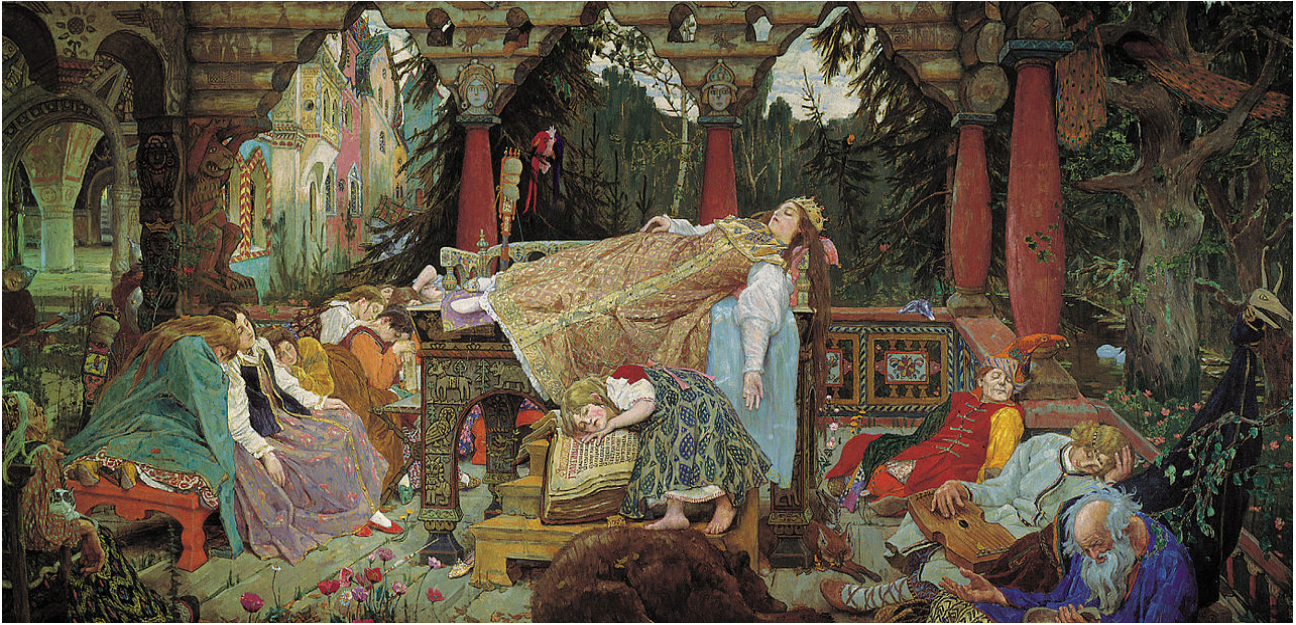




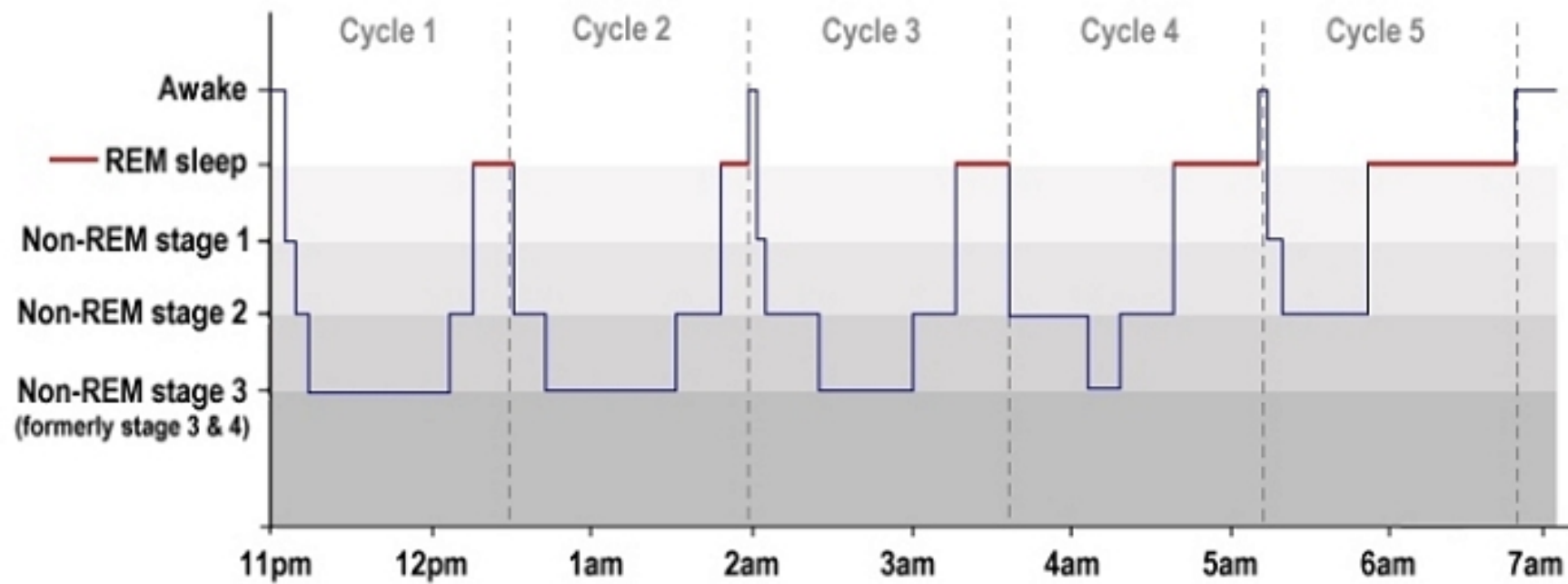
Lina Fine, MD, MPhil

