NIH Blueprint for Neuroscience Research

Sleep Research Society®

Beyond the Symptom: The Biology of Fatigue
September 27 – 28, 2021

The Role of the Brainstem in Slow-Wave-Sleep Control

Christelle Anaclet, Ph.D.
Assistant Professor,
Department of Neurobiology,
UMass Chan Medical School,
Worcester, MA

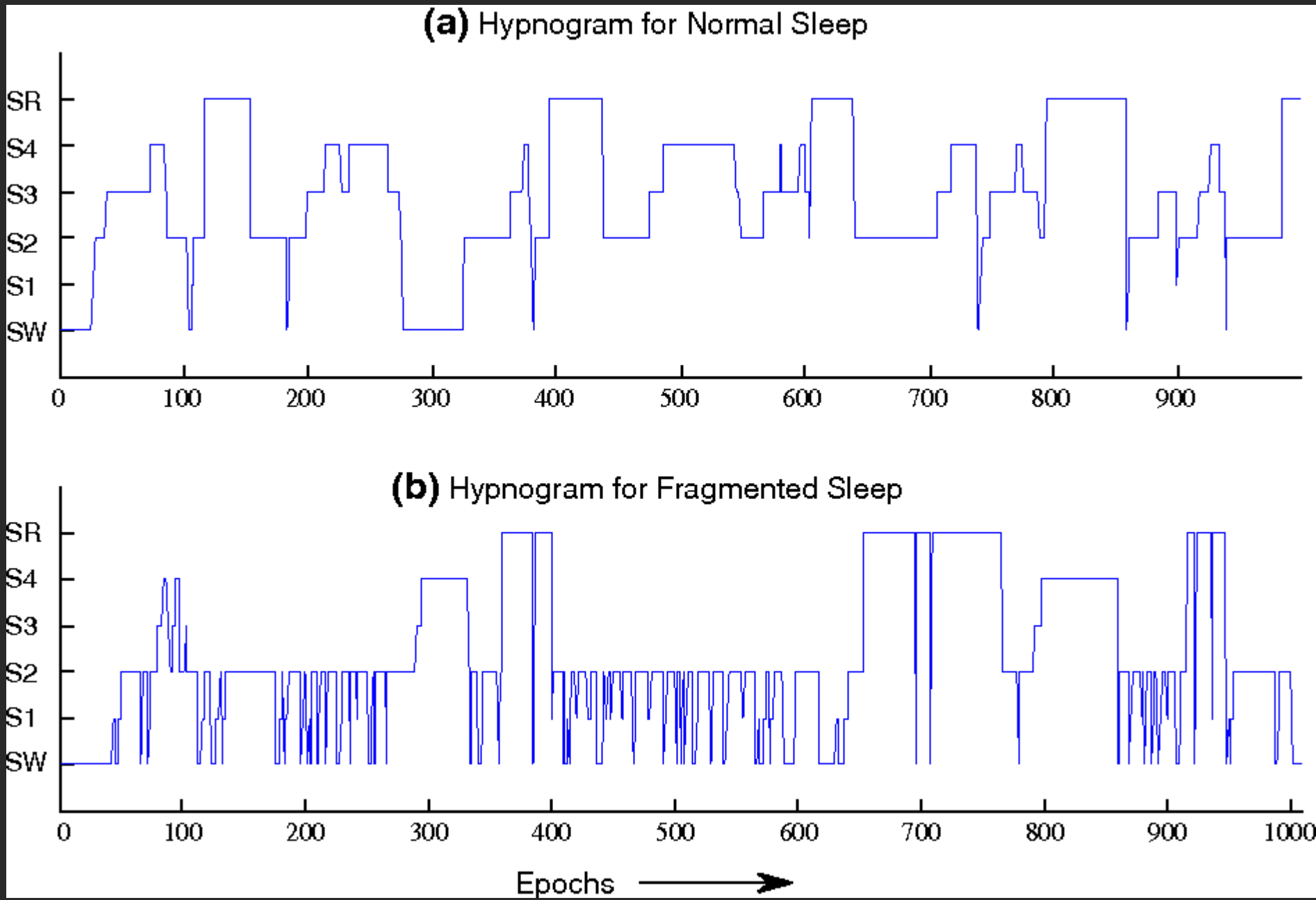
Disclaimer and Disclosures

Disclaimer
This certifies that the views expressed in this presentation are those of the author and do not reflect the official policy of the NIH.

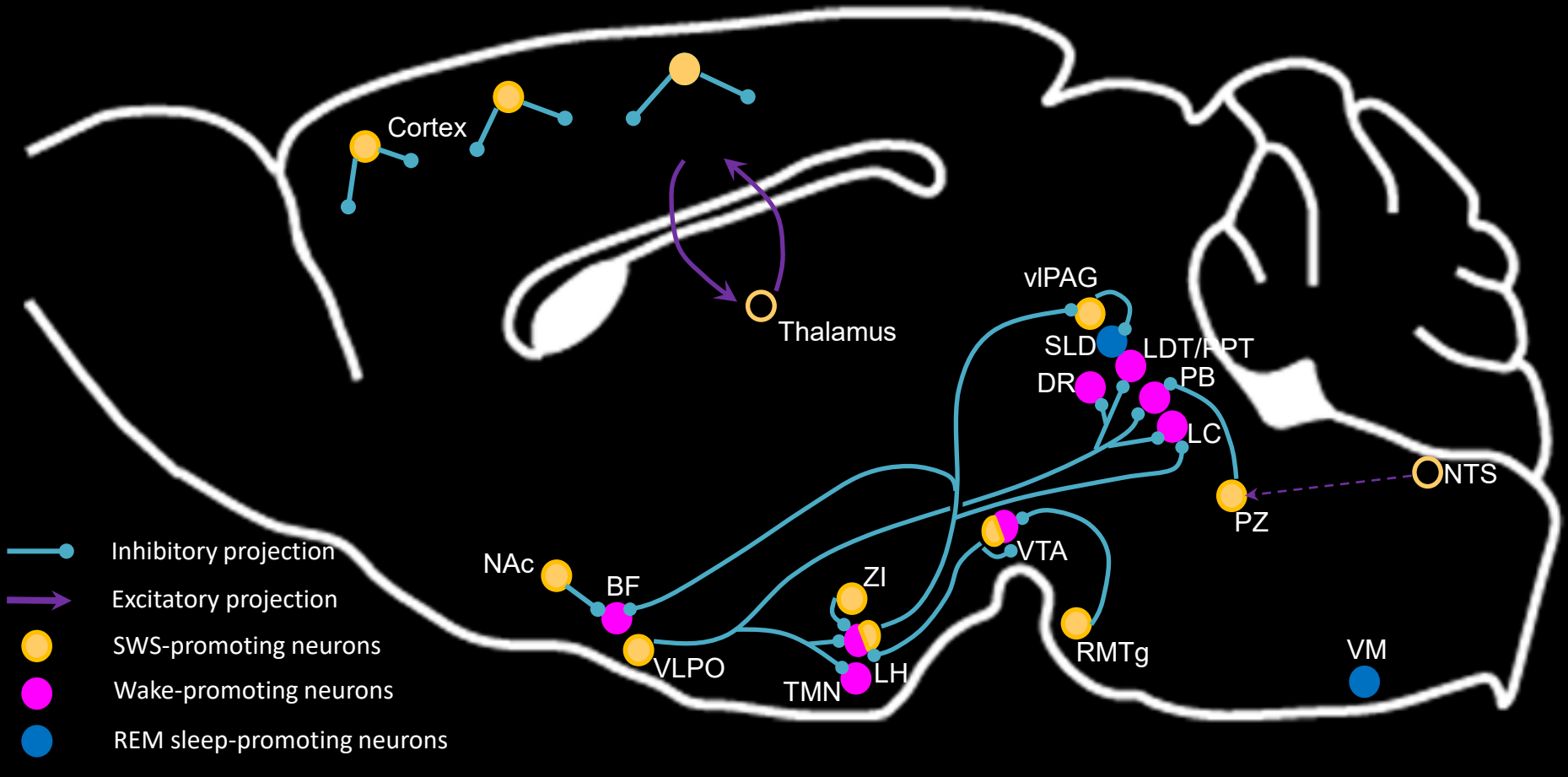
Disclosure
This certifies that I, Christelle Anaclet, have no financial relationship that is relevant to the subject matter of this presentation.

