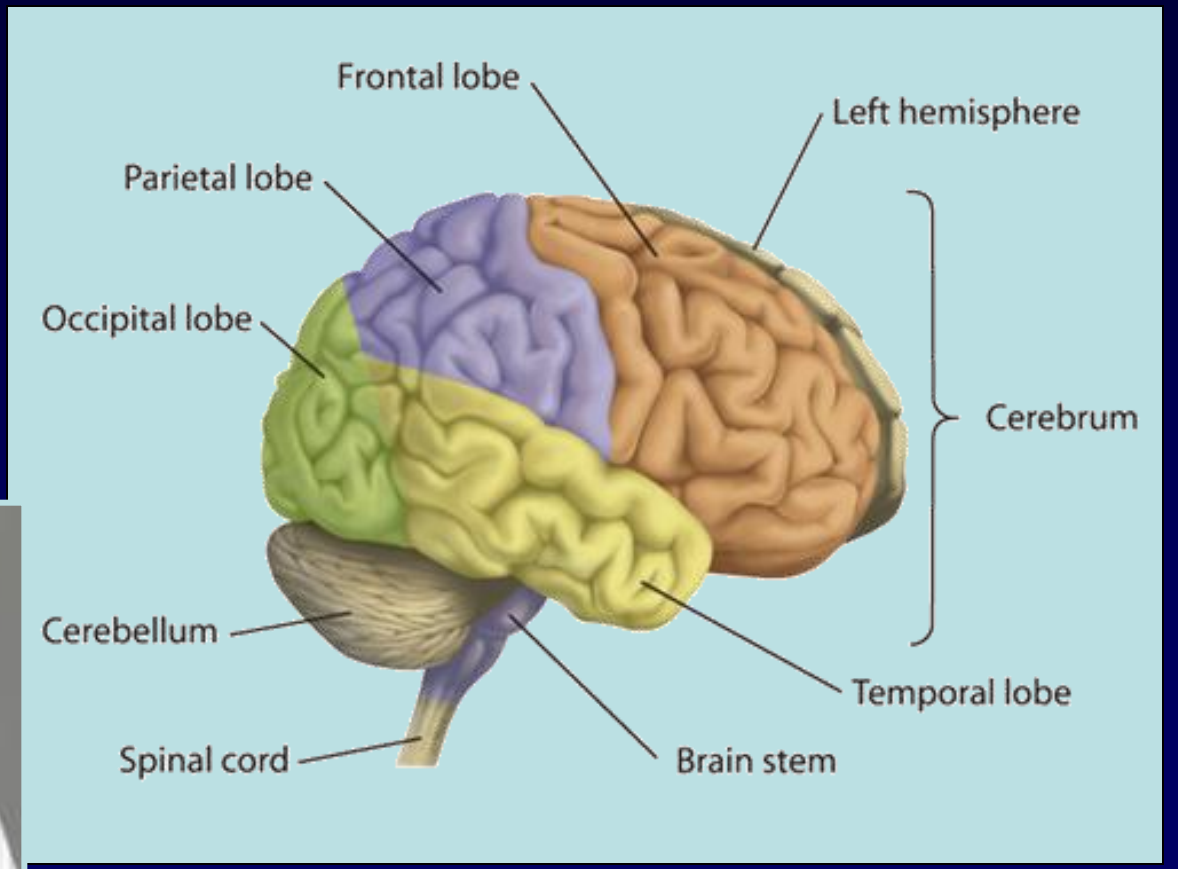
Adolescenza, Stili di Vita, Psicopatologia

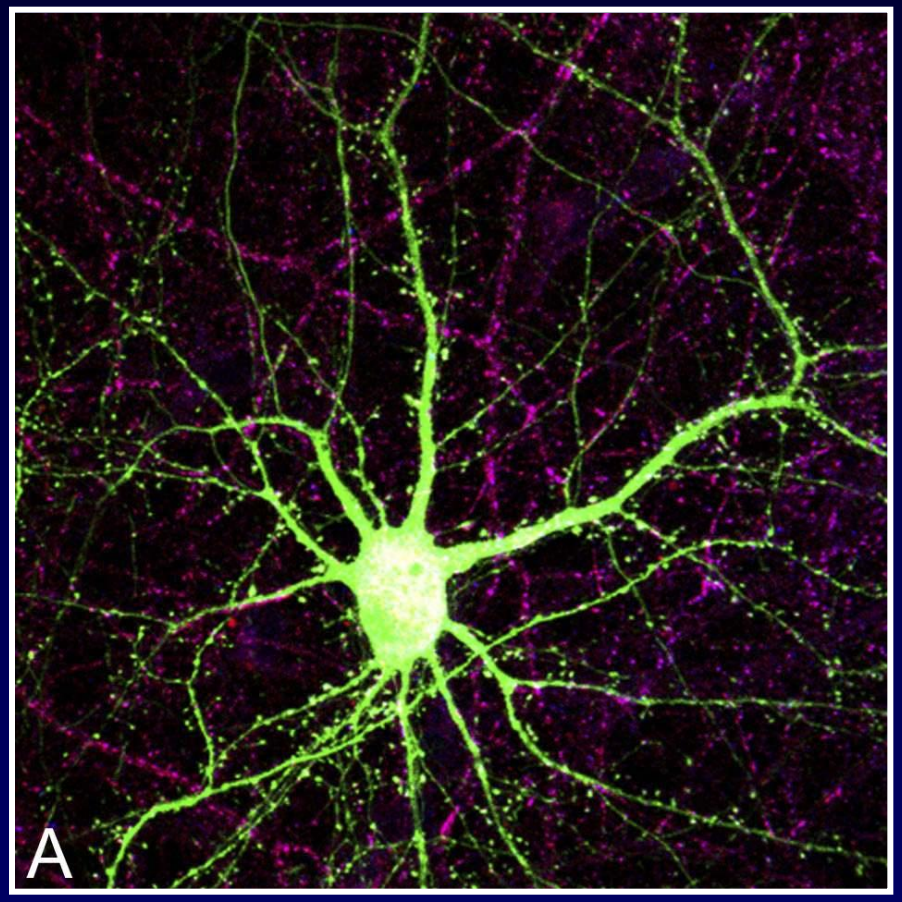
Giovanni Biggio

Centro di Eccellenza per la "Neurobiologia delle Dipendenze",

Università degli Studi di Cagliari



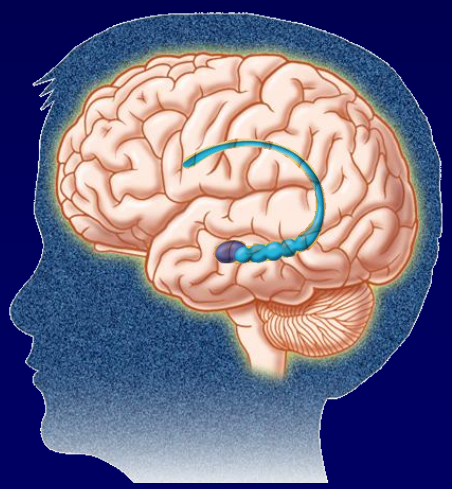
Il cervello è una ricca rete di cellule nervose collegate fra loro

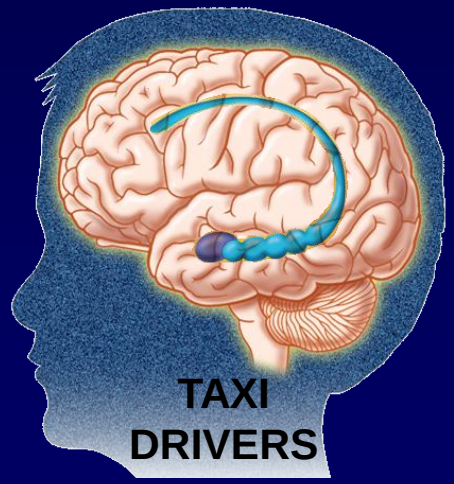


Navigation-related structural change in the hippocampi of taxi drivers

Maguire EA,. Gadian DG., Johnsrude IS., Good CD., Ashburner J-, Frackowiak RSJ., Frith CD.

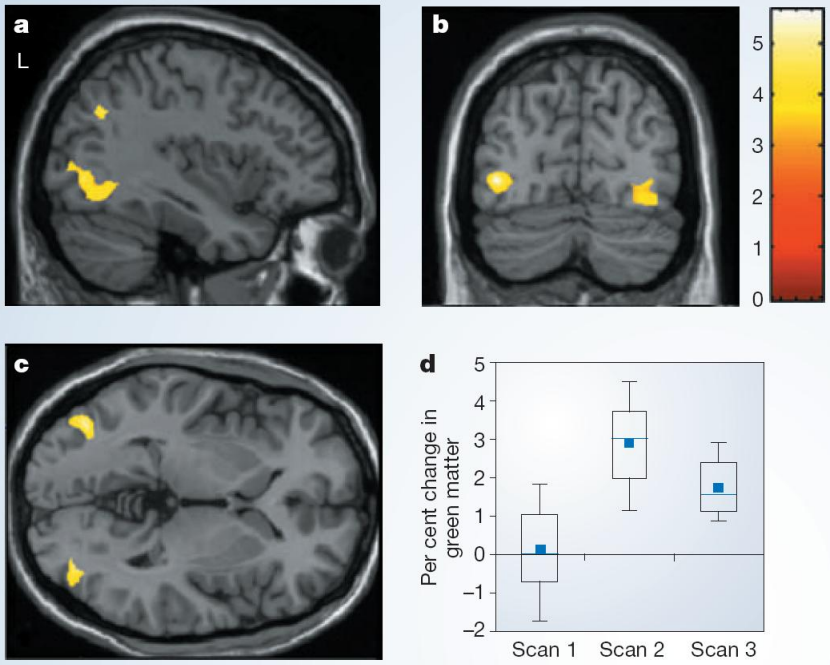
PNAS, 2000





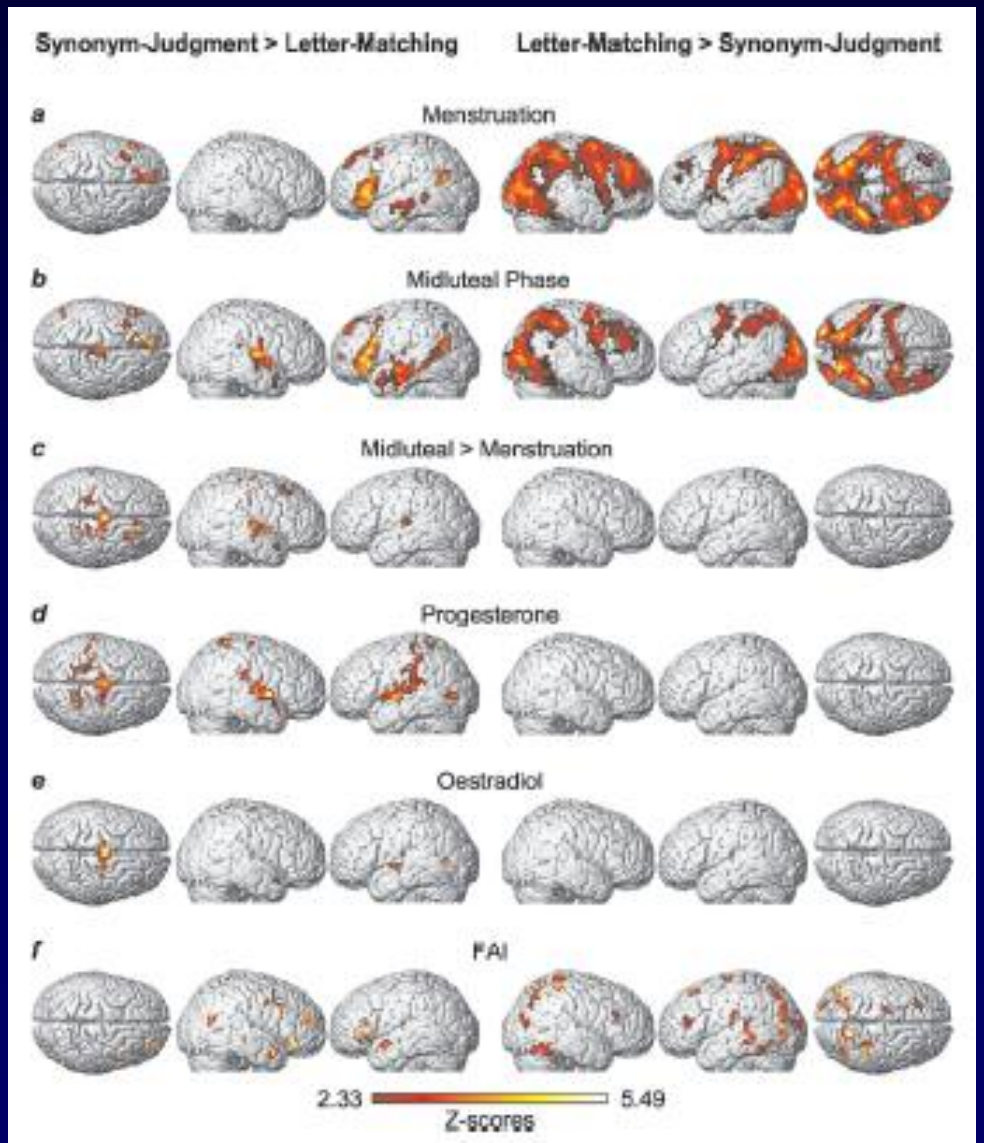
Changes in gray matter induced by training

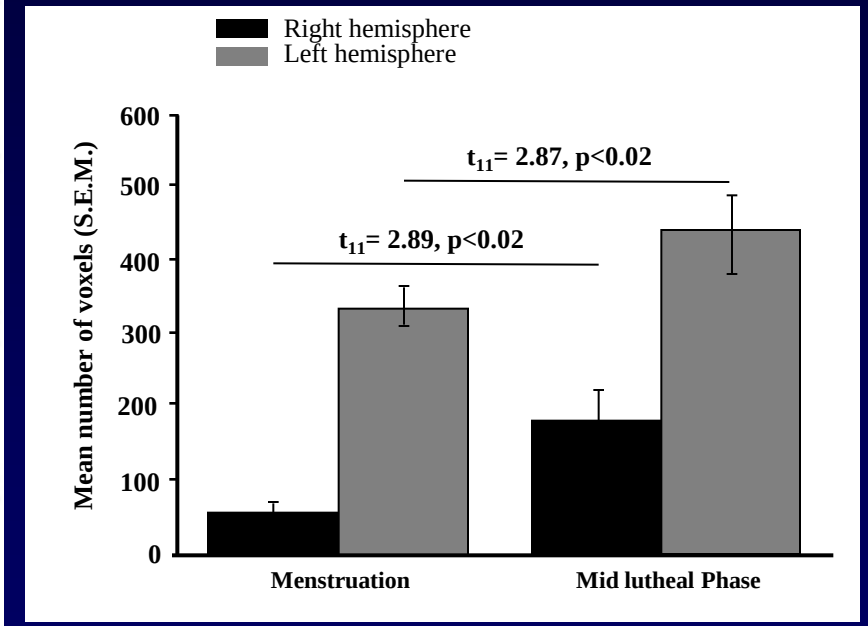
Nature, 2004



“Menstrual cylcle-dependent neural plasticity in the adult human brain is hormone, task and region specific”

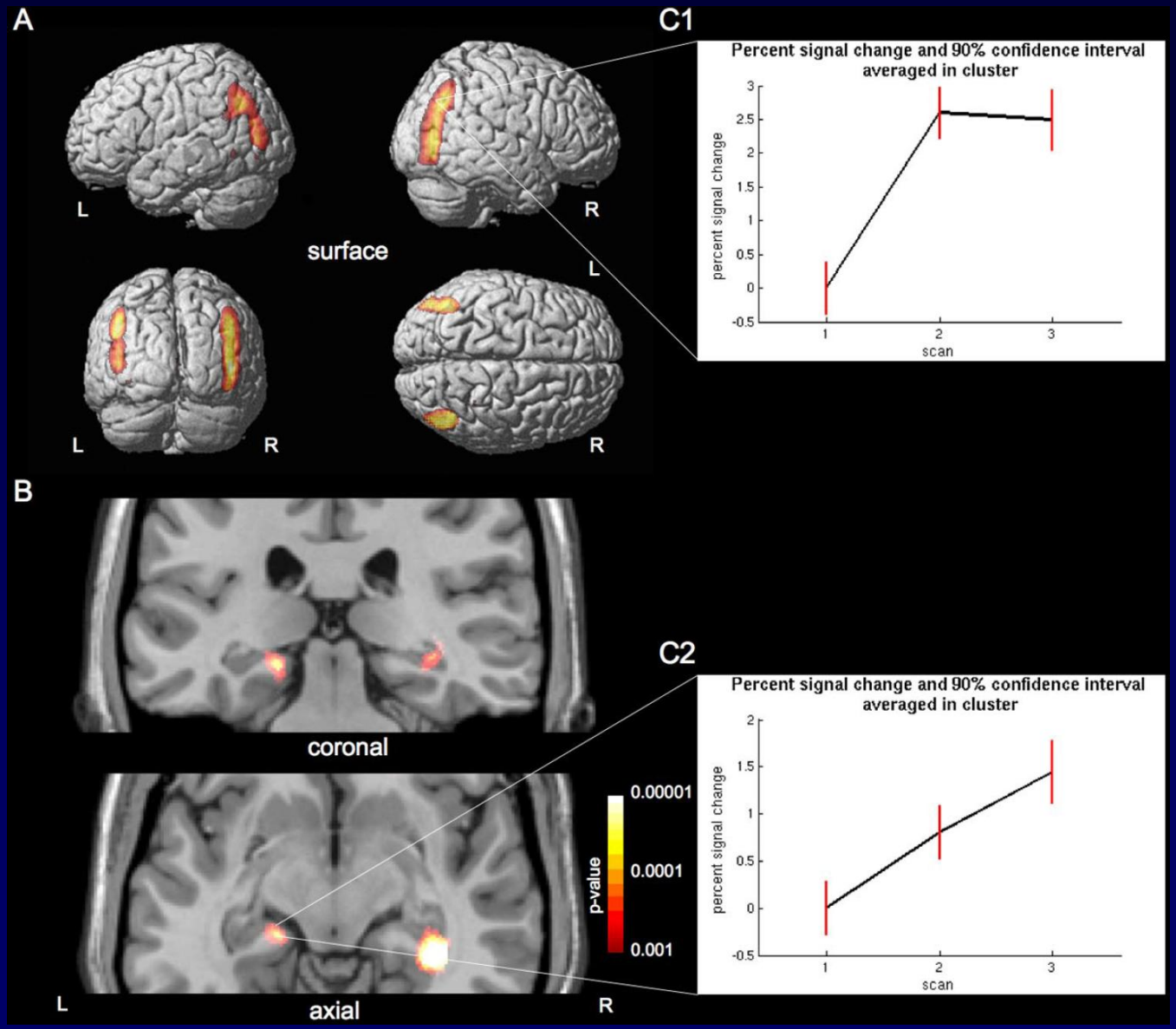
Fernandez G et al., *J Neurosci*, 23(9): 3790-3795 (2003)



