

# El son és integral a la vida

Dr. Antoni Esteve

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28 d'Octubre de 2021

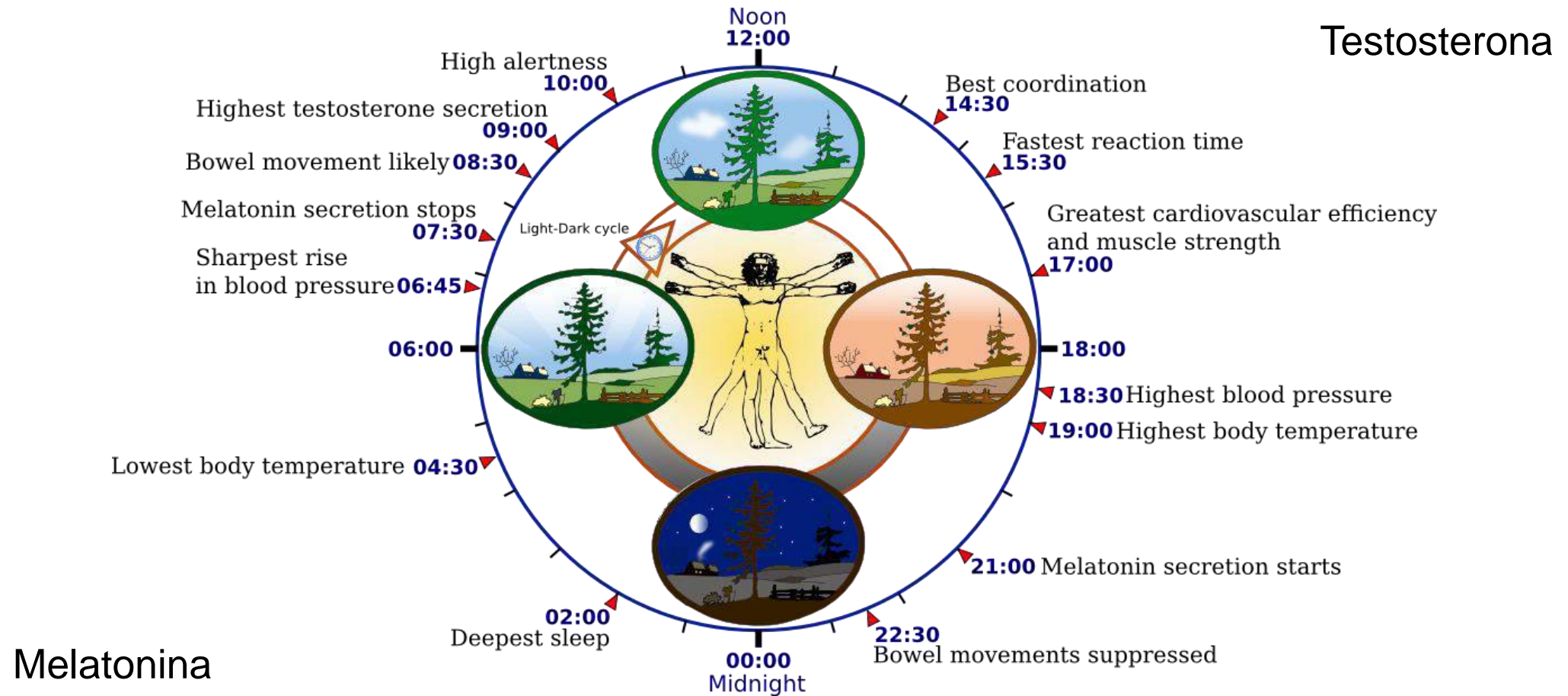


AdSalutem  
Sleep Institute

"Tothom ha de saber que el son, o dormir bé és fonamental per a la salut i el benestar"