Fatigue

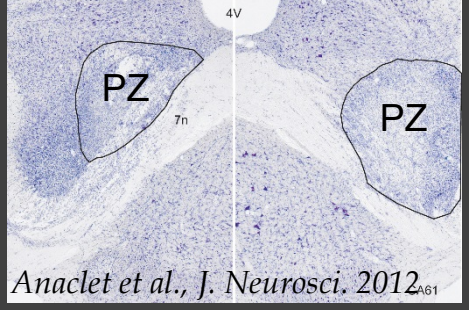
Decreased Sleep Quality



NREM Sleep Promoting Circuitries



Effect of PZ Lesion on Rat Sleep-Wake Cycle



Wake

NREM sleep

REM sleep

Control n=13
PZ Lesion n=11

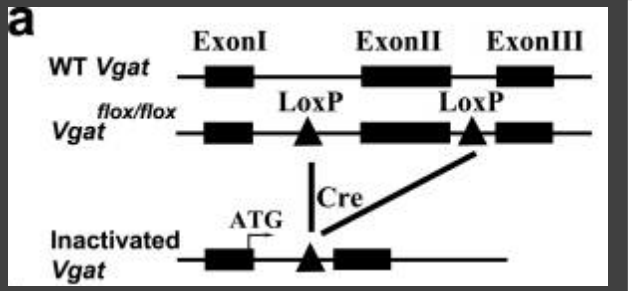
% of time

7 am 7 pm 7 am

Light Dark 24 hrs

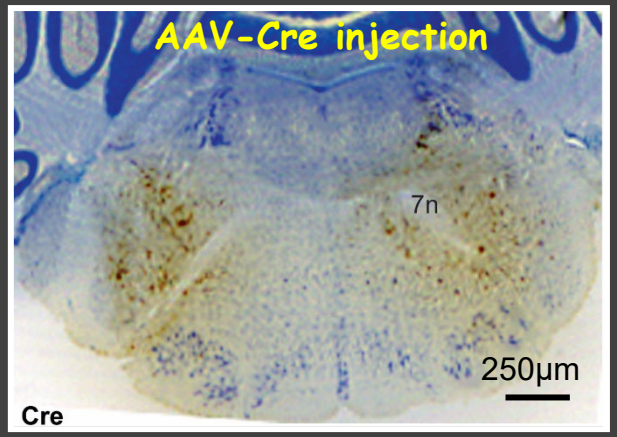
GABA Neurons Located in the Parafacial Zone are Involved in Sleep Control

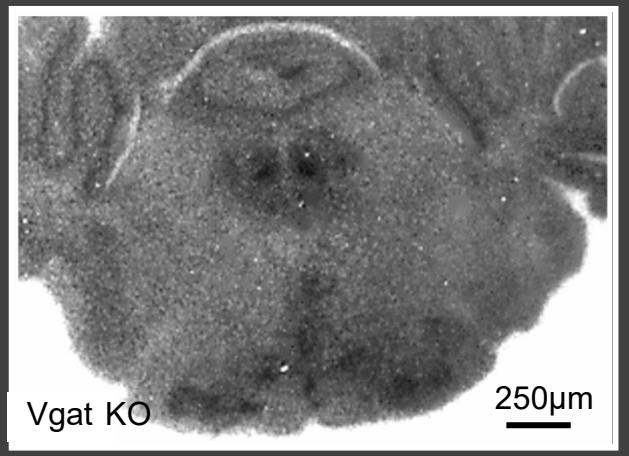
Anaclet et al., JN 2012

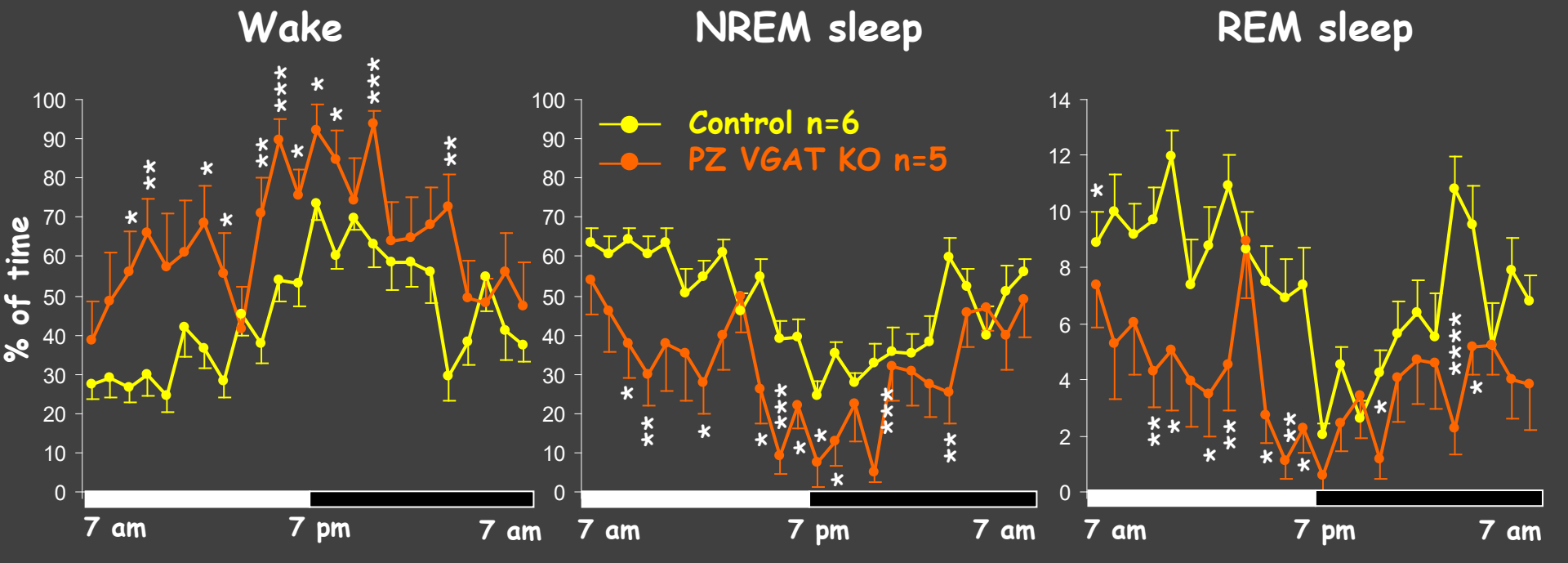


Vgat$^{flox/flox}$ mice

(Tong et al., 2008)