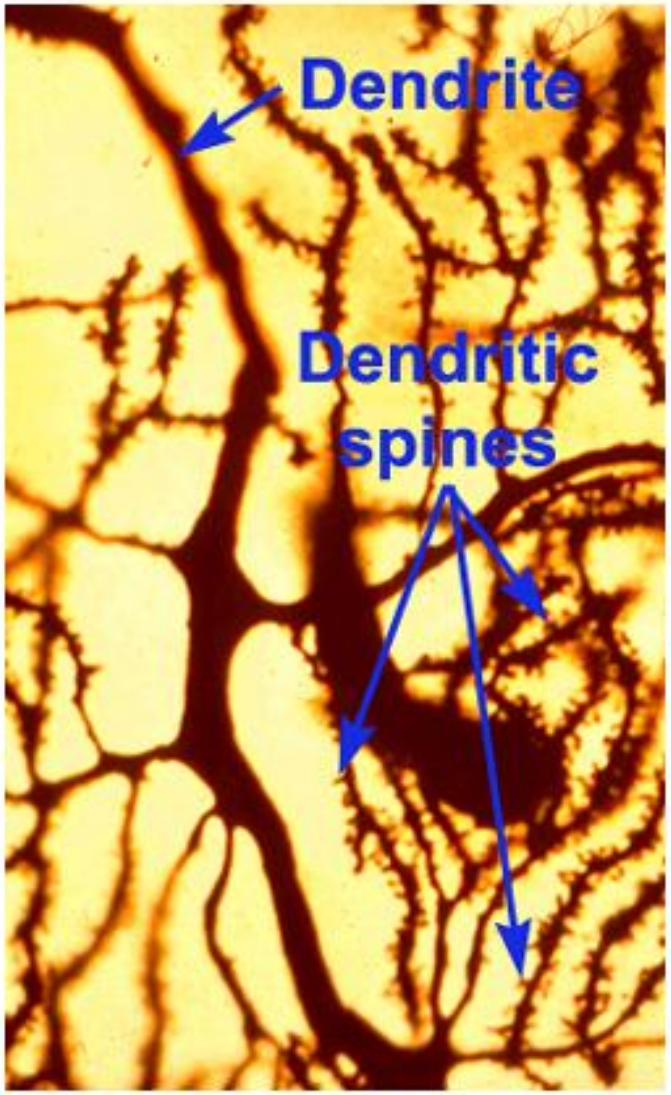


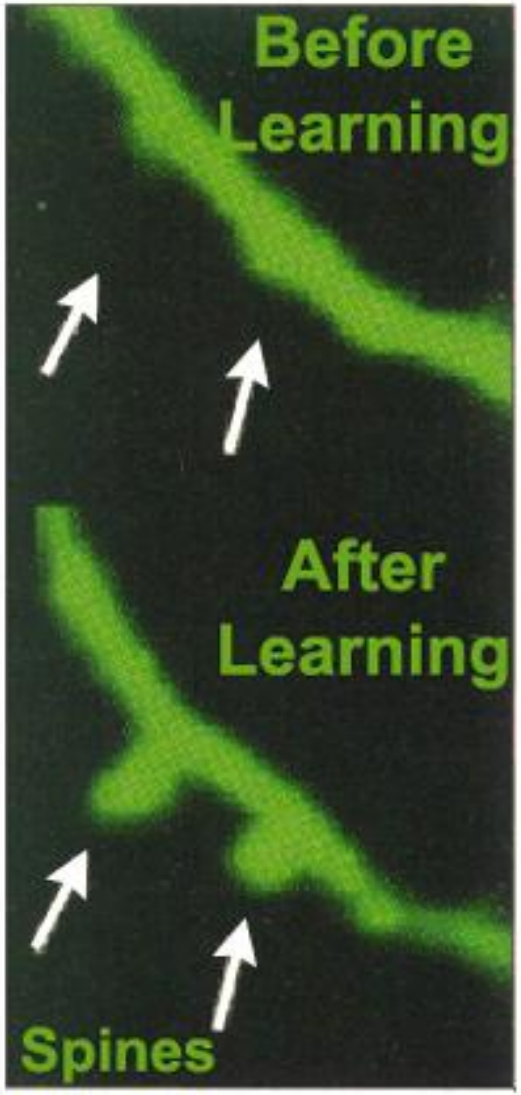
Temporal and Spatial Dynamics of Brain Structure Changes During Extensive Learning

Draganski B et al., J. Neurosci., 2006



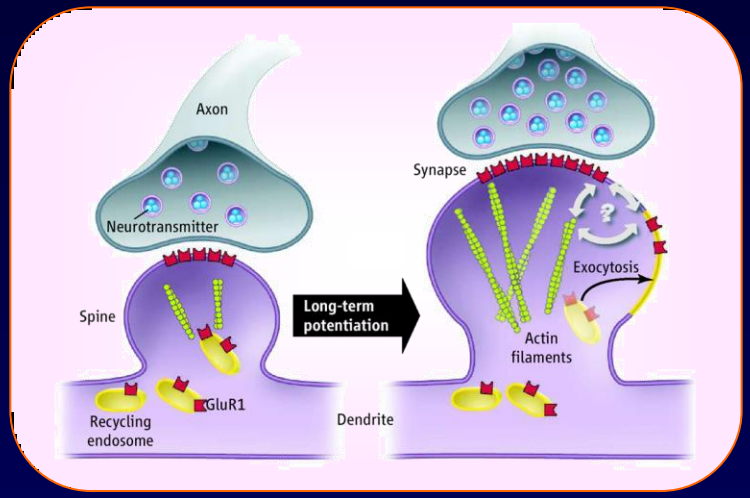
Dendritic Spines Increase with Learning

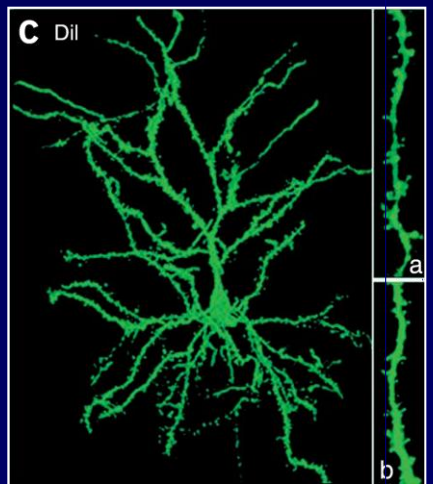




“Fatherhood affects dendritic spines and vasopressin V1a receptors in the primate prefrontal cortex”

Y. Kozorovitskiy, Nature Neurosci, 2006,





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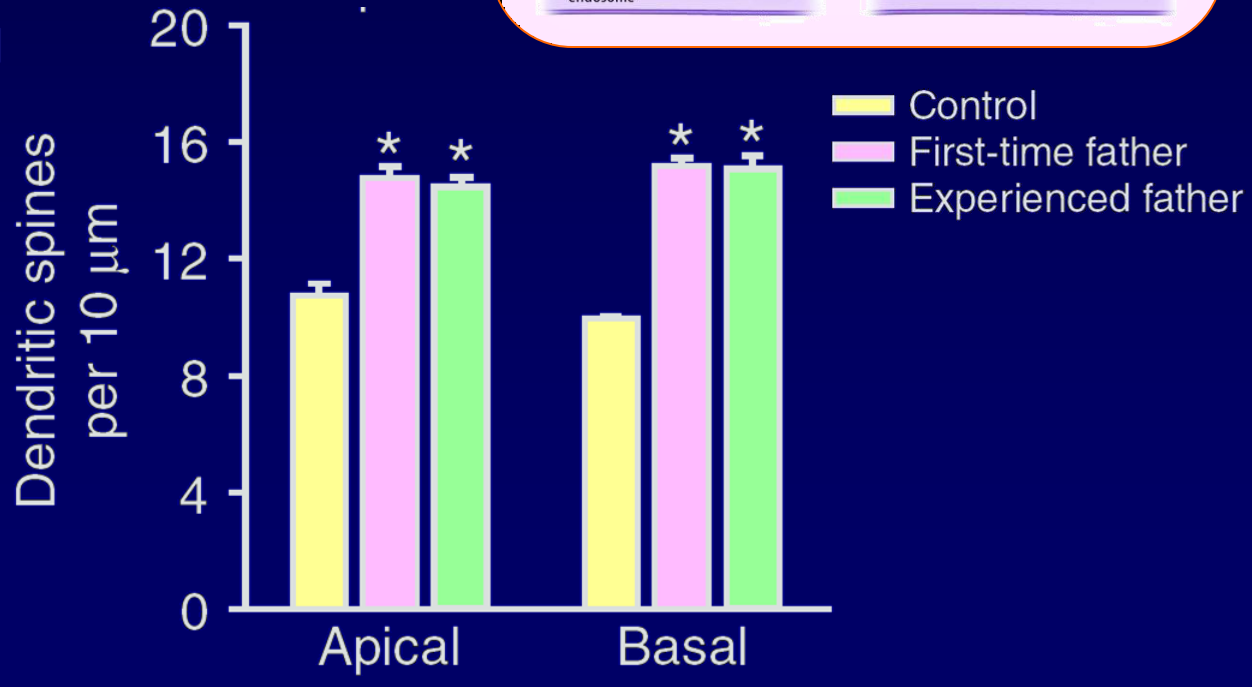
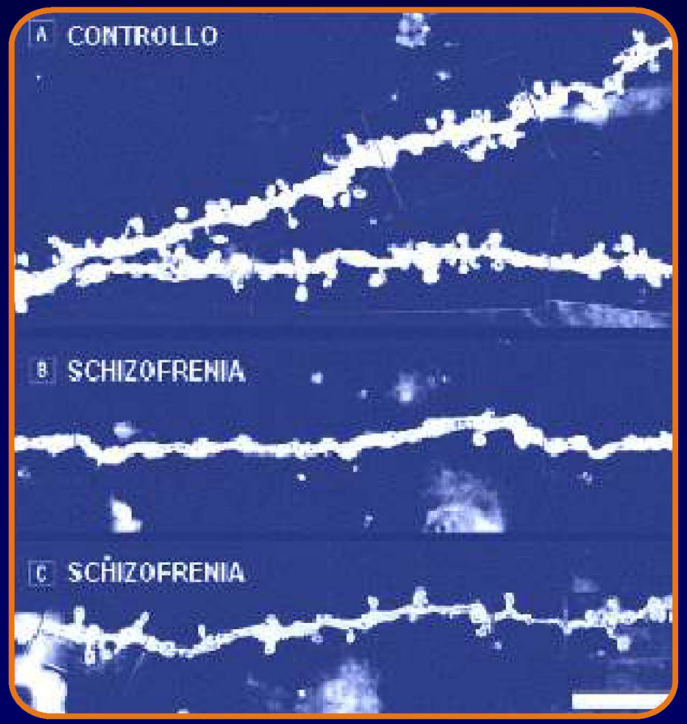
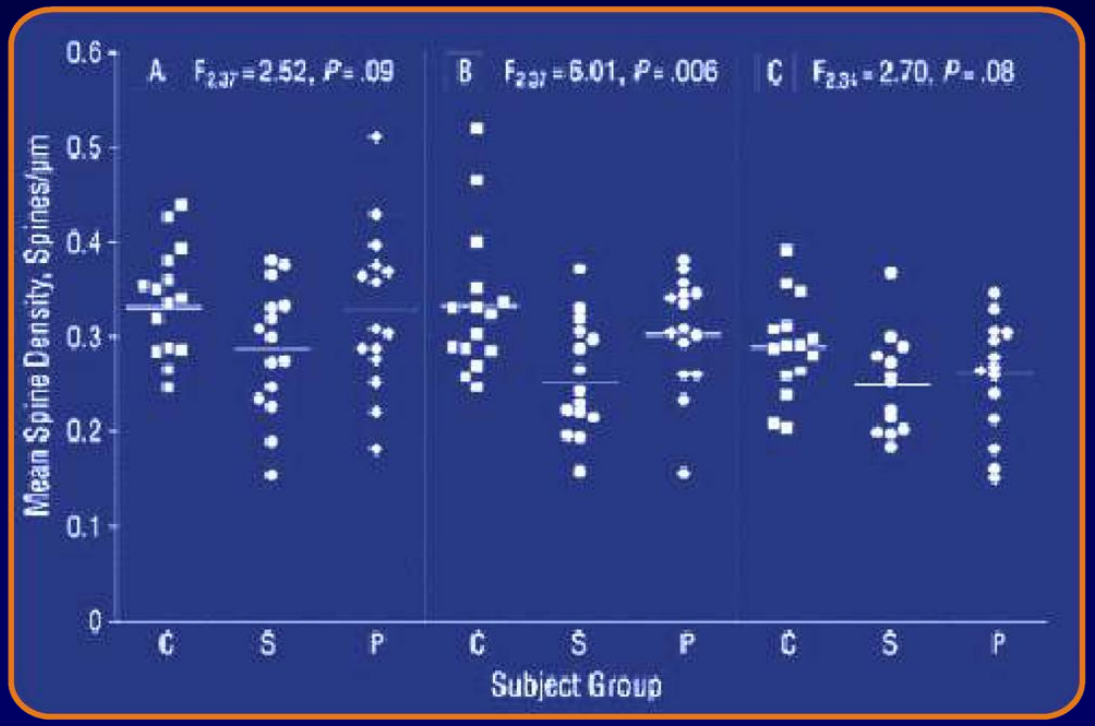


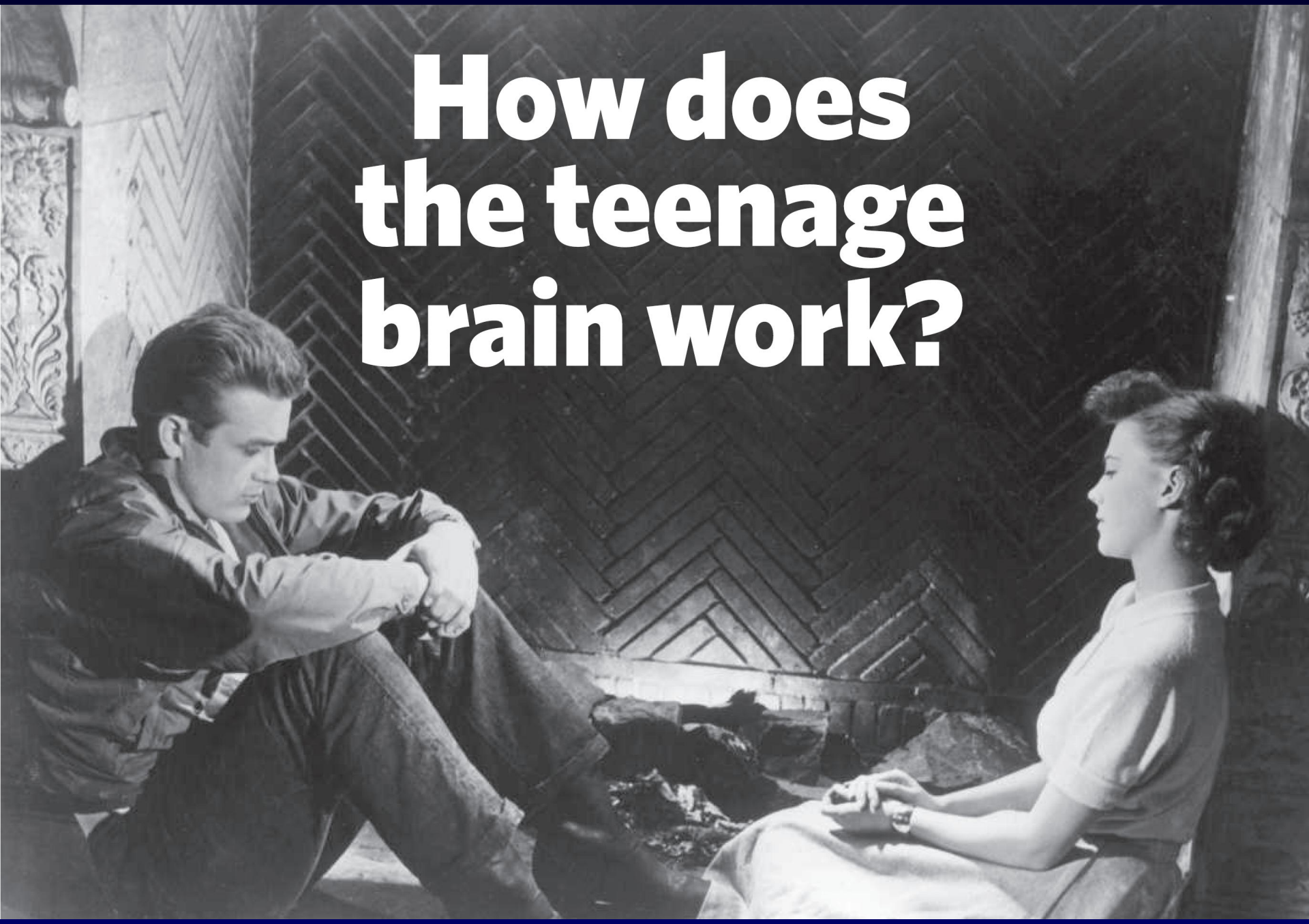
Neurosviluppo ⟶ Neuroplasticità

Riduzione nel numero di spine dendritiche di neuroni piramidali in PFC nella schizofrenia





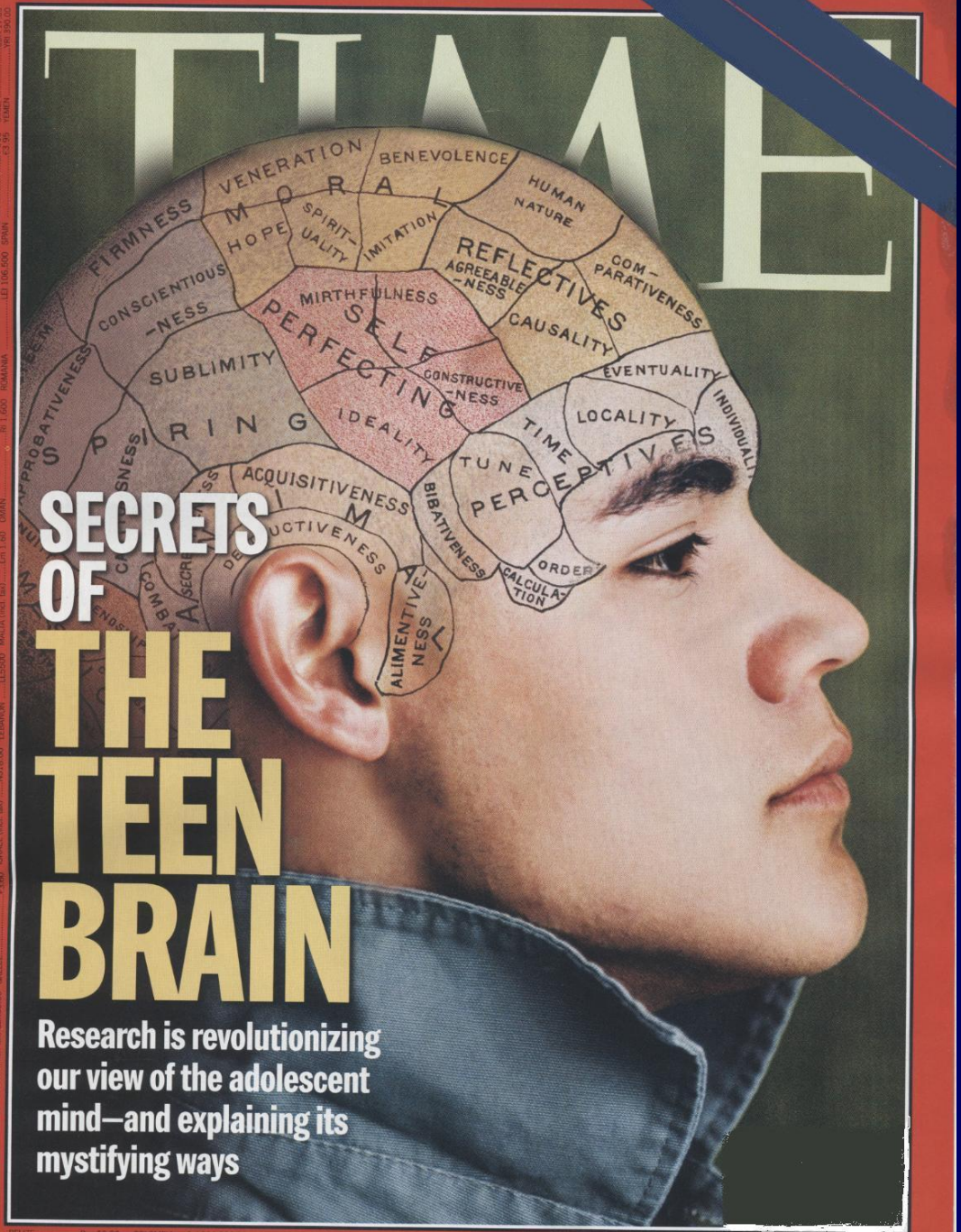
(Glantz and Lewis, Arch. Gen. Psych. 2000)



Nature, 2006

JUNE 7, 2004

TIME



SECRETS OF THE TEEN BRAIN

Research is revolutionizing our view of the adolescent mind—and explaining its mystifying ways