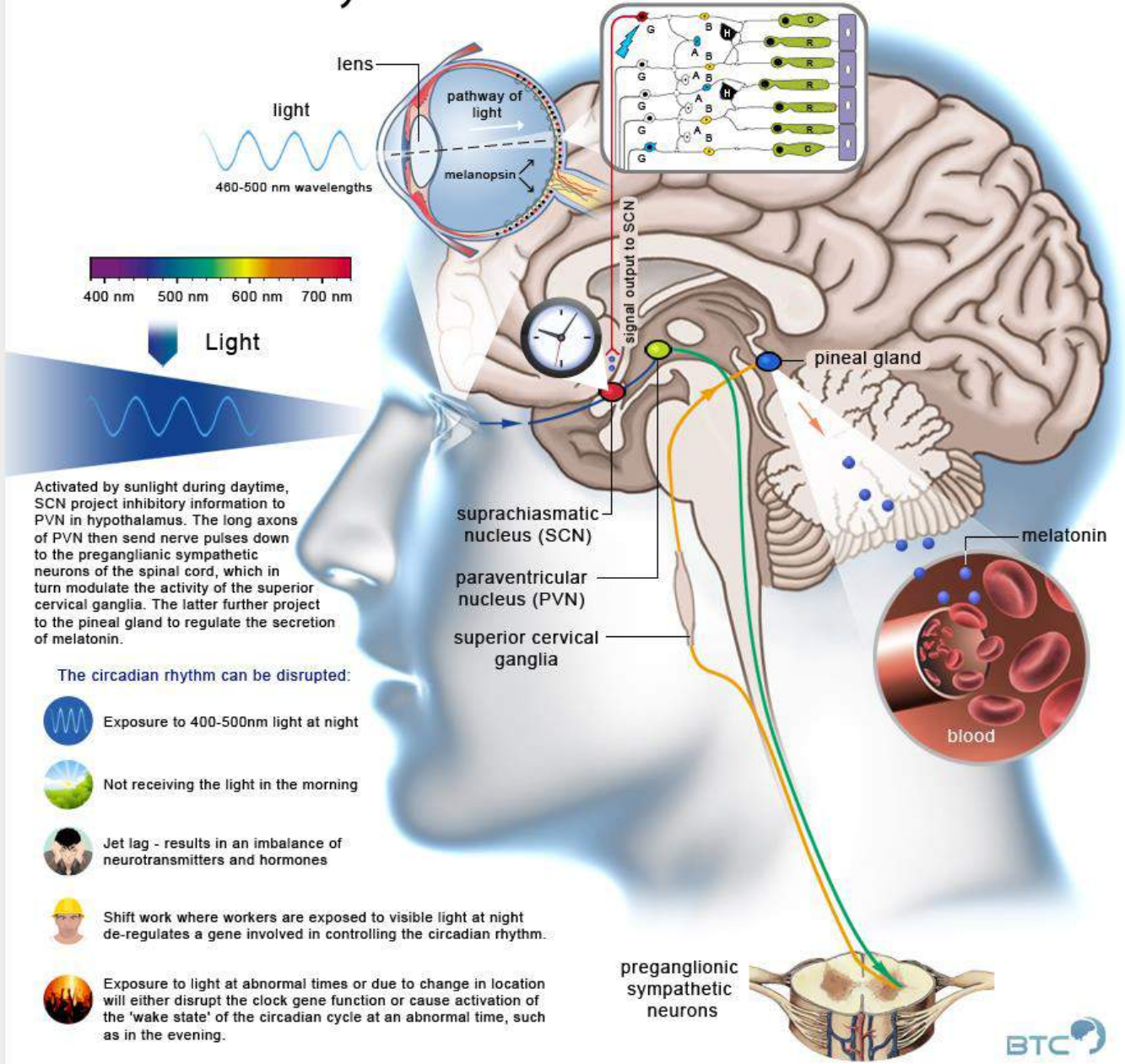
Dr. Antoni Esteve

# El son i el ritme circadiari

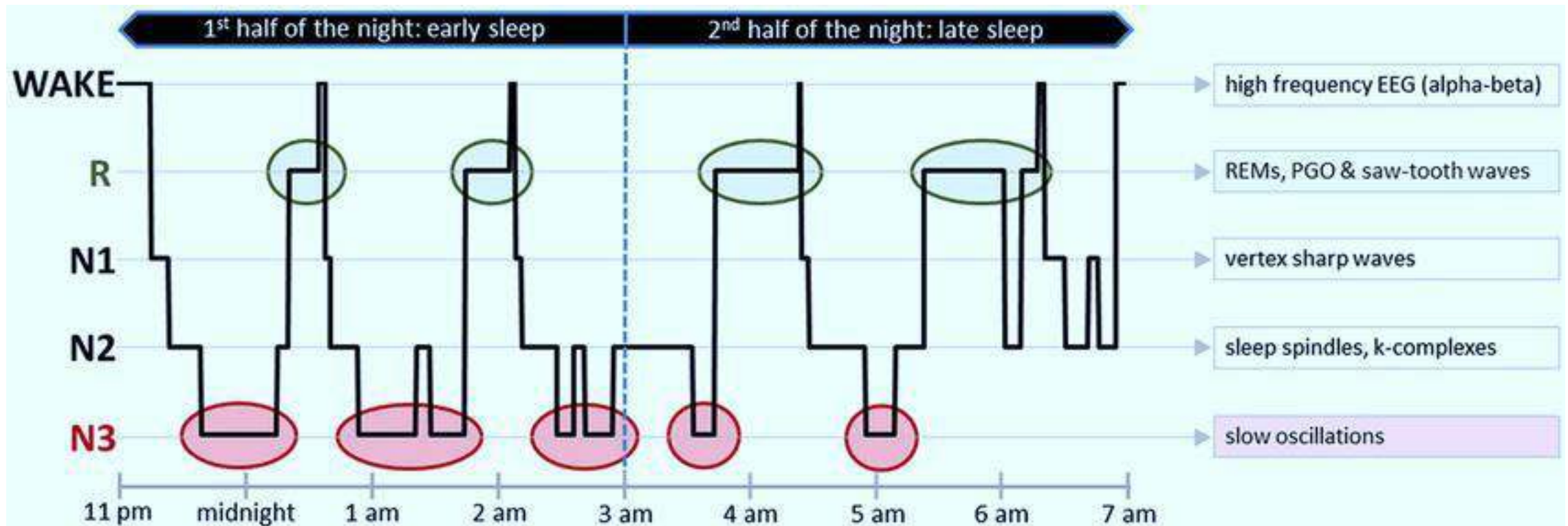




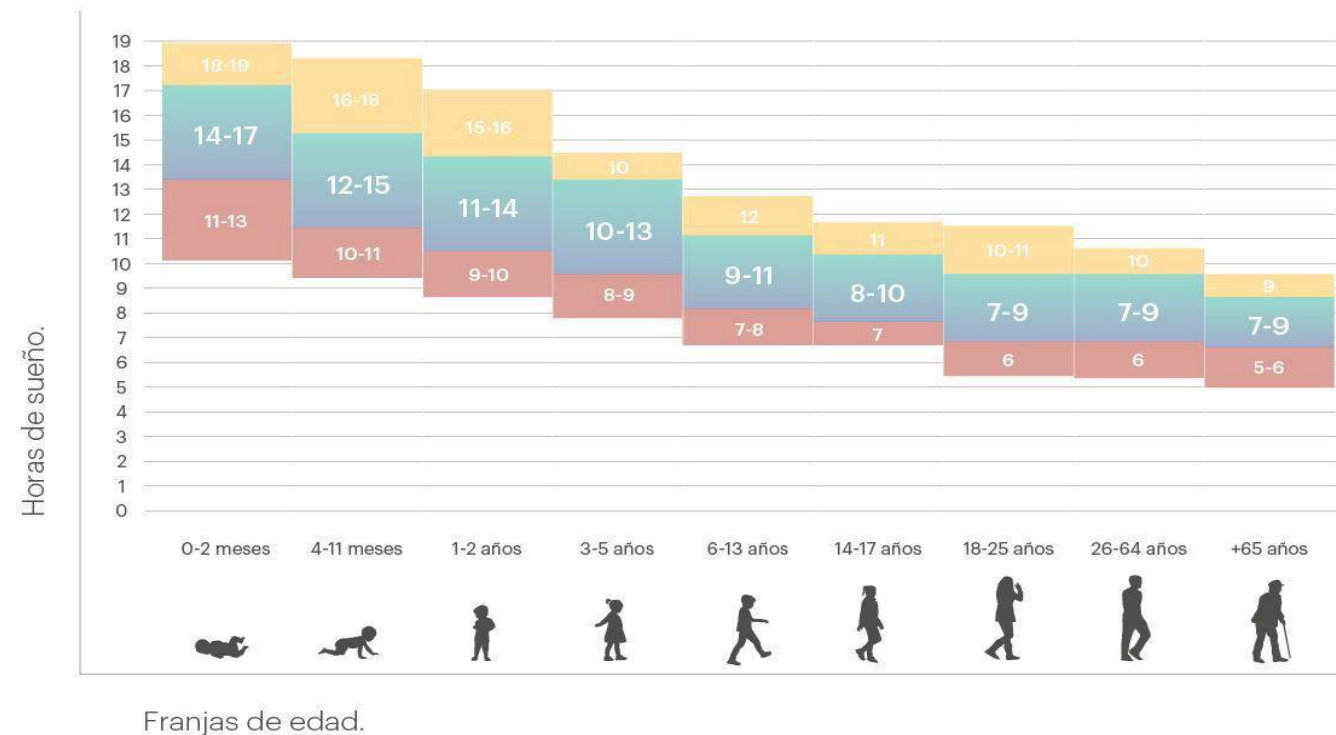
# circadian rhythm



# L'arquitectura del Son



# Hores de son al llarg de la vida



Estas cifras reflejan tanto las horas nocturnas de sueño como las posibles siestas.

