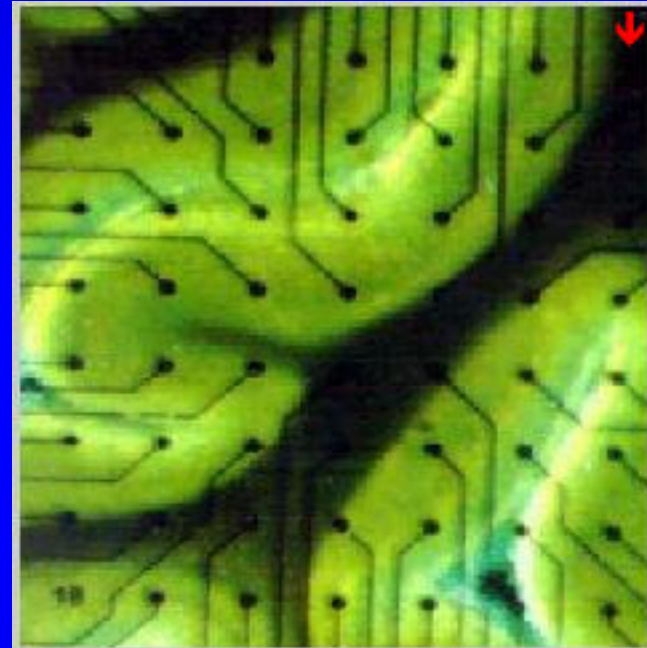
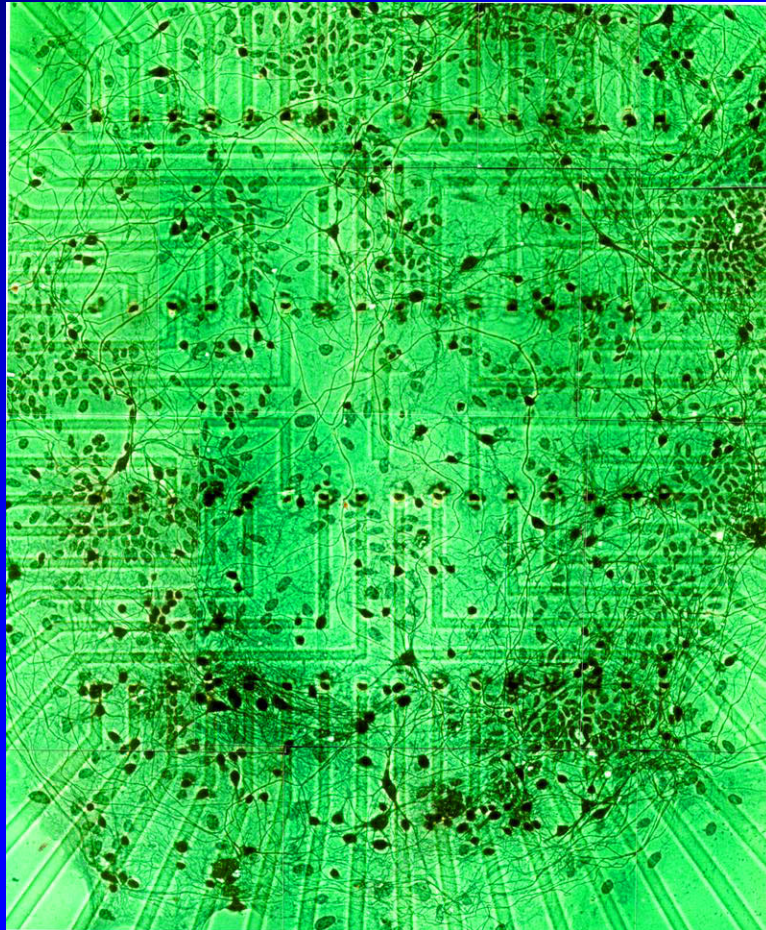
Cerebros *in vitro*

