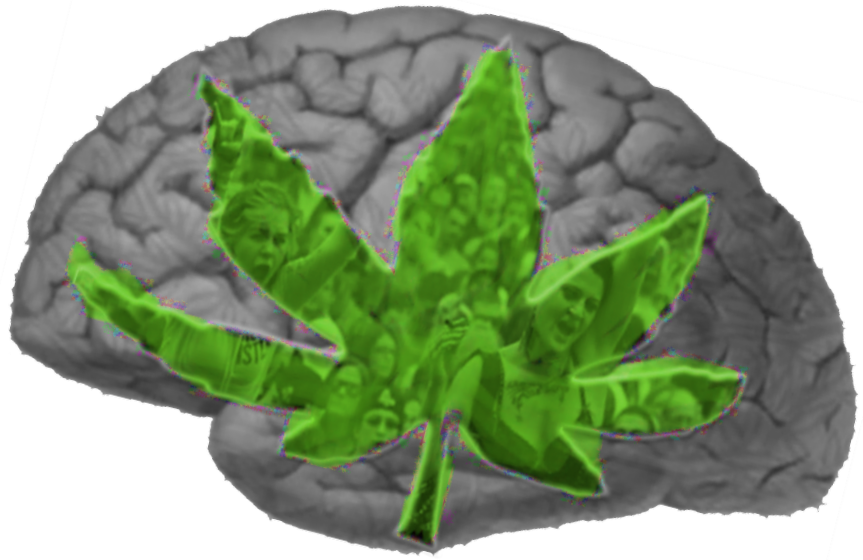
consequences?



marijuana and the teen brain

MARY ET BOYLE, PH. D.