■ Recomendación   
 ■ Apropiado   
 ■ No recomendado

Adaptado de "The National Sleep Foundation". Sleep duration recommendation. Sleep health: The Official Journal of the National Sleep Foundation (2015)\*

# Proporcions de la població que dorm menys de 7 hores

	U.S.	UK	Germany	Japan	Canada
Less than 6 hours	18%	16%	9%	16%	6%
6 to 7 hours	27%	19%	21%	40%	20%

*Notes: Sleep data based on data from the National Sleep Foundation (2013) representative survey. The proportions of people sleeping less than six and between six and seven hours have been calculated by using the weighted average among the proportions for workday and weekend sleep patterns.*

*Why sleep matters - the economic costs of insufficient sleep.*

# El son com a promotor de la cognició, l'equilibri emocional i la salut



Aprenentatge  
i memòria



Benestar  
emocional



Sistema  
immunitari



Neuroprotecció



Cardiometabolisme

**Sleep is integral to life!**





## Conseqüències de la privació de son



**Sleep is integral to life!**

# Què entenem per trastorns de son?



Síndrome de **Apnea-Hipopneas** durante el sueño



Excesiva **somnolencia diurna** (ESD) asociada al SAHS



**Insomnio**



Síndrome de **piernas inquietas** (SPI)