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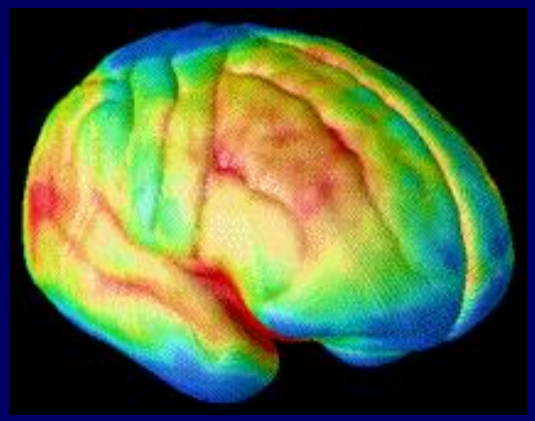
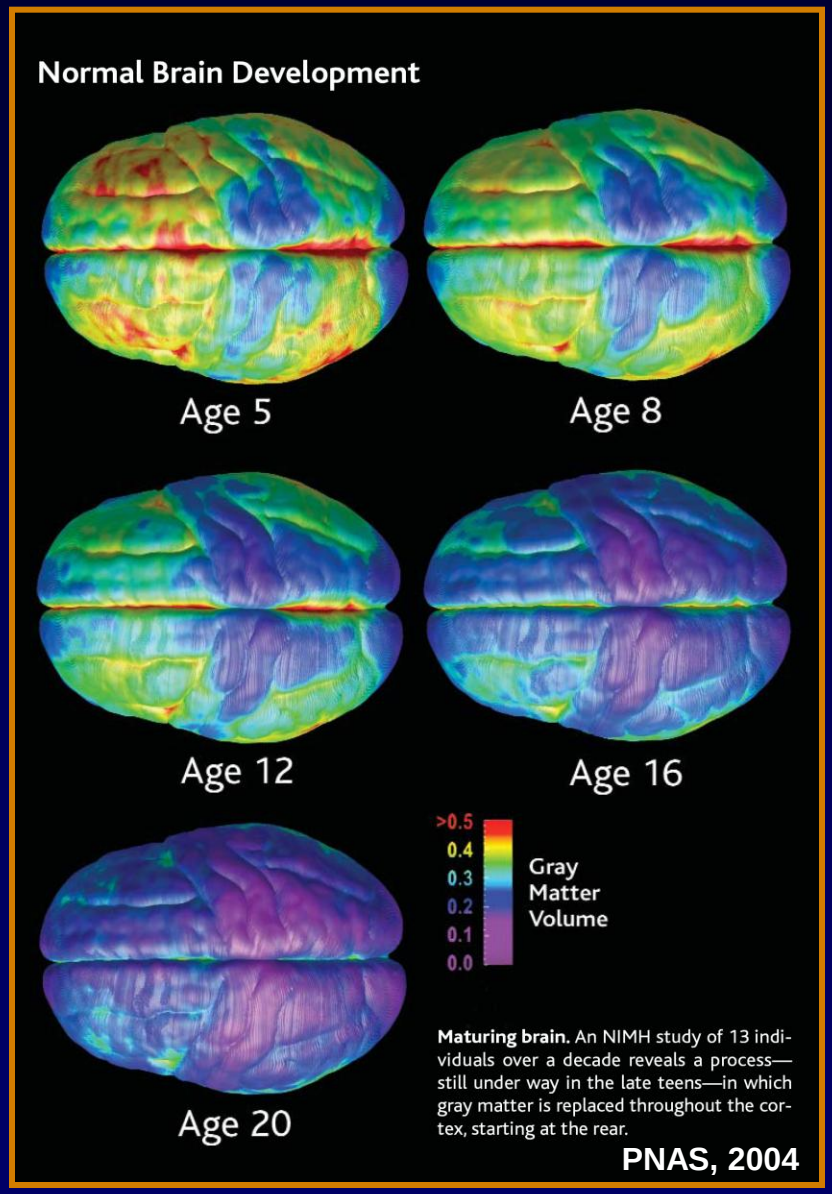
www.timeeurope.com AOL Keyword: TIME

SECRETS OF THE TEEN BRAIN

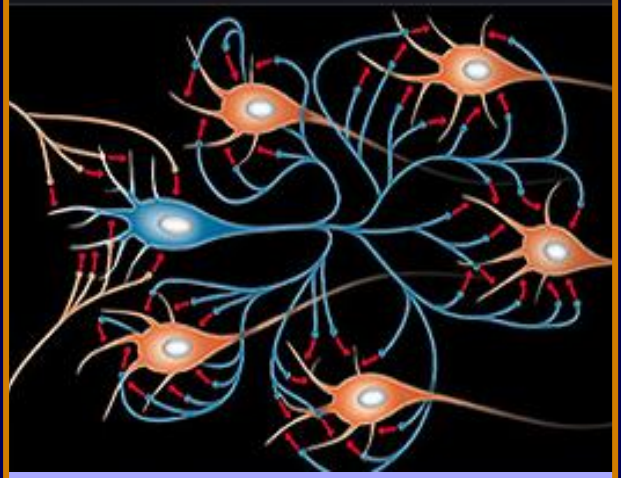
PNAS, 2004



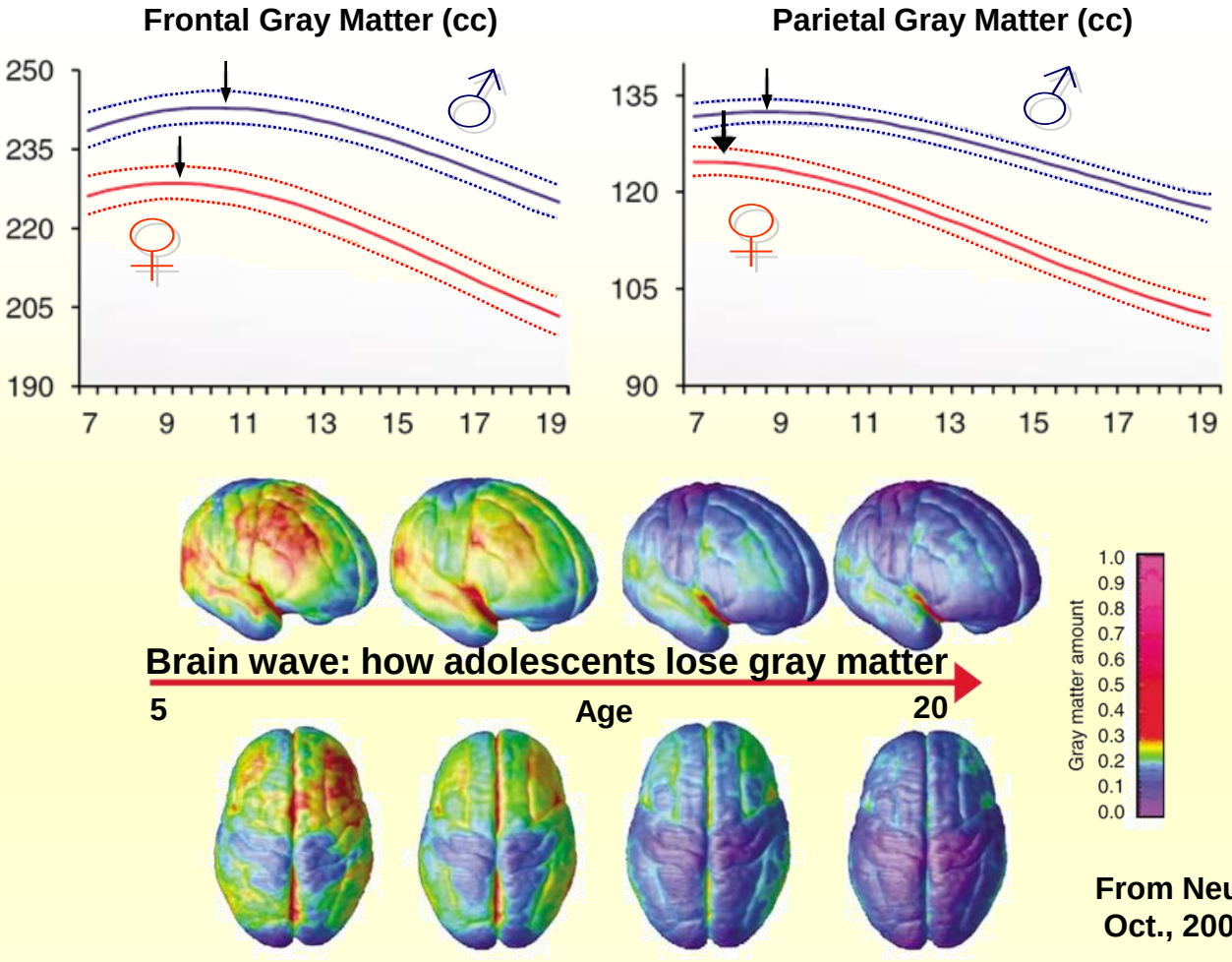
Brain wave: how adolescents lose gray matter



Nerve Proliferation…



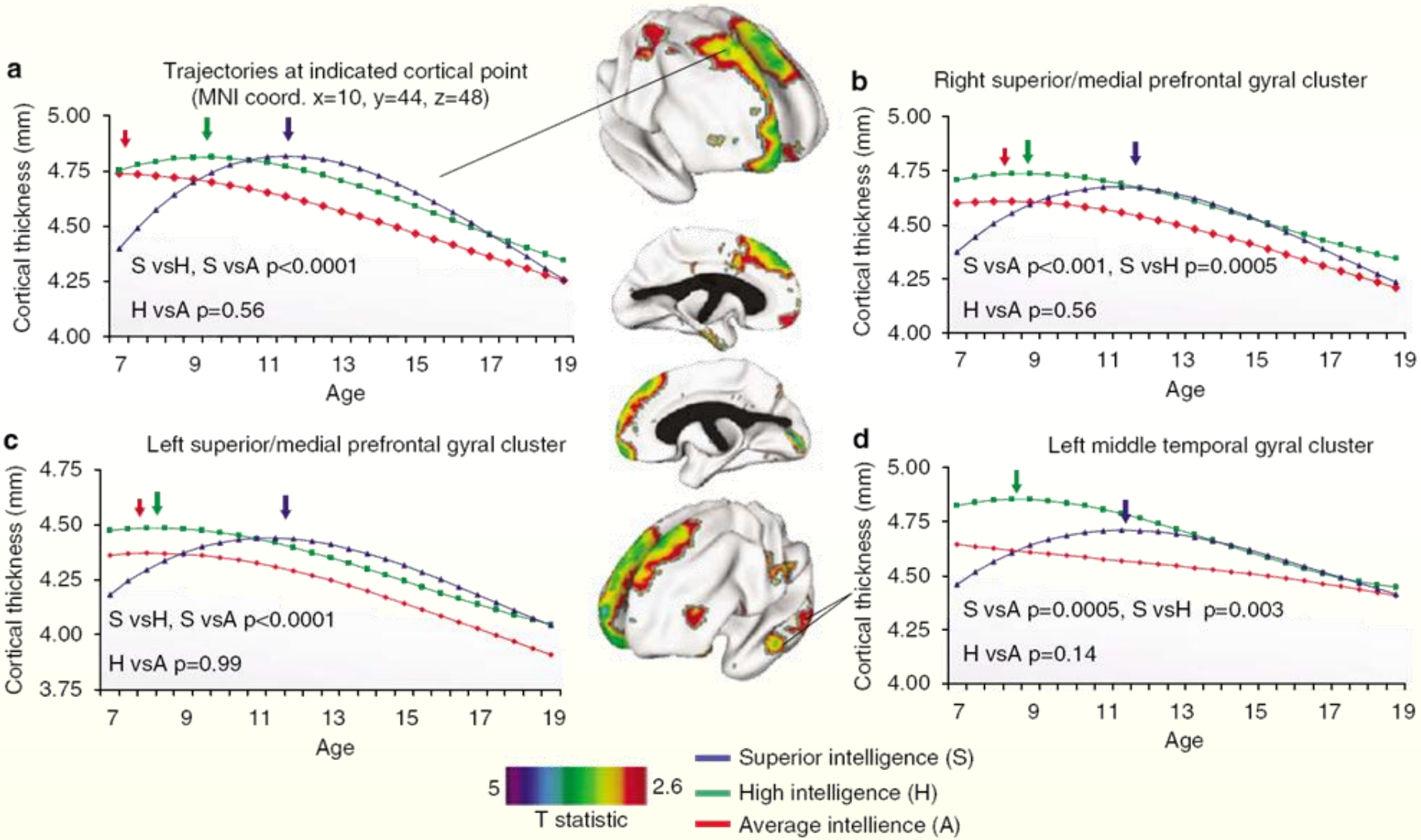
…and Pruning

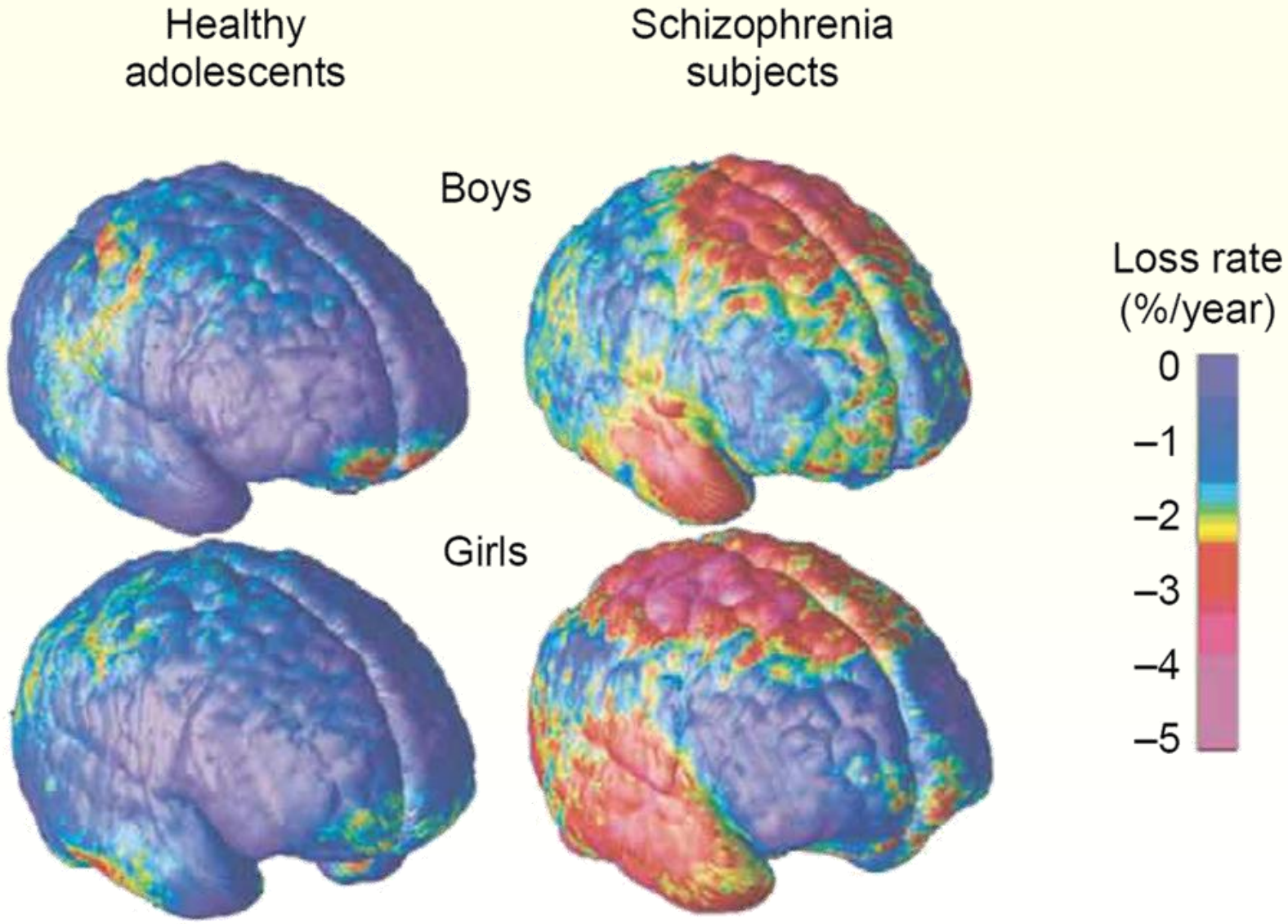


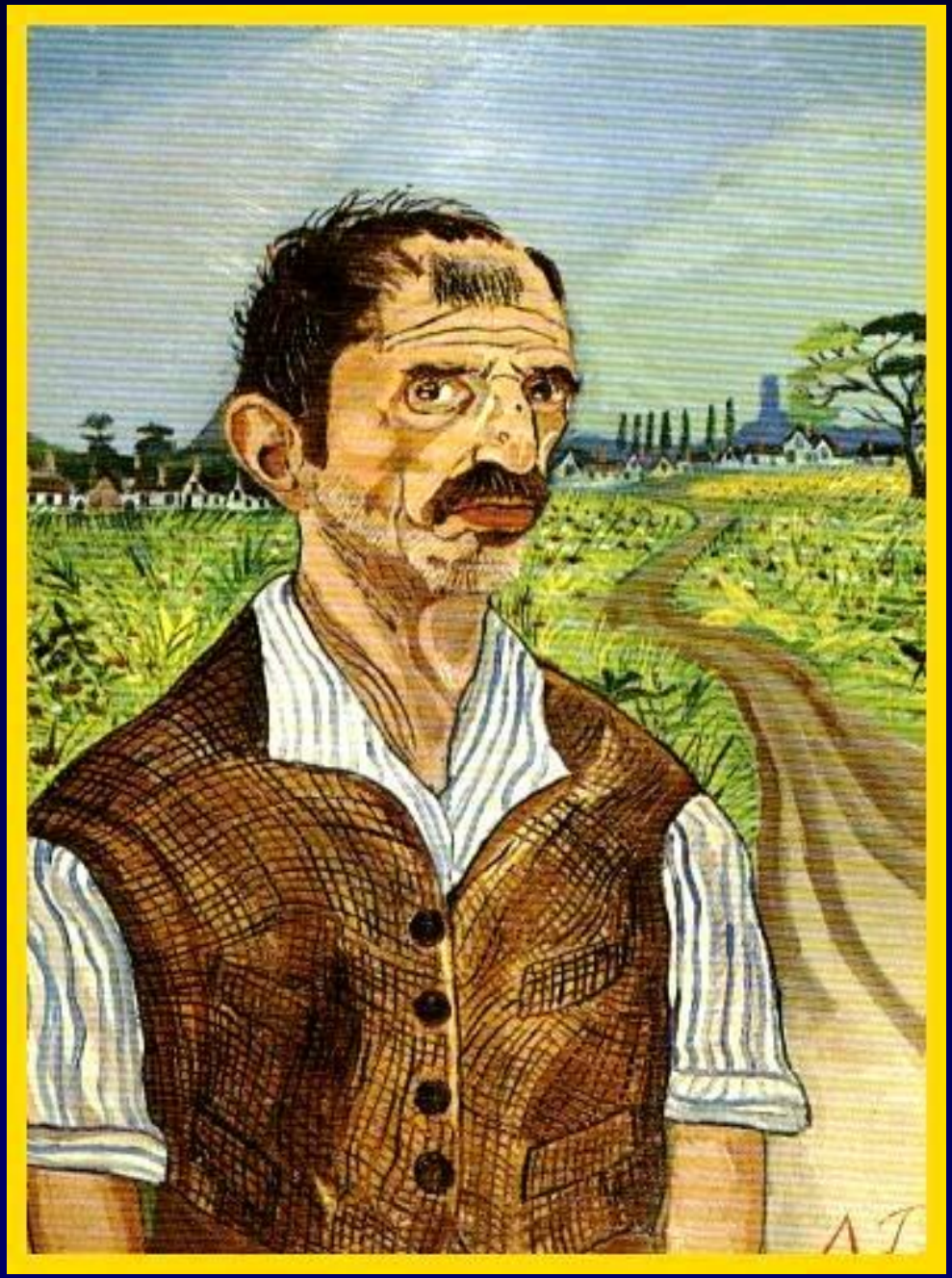
From Neuropsychopharmacology, Oct., 2007

Intellectual ability and cortical development in children and adolescents

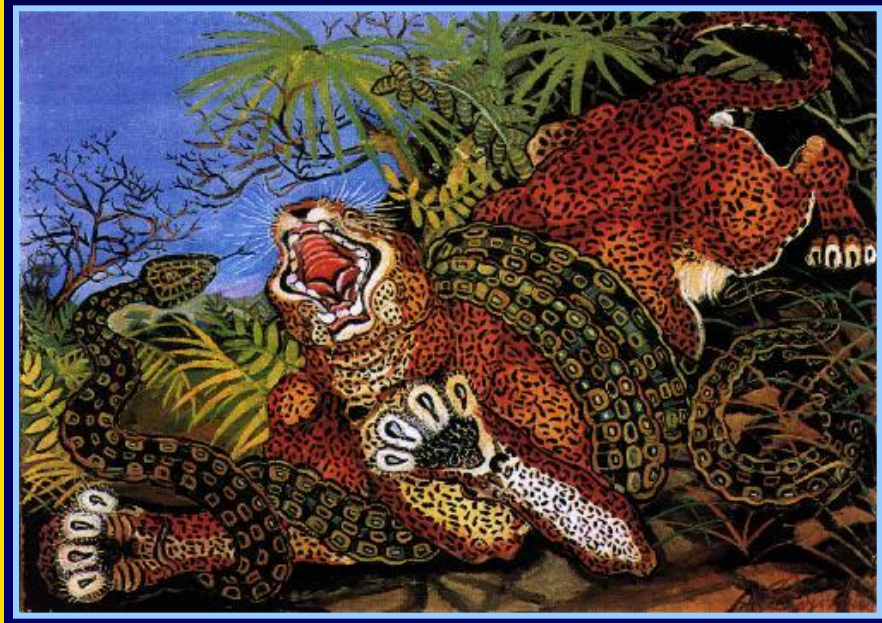
P. Shaw et al., Nature 2006




Healthy adolescents
Schizophrenia subjects
Boys
Girls
Loss rate (%/year)
0
–1
–2
–3
–4
–5