# AGING SLEEP

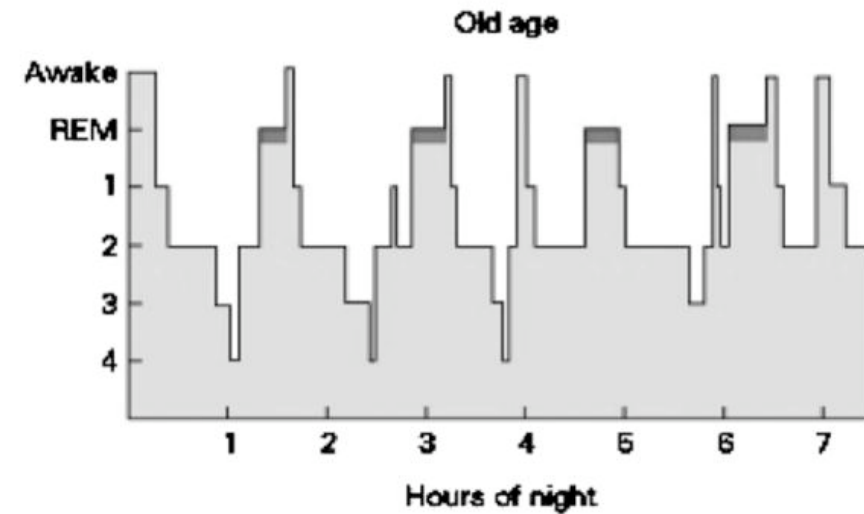
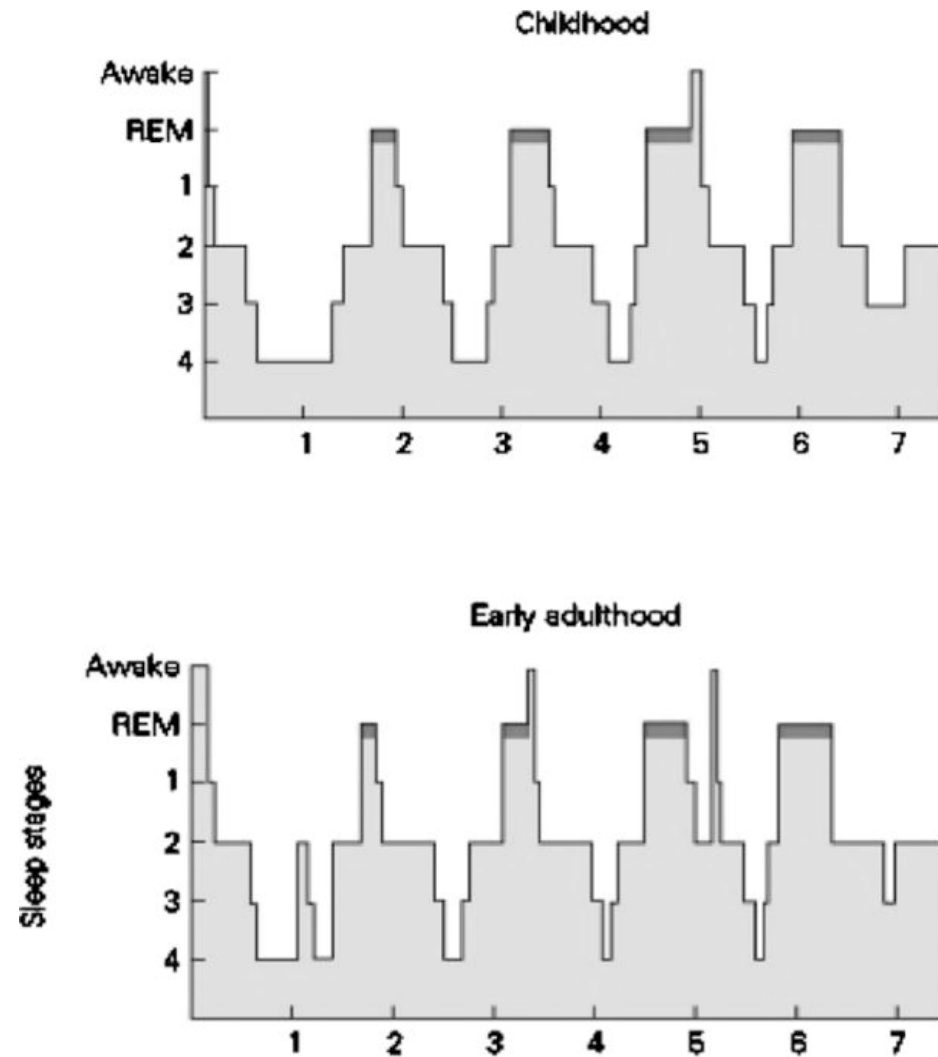