DEPARTMENT OF COGNITIVE SCIENCE

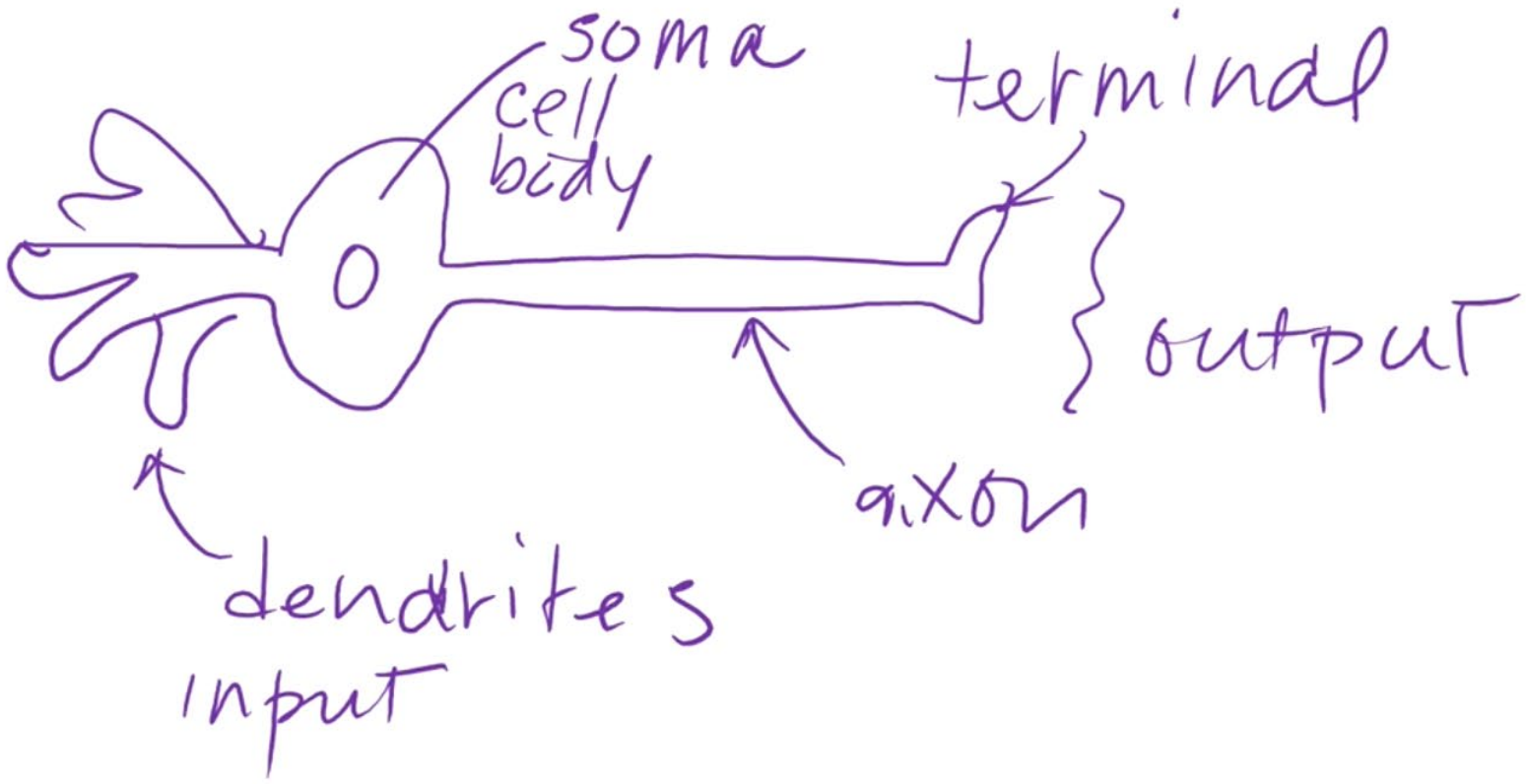
UCSD

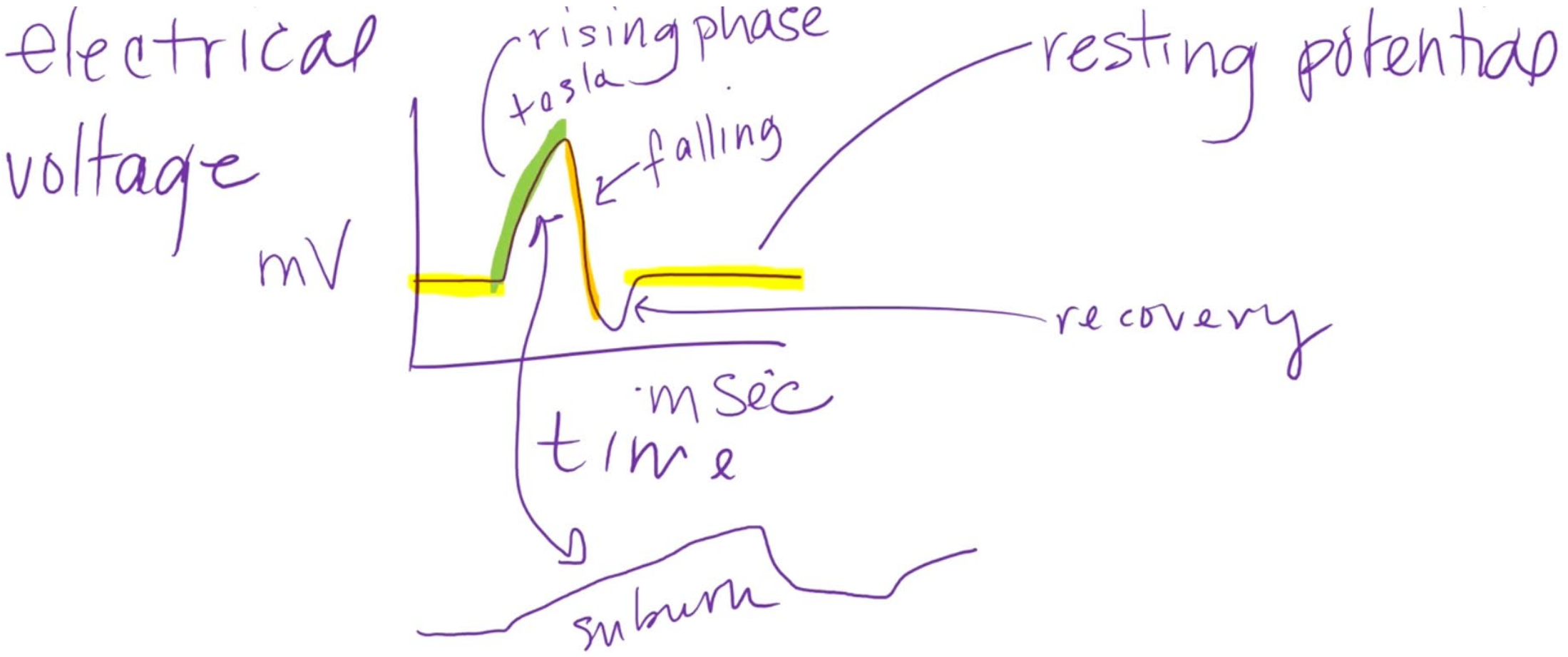
PART 3

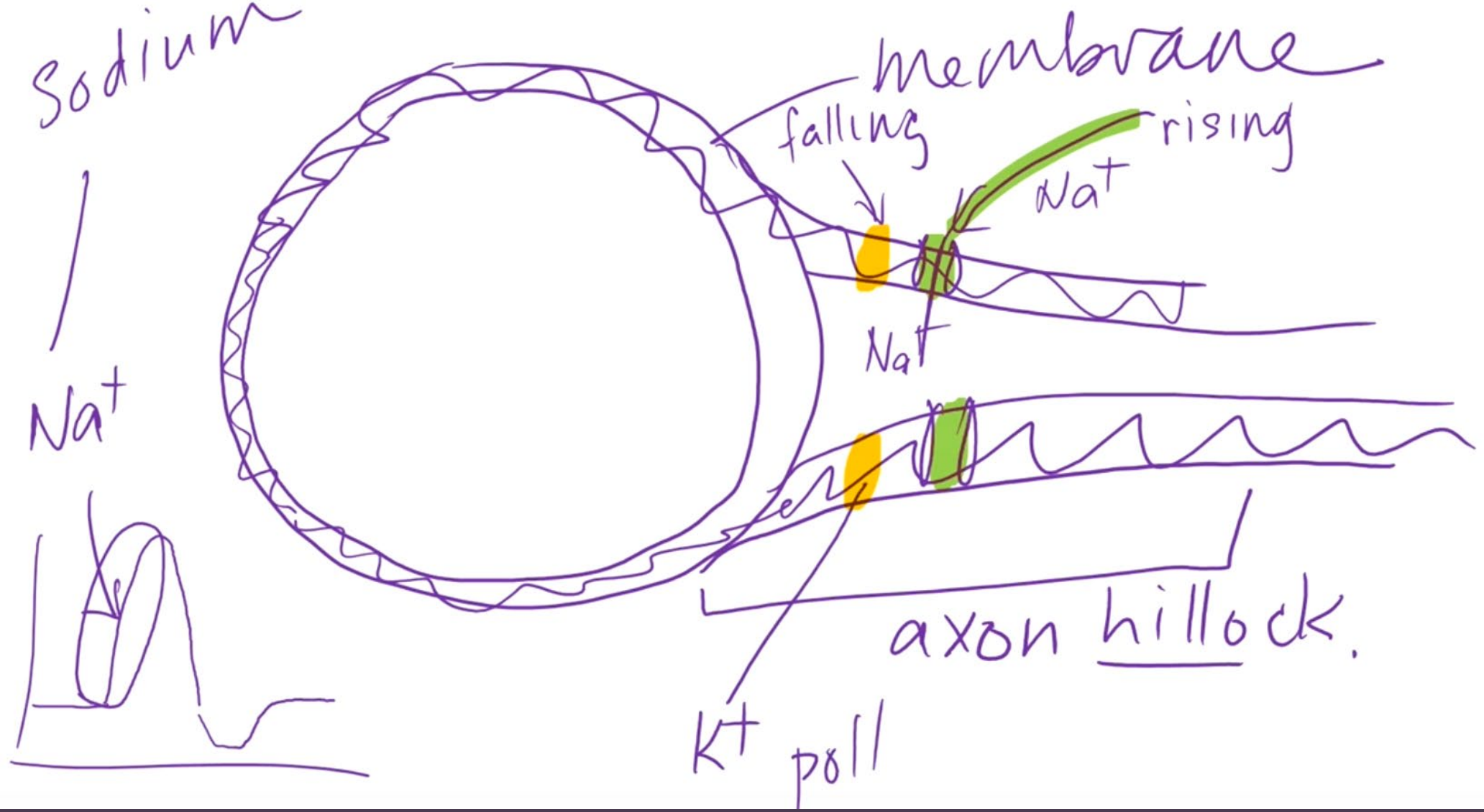
FINAL EXAM = MIDTERM 3

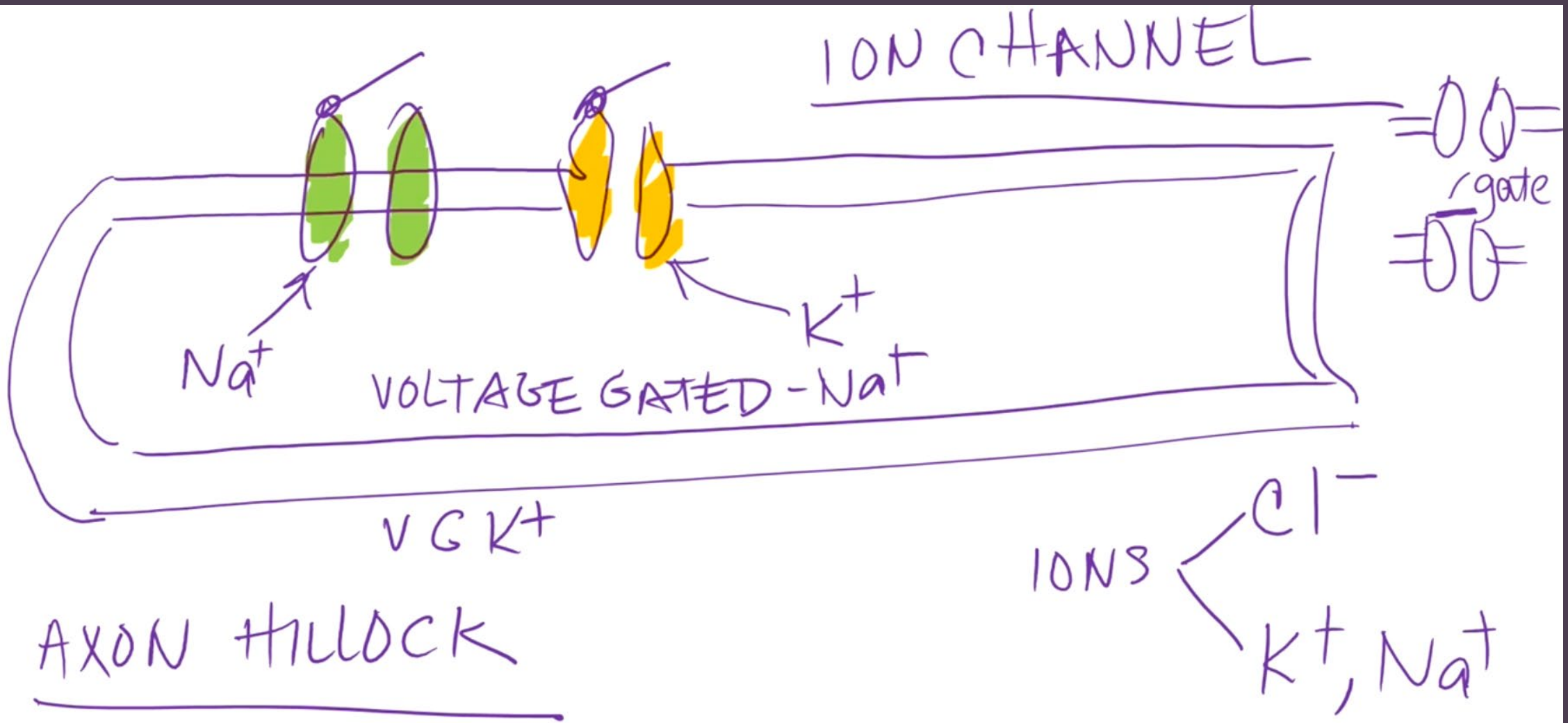