**Parasomnias**



Excesiva **somnolencia diurna**



**Trastornos del ritmo circadiano** del sueño

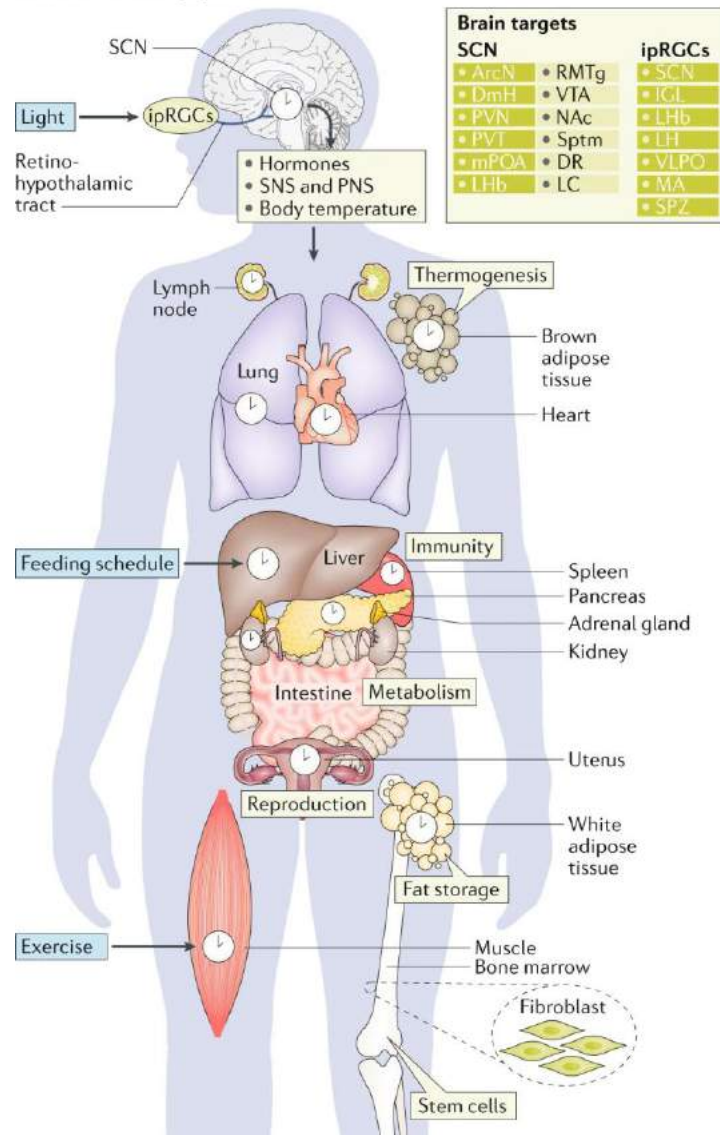


Particularidades de trastornos del sueño en la **población pediátrica**

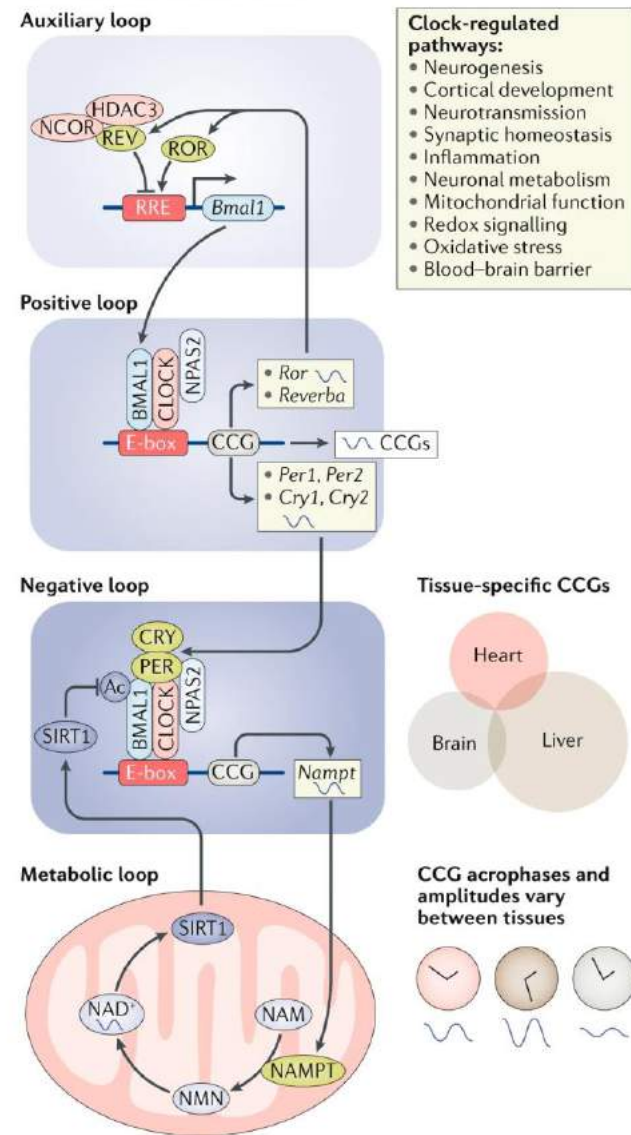


# Relació fisiopatològica del son amb malalties rellevants

**a Circadian timing system**



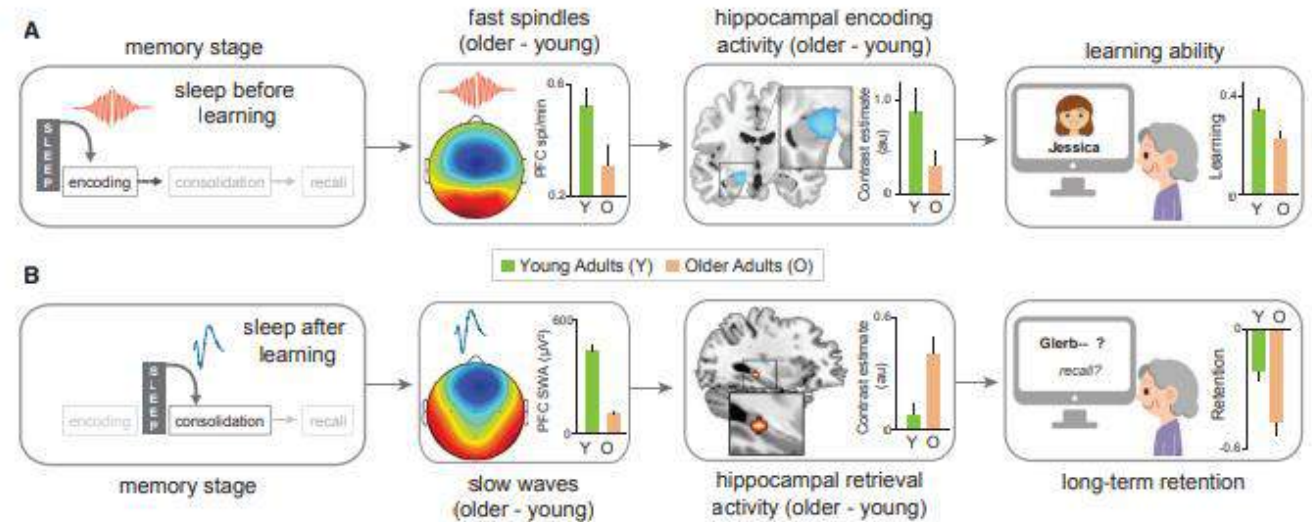
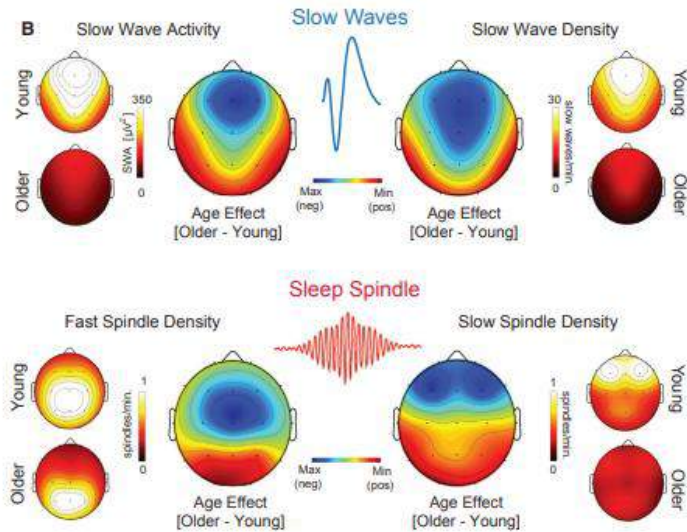
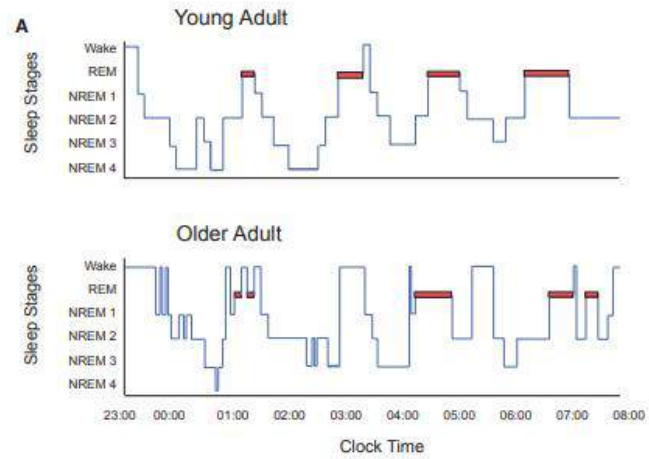
**b Mammalian molecular clock**





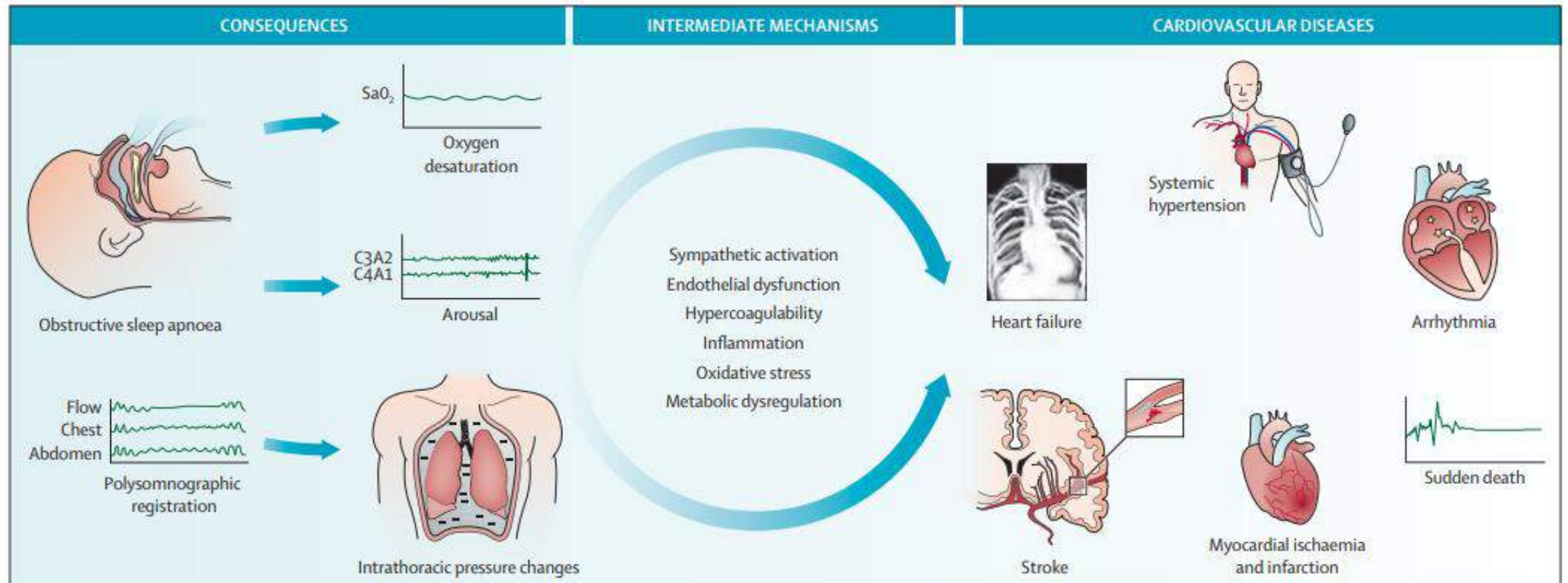
# Relació fisiopatològica del son amb malalties rellevants (1)

## Son i envelliment



## Relació fisiopatològica del son amb malalties rellevants (2)

### Malalties cardiometabòliques



**Figure: Obstructive sleep apnoea consequences and intermediate mechanisms that potentially contribute to risk of cardiovascular disease**

The events associated with collapse of the upper airway lead to brain arousal, intrathoracic pressure changes, and hypoxaemia and reoxygenation. Several intermediate mechanisms link obstructive sleep apnoea with the initiation and progression of cardiovascular diseases. SaO<sub>2</sub>=oxygen saturation. C3A2 and C4A1=electroencephalographic channels.