# STAGES OF SLEEP

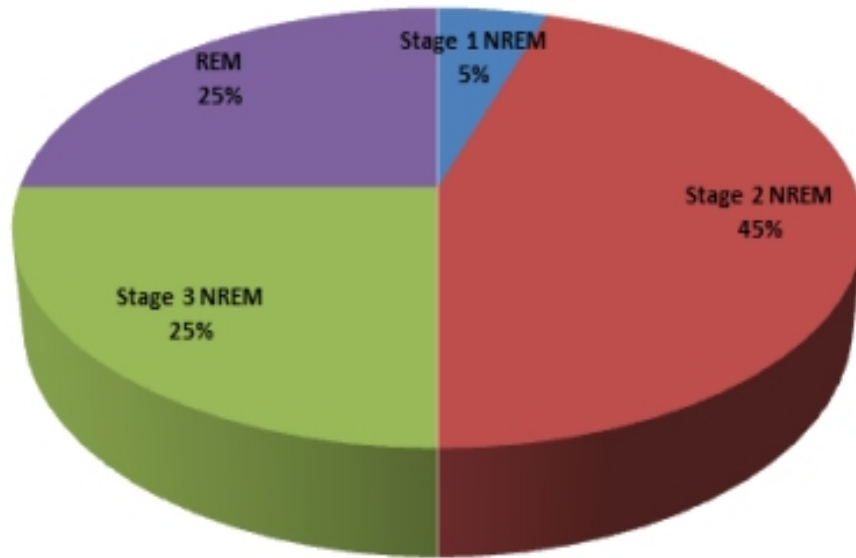


# AGE AND SLEEP STAGES

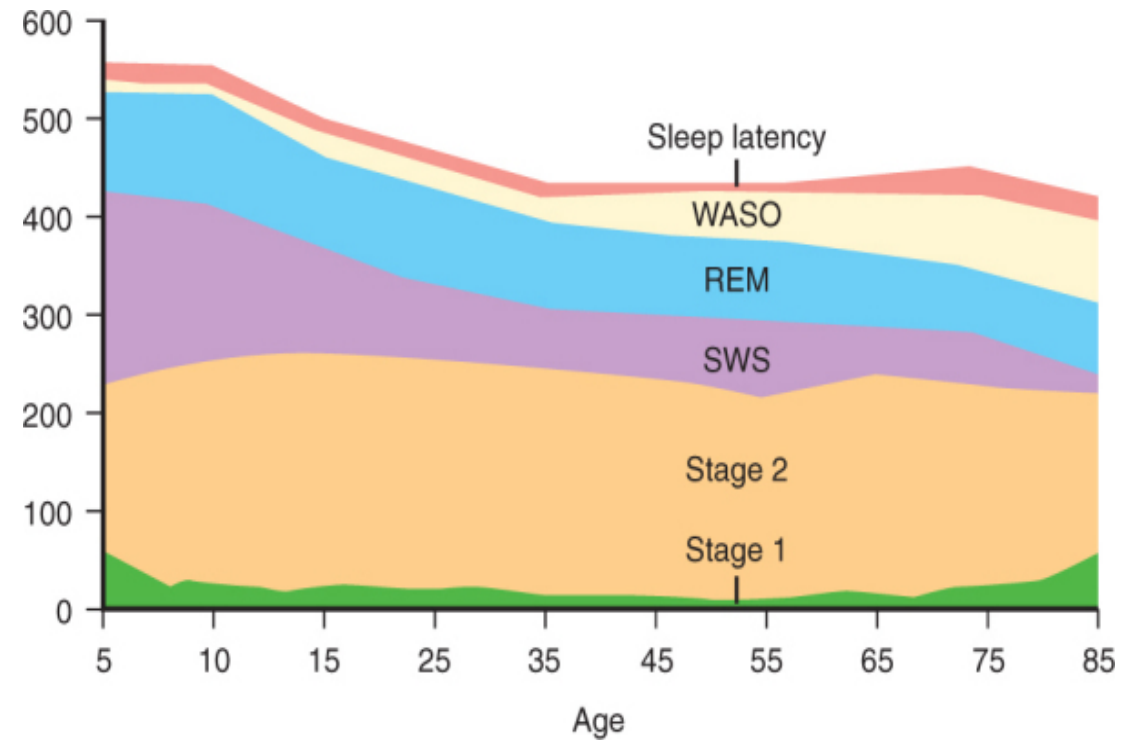


# SLEEP STAGES

Duration of Sleep Stages