LAST CLASS NOT DURING FINALS

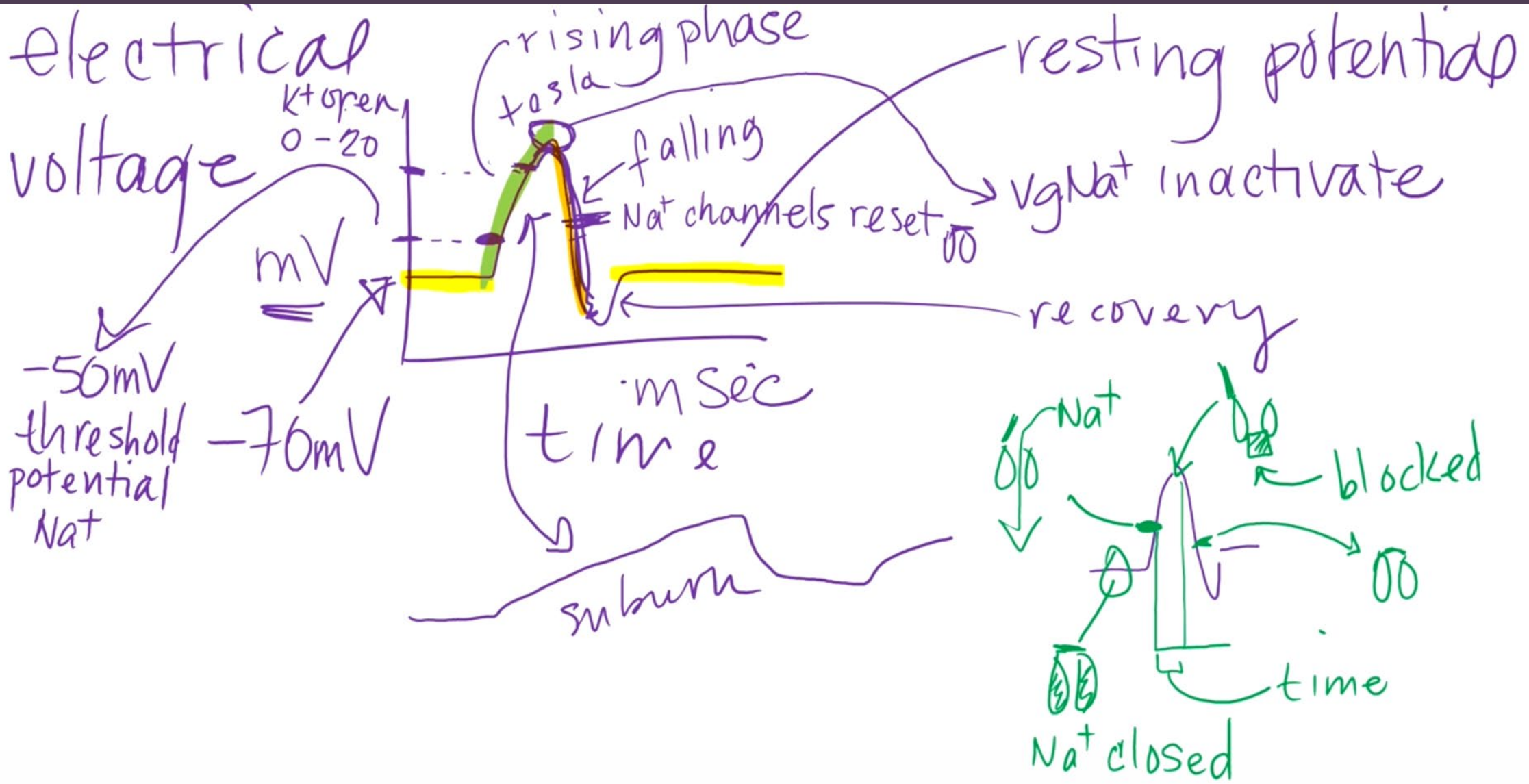
neuron

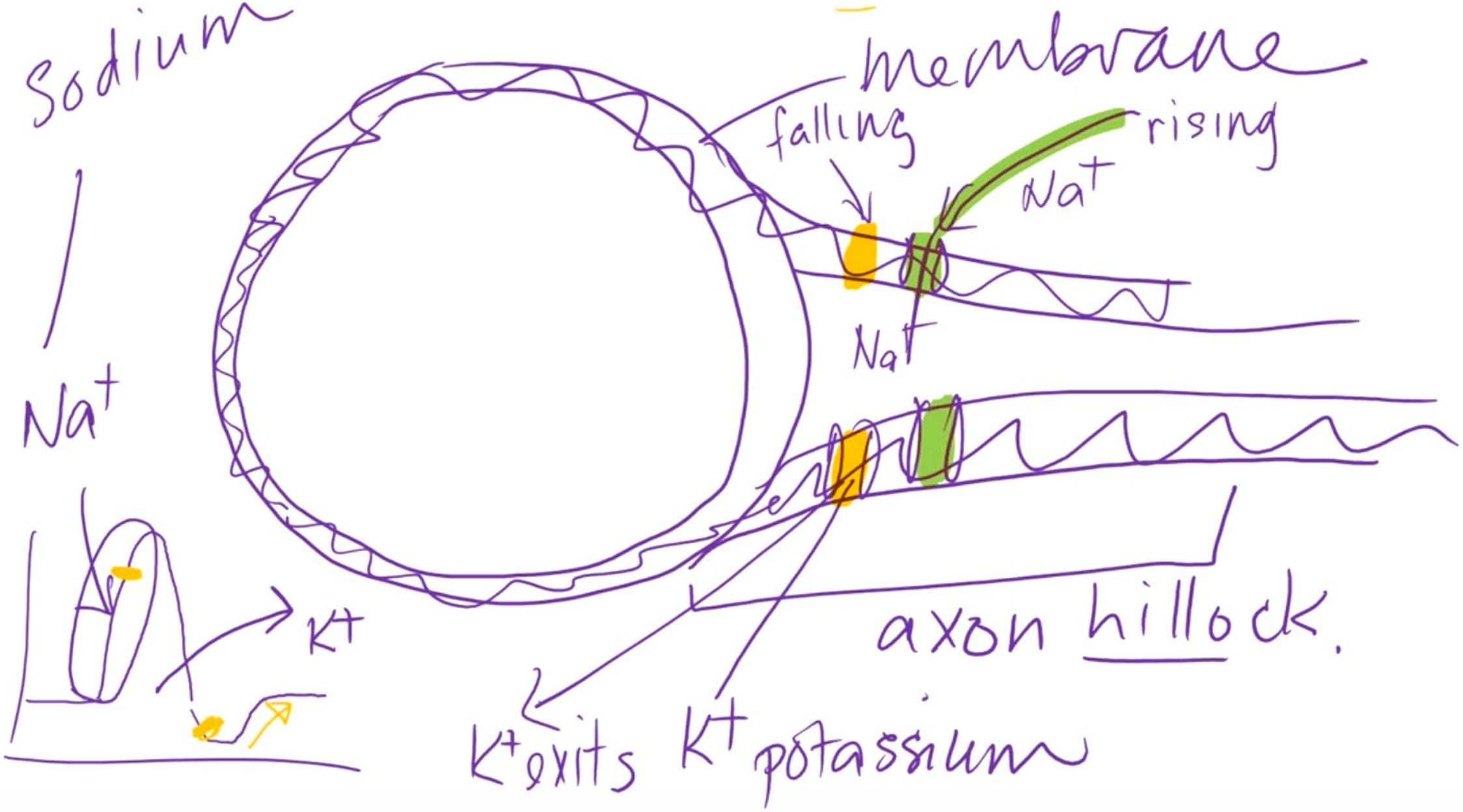



electrical
voltage
mV
rising phase
tasla
falling
resting potential
recovery
msec
time
suburn