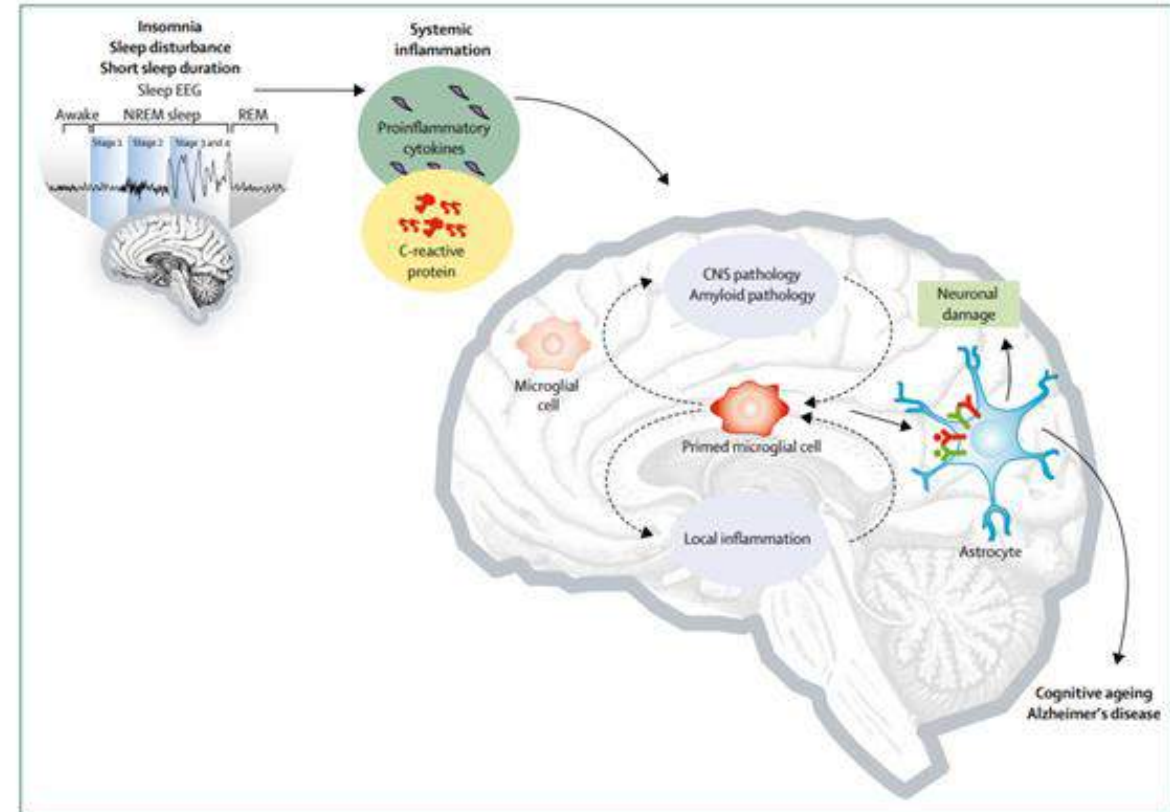
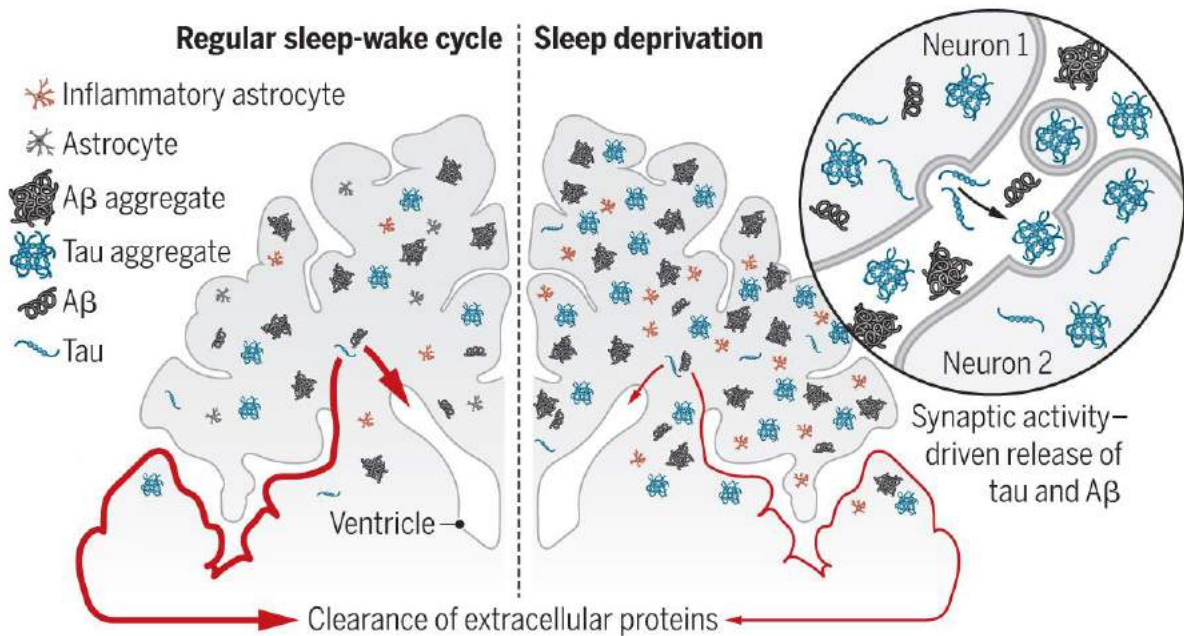


## Relació fisiopatològica del son amb malalties rellevants (3)

### Malalties neurodegeneratives

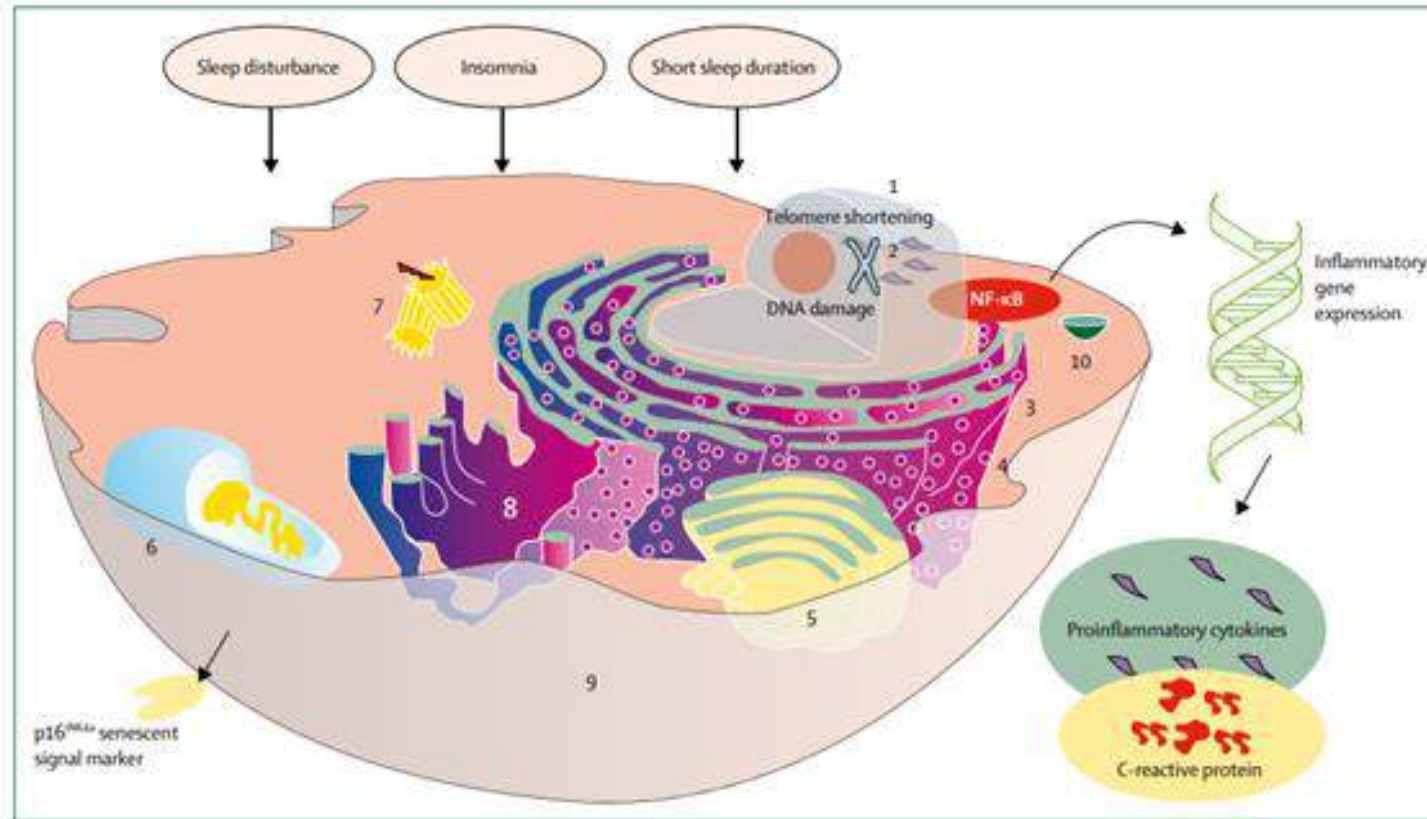
#### Sleep deprivation promotes Alzheimer's pathology