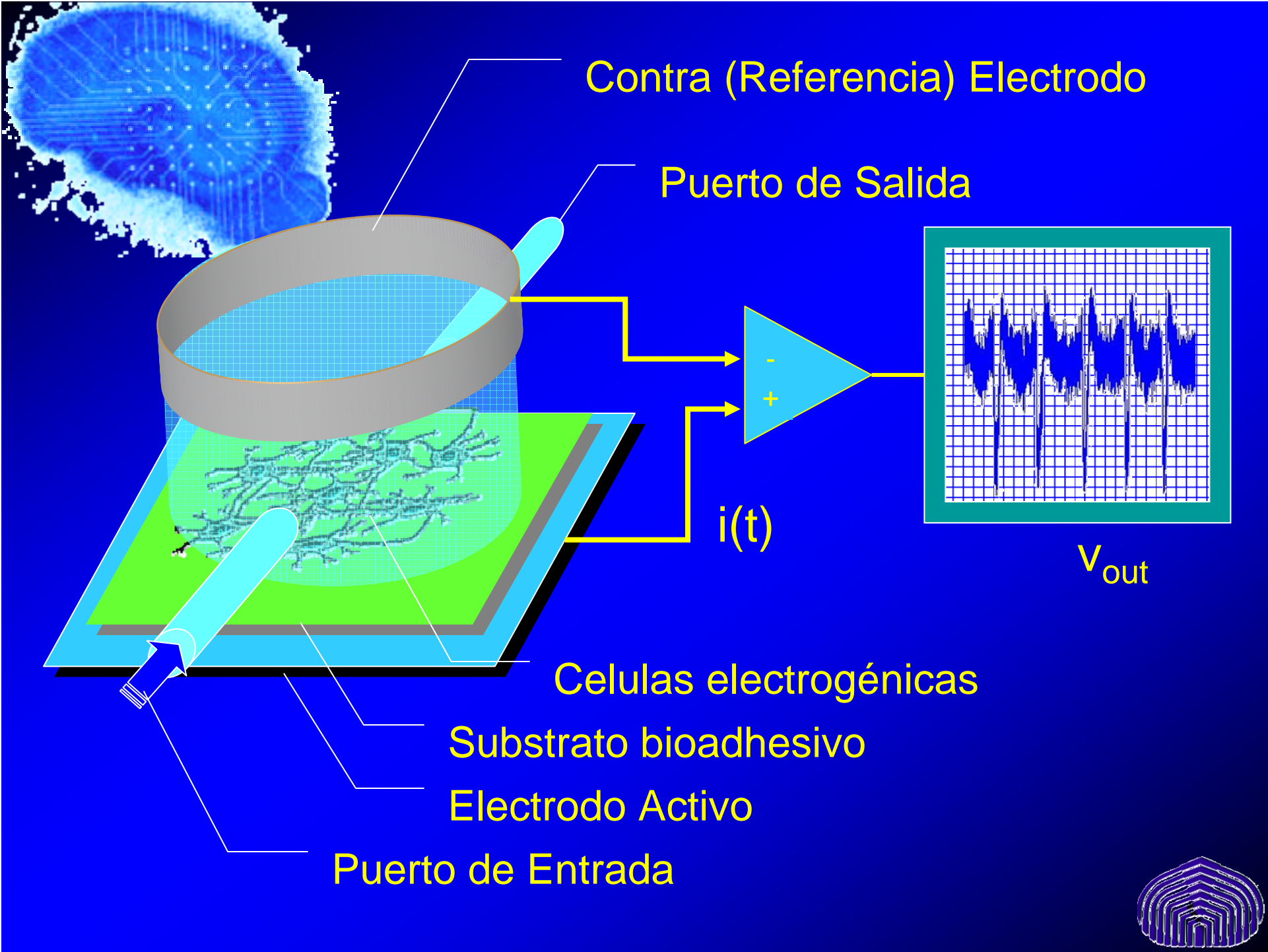


Bi osensores

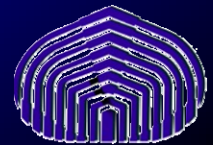
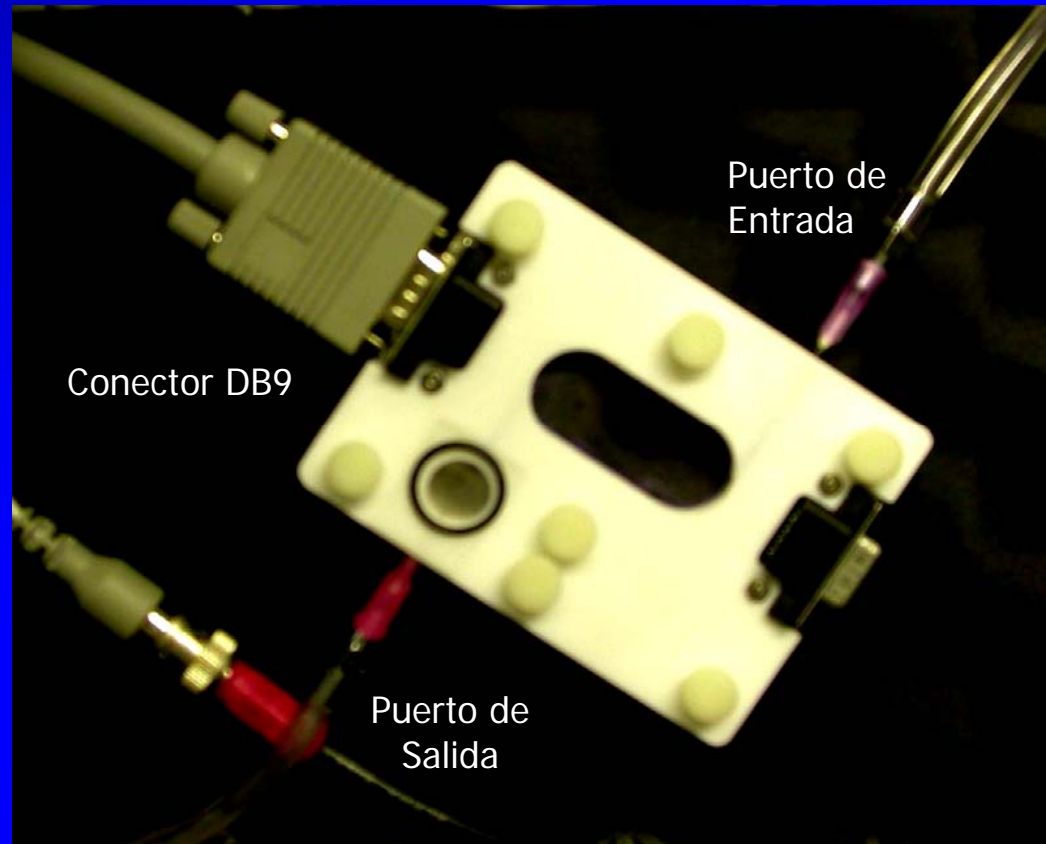