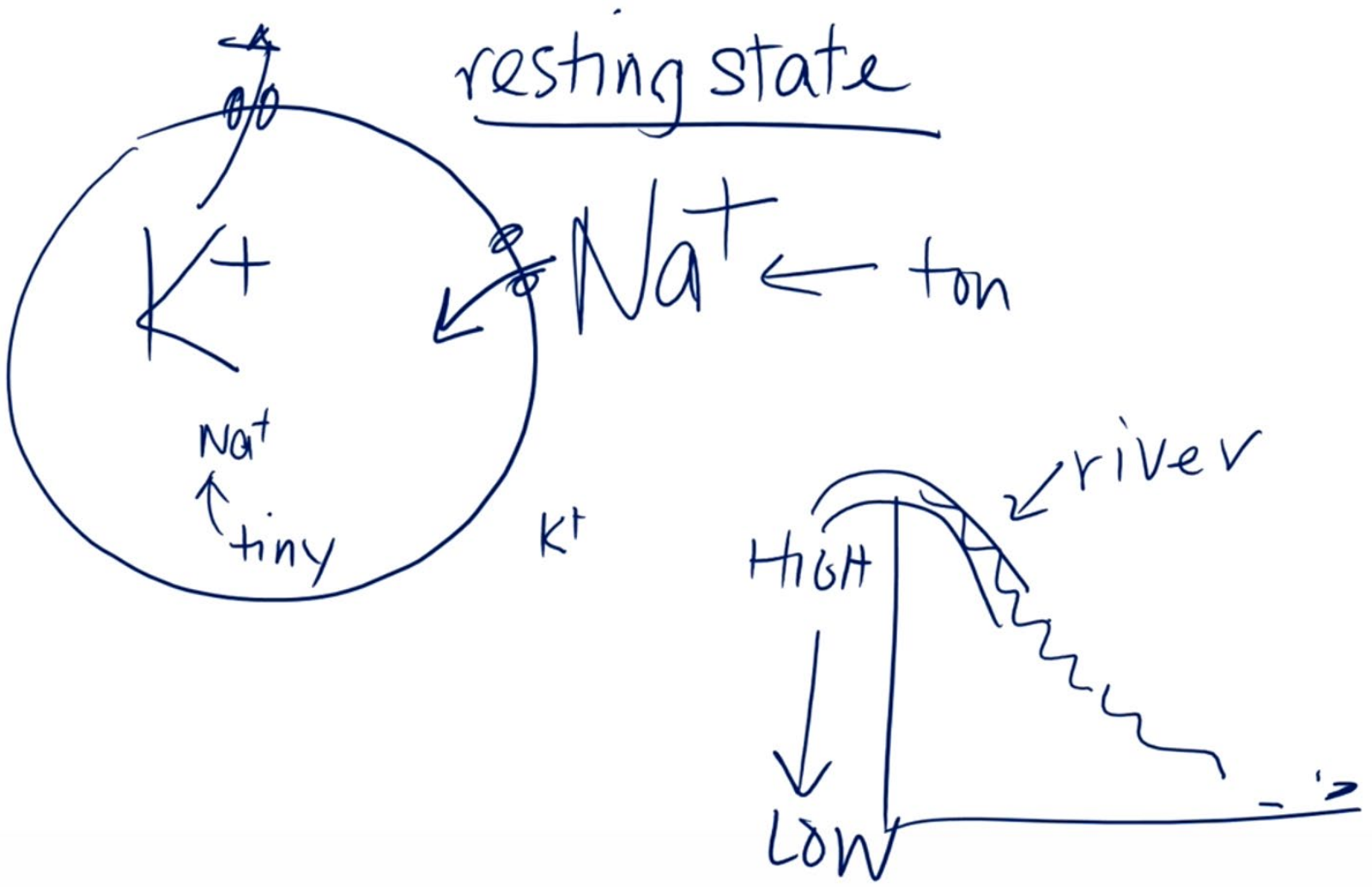

Sodium
membrane
falling
rising
Na+
Na+
Na+
axon hillock.
K+ poll

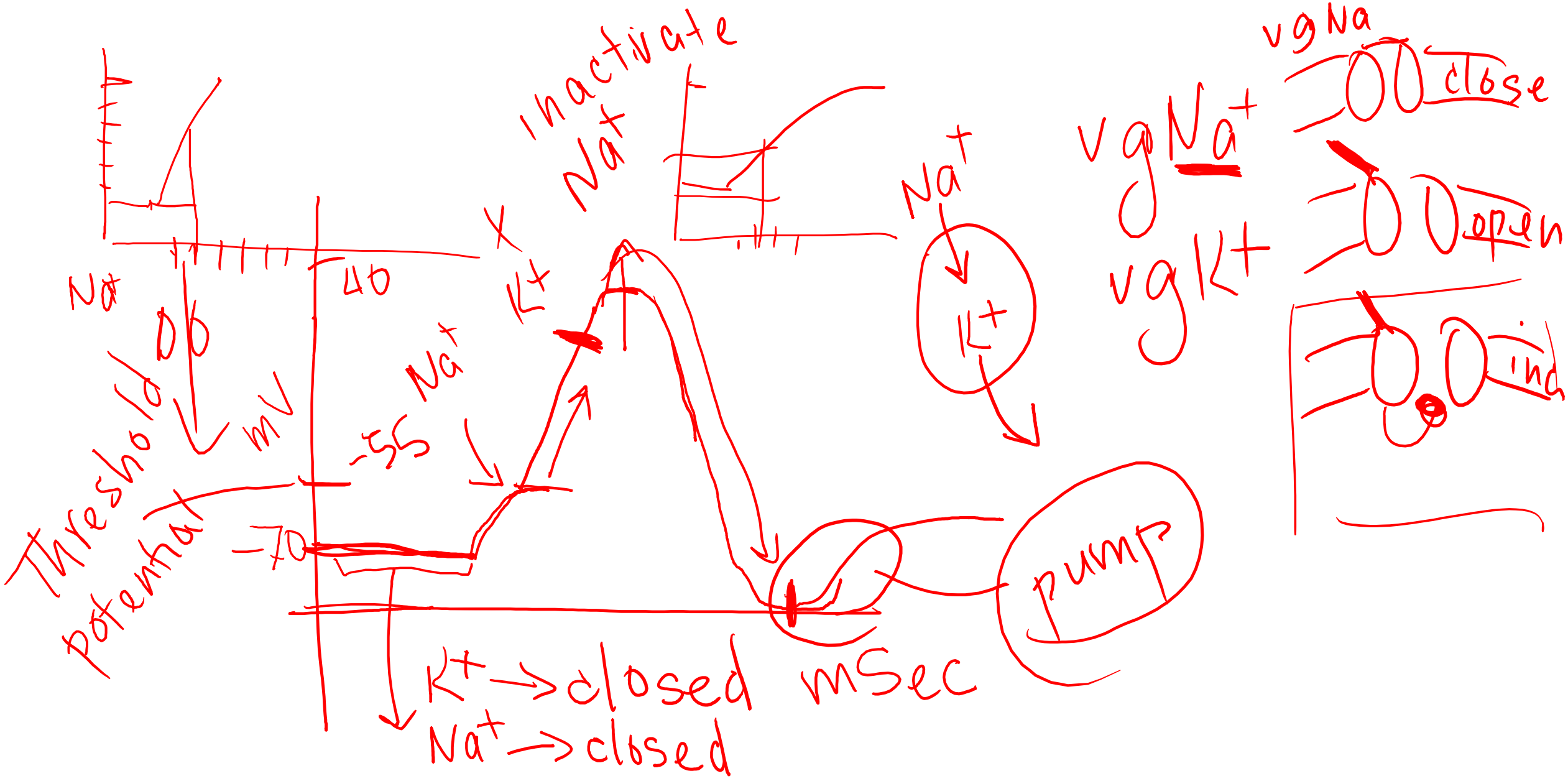

ION CHANNEL
gate
Na^+
K^+
VOLTAGE GATED - Na^+
VGK+
AXON HILLOCK
IONS
Cl^-
K^+, Na^+

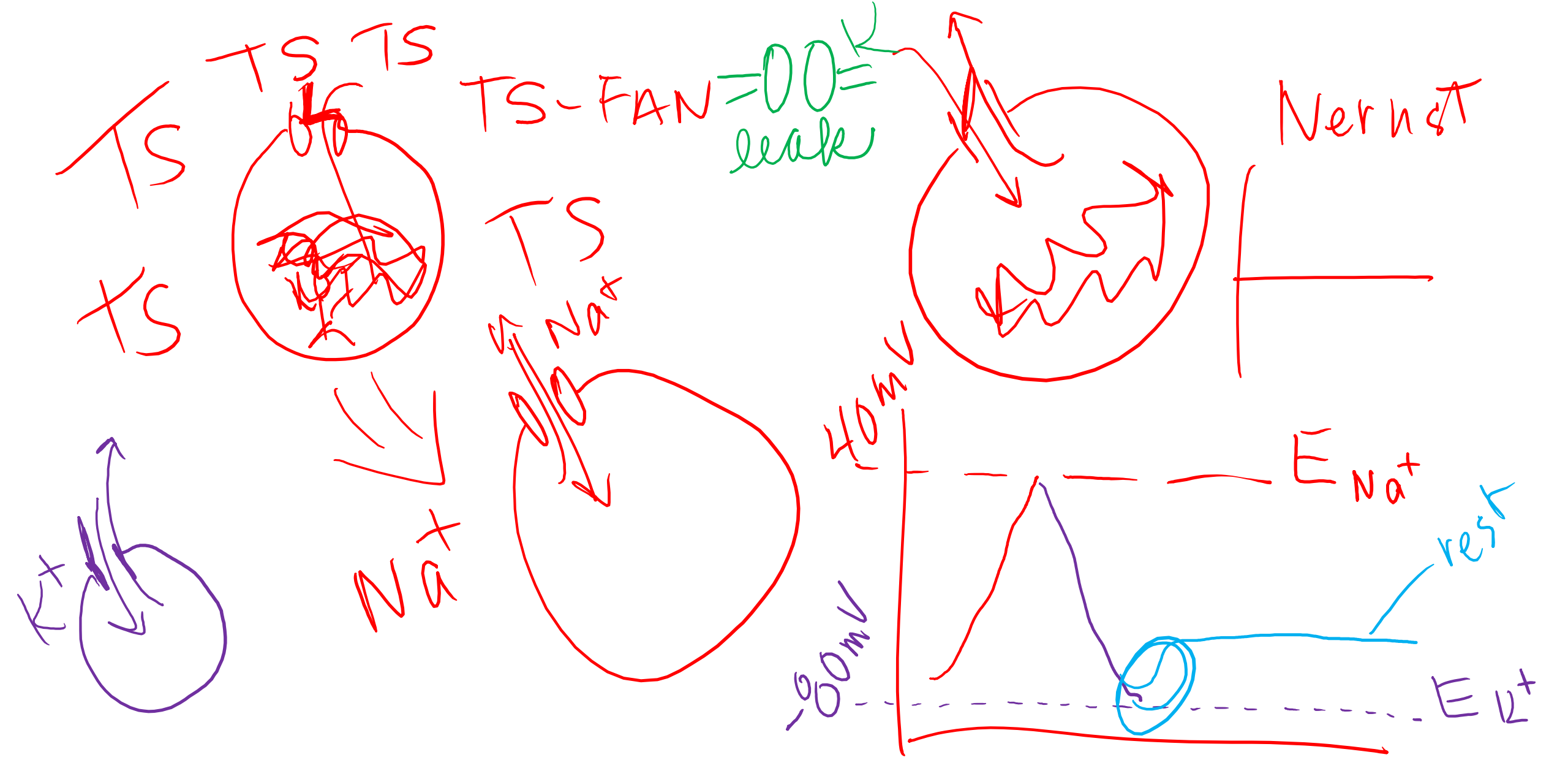

electrical
voltage
rising phase
tosla
K+ open
0-20
falling
Na+ channels reset
resting potential
Vg Na+ inactivate
recovery
mV
-50mV
threshold
potential
Na+
-70mV
m sec
time
suburn
Na+
blocked
time
Na+ closed

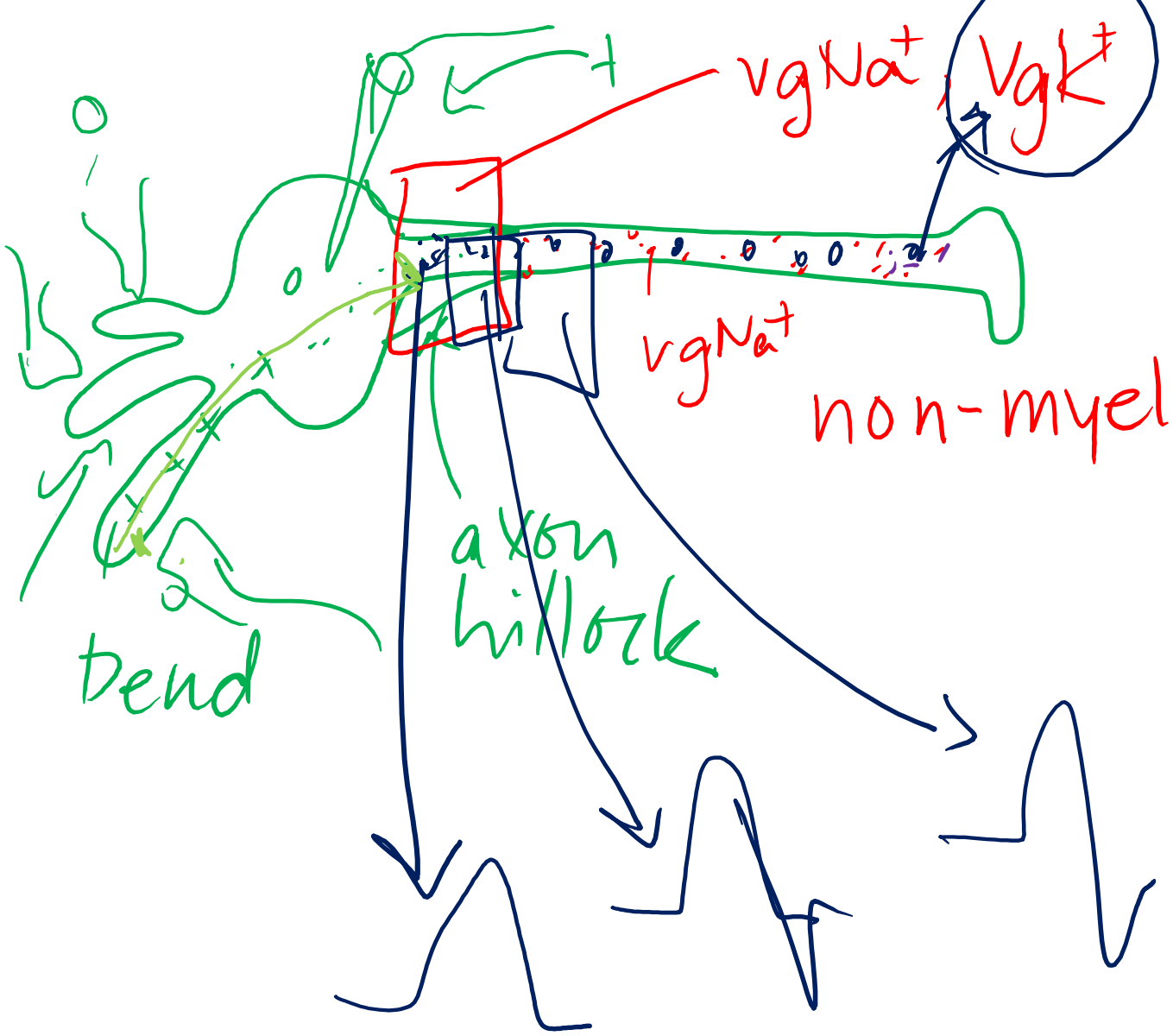

Sodium
membrane
falling
rising
Na+
Na+
Na+
K+
axon hillock.
K+ exits
K+ potassium

Why?