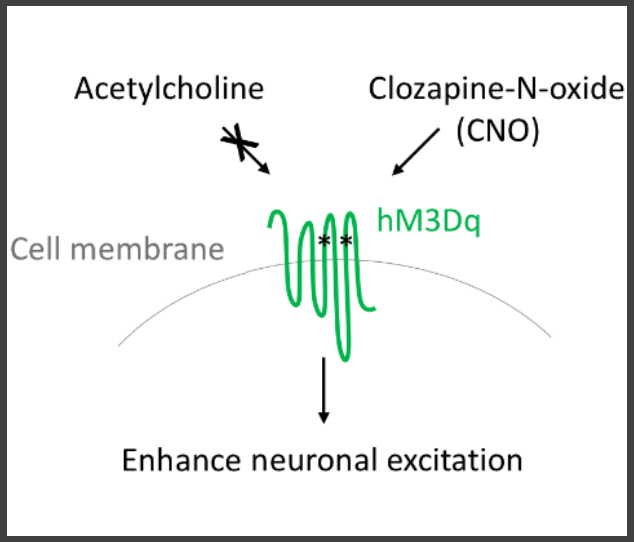


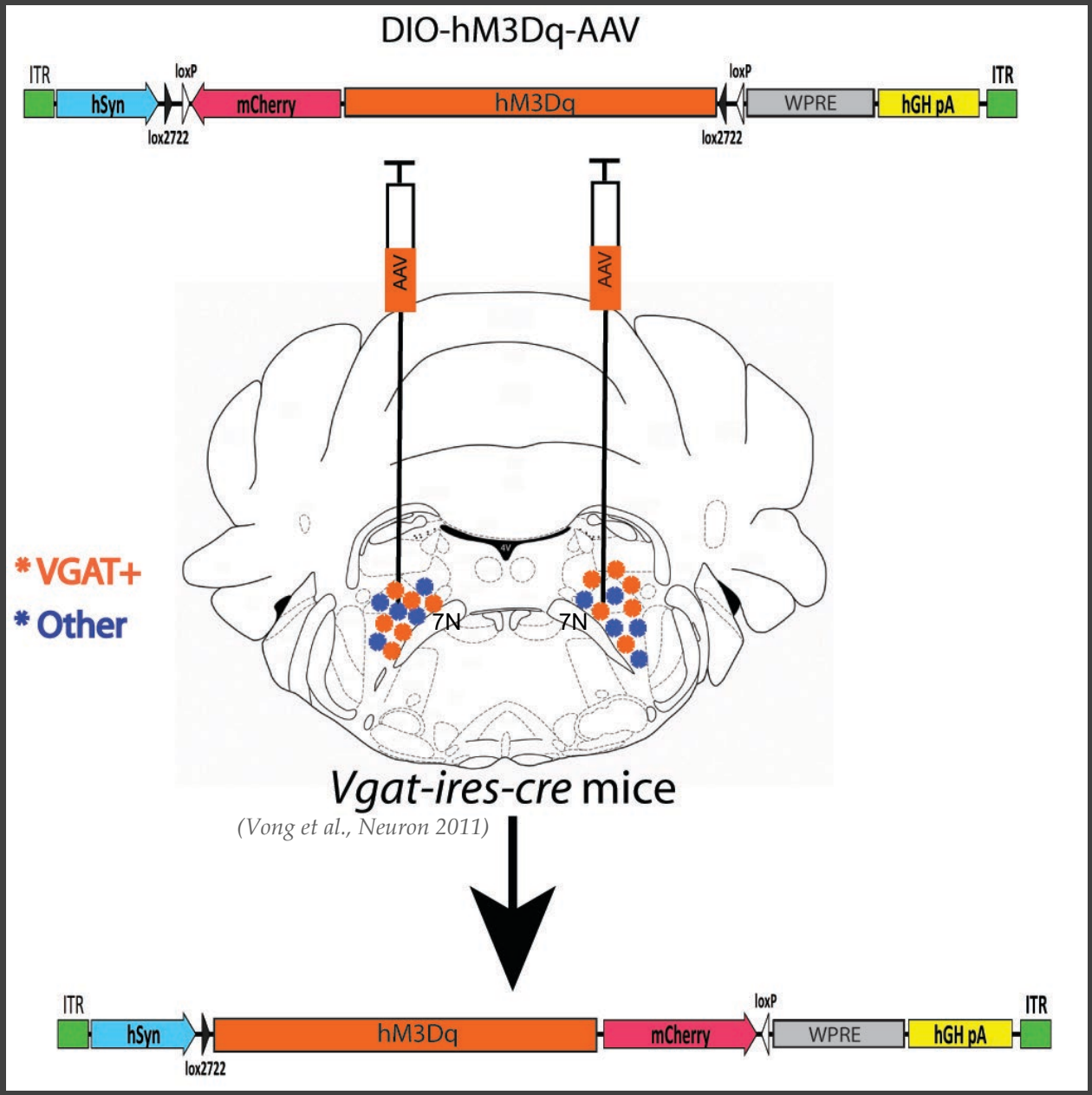




Chemogenetic Activation of PZ GABAergic Neurons

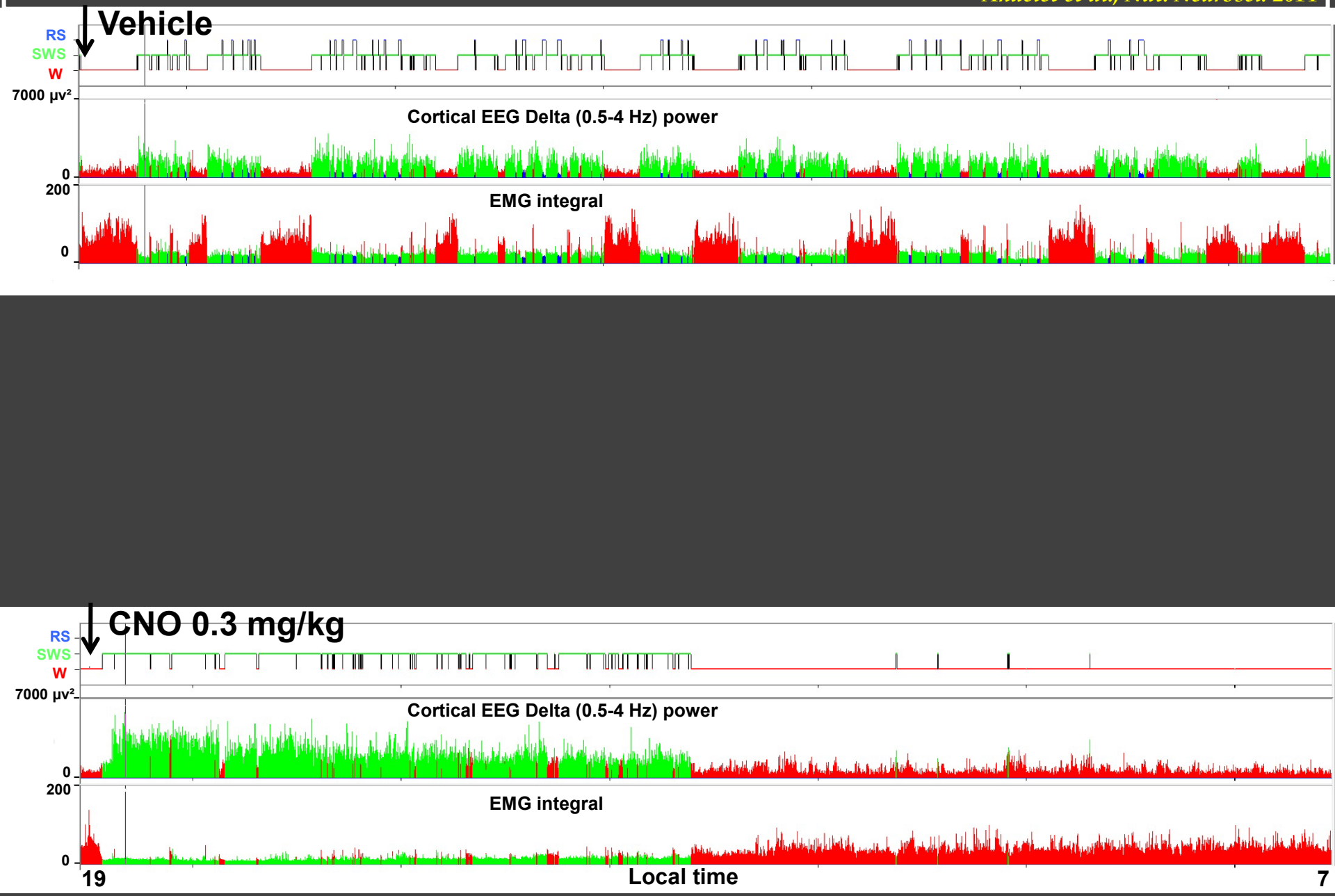
Anaclet et al., Nat. Neurosci., 2014