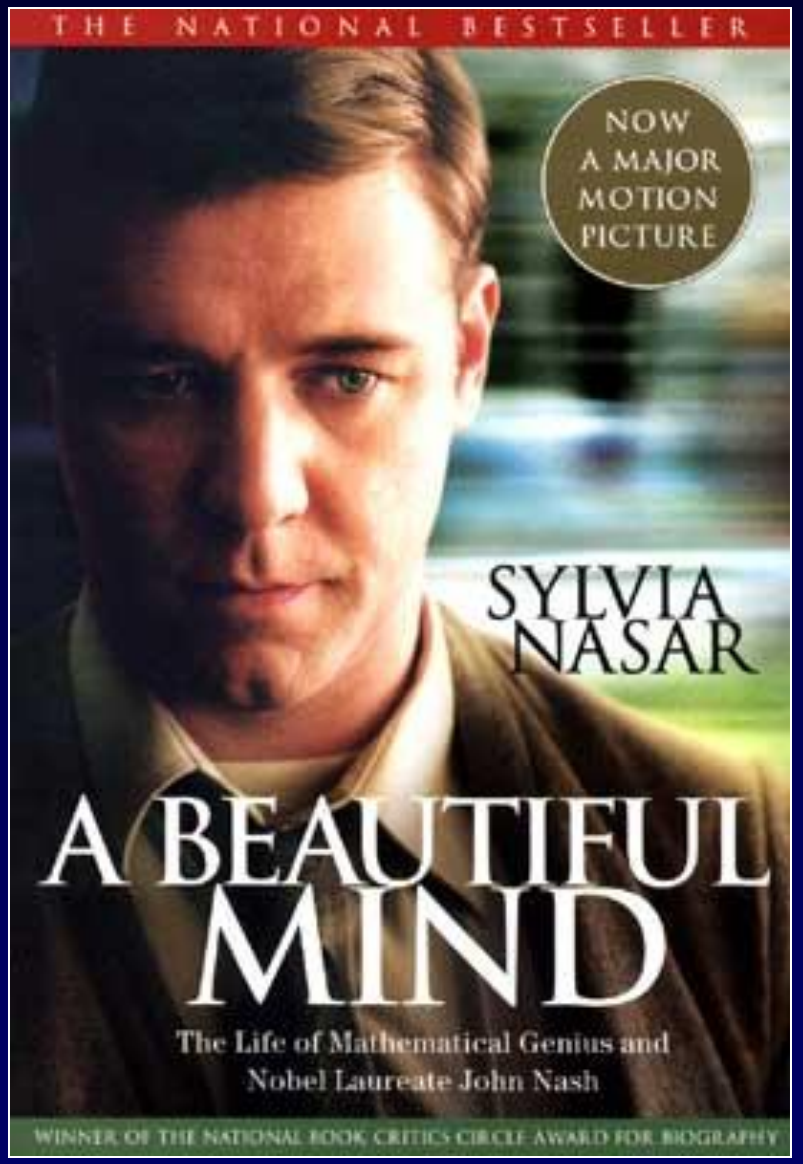


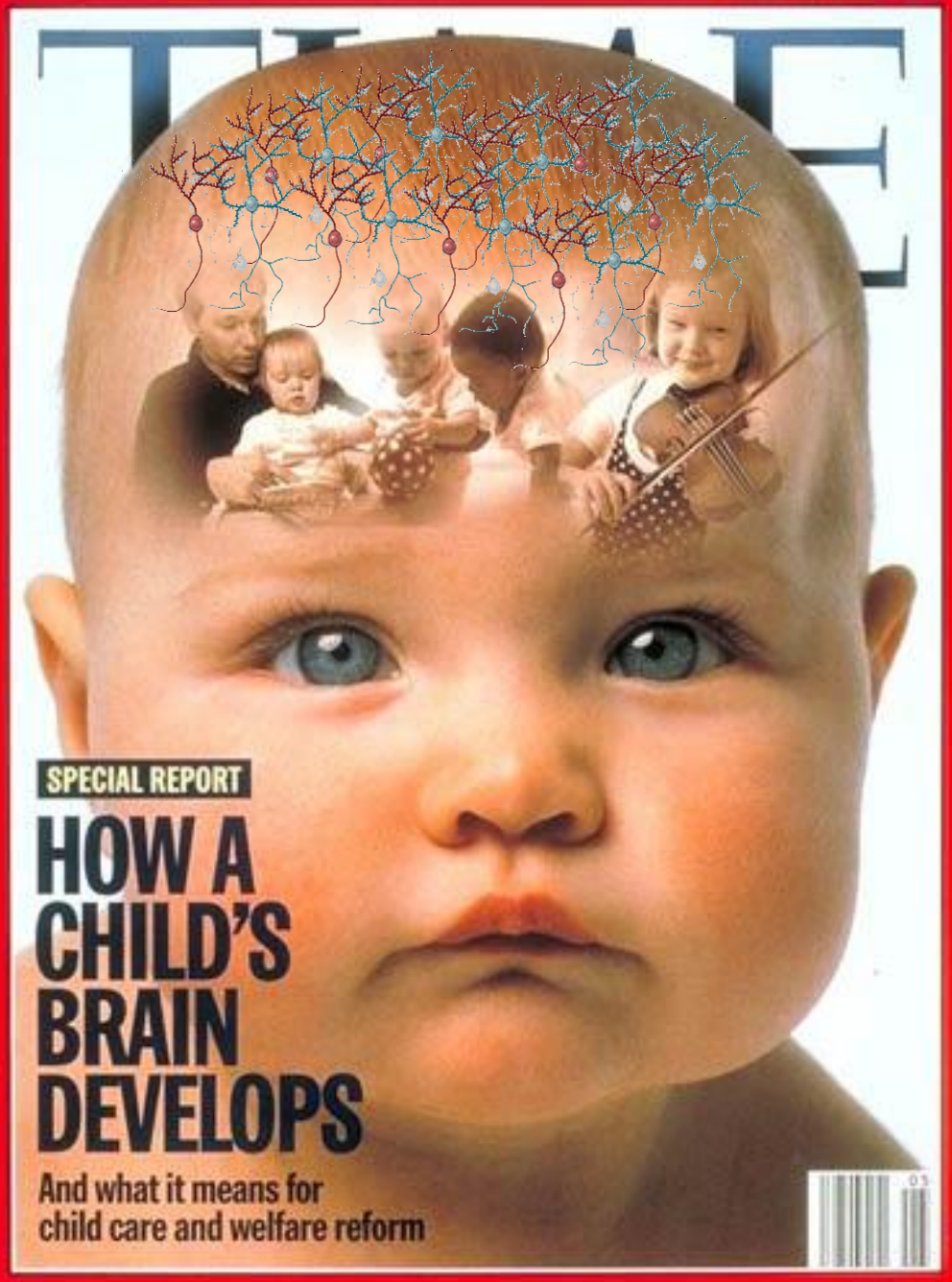
Antonio Ligabue
1899 - 1965



John Forbes Nash Jr.

1994 Premio Nobel per l'Economia

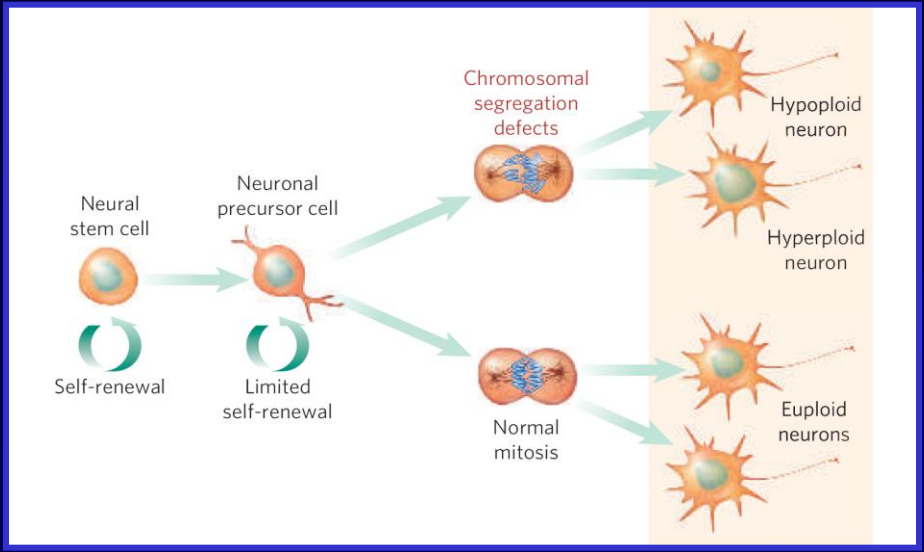


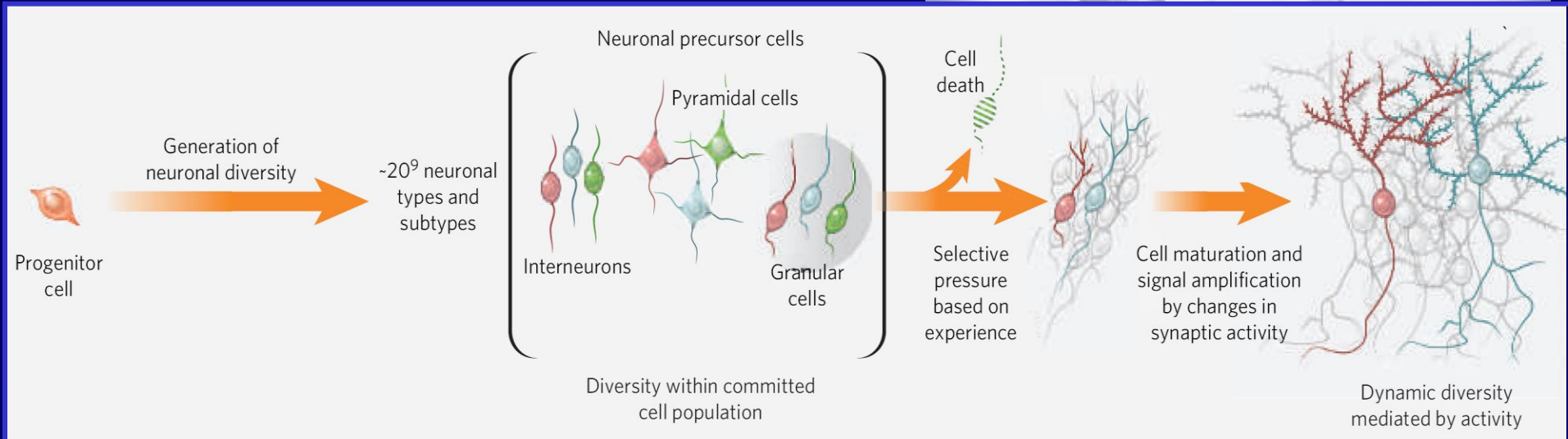

TIME
SPECIAL REPORT
HOW A CHILD'S BRAIN DEVELOPS
And what it means for child care and welfare reform

Nature, 2006

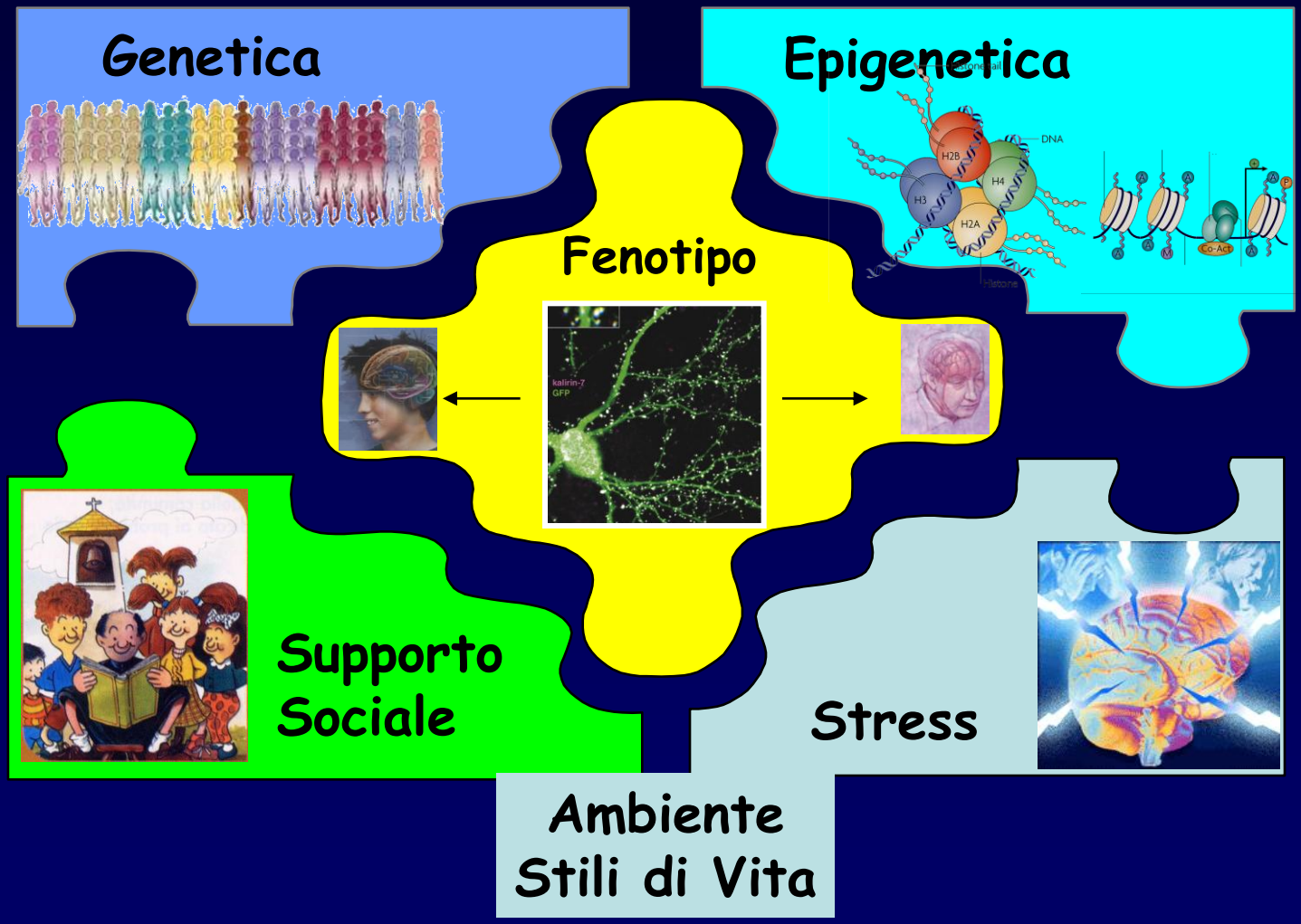
Generation of neuronal Variability and complexity

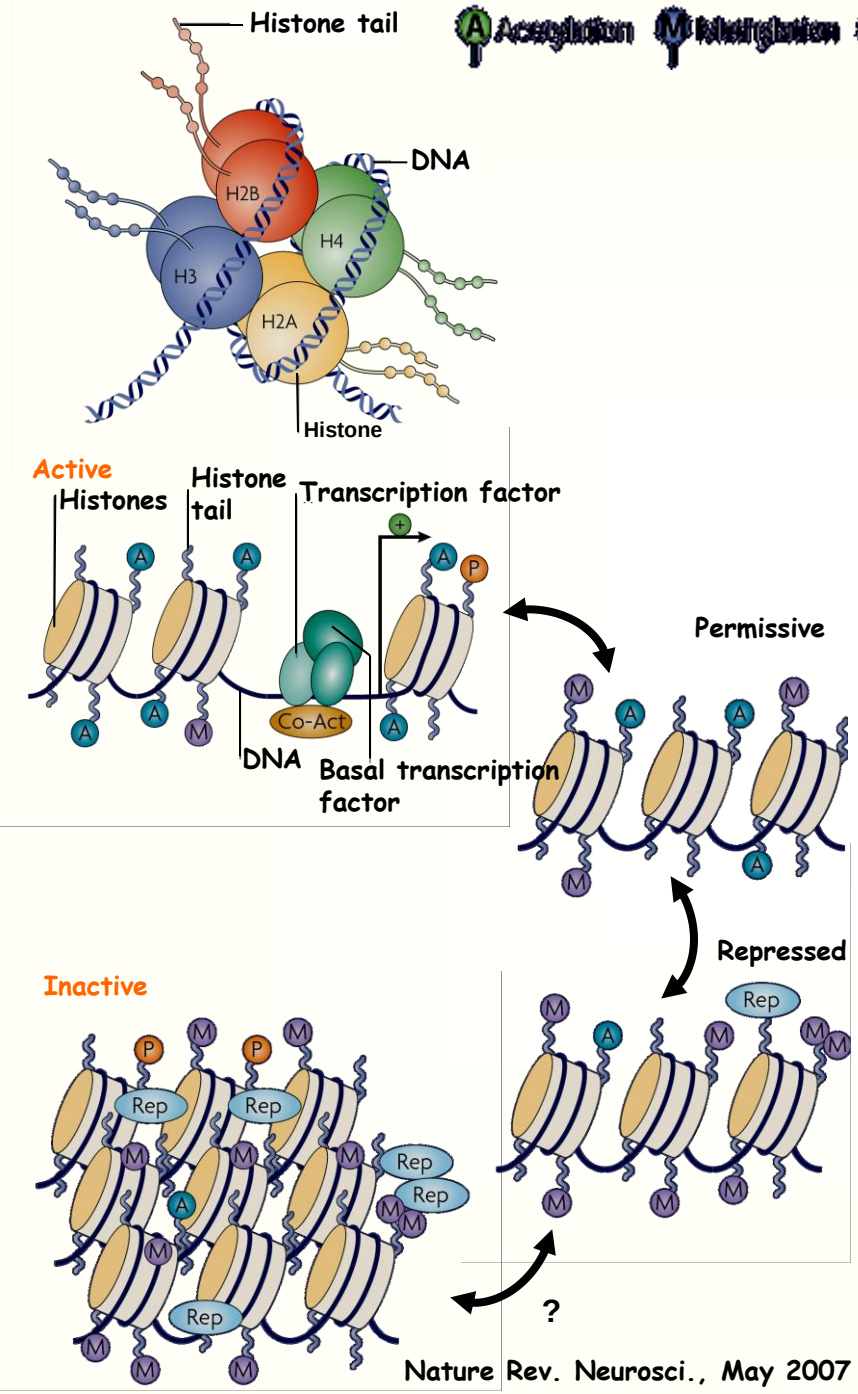
Alysson R. Muotri & Fred H. Gage



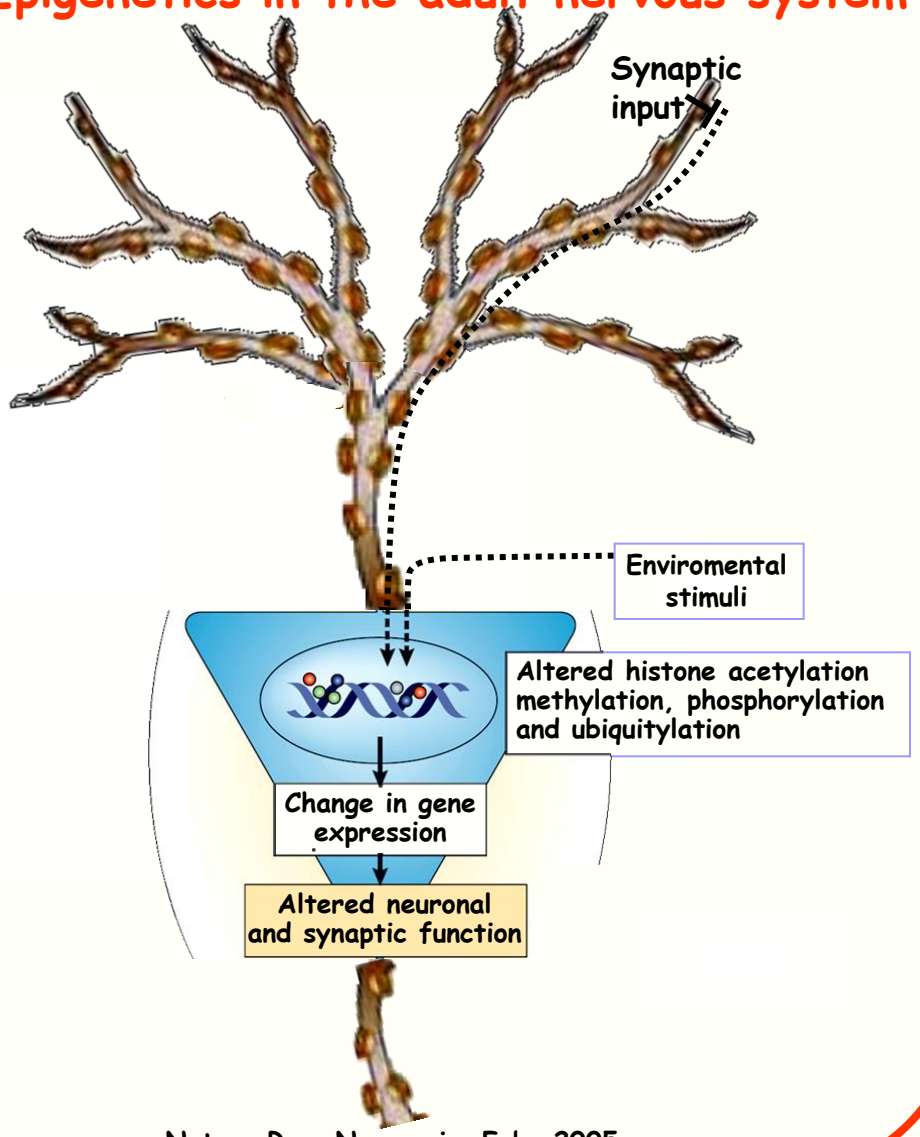


Eziologia della Psicopatologia





Epigenetics in the adult nervous system



Nature Rev. Neurosci., Febr 2005

“Epigenetic programming by maternal behavior”