Multi electrode Arrays

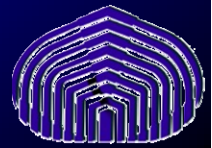
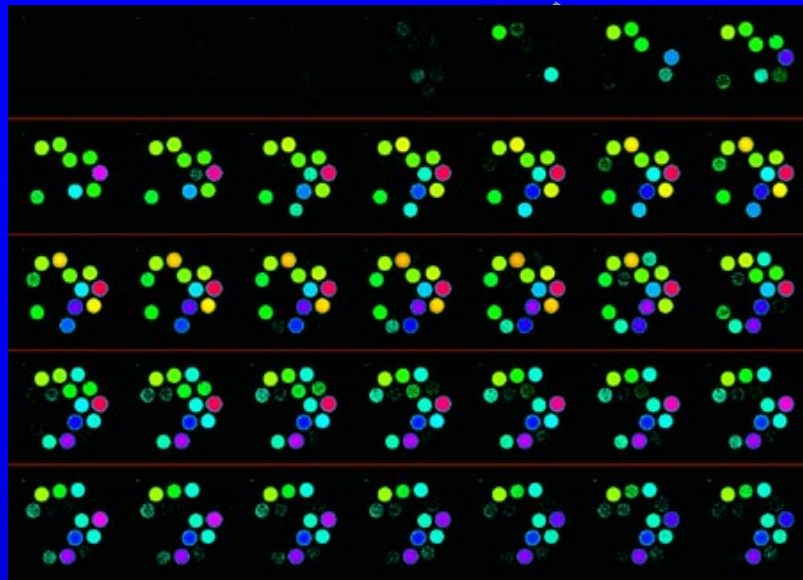
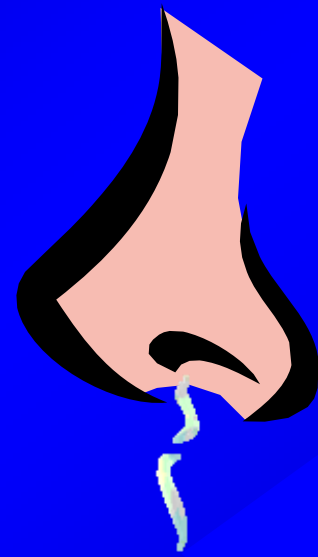
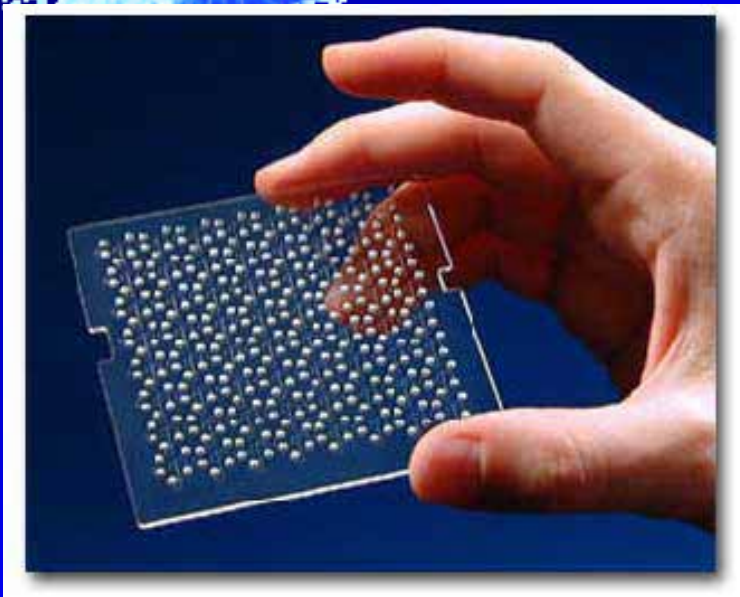




Cell Culture Chamber #2



Nari z Arti fi ci al





Cerebros *In-Vi tro*

*University of Florida
researcher Thomas DeMarse
holds a glass dish on October
12, 2004, containing a “brain”
-- a living network of 25,000 rat
brain cells connected to an
array of 60 electrodes that can
interact with a computer to fly a
simulated F-22 fighter plane.*



<http://www.sciencedaily.com/releases/2004/10/041022104658.htm>