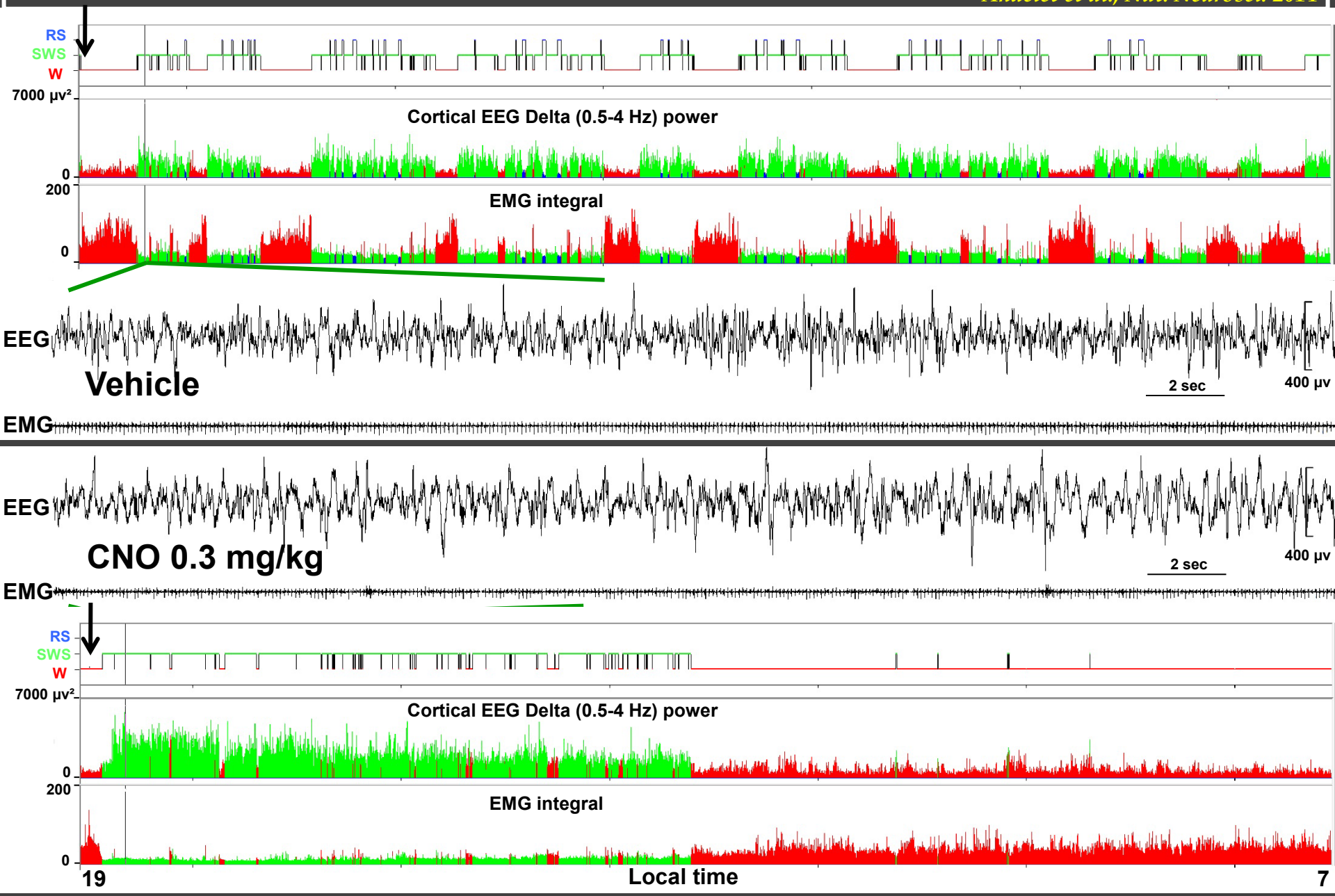
Activation of PZ GABA Neurons Induces SWS

Anaclet et al., Nat. Neurosci. 2014



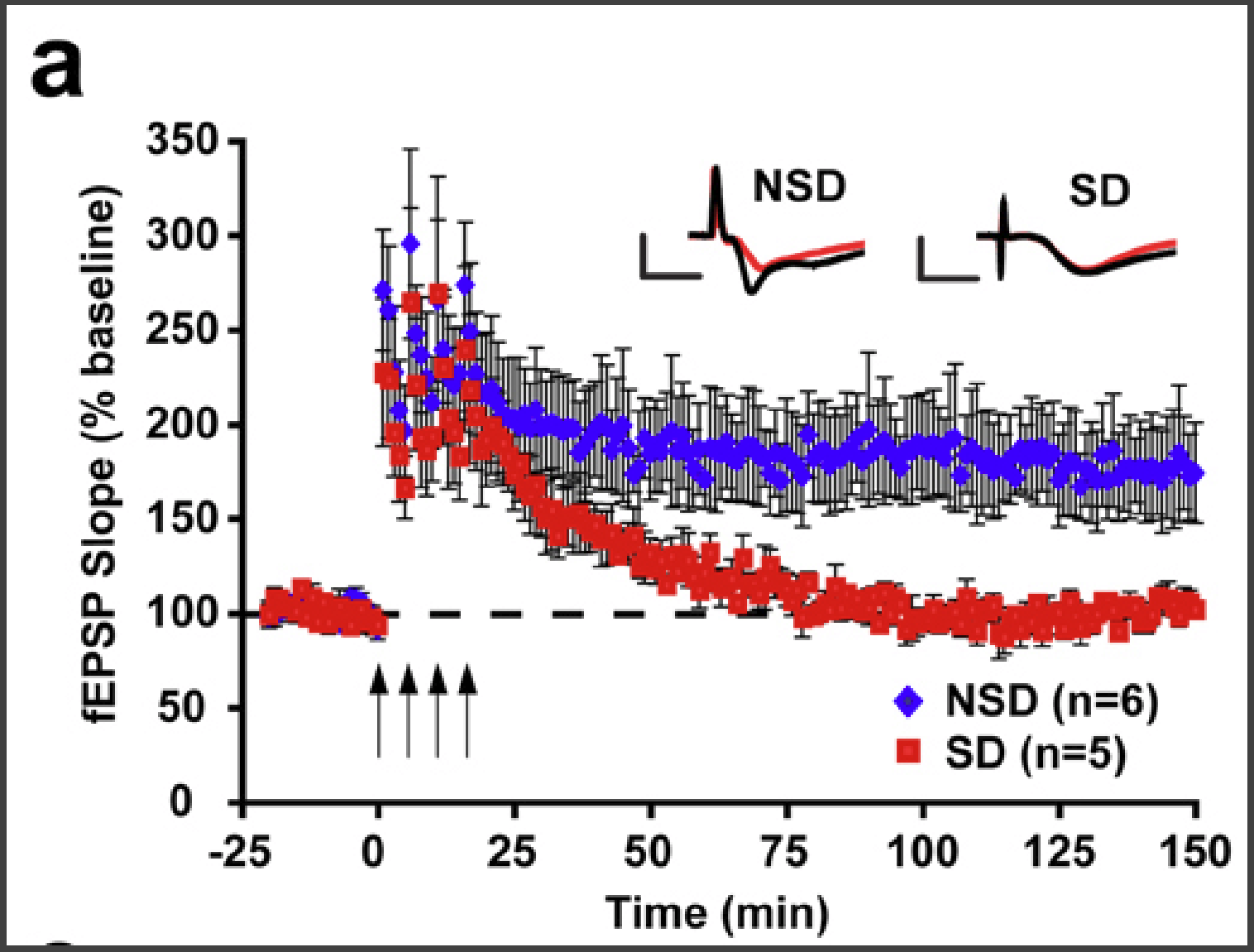
Activation of PZ GABA Neurons Induces SWS