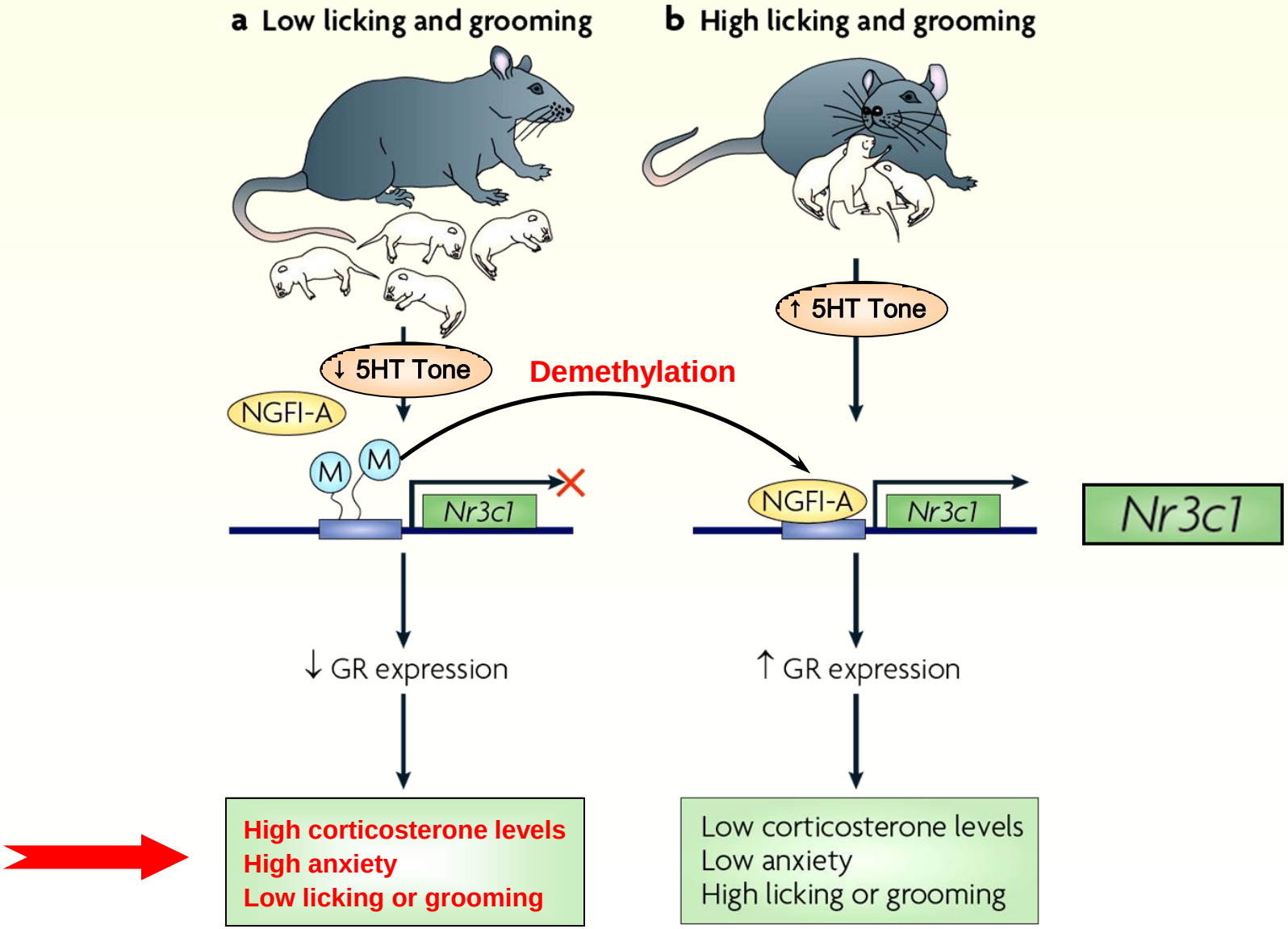
Nature Neurosci., 2004

Motherly Love Coddles the Brain

Science, 2004

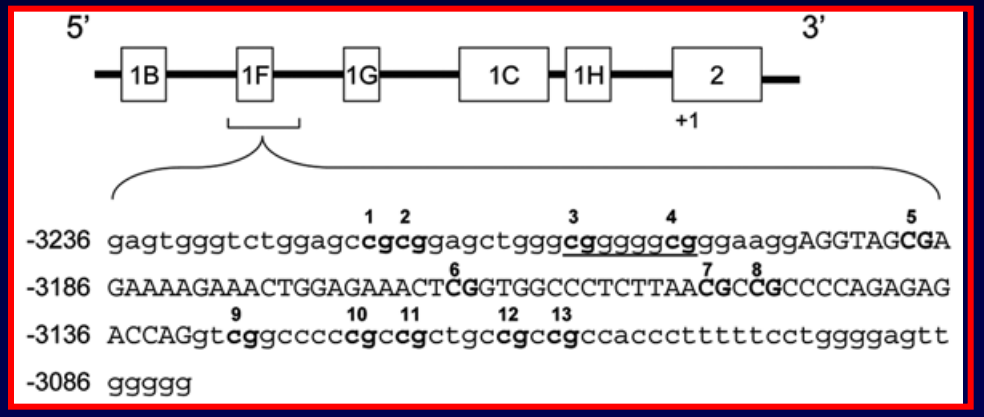
Epigenetic mechanisms of stress responsiveness

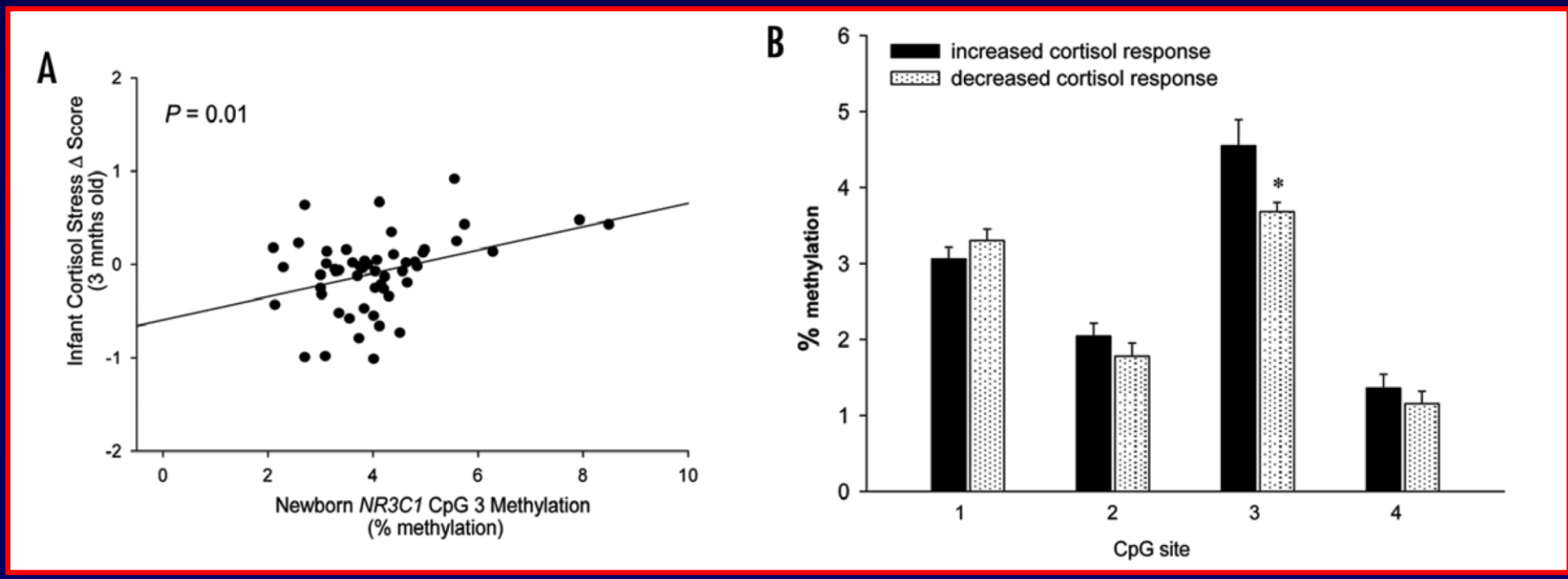
Nature, June 14 2009



Prenatal exposure to maternal depression, neonatal methylation of human glucocorticoid receptor gene (NR3C1) and infant cortisol stress responses

Epigenetics, 2008





Abuse Leaves Its Mark on the Brain

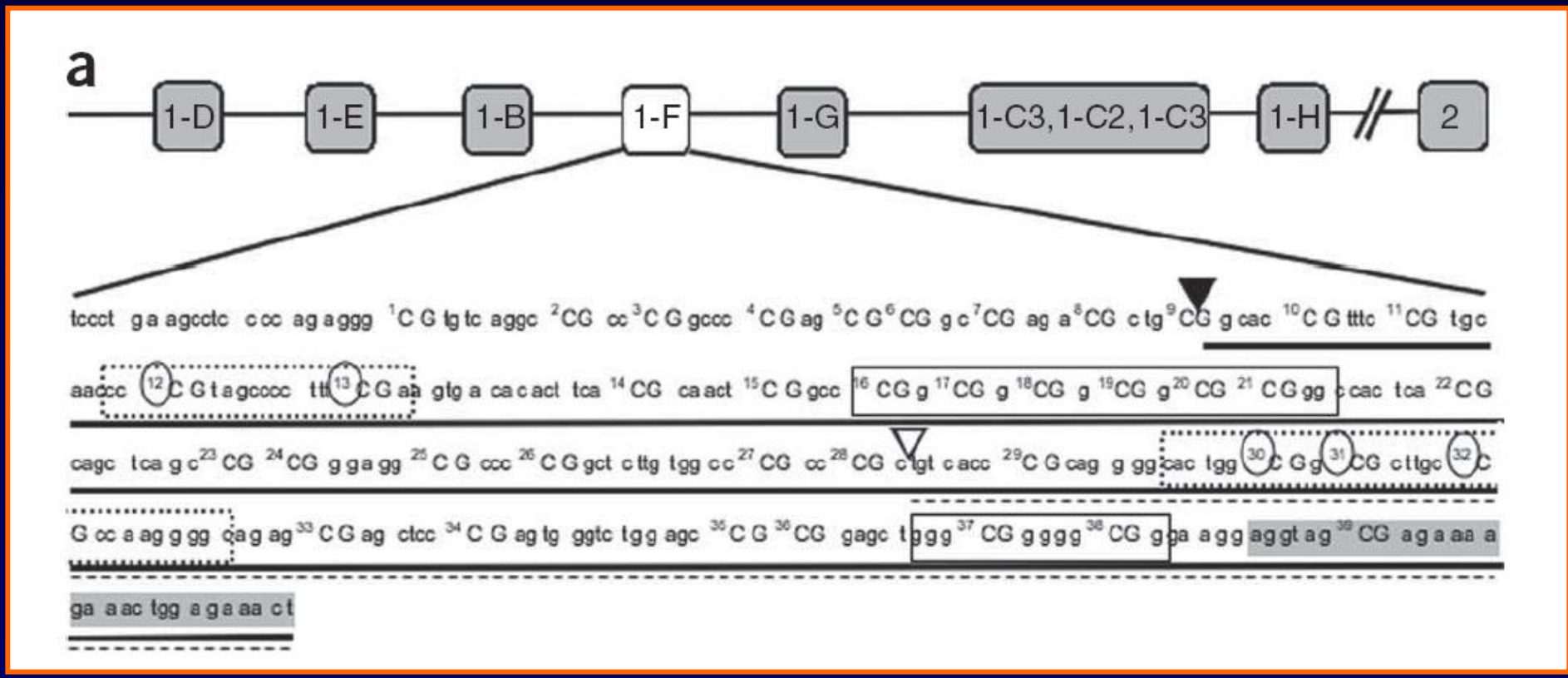
Science,
February 2009

The Epigenetics of Child Abuse

Nature Rev.,
April 2009

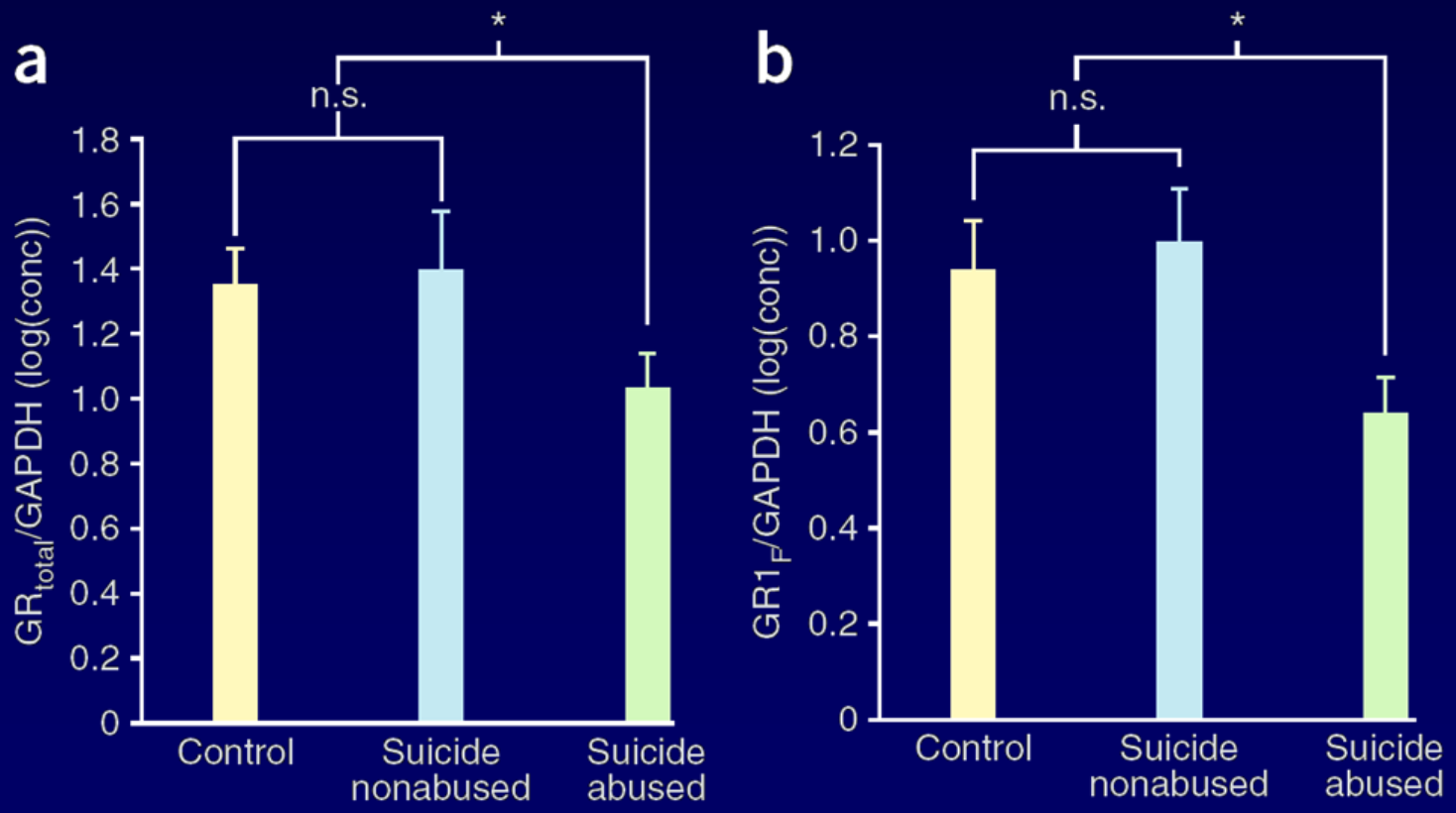
Epigenetic regulation of the glucocorticoid receptor in human brain associates with childhood abuse

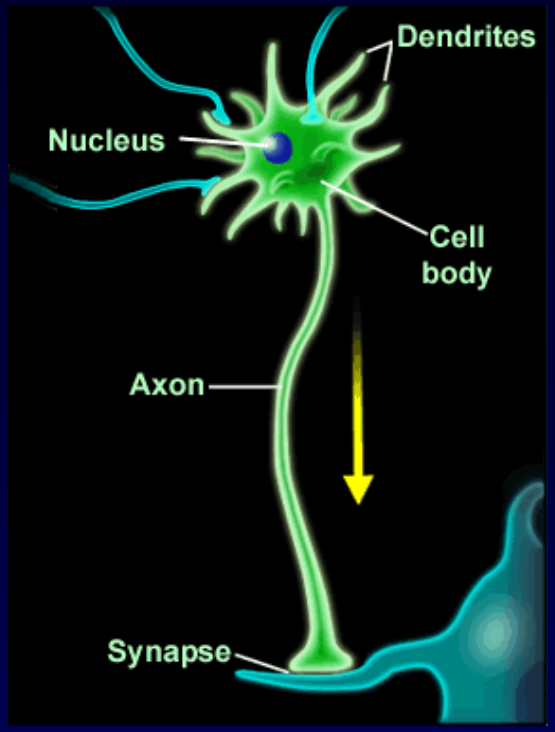
Nature, March 2009



Epigenetic regulation of the glucocorticoid receptor in human brain associates with childhood abuse

Nature, March 2009

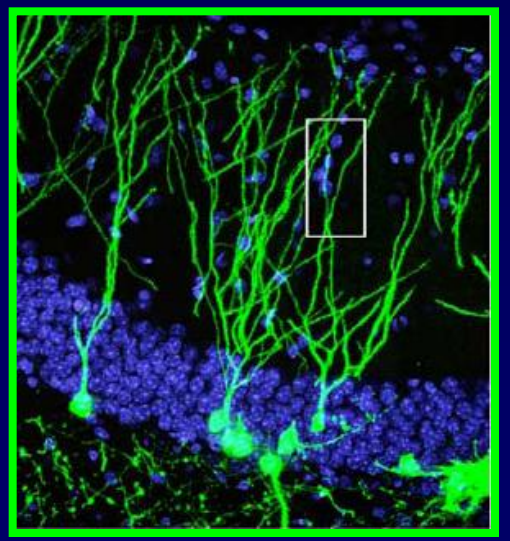




"Once development was ended, the fonts of growth and regeneration of the axons and dendrites dried up irrevocably. In the adult centers, the nerve path are something fixed, and immutable: everything may die, nothing may be regenerated"