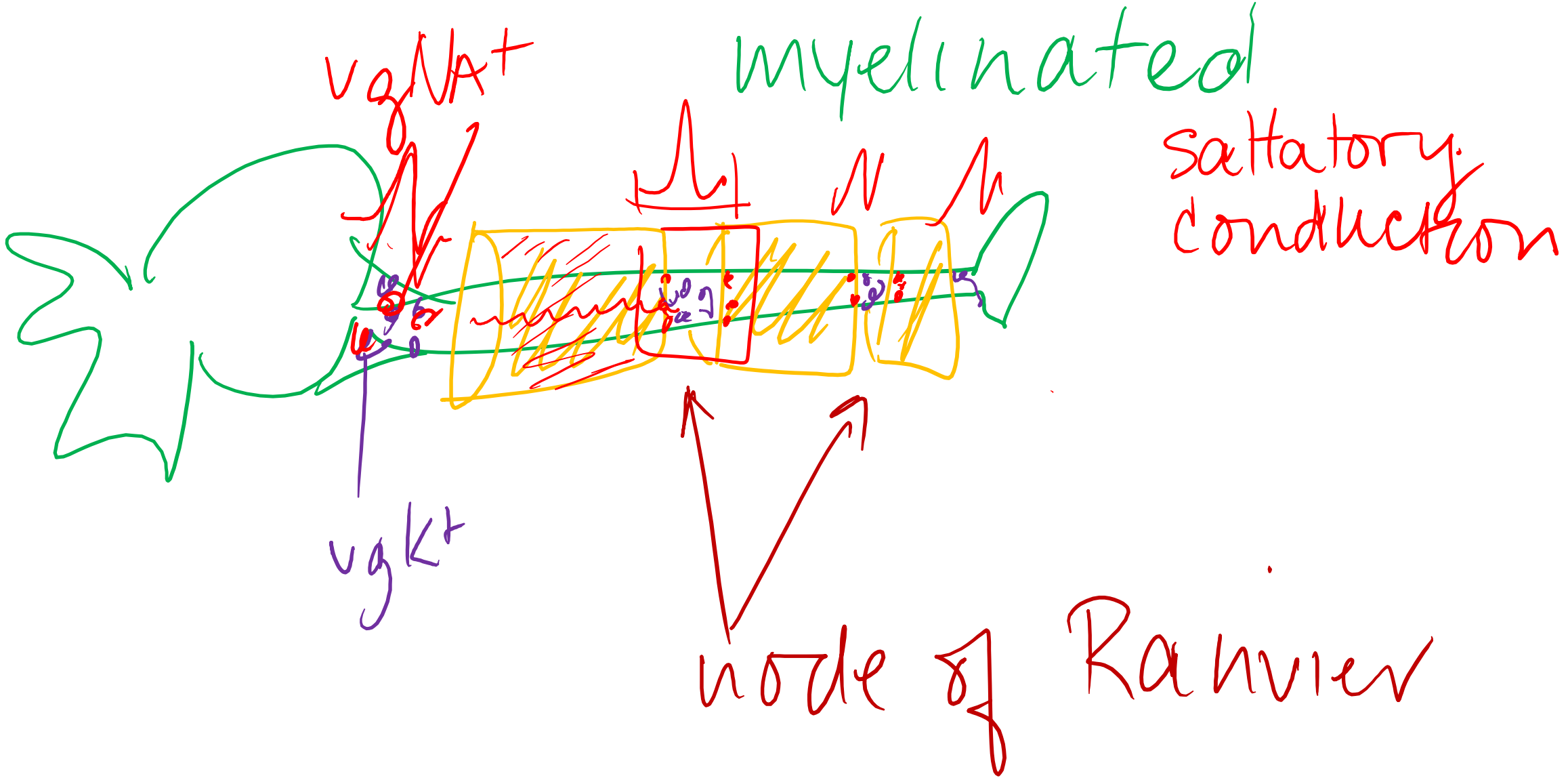


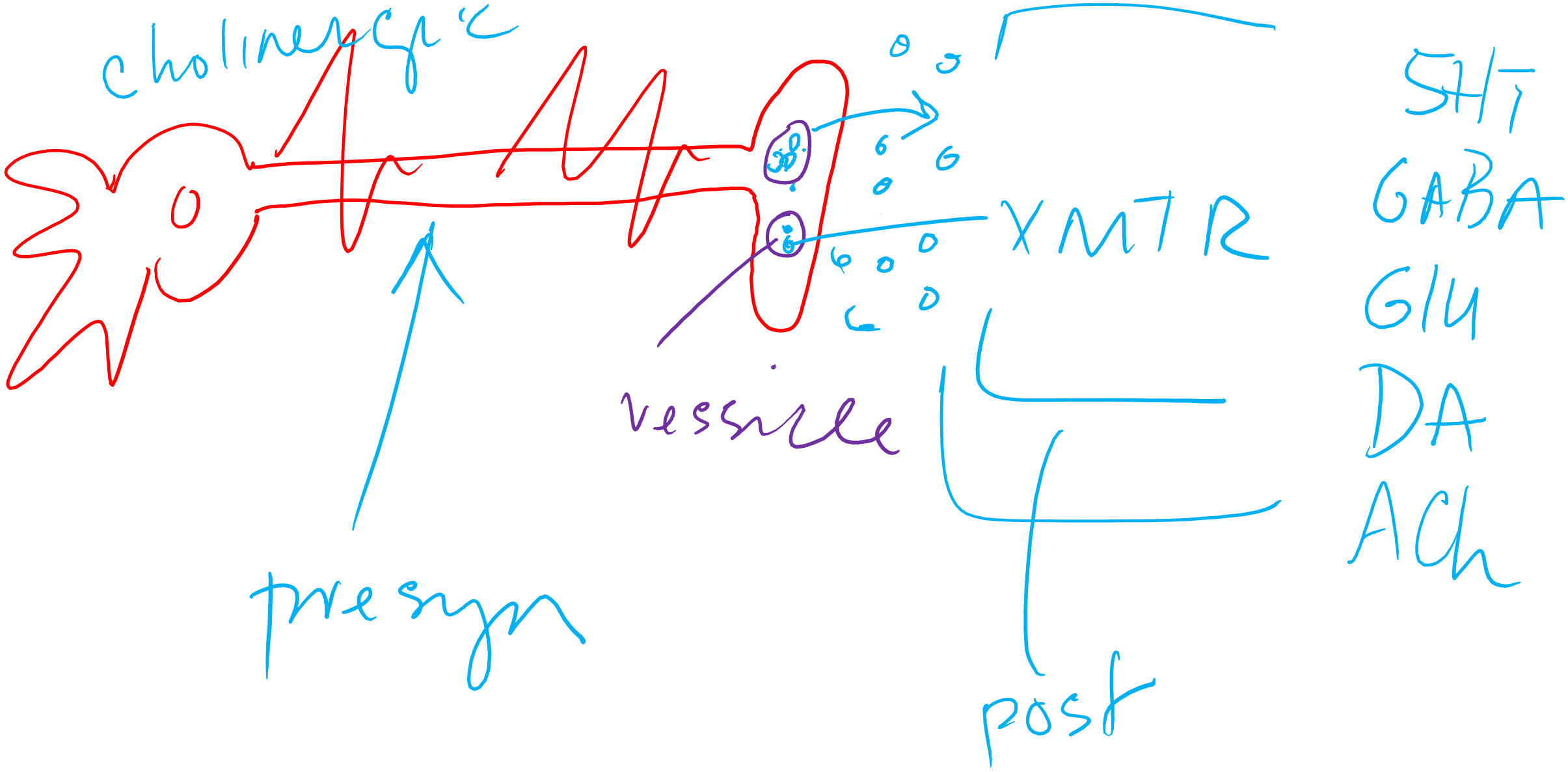

Na+
40
X
K+
inactivate
Na+
Na+
K+
vg Na
vg Na+
vg K+
close
open
ind
Threshold
potential
mV
-55
Na+
-70
pump
K+ → closed
Na+ → closed
mSec