Anaclet et al., Nat. Neurosci. 2014

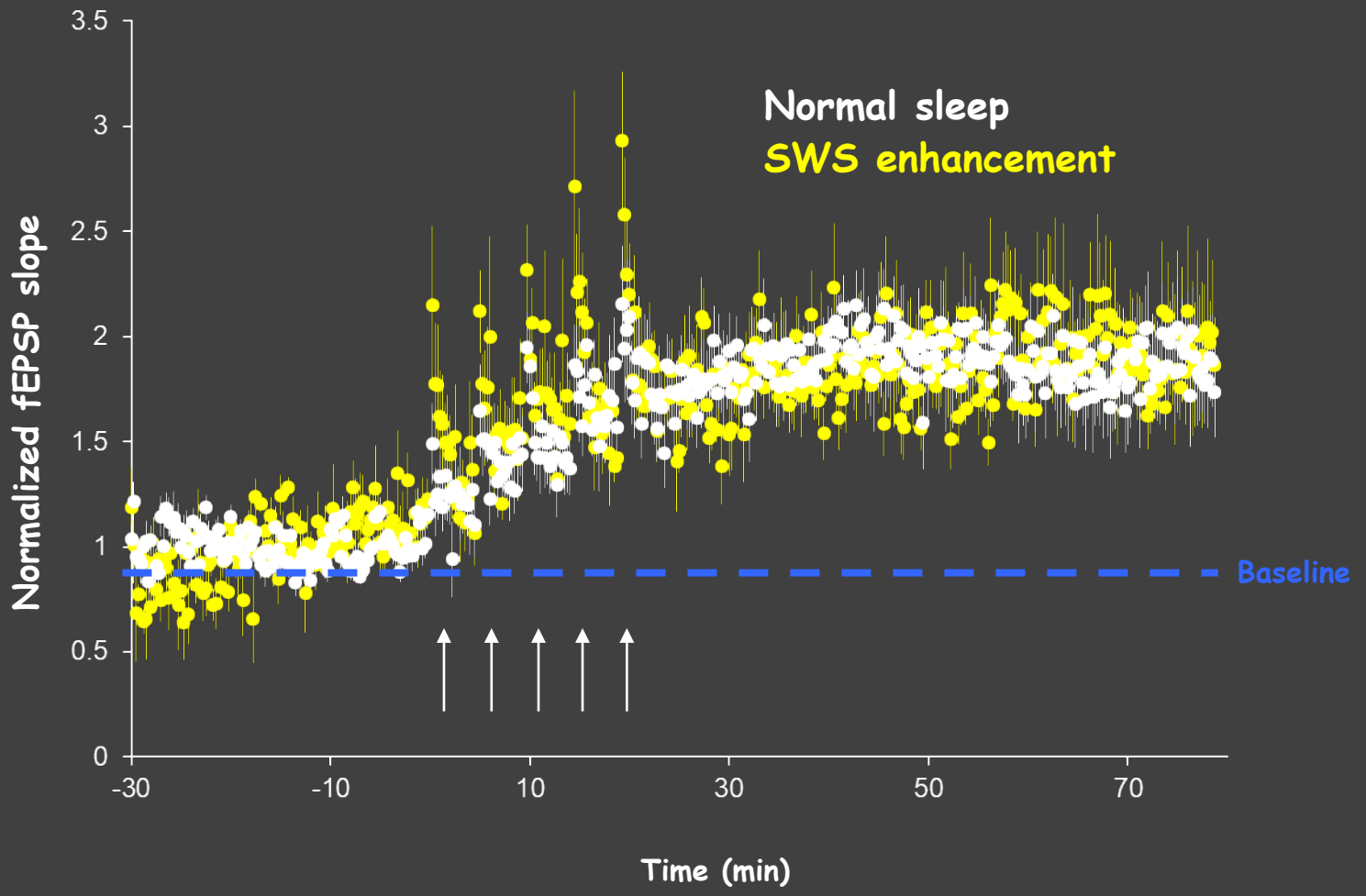


Effect of Sleep Deprivation on Hippocampal Function

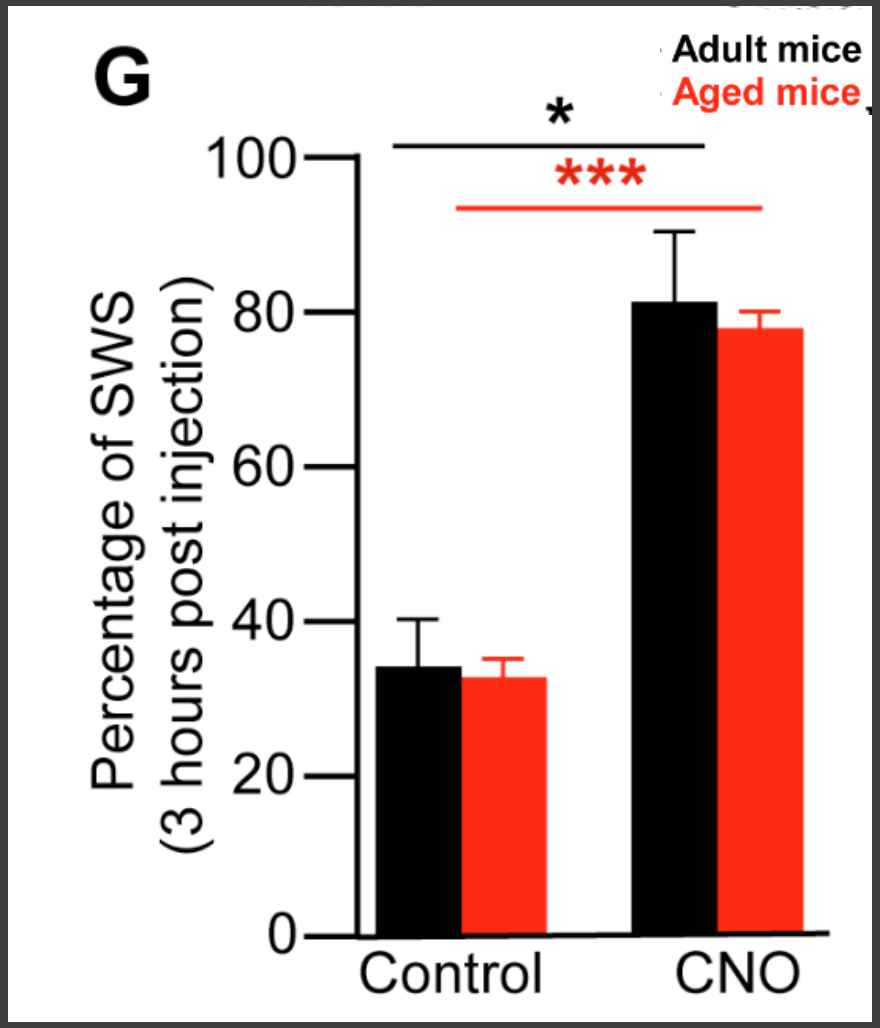
Vecsey et al., Nature. 2009

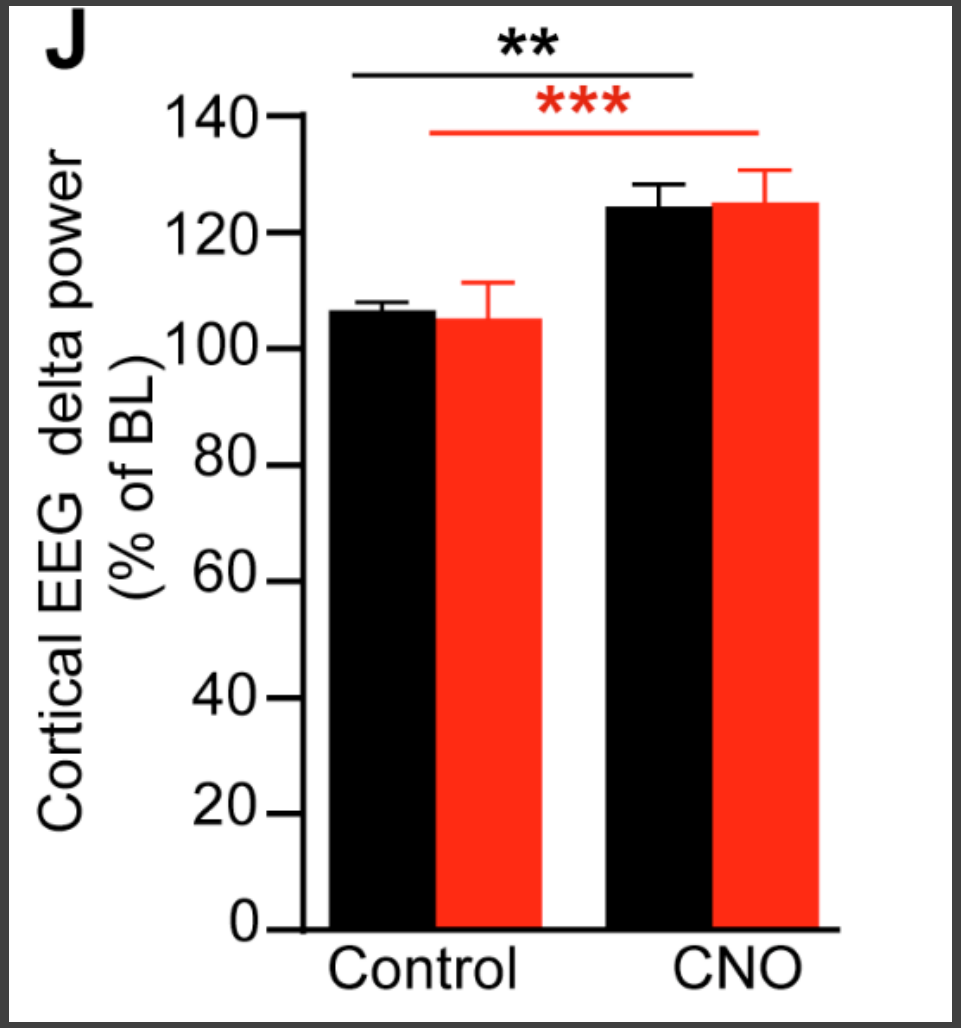


Effect of Sleep Enhancement on Hippocampal Function in Adult Mice

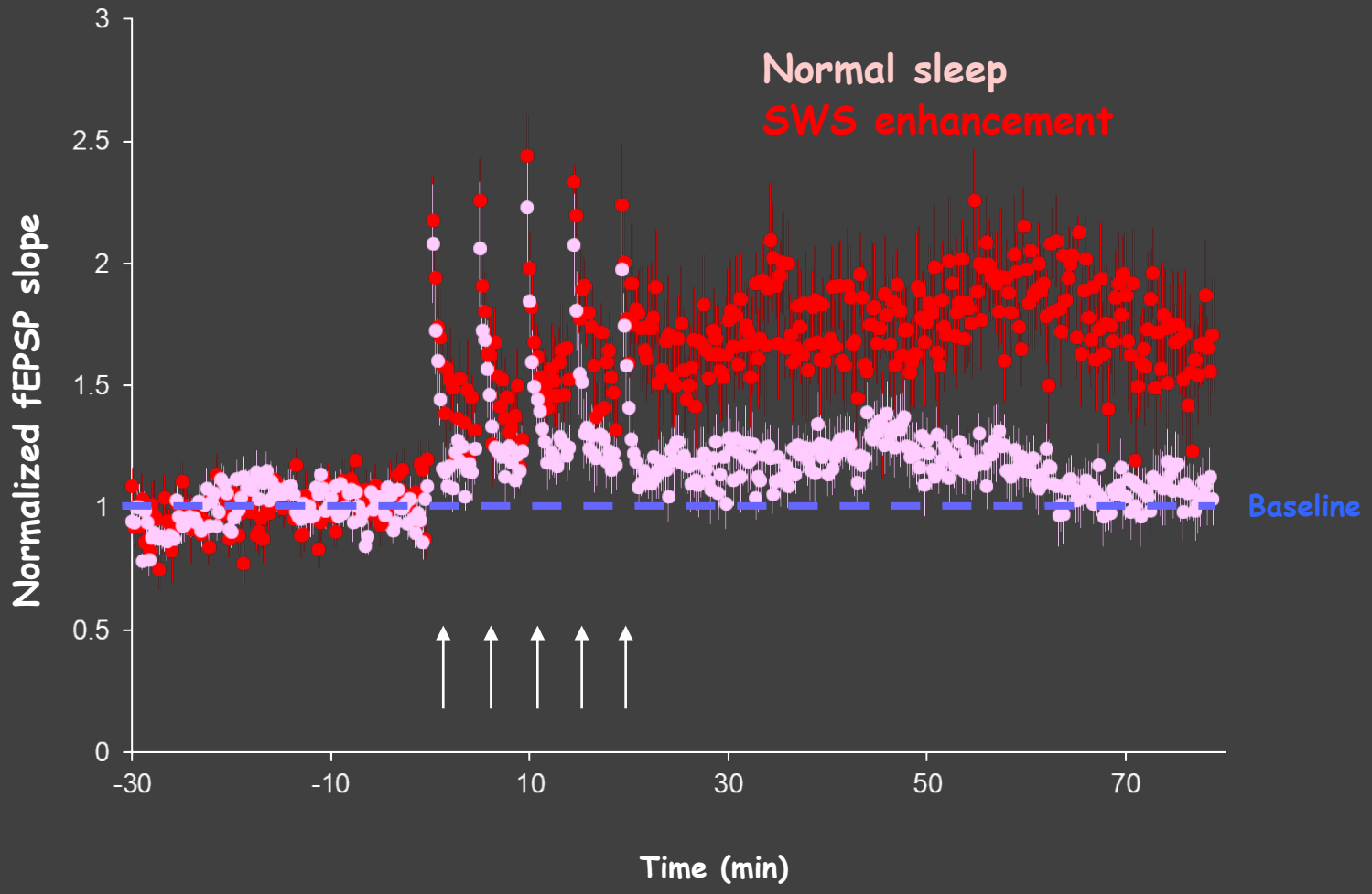