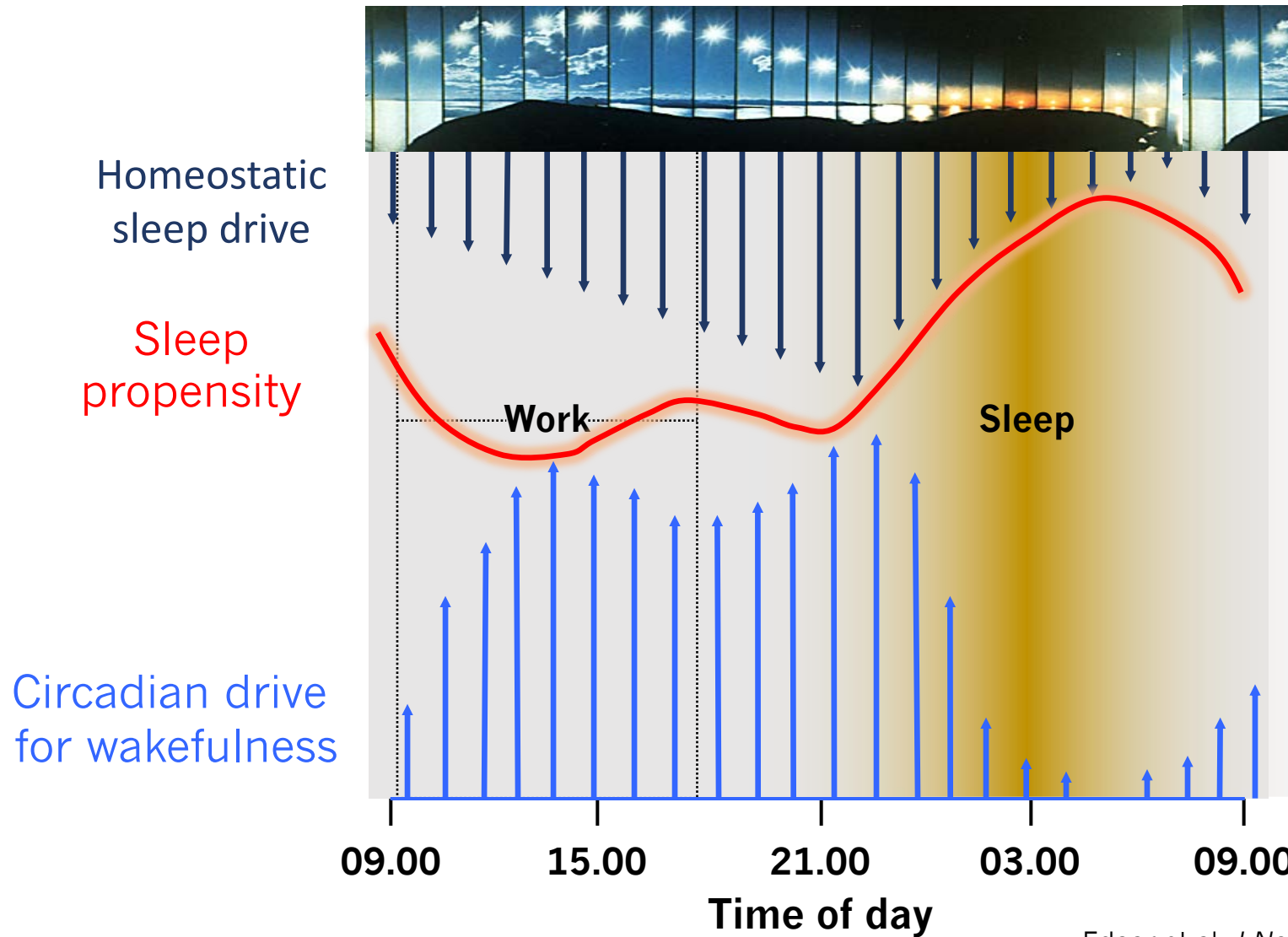


- SWS (Slow Wave Sleep, Stage 3) goes down and may disappear
- REM sleep duration slightly goes down
- WASO (wake after sleep onset) goes up – those multiple awakenings