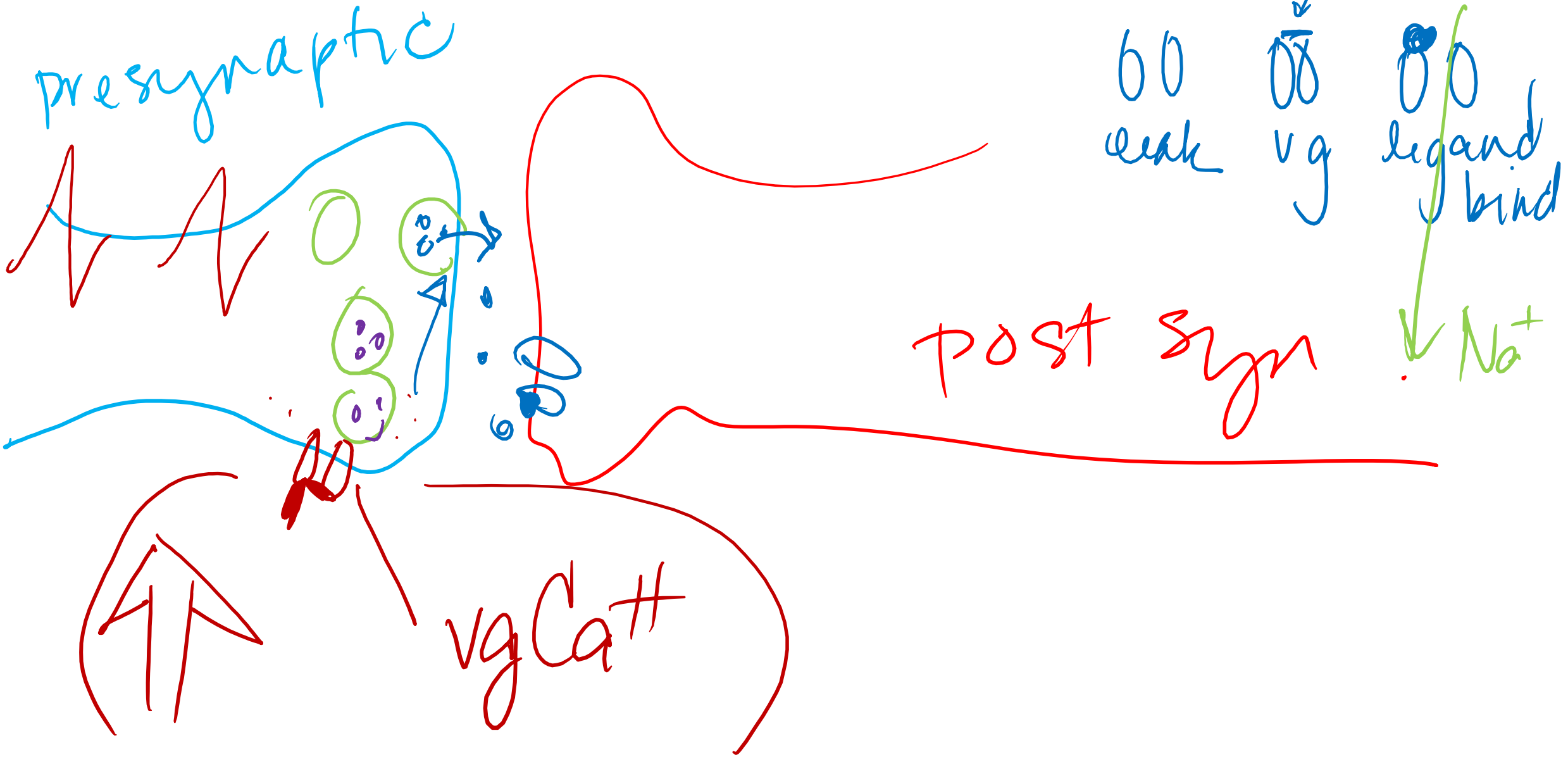

TS
TS
TS
TS
TS
TS-FAN=OO=
leak
K+
Na+
Na+
Nernst
40mV
-90mV
E Na+
E K+
rest



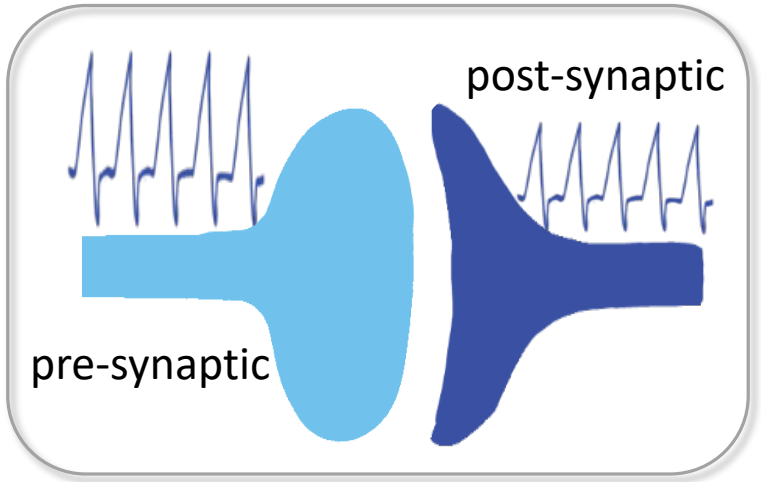
passive propagation of action potential along the axon

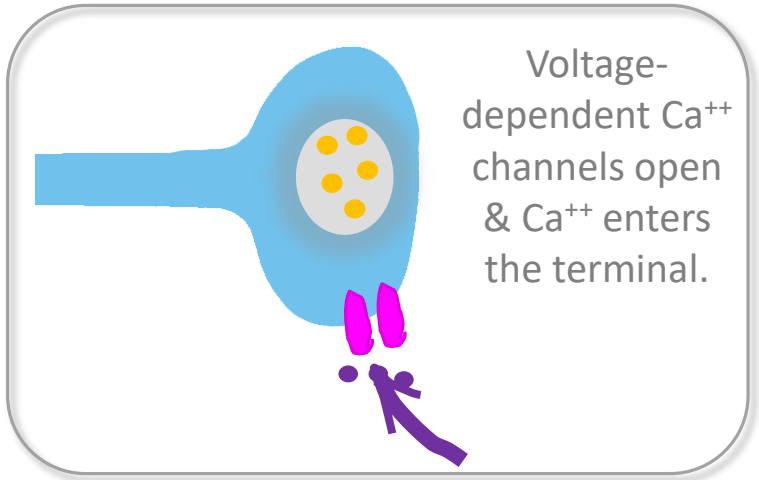

vgNa+
myelinated
saltatory conduction
vgK+
node of Ranvier

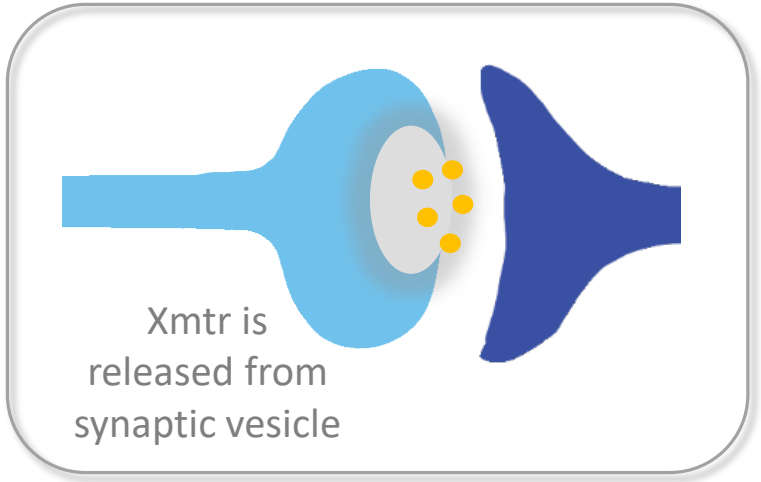

cholinergic
XMTR
vesicle
presyn
post
5HT
GABA
GLU
DA
ACh

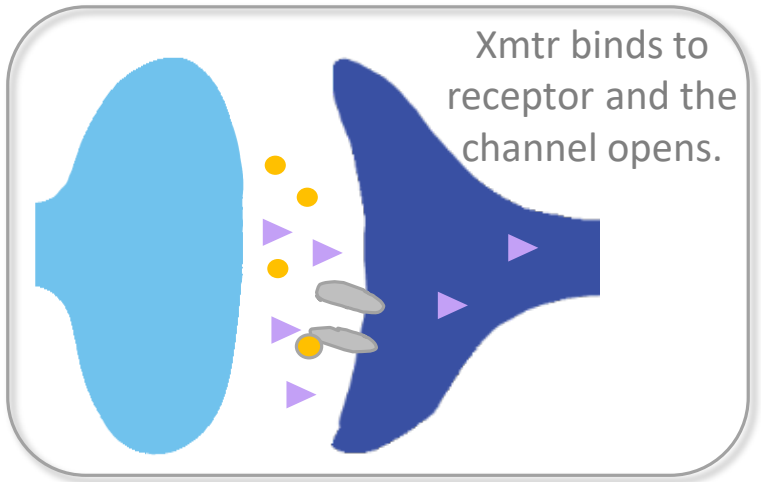

presynaptic
60
weak
vg
ligand
bind
post syn
Na+
vgCa++

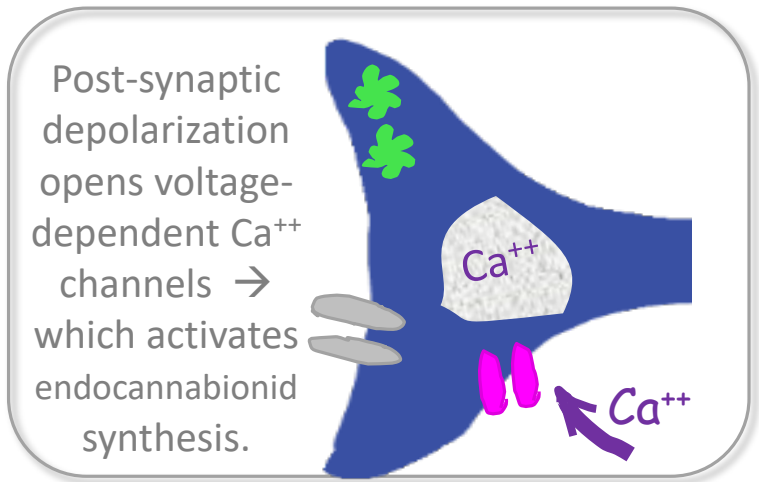
How do endocannibinoids affect synaptic transmission?