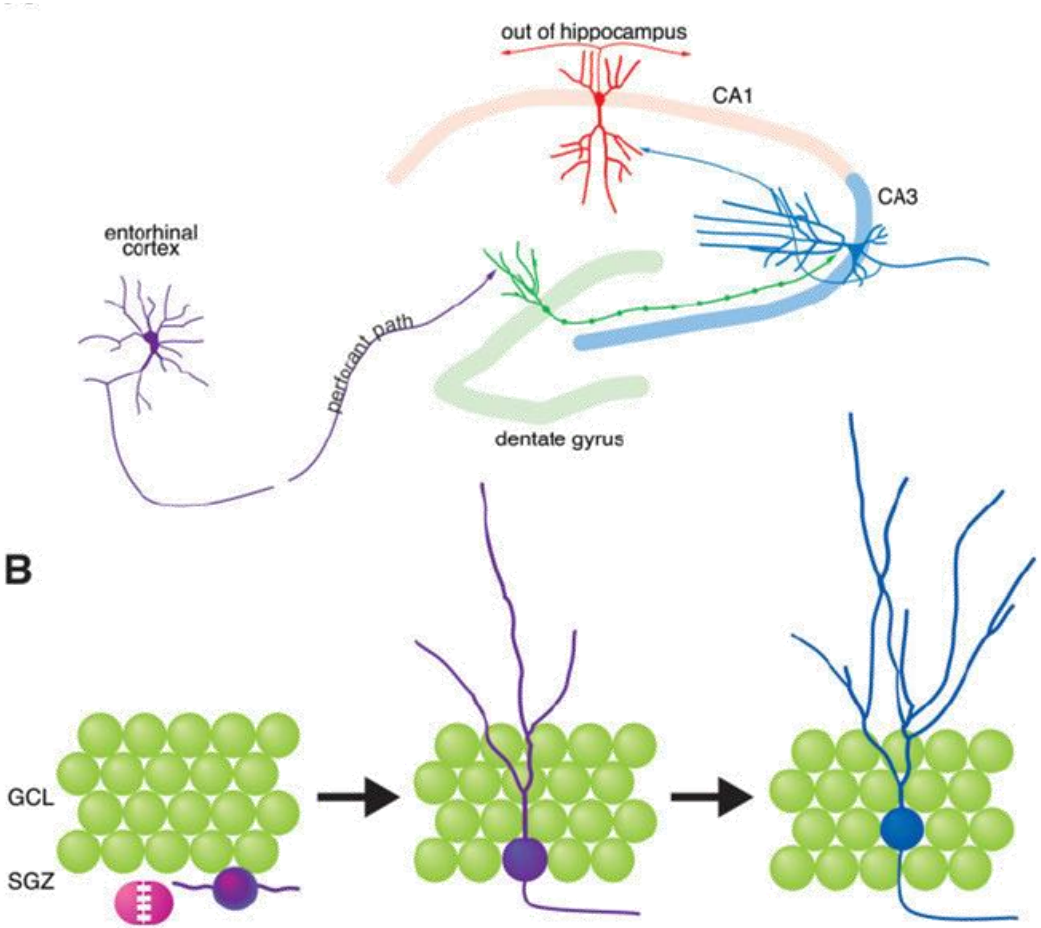
Santiago Ramon Cajal, 1913

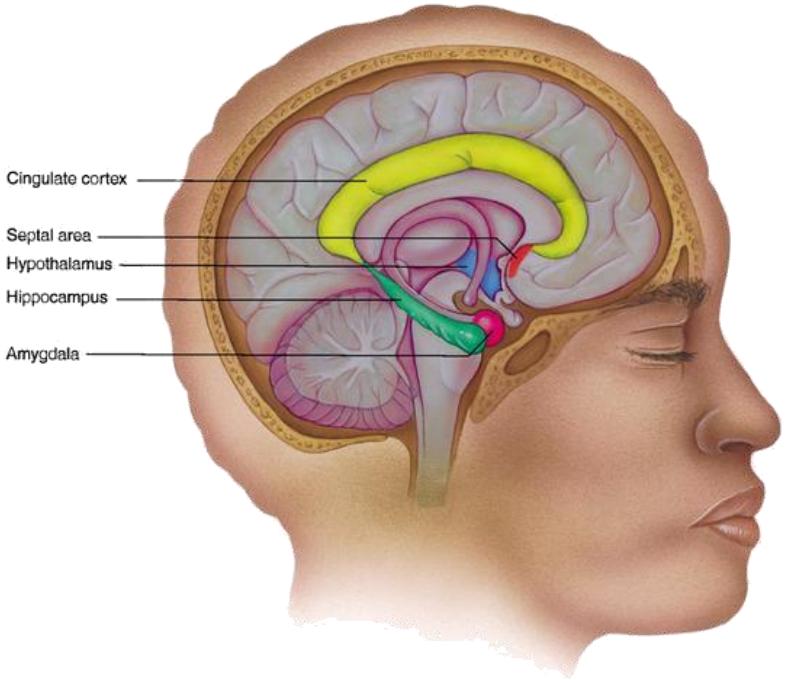
"Neurogenesis in the adult brain: death of a dogma"
Charles G. Gross
***Nature Review- Neuroscience* (2000)**



The Incredible Elastic Brain: How Neural StemCells Expand Our Minds

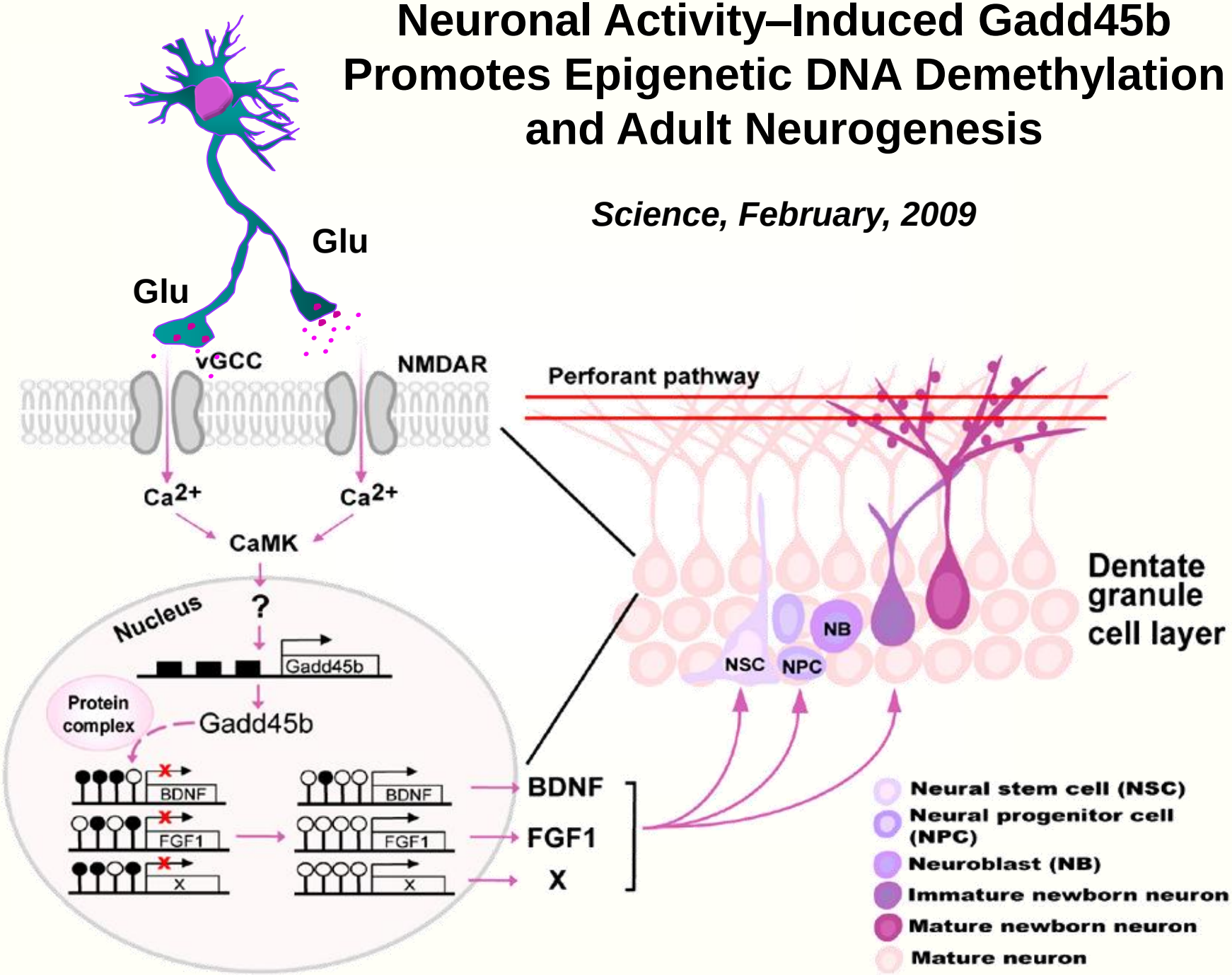
Neuron, 2008





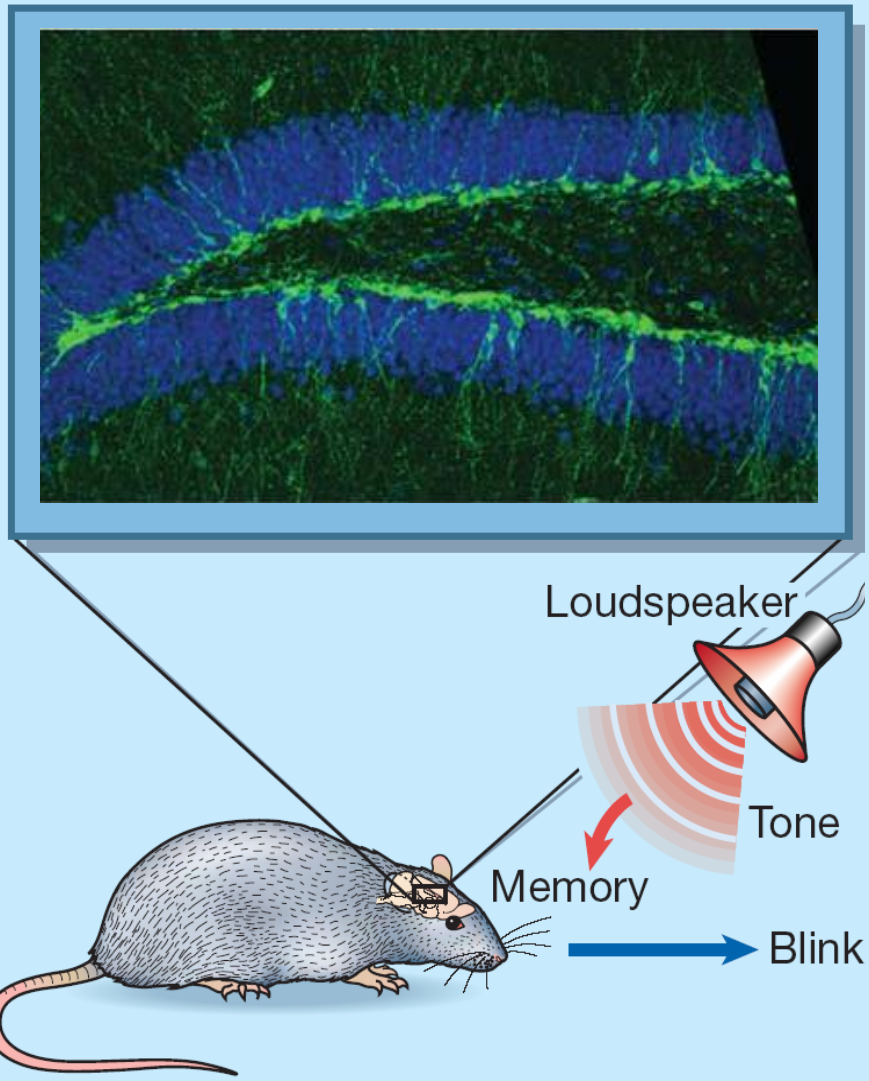
Neuronal Activity–Induced Gadd45b Promotes Epigenetic DNA Demethylation and Adult Neurogenesis

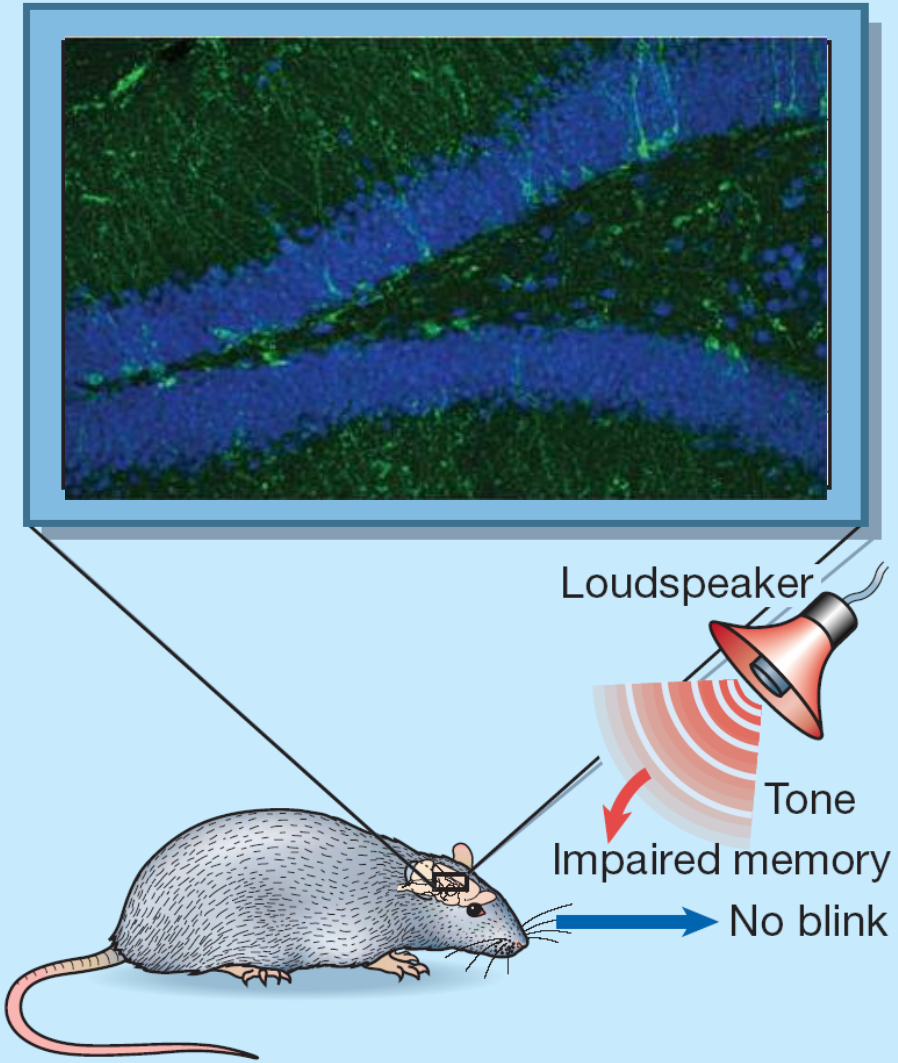
Science, February, 2009



Adult-Born Hippocampal Dentate Granule Cells Undergoing Maturation Modulate Learning and Memory in the Brain

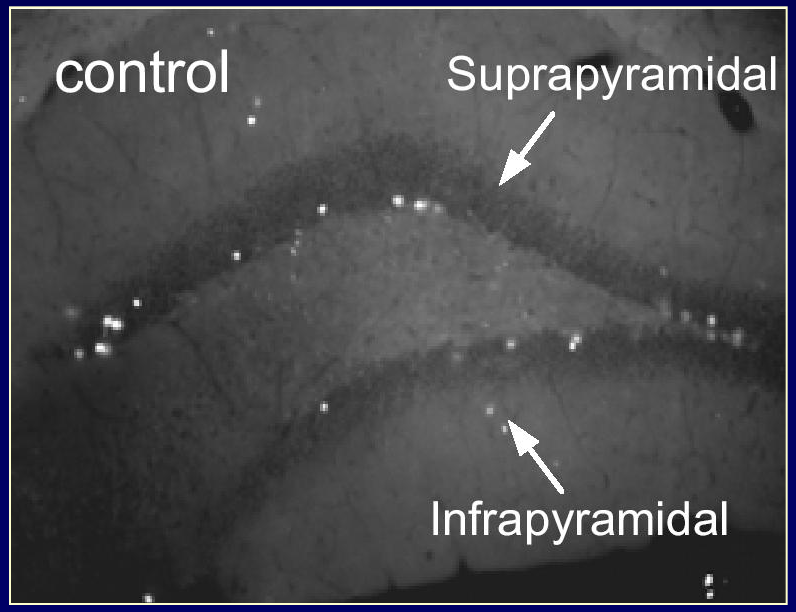
J. Neurosci., October 2009

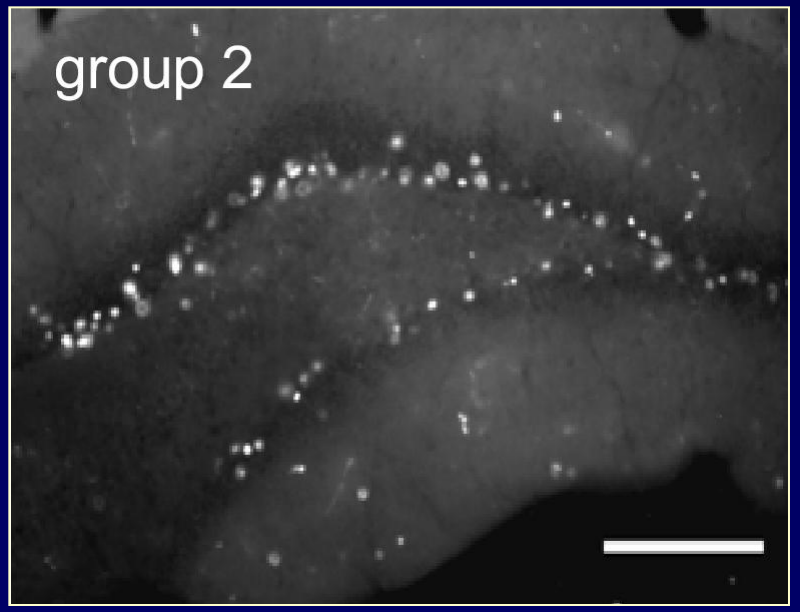




Experience-specific functional modification of the dentate gyrus through adult neurogenesis: a critical period during an immature stage

A.Tashiro, H. Makino, and F. H. Gage, J. Neurosci., marzo 2007





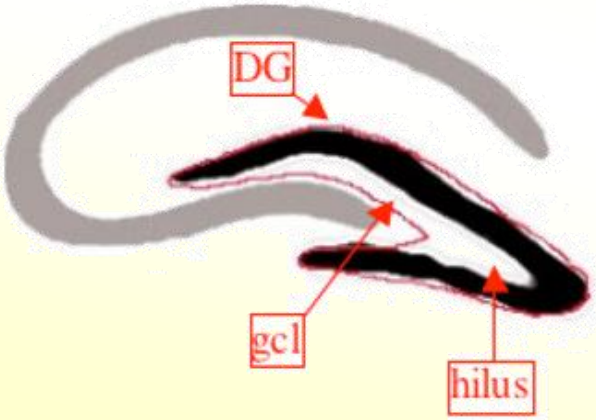
“Neurogenesis in adolescent brain is potently inhibited by ethanol ”

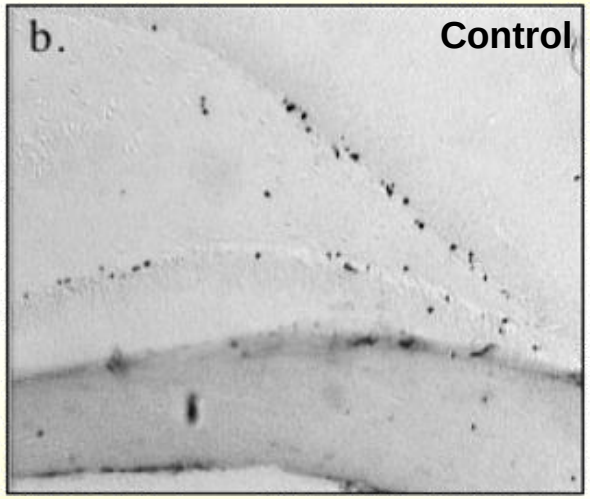
Crews FT, Mdzinarishvili A, Kim D, He J, Nixon K

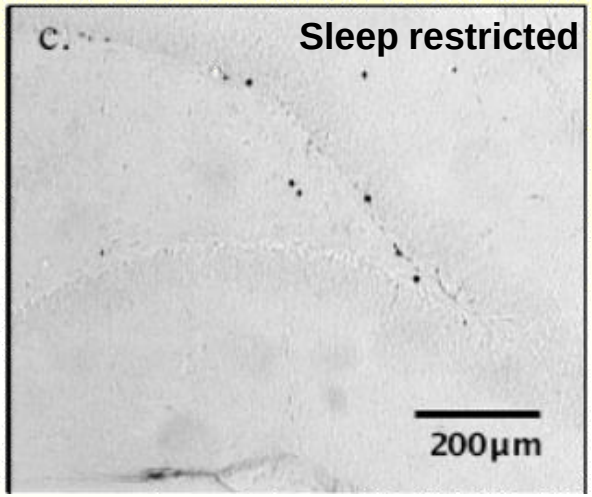
Neuroscience 137 (2): 437-445 (2006)