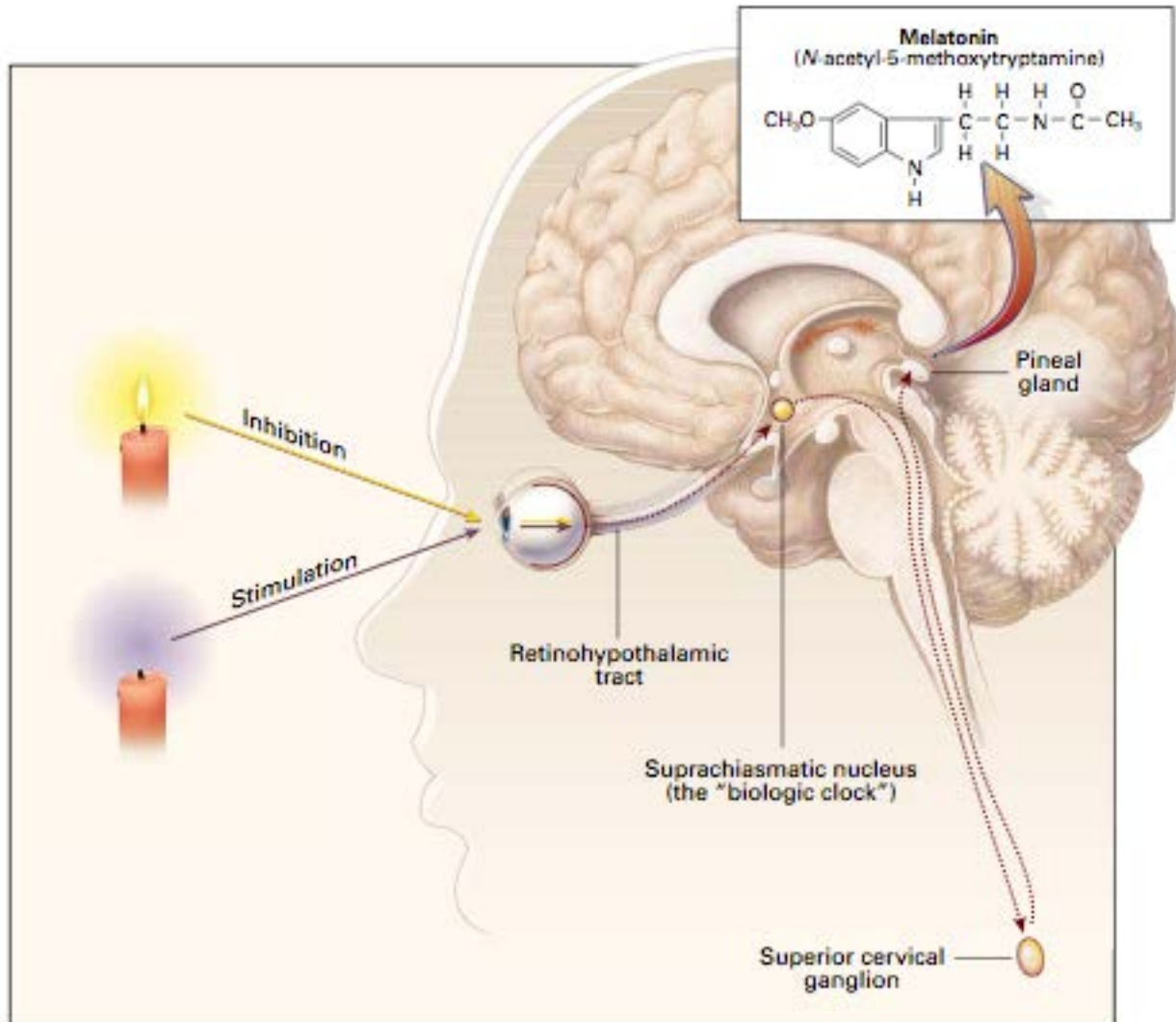




# Circadian Sleep-Wake Cycle



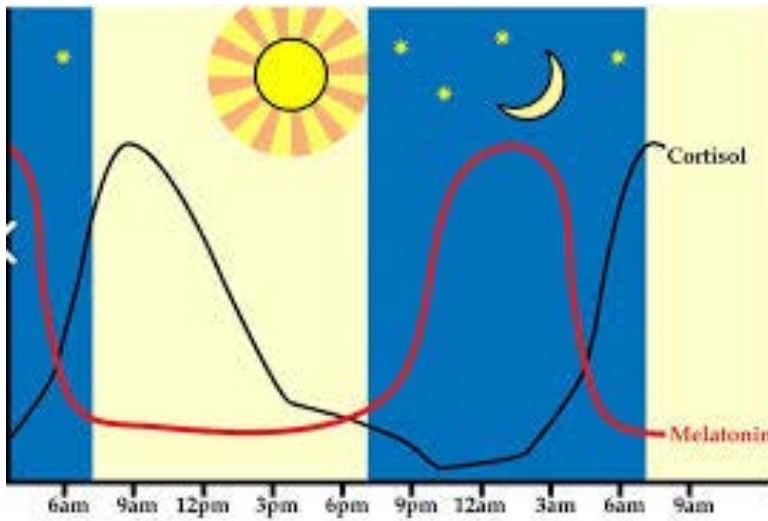
# Circadian Sleep-Wake Cycle



SCN becomes less sensitive to entrainment stimuli:

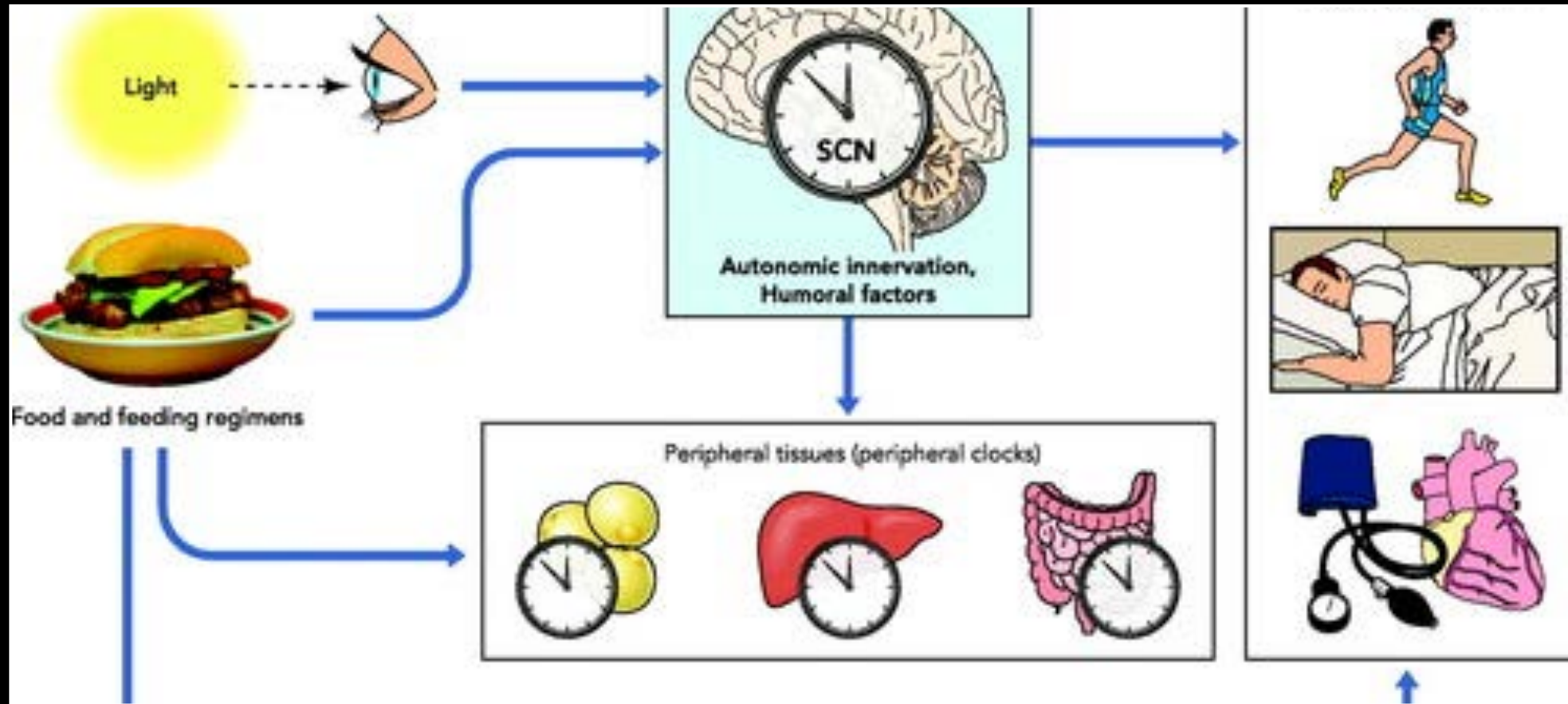
- Opacity of the lens
- Impairment in expression of *Per* genes in SCN (sensitivity of the system to light)
- Reduced activity of NMDA, histamine (act similar to light) in SCN
- Advancing of sleep phase (super early to bed, super early to rise)