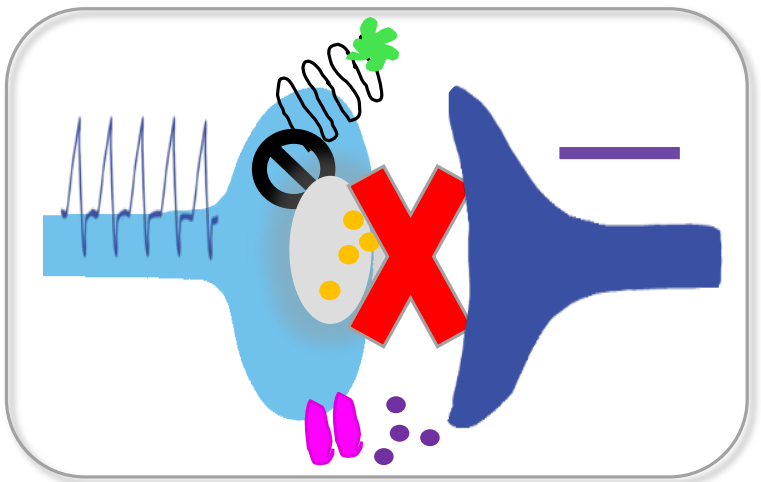




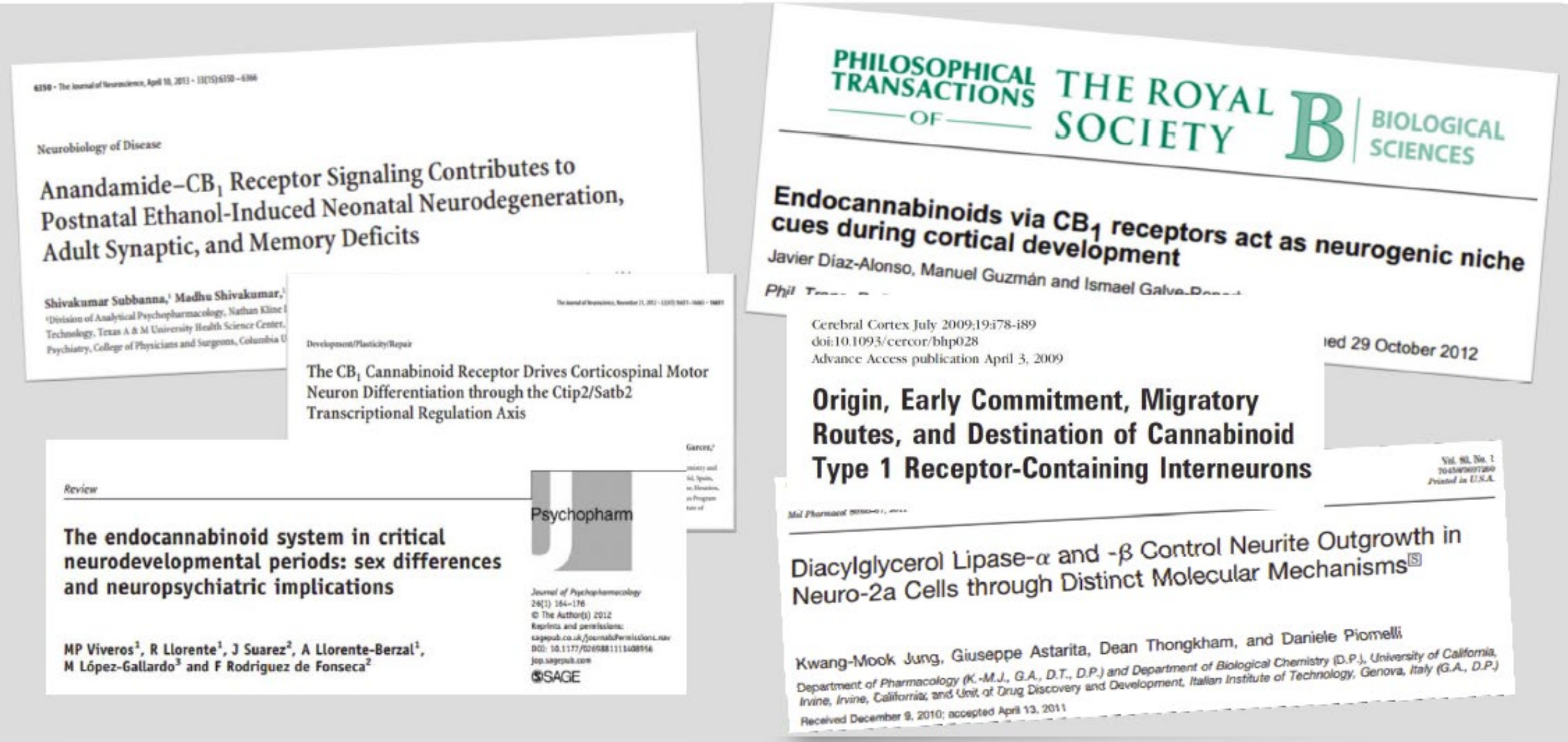








endocannabinoid signaling is critical during development



6350 • The Journal of Neuroscience, April 10, 2013 • 33(15):6350–6366

Neurobiology of Disease

Anandamide–CB_1 Receptor Signaling Contributes to Postnatal Ethanol-Induced Neonatal Neurodegeneration, Adult Synaptic, and Memory Deficits

Shivakumar Subbanna,[1] Madhu Shivakumar,[1]
[1]Division of Analytical Psychopharmacology, Nathan Kline I
Technology, Texas A & M University Health Science Center,
Psychiatry, College of Physicians and Surgeons, Columbia U

Development/Plasticity/Repair

The CB_1 Cannabinoid Receptor Drives Corticospinal Motor Neuron Differentiation through the Ctip2/Satb2 Transcriptional Regulation Axis

Garcez,[1]

Review

The endocannabinoid system in critical neurodevelopmental periods: sex differences and neuropsychiatric implications

MP Viveros[1], R Llorente[1], J Suarez[2], A Llorente-Berzal[1], M López-Gallardo[3] and F Rodriguez de Fonseca[2]

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Journal of Psychopharmacology
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DOI: 10.1177/0269881111408956
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PHILOSOPHICAL TRANSACTIONS OF THE ROYAL SOCIETY B BIOLOGICAL SCIENCES

Endocannabinoids via CB_1 receptors act as neurogenic niche cues during cortical development

Javier Díaz-Alonso, Manuel Guzmán and Ismael Galve-Roperh

ed 29 October 2012

Cerebral Cortex July 2009;19:i78-i89
doi:10.1093/cercor/bhp028
Advance Access publication April 3, 2009

Origin, Early Commitment, Migratory Routes, and Destination of Cannabinoid Type 1 Receptor-Containing Interneurons

Vol. 80, No. 1
Printed in U.S.A.

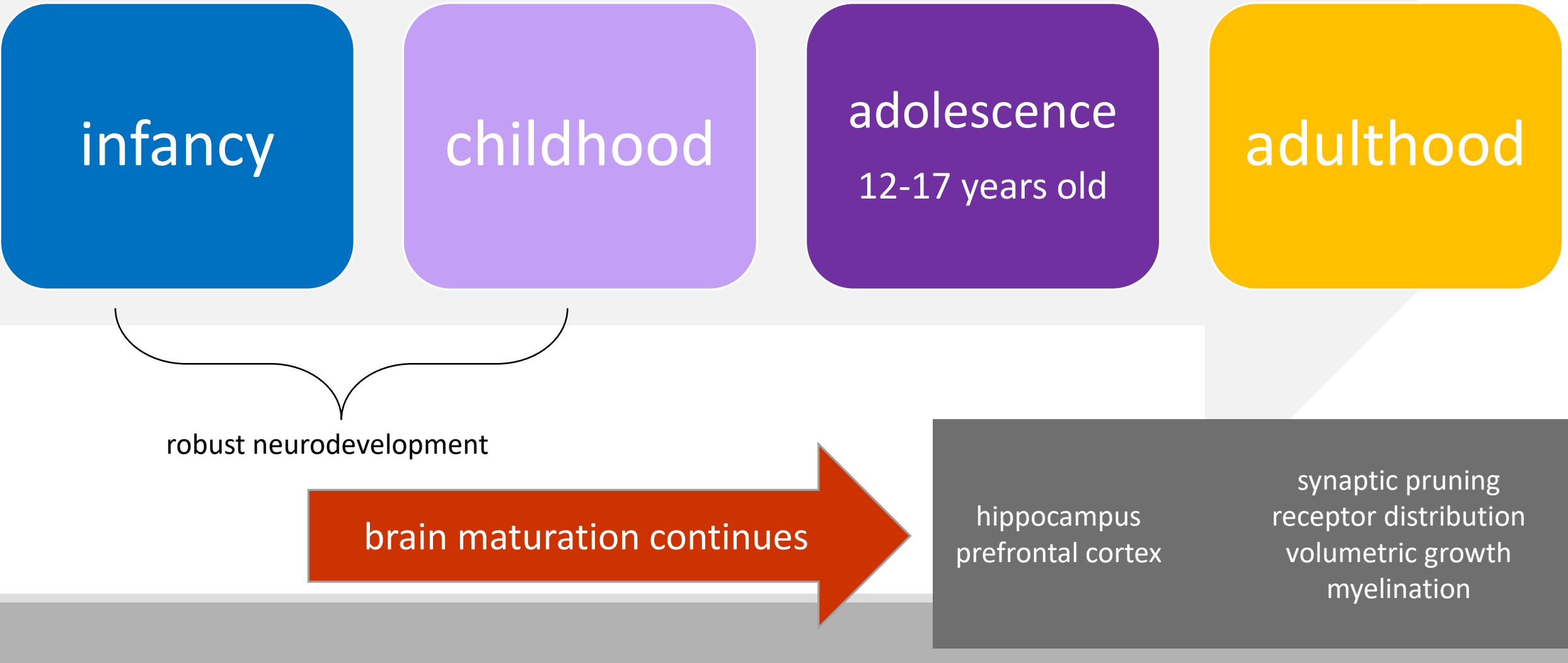
Diacylglycerol Lipase-α and -β Control Neurite Outgrowth in Neuro-2a Cells through Distinct Molecular Mechanisms[S]

Kwang-Mook Jung, Giuseppe Astarita, Dean Thongkham, and Daniele Piomelli

Department of Pharmacology (K.-M.J., G.A., D.T., D.P.) and Department of Biological Chemistry (D.P.), University of California, Irvine, Irvine, California, and Unit of Drug Discovery and Development, Italian Institute of Technology, Genova, Italy (G.A., D.P.)

Received December 9, 2010; accepted April 13, 2011

Brain maturation continues through adolescence.