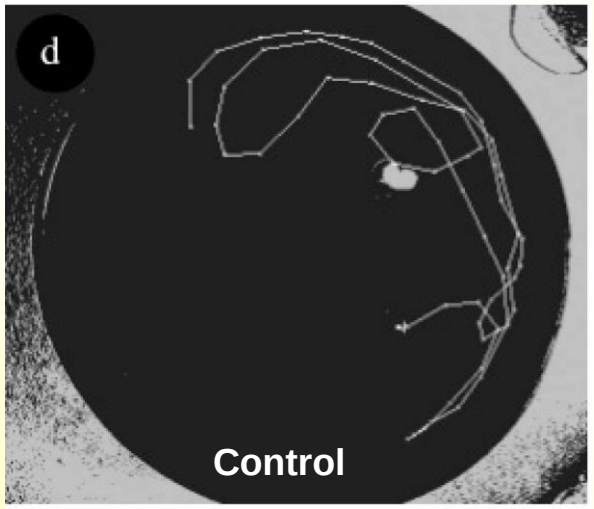
Sleep restriction suppresses neurogenesis induced by hippocampus-dependent learning

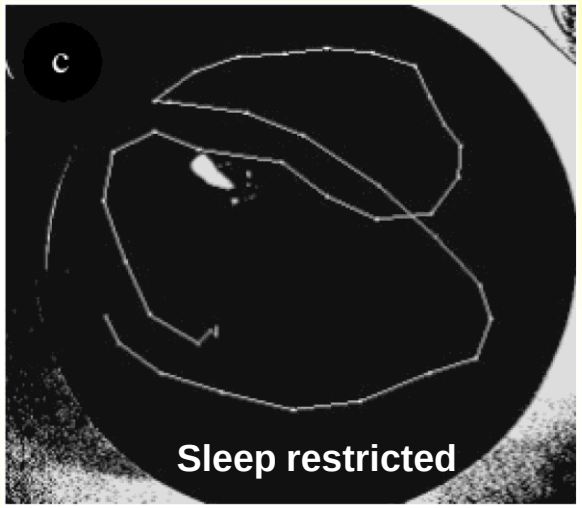
I.S. Haiston et al., J. Neurophysiol., 2005





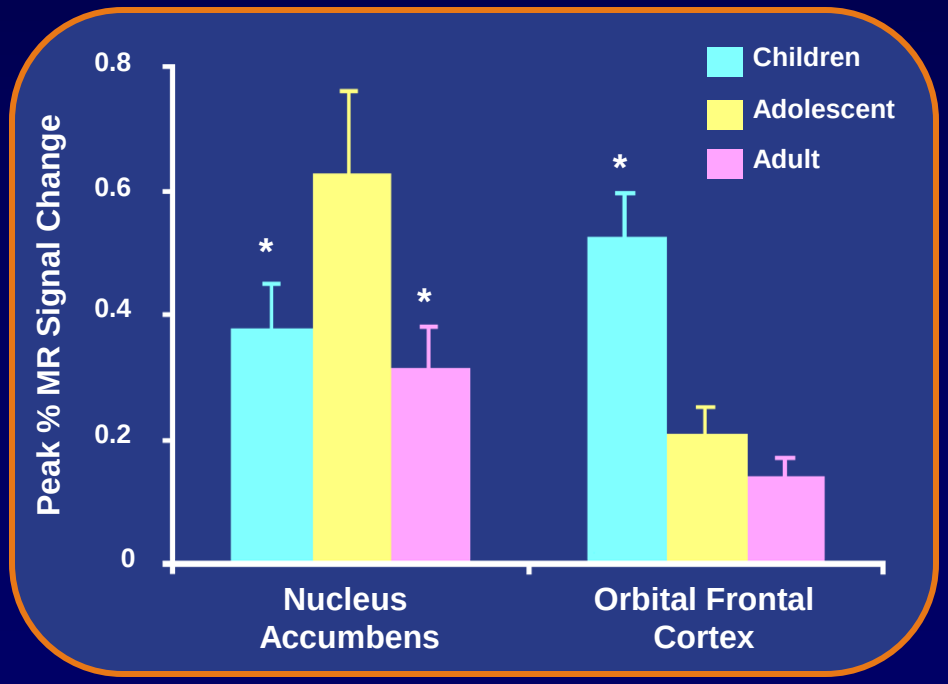


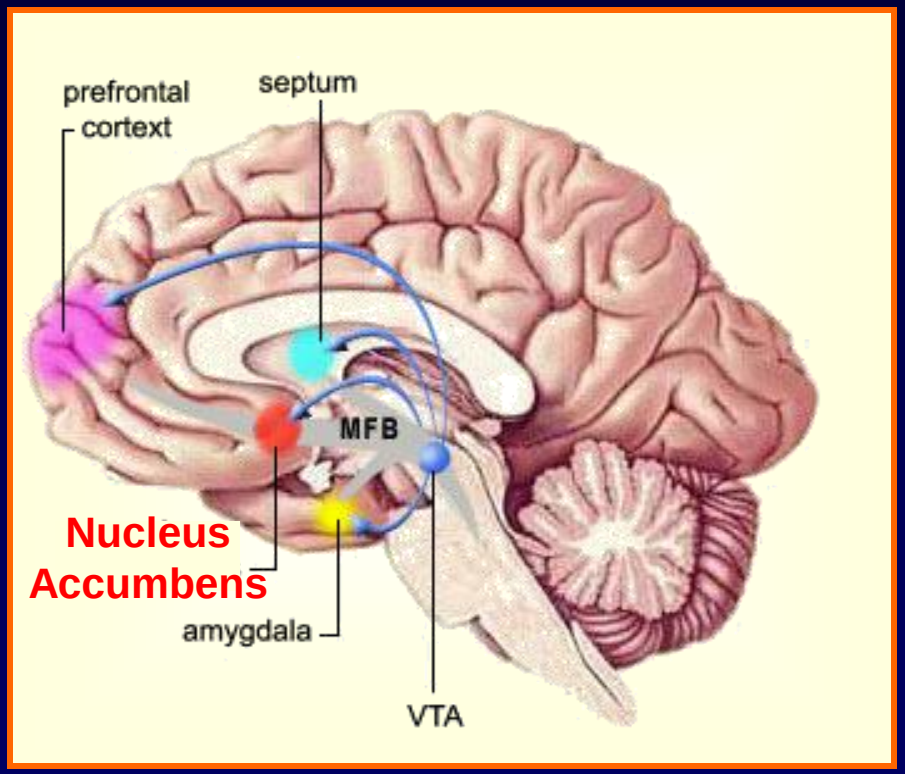


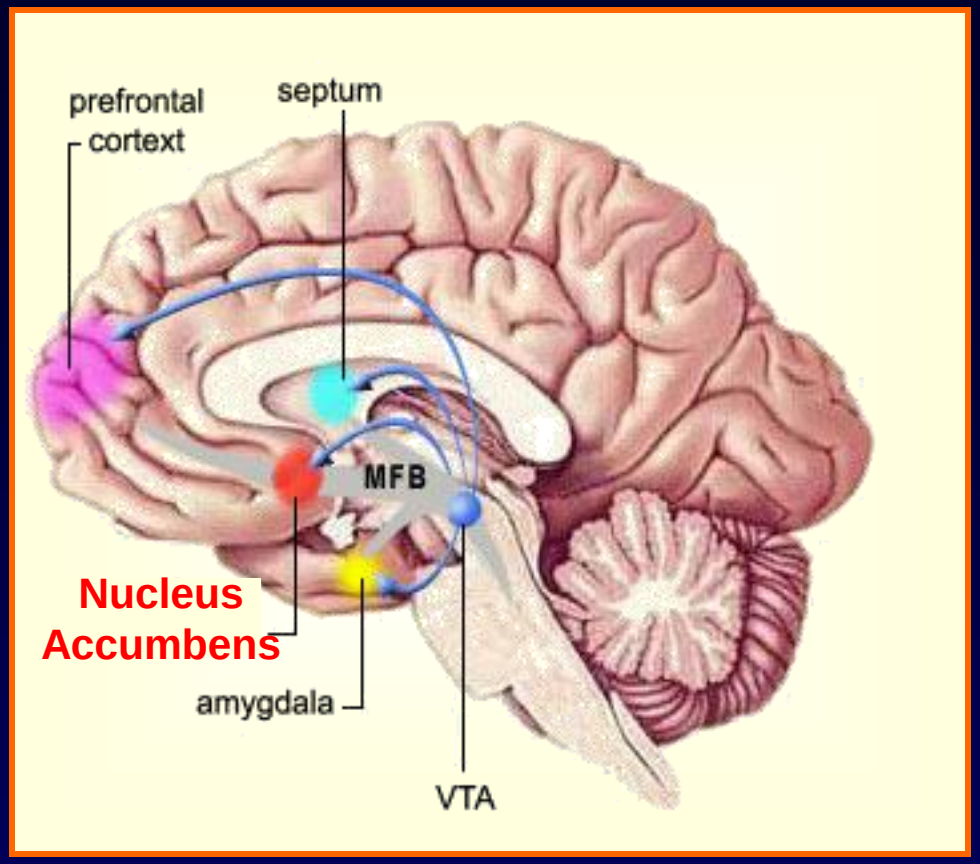


Earlier Development of the Accumbens Relative to Orbitofrontal Cortex Might Underlie Risk-Taking Behavior in Adolescents

A. Galvan et al., J. Neurosci, 2006







Eroina
Cocaina
Mariuana

GABA/BDZ

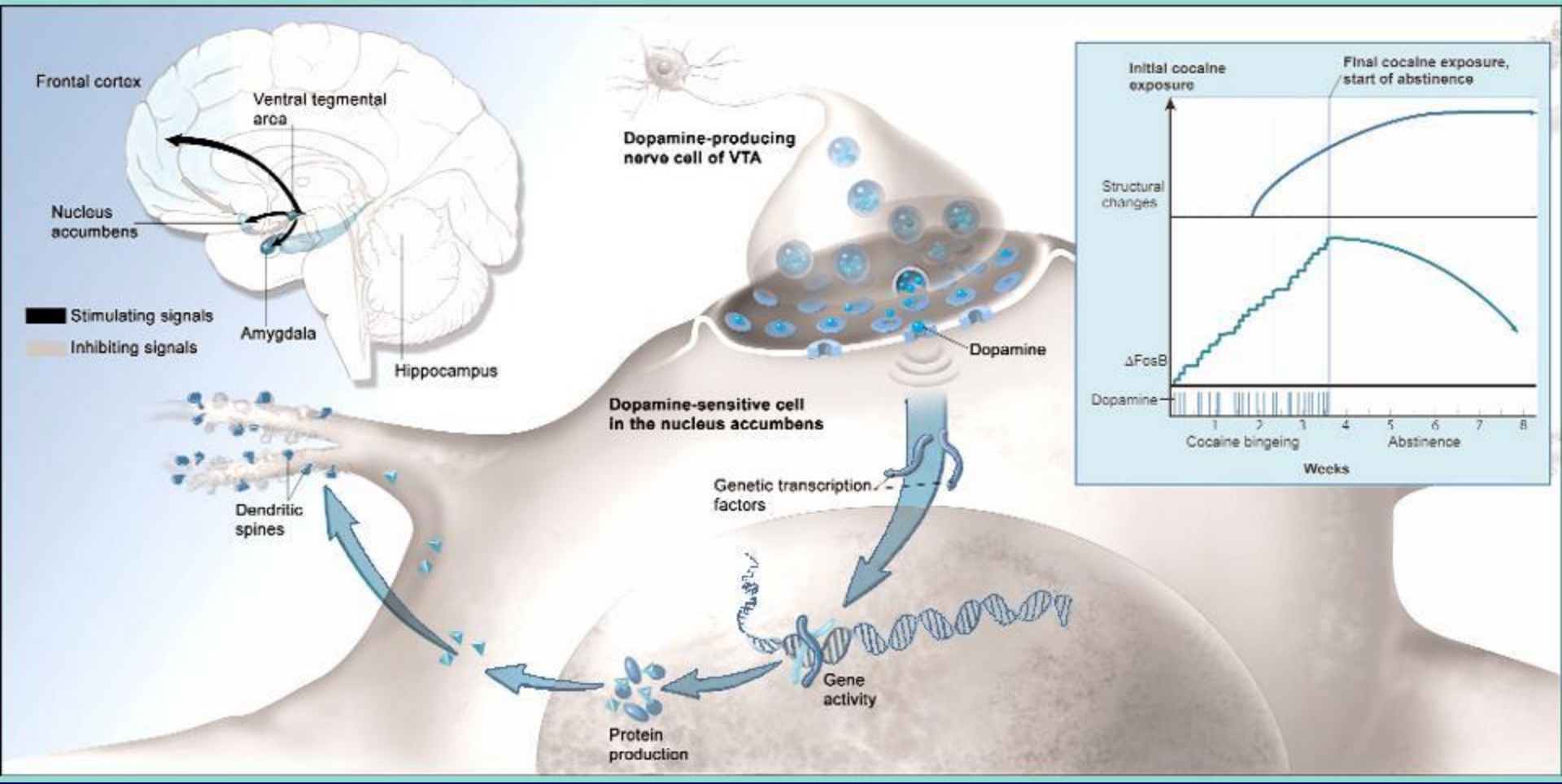
5HT

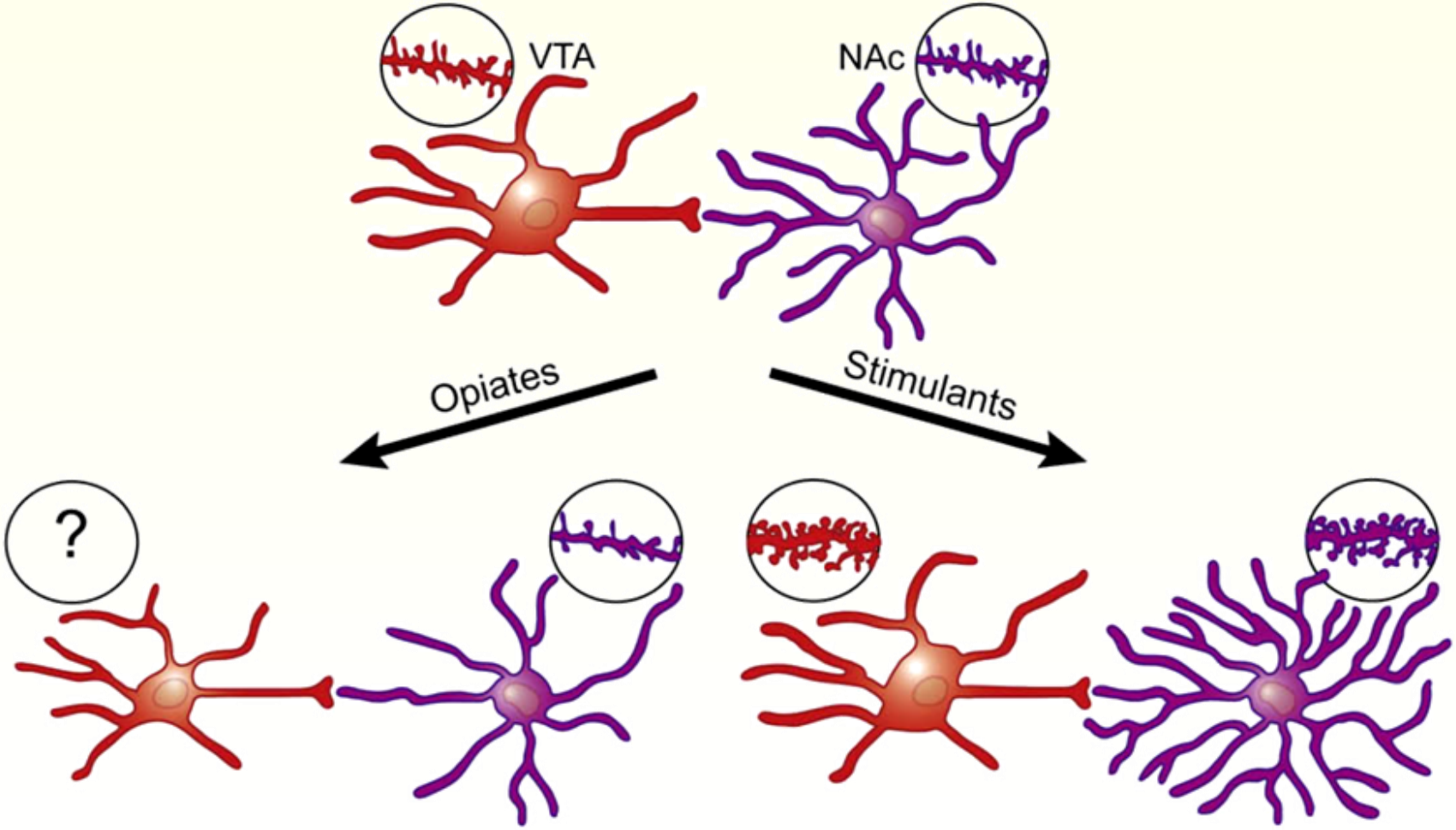
α_2

α_2

Dopamina

DA

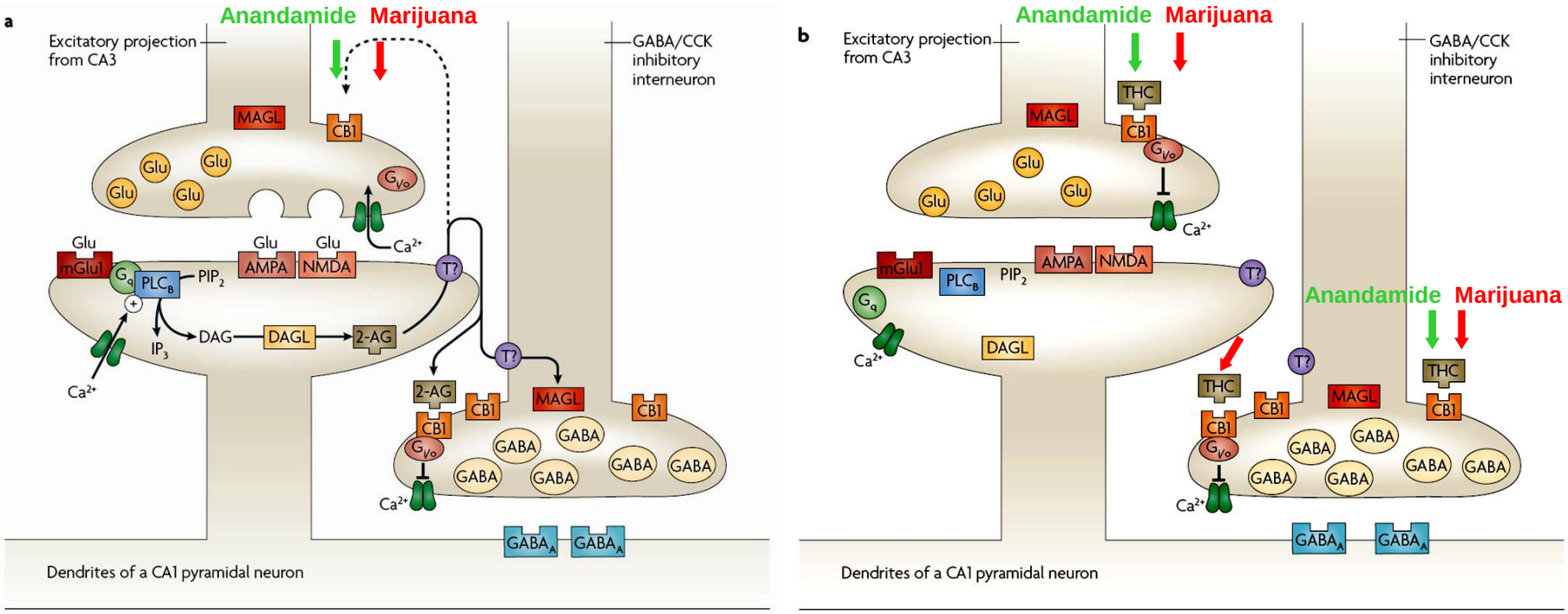

Frontal cortex
Ventral tegmental area
Nucleus accumbens
Stimulating signals
Inhibiting signals
Amygdala
Hippocampus
Dopamine-producing nerve cell of VTA
Dopamine
Dopamine-sensitive cell in the nucleus accumbens
Dendritic spines
Genetic transcription factors
Gene activity
Protein production
Initial cocaine exposure
Final cocaine exposure, start of abstinence
Structural changes
ΔFosB
Dopamine
1
2
3
4
5
6
7
8
Cocaine bingeing
Abstinence
Weeks



From Neuropharmacol., 2009

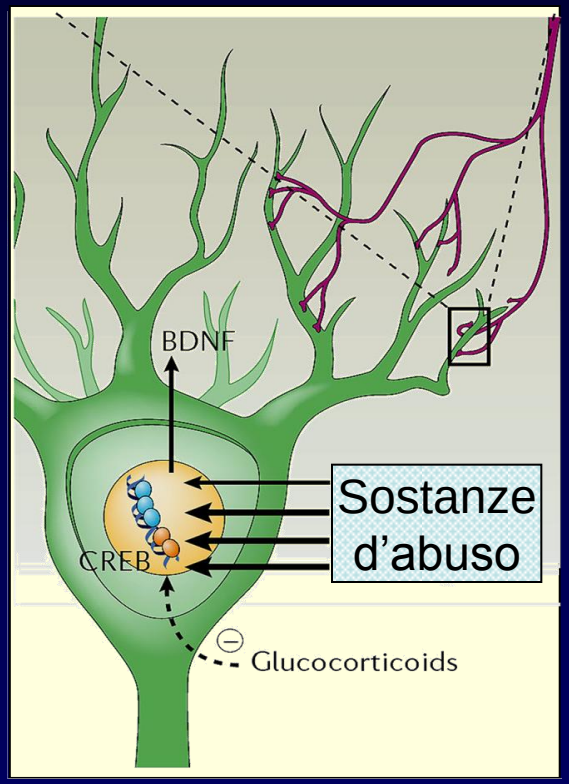
Endocannabinoids Mediate Synaptic Plasticity at Mixed Synapses

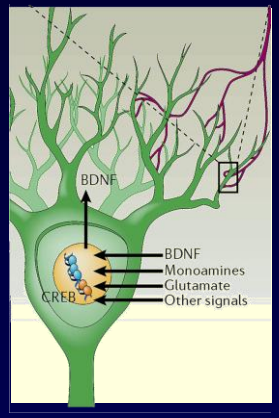
Neuron, 2007



Cannabinoids inhibit the formation of new synapses between hippocampal neurons in culture.