Sleep is accompanied by lowered activity-driven release and heightened clearance of A $\beta$  and tau from the brain. Sleep deprivation reduces aggregate clearance and promotes astrogliosis, network activity-driven tau and A $\beta$  release, further protein aggregation, and the spread of Alzheimer's disease pathology.



## Relació fisiopatològica del son amb malalties rellevants (4)

### Processos inflamatoris

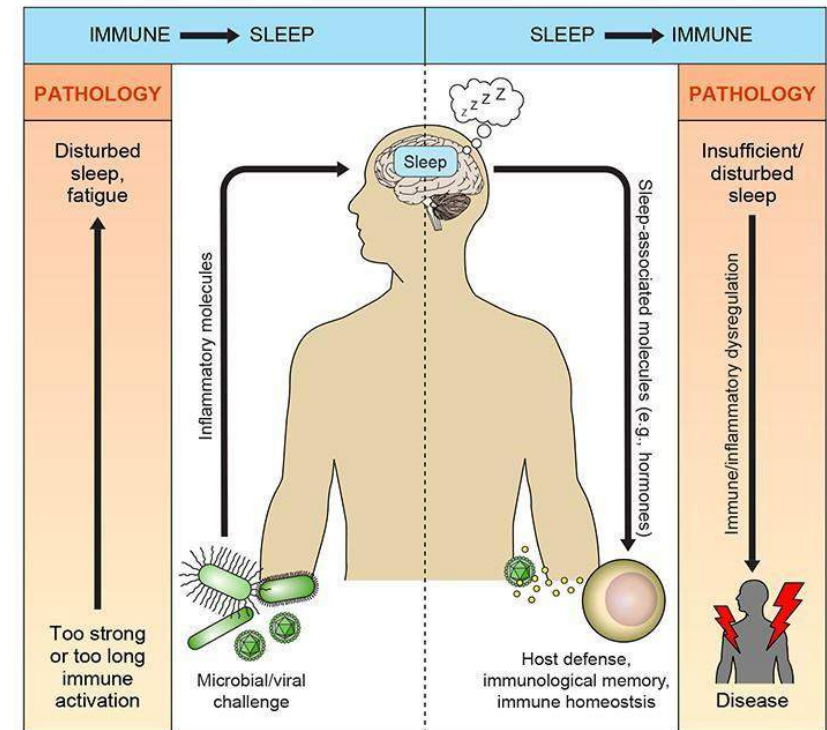
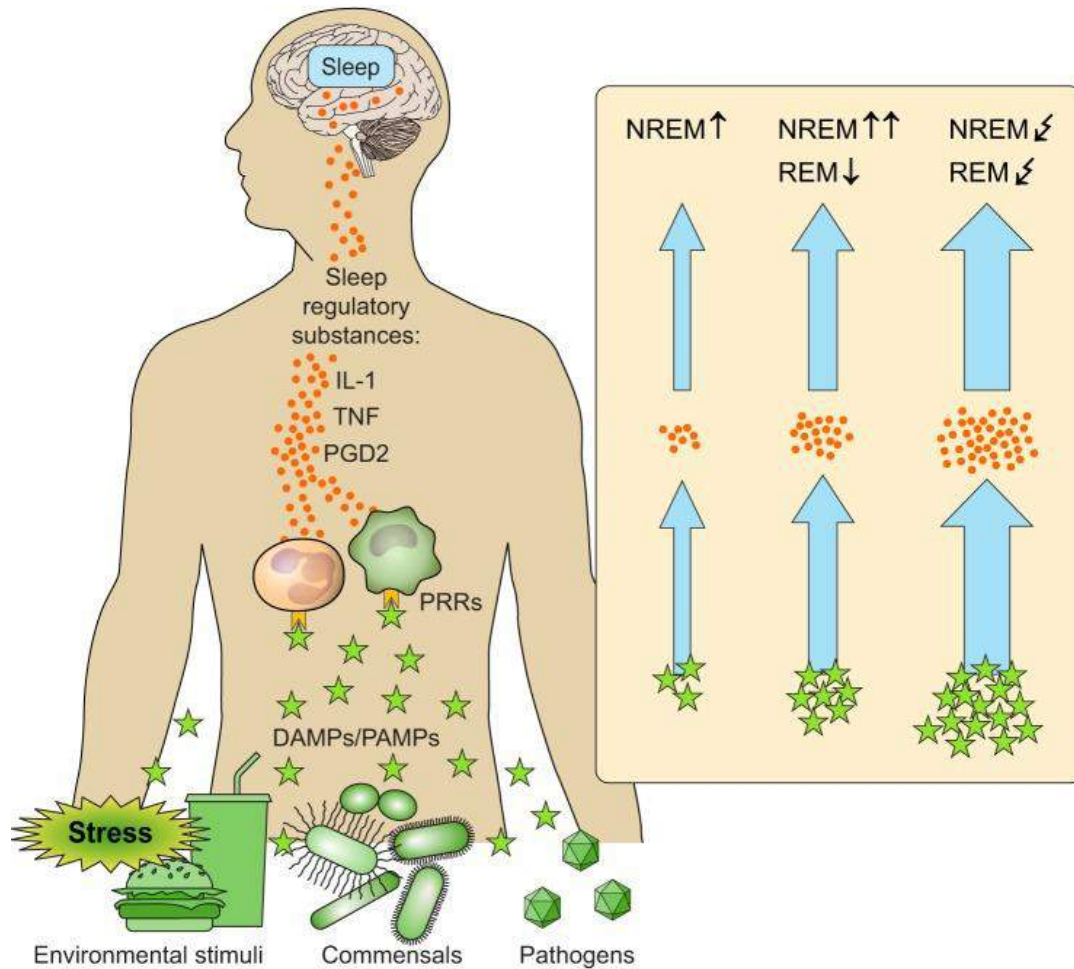


Irwin MR, Vitiello MV. Implications of sleep disturbance and inflammation for Alzheimer's disease dementia. *Lancet Neurol.* 2019 Mar;18(3):296-306. doi: 10.1016/S1474-4422(18)30450-2. Epub 2019 Jan 17. PMID: 30661858.