# MELATONIN



- Melatonin is not influenced by sleep *per se* (NOT a sleeping pill)
- Robust circadian rhythmicity in BIOLOGICAL night and day (as opposed to social)
- Neurodegeneration= loss of SCN neurons = melatonin drop
- SCN innervates PVN of the hypothalamus and so regulates CRH (GABA interneurons) and energy homeostasis via pre-autonomic sympathetic/parasympathetic systems.





## Circadian regulation



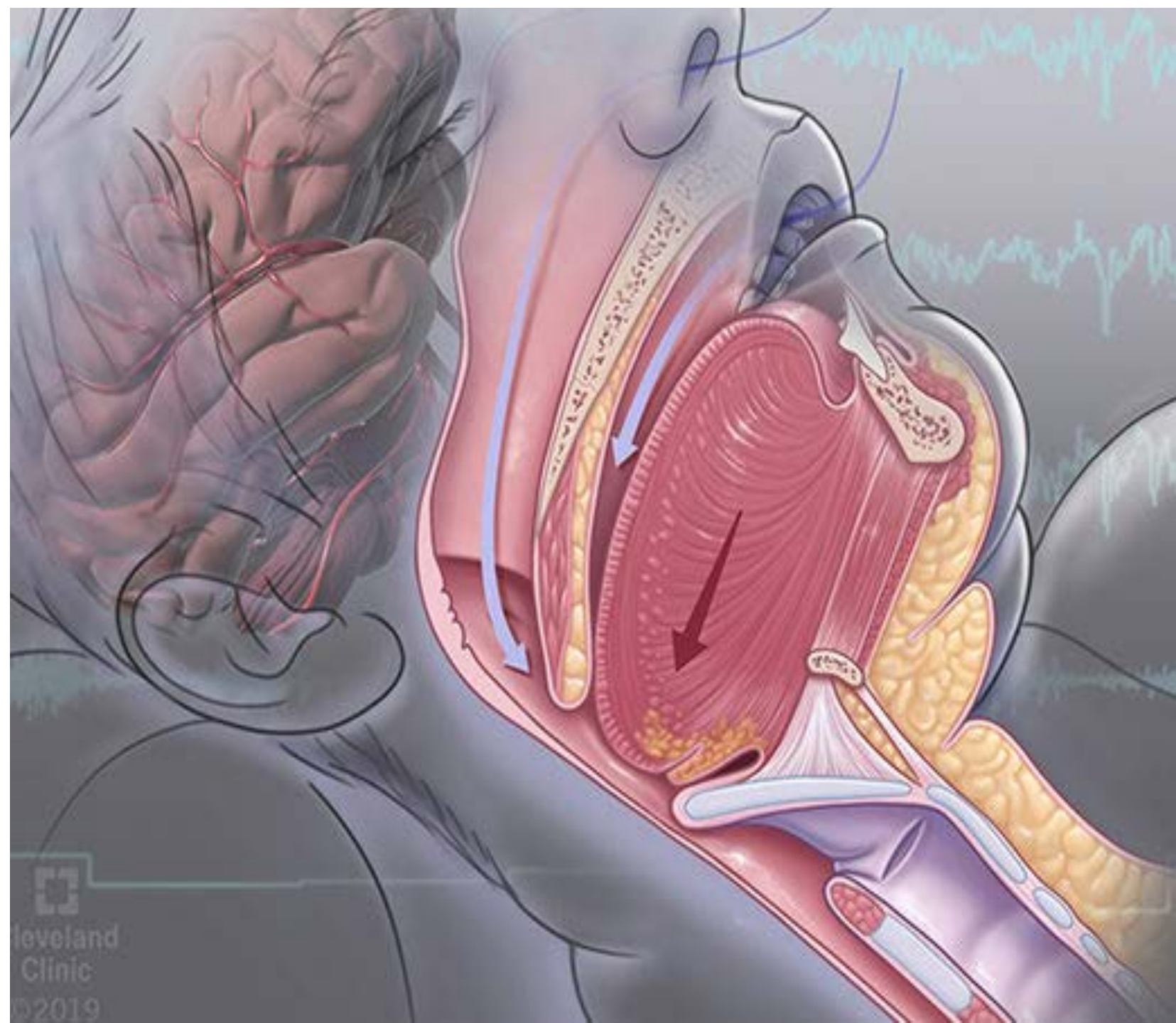
## REGULATION OF SLEEP WITH AGE





## OBSTRUCTIVE SLEEP APNEA

- *ApoE4* - amyloid burden increase
- Elevated T-tau and P-tau – plasma but also CSF
- Hypoxia or sleep fragmentation
- Severity of apnea