D Kim and S.A. Thayer, J. Neurosci, 2001



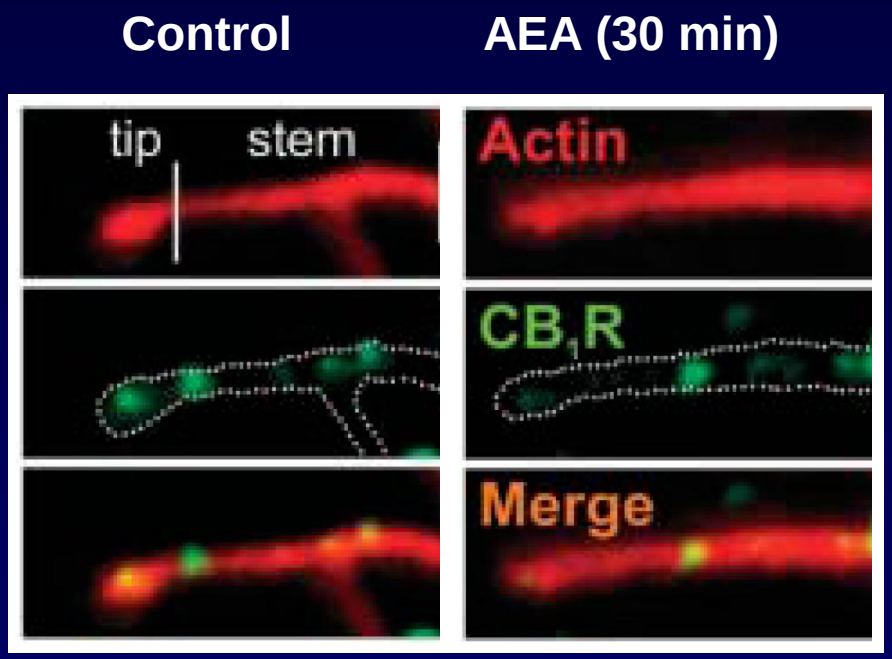


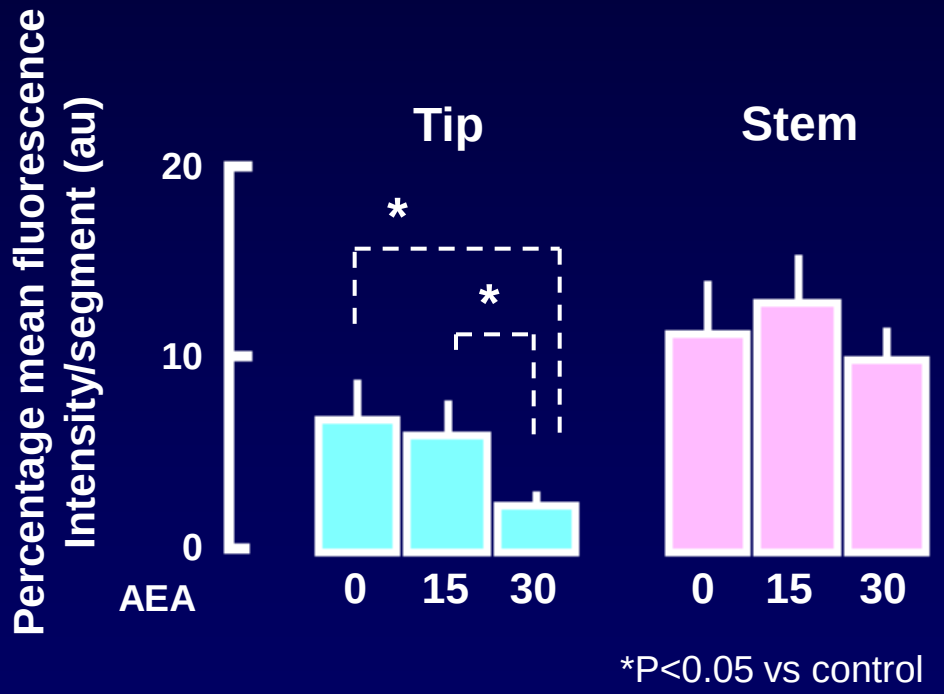
Repeated cannabinoid exposure during perinatal, adolescent or early adult ages produces similar longlasting deficits in object recognition and reduced social interaction in rats

M. O'Shea et al., J. Psychopharmacol., 2006

Hardwiring the Brain: Endocannabinoids Shape Neuronal Connectivity

Science may 2007



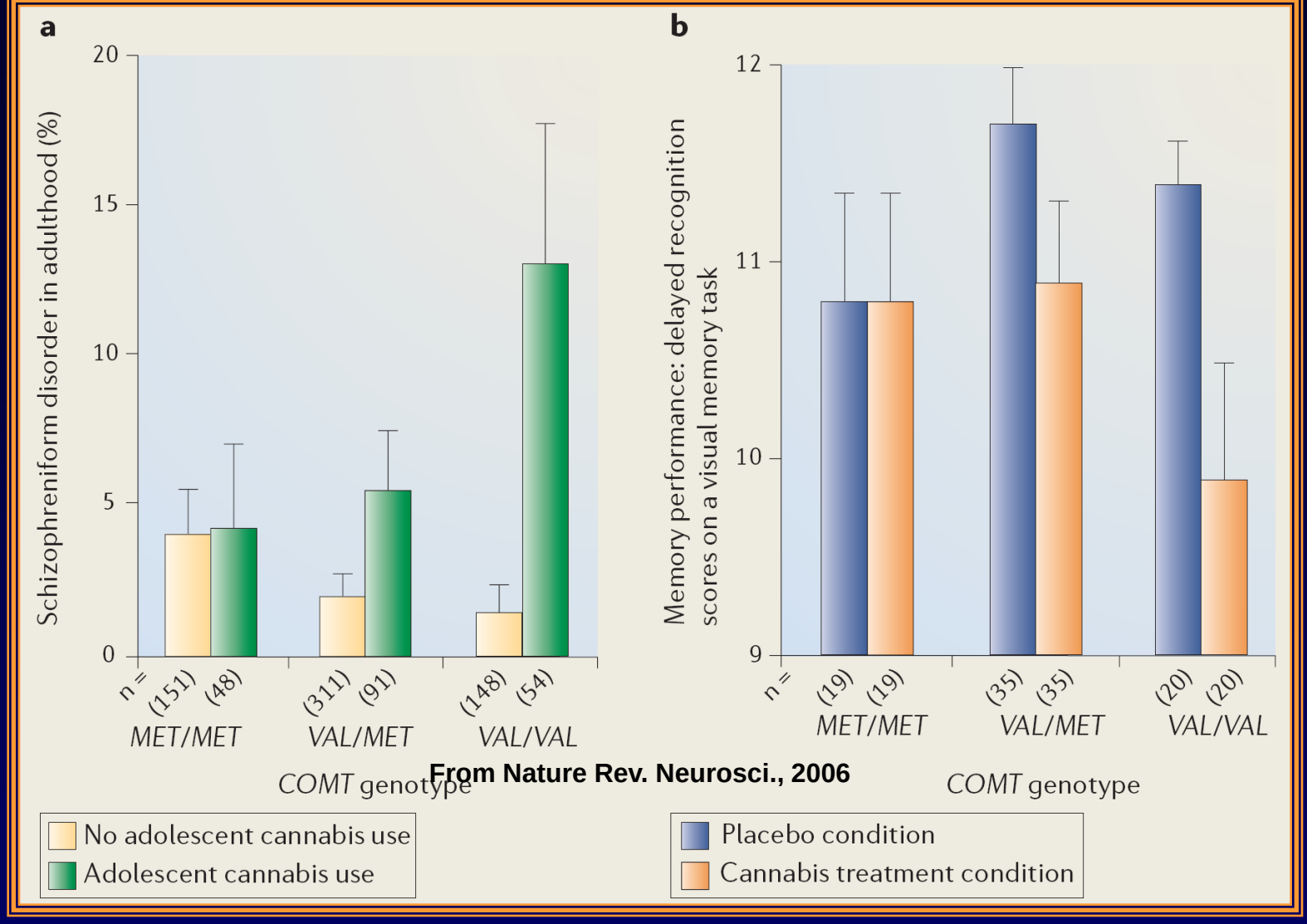


Endocannabinoid signaling regulates synaptogenesis and target selection in vivo. Marijuana consumption may affect neurodevelopment and disrupt the proper postsynaptic target selectivity.

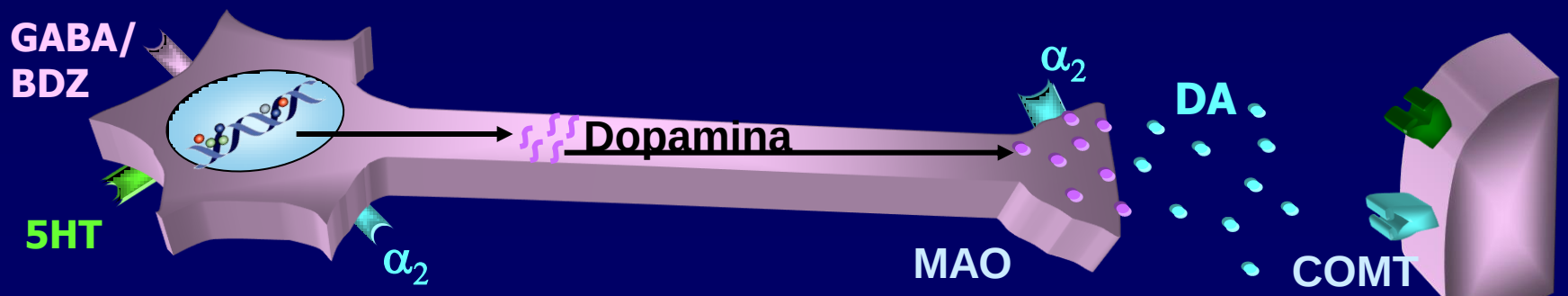
Cannabis use and risk of psychotic or affective mental health outcomes: a systematic review.

T.H. Moore et al. Lancet, 2007

……we conclude that there is now sufficient evidence to warn young people that using cannabis could increase their risk of developing a psychotic illness later in life.



From Nature Rev. Neurosci., 2006

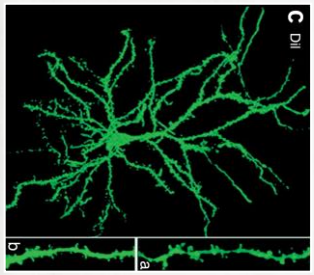


Gerald M. Edelman
Piú grande del cielo

Lo straordinario dono fenomenico della coscienza

Nobel per la Medicina 1972
Laurea Honoris Causa in Biologia
Università degli Studi di Cagliari 1989

1 MIL di Miliardi tra
Neuroni e Sinapsi



Biblioteca Einaudi

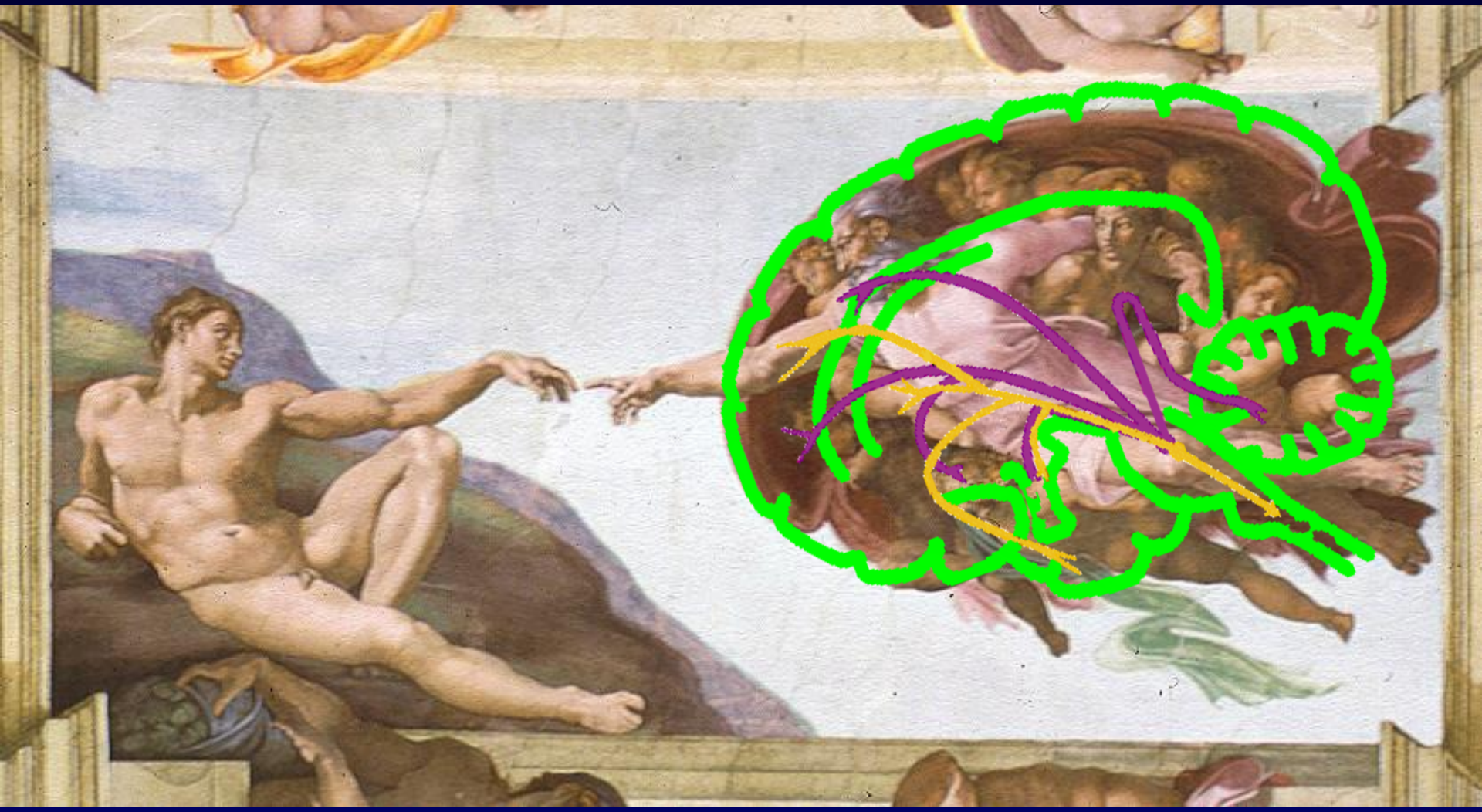
The Brain

The Brain - is wider than the Sky –
For – put them side by side –
The one the other will contain
With ease – and You – beside –

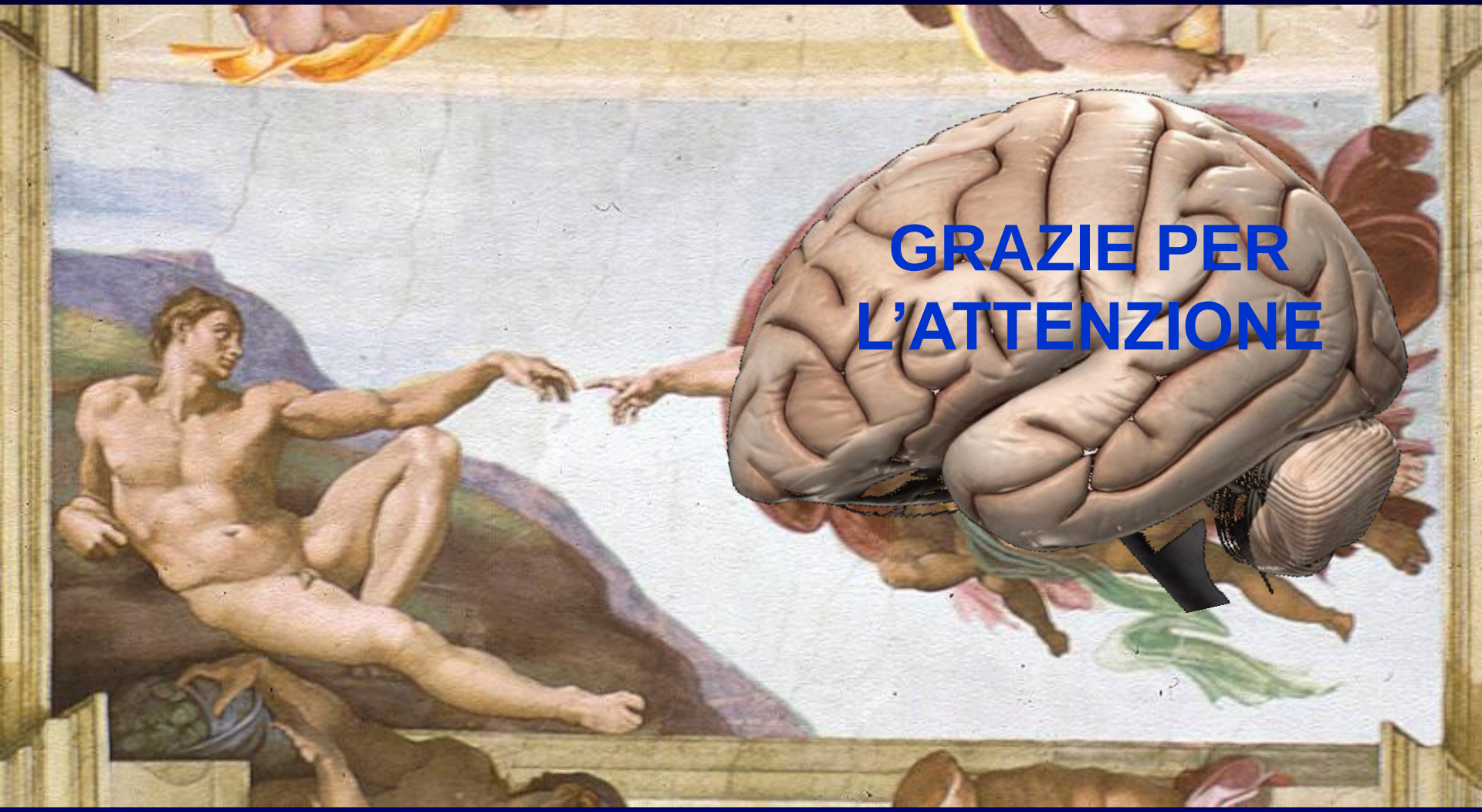
The Brain is deeper than the sea –
For – hold them – Blue to Blue –
The one the other will absorb –
As sponges – Buckets – do

The Brain is just the weight of God –
For – Heft them – Pound for Pound –
And they will differ – if they do –
As syllable from Sound –

Emily Dickinson
(1830-1886)



Michelangelo XVI secolo



Michelangelo XVI secolo