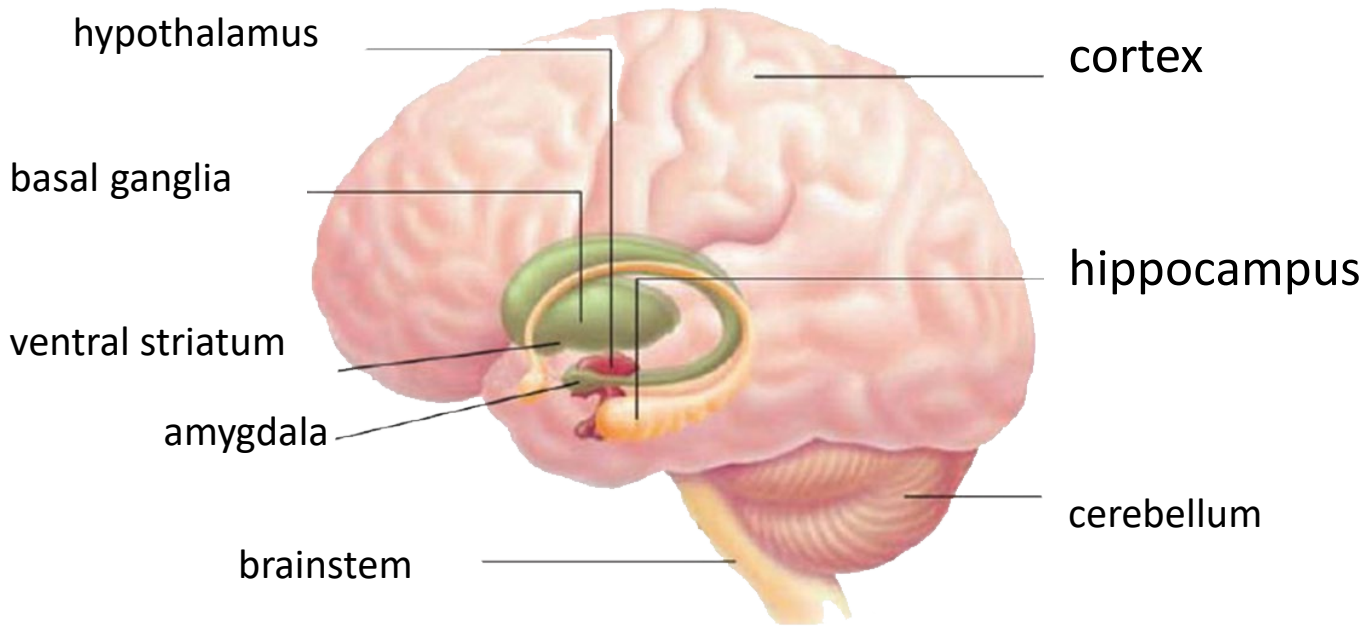


CB_1 receptors increase dramatically from infancy to young adulthood.

CB1 receptor expression **changes** over time

dramatic increase during development

frontal cortex, striatum & hippocampus



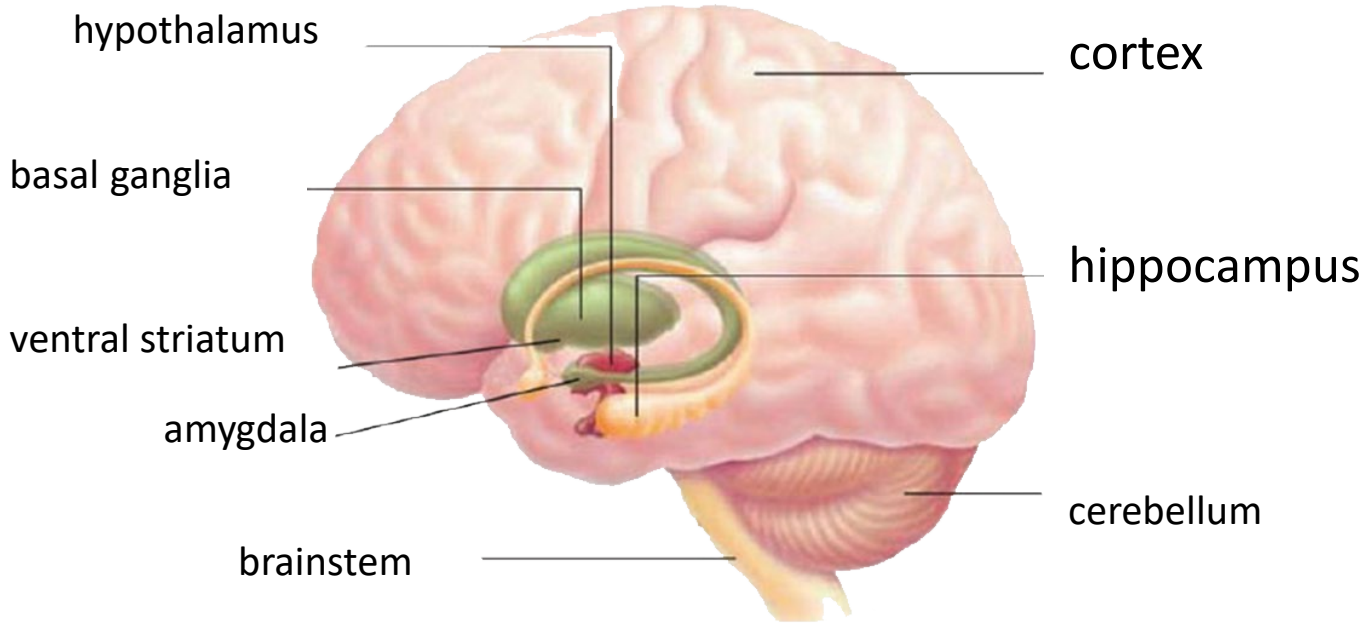
Mato *et al.*, 2003

endocannabinoid ligand expression changes during adolescence.

AEA and 2-AG expression changes

AEA – onset of puberty for females in hypothalamus

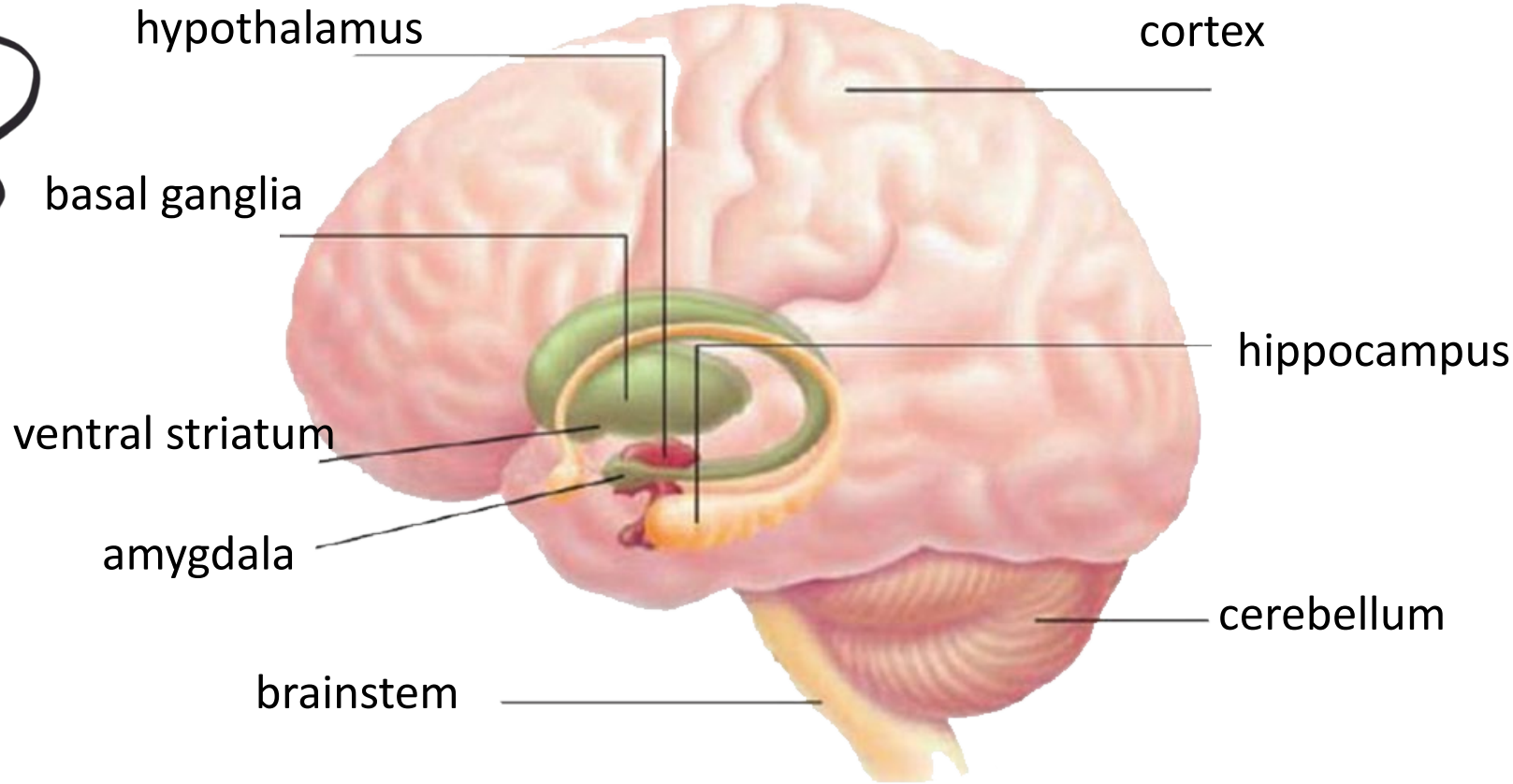
2-AG expression changes in PFC & N. Accumbens



disruption of normative endocannabinoid signalling during adolescence may have long-standing consequences on adult brain function

Mato *et al.*, 2003

what now?


hypothalamus
cortex
basal ganglia
hippocampus
ventral striatum
amygdala
cerebellum
brainstem