Sleep Enhancement in Aged Mice

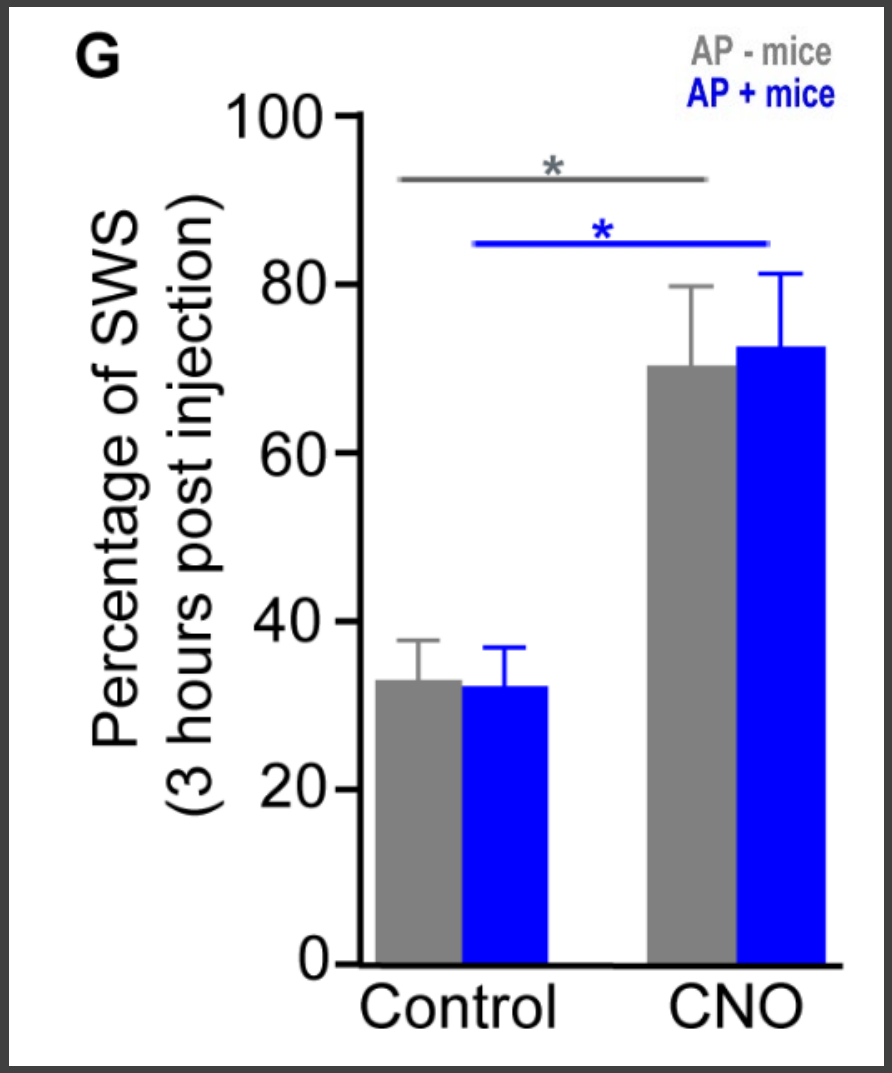


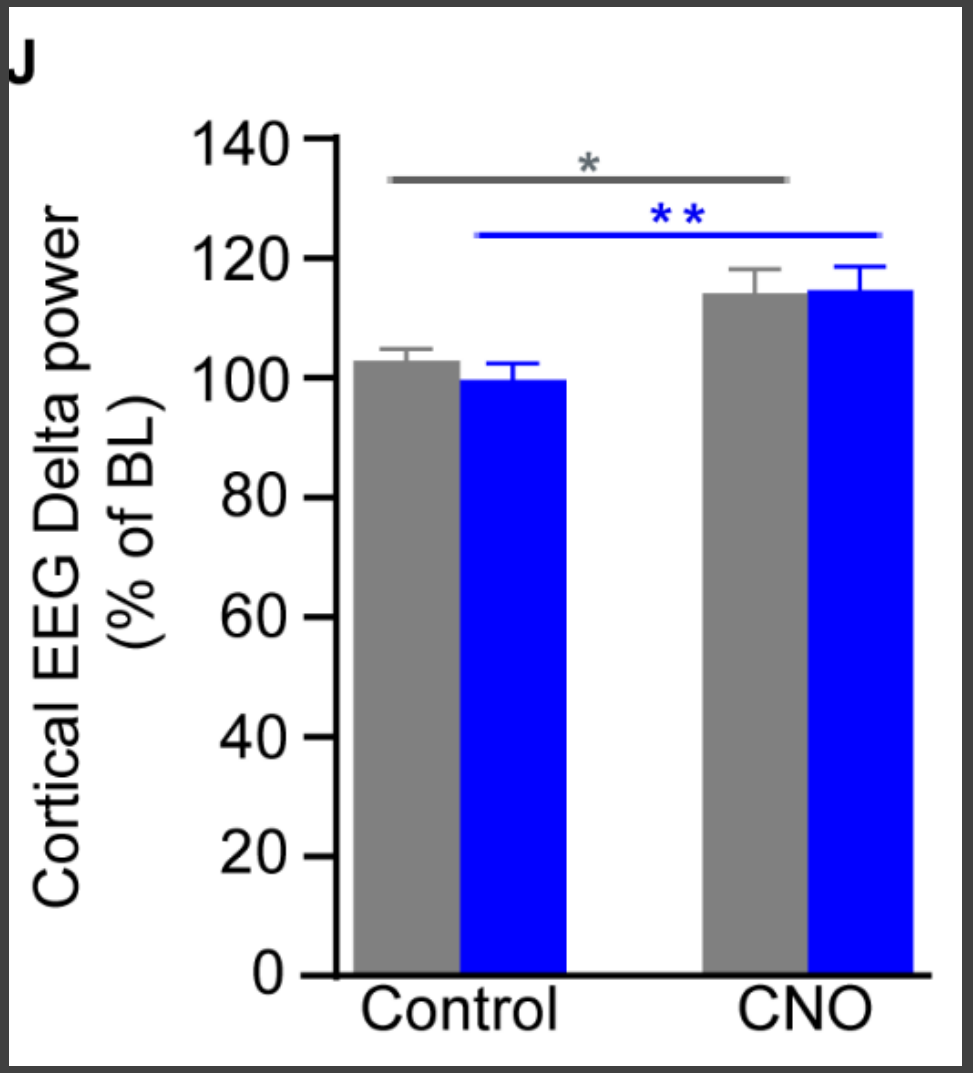


Effect of Sleep Enhancement on Hippocampal Function in Aged Mice

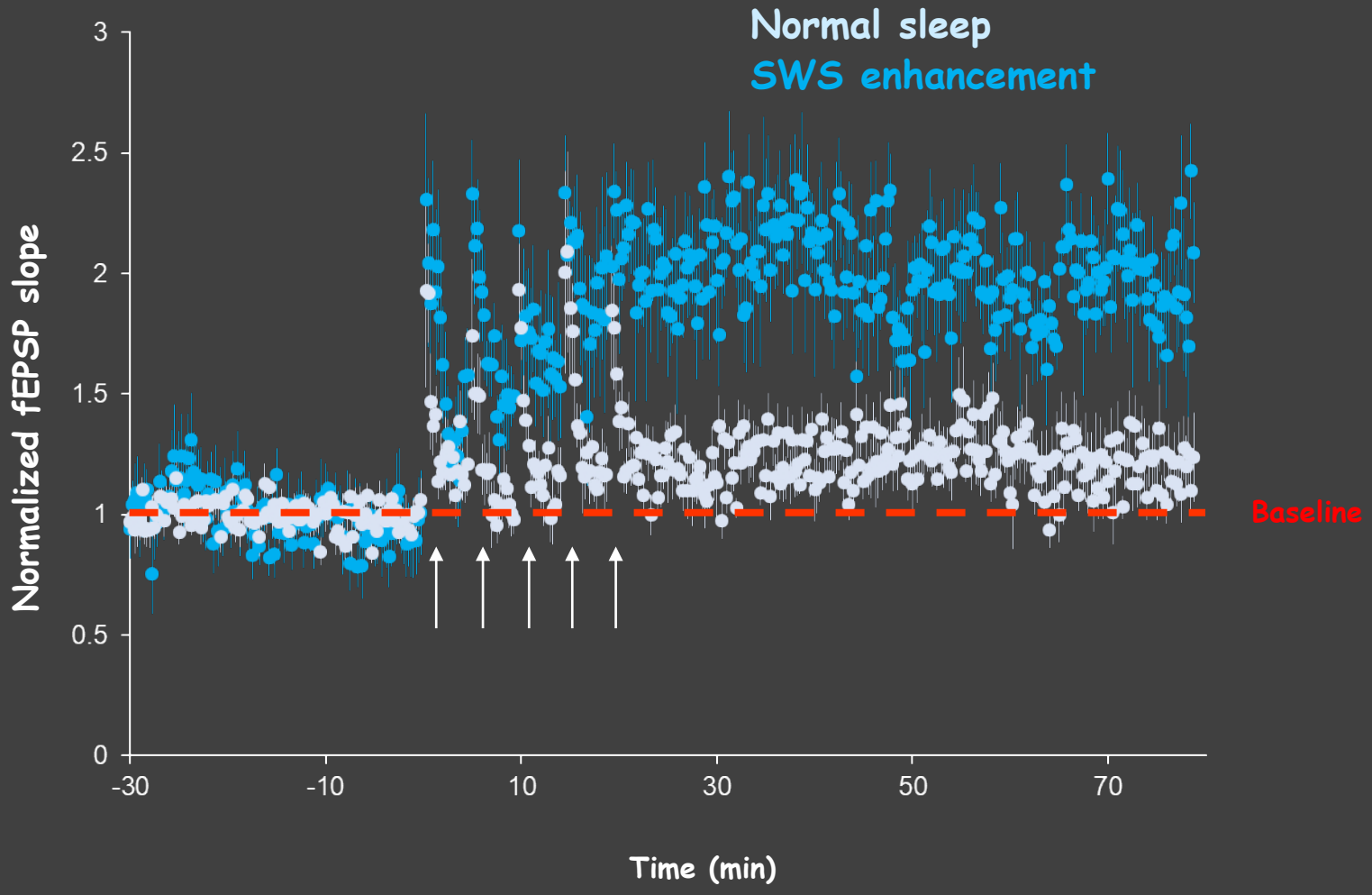


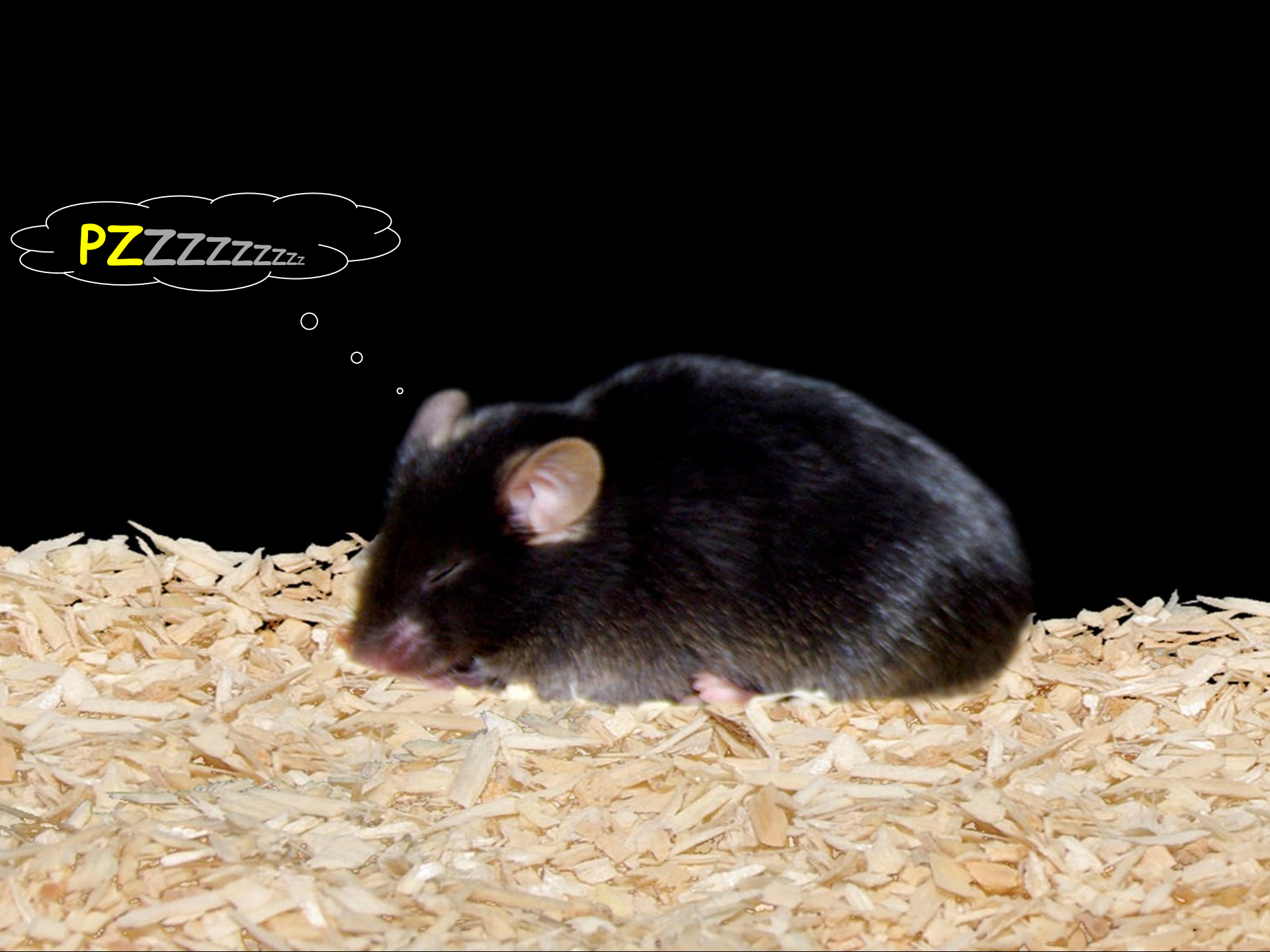
Sleep Enhancement in APP/PS1 Mice