# CPAP and COGNITION

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- Cognition – mild improvement in severe OSA
- Compliance remains a confounder
- Delay of MCI onset
  - AD Neuroimaging Initiative:
    - OSA = MCI onset at 72
    - No OSA = MCI onset at 83
    - CPAP RX = MCI onset 82

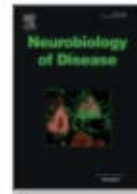
AD Neuroimaging Initiative





## Neurobiology of Disease

Volume 145, November 2020, 105054



Review

# Obstructive Sleep Apnea and Its Treatment in Aging: Effects on Alzheimer's disease Biomarkers, Cognition, Brain Structure and Neurophysiology

Anna E. Mullins <sup>a</sup>, Korey Kam <sup>a</sup>, Ankit Parekh <sup>a</sup>, Omonigho M. Bubu <sup>b</sup>, Ricardo S. Osorio <sup>b, 1</sup>, Andrew W. Varga <sup>a</sup>



## STOP BANG SCREENING

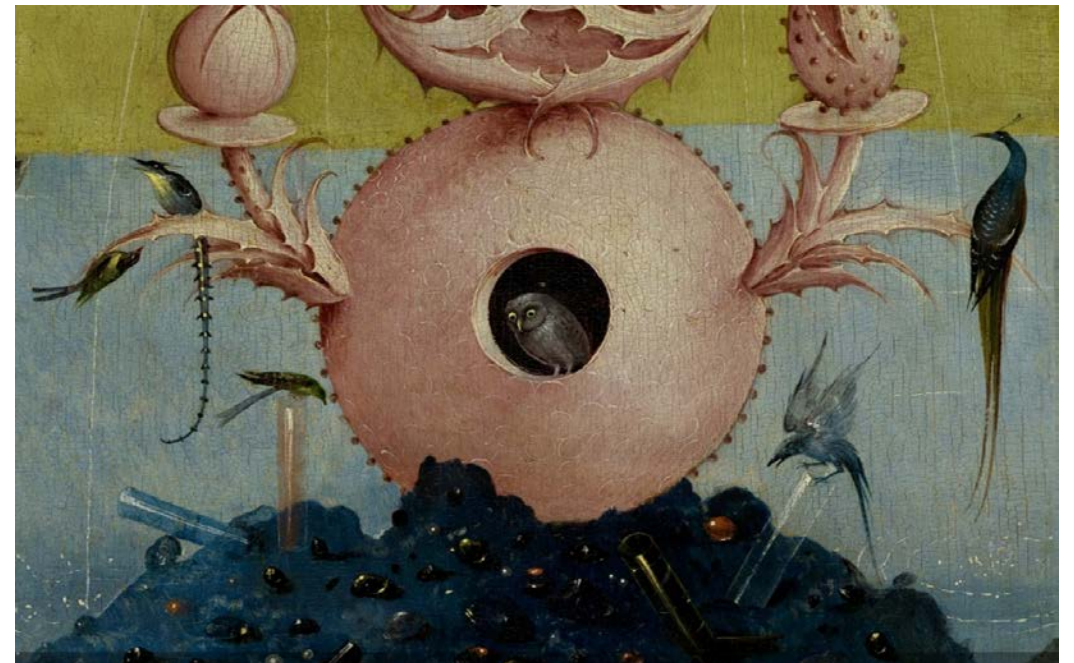
S	Snoring	
T	Tiredness	
O	Observed apnea	
P	High blood pressure	
B	Body mass index >35 kg/m <sup>2</sup>	
A	Age >50 years	
N	Neck circumference >40 cm	
G	Male gender	
Scoring:	0-3	Low risk
	4+	High risk



# THANK YOU FOR YOUR ATTENTION!

Sleep that knits up the ravell'd sleeve of care,  
The death of each day's life, sore labour's bath,  
Balm of hurt minds, great nature's second  
course,  
Chief nourisher in life's feast.

Shakespeare, Macbeth



Feel free to email me at [lina.fine@swedish.org](mailto:lina.fine@swedish.org) with any questions