# Relació fisiopatològica del son amb malalties rellevants (5)

## Sistema immunològic

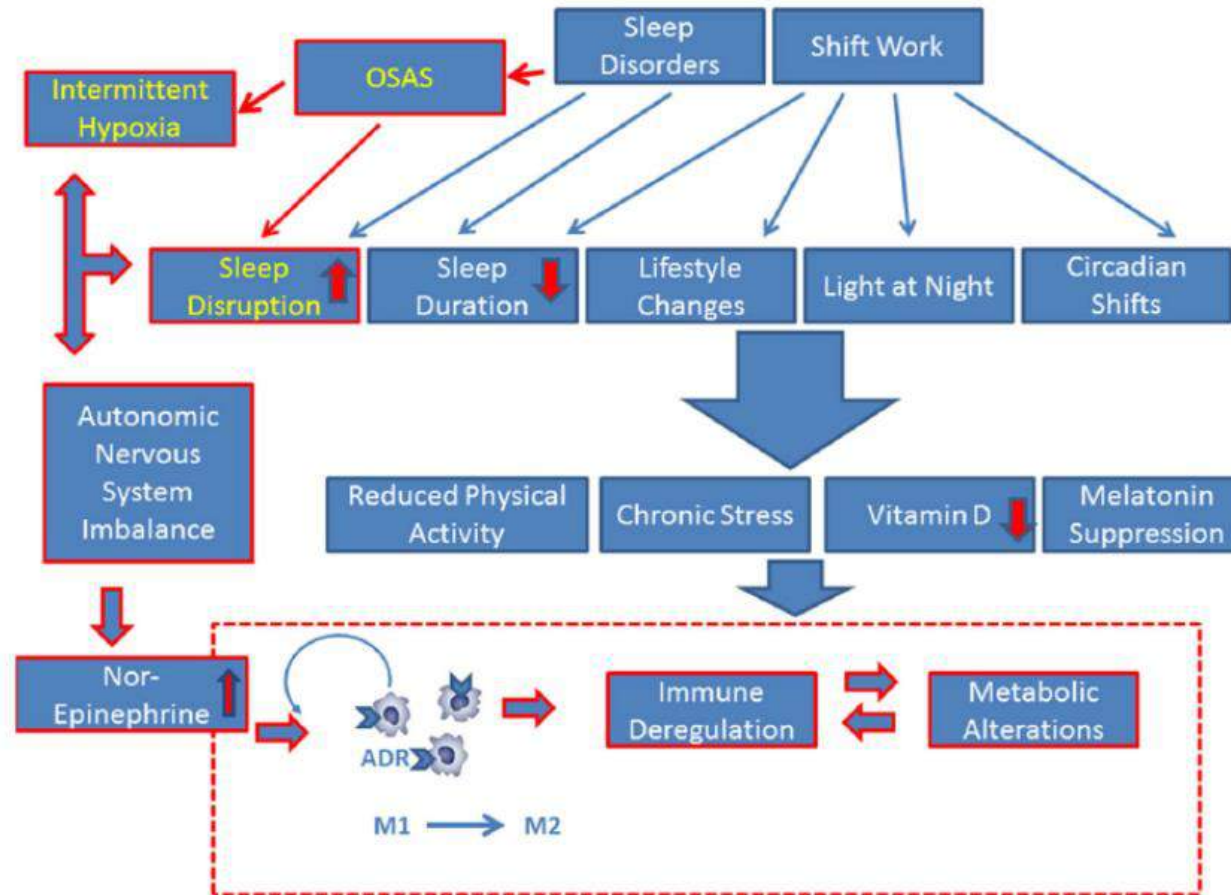


Physiological Reviews © 2019



*Sleep disturbances promote cancer*

**Why?**



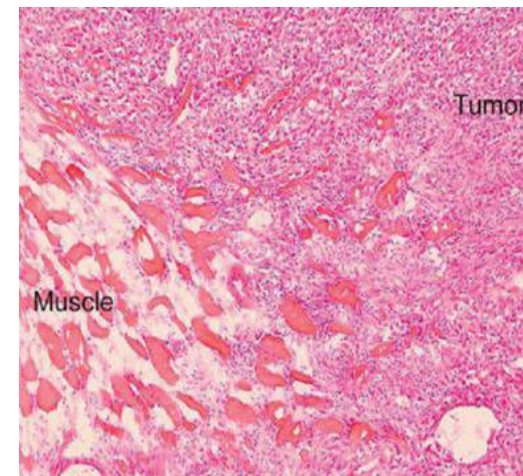
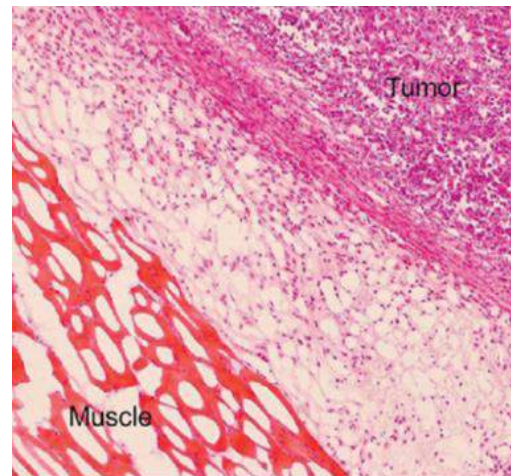
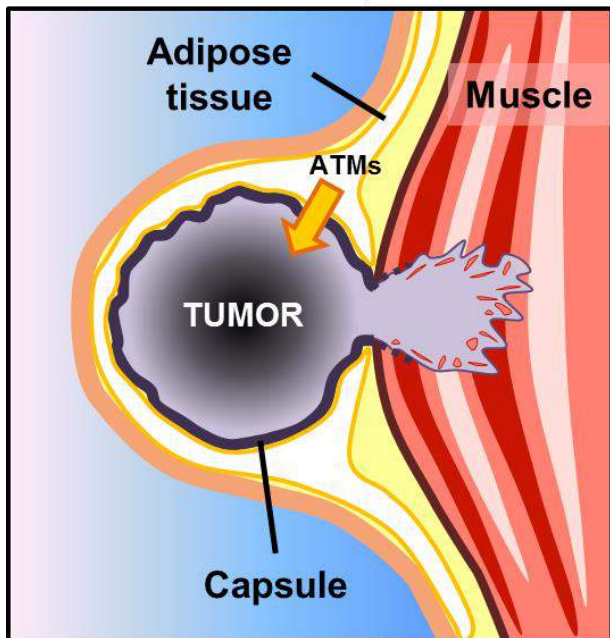
*Sleep disturbances promote cancer*