Effect of Sleep Enhancement on Hippocampal Function in Alzheimer's Mice




PZZZZZZZzz

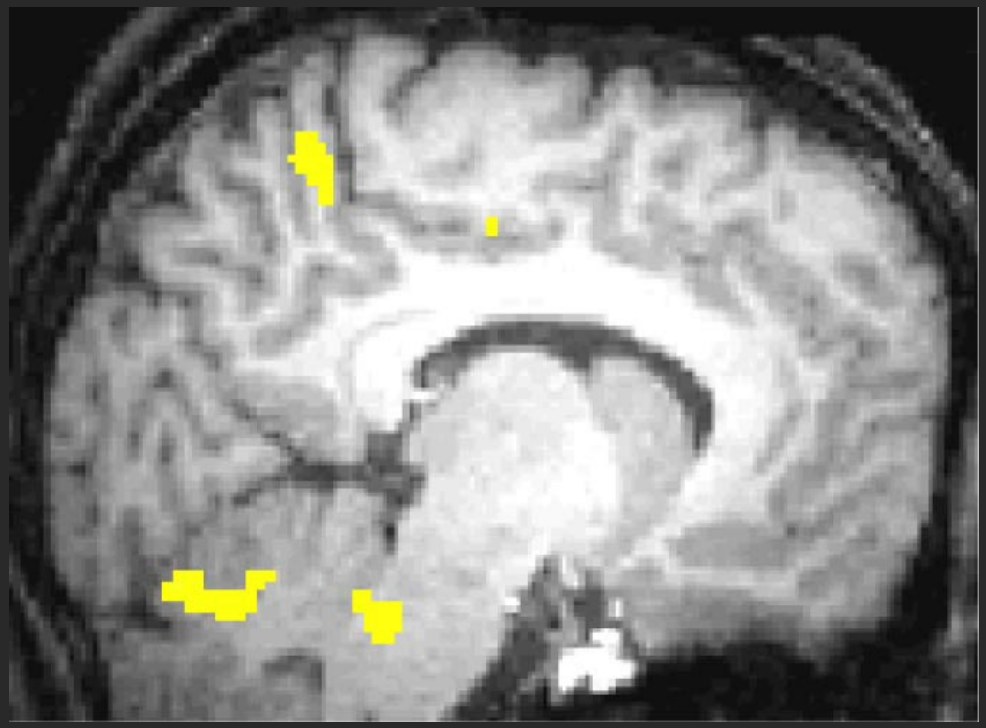
Spontaneous Neuronal Activity During Human Slow Wave Sleep

Dang-Vu et al., 2008

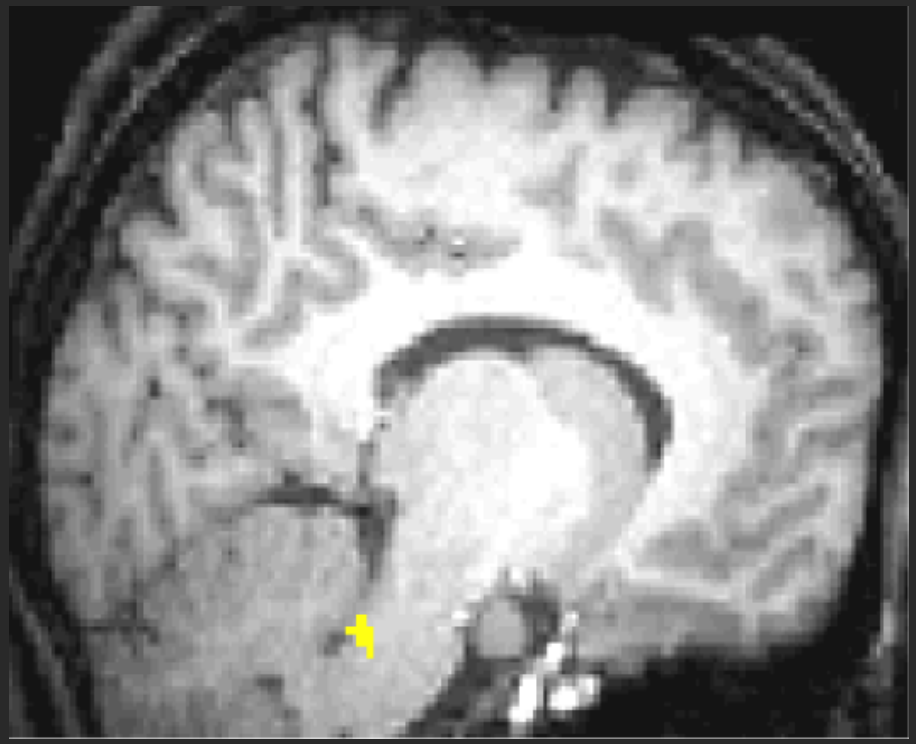
fMRI study

Brain regions activated in relation to slow oscillation

Common effects of both high-amplitude slow waves and delta waves



Specific responses associated with high amplitude slow waves



Thank You!

Support:

NIH National Institute of Mental Health

MH103399

Rotary

CART COINS FOR ALZHEIMER'S RESEARCH TRUST
A Project of the Rotary Clubs of North America

CURE Citizens United for Research in EPILEPSY

BrightFocus™ Foundation
Cure in Mind. Cure in Sight.