*Experimental data from animal models*

➤ **Tumor invasion**

*INTERMITTENT HYPOXIA* ↑

*SLEEP FRAGMENTATION* ↑



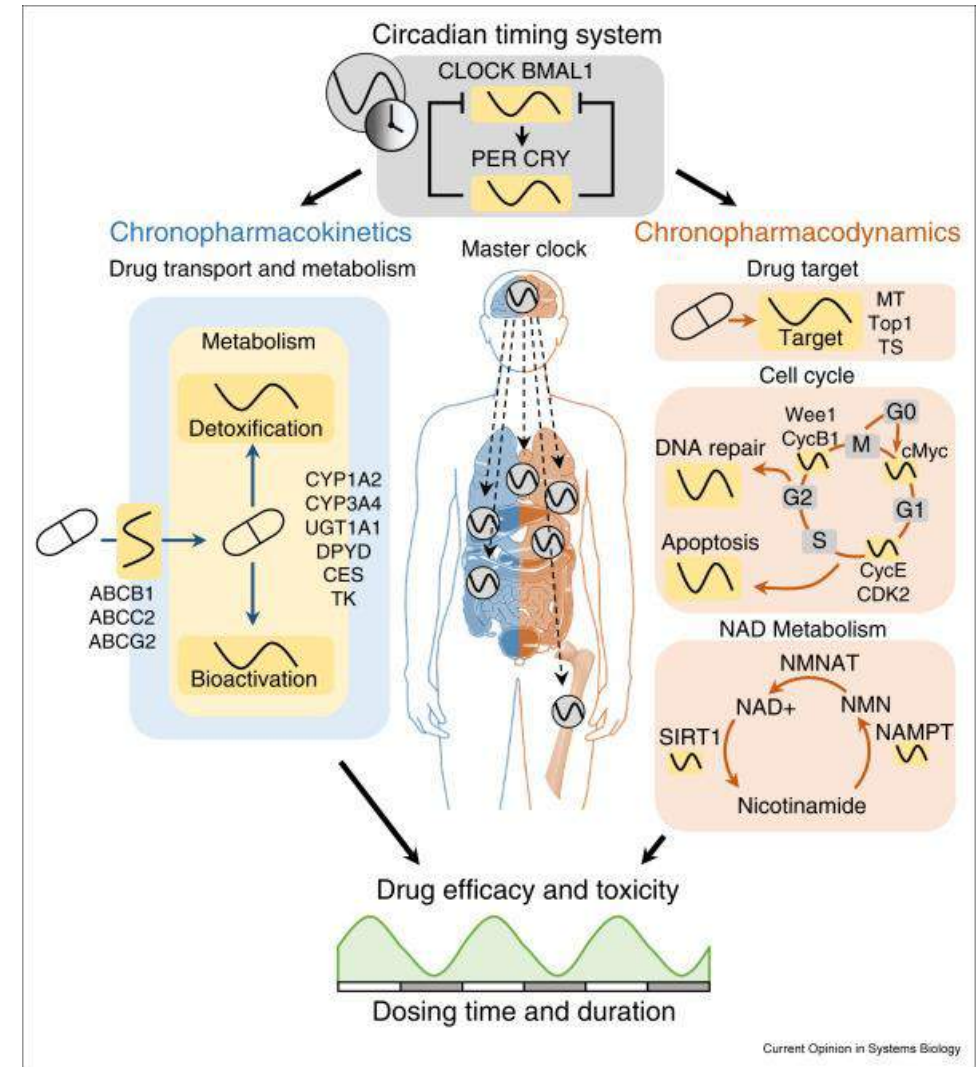
*Almendros I et al. Am J Respir Crit Care Med;189:593-601, 2014*

*Cortese R et al. Oncotarget.;6:556-69 2015*

*Hakim et al. Cancer Res. 2014;74:1329-37*



# Cronoterapia



Dae Wook Kim, Eder Zavala, Jae Kyoung Kim (2020). Wearable technology and systems modeling for personalized chronotherapy. *Current Opinion in Systems Biology*.



HEALTH

# Chemotherapy could work twice as well if given at the right time

25 October 2016

by Joanna Roberts

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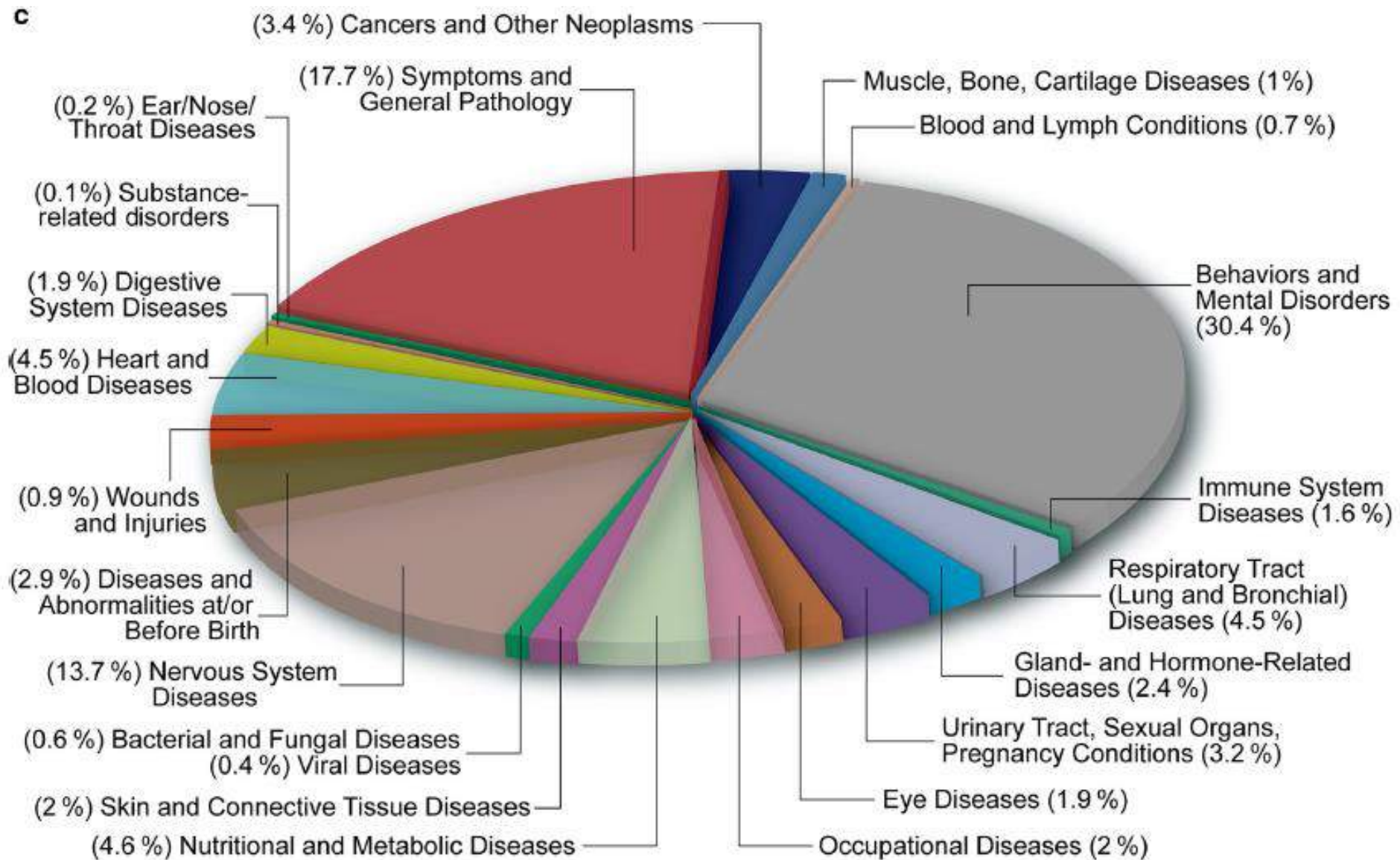


*Adjusting the time that chemotherapy is given to male colorectal cancer patients has been shown to increase their survival rates by three months. Photo credit: Pixabay/ public domain*

The anti-tumour properties of chemotherapy drugs could work twice as well if you take them at times when the body is most receptive, but that means different timetables for different people, according to researchers working to understand how to use the body's daily rhythms to make medicine optimally effective and reduce unpleasant side effects.

[Chemotherapy could work twice as well if given at the right time | Research and Innovation \(europa.eu\)](#)

# Chronotherapy: Intuitive, Sound, Founded...But Not Broadly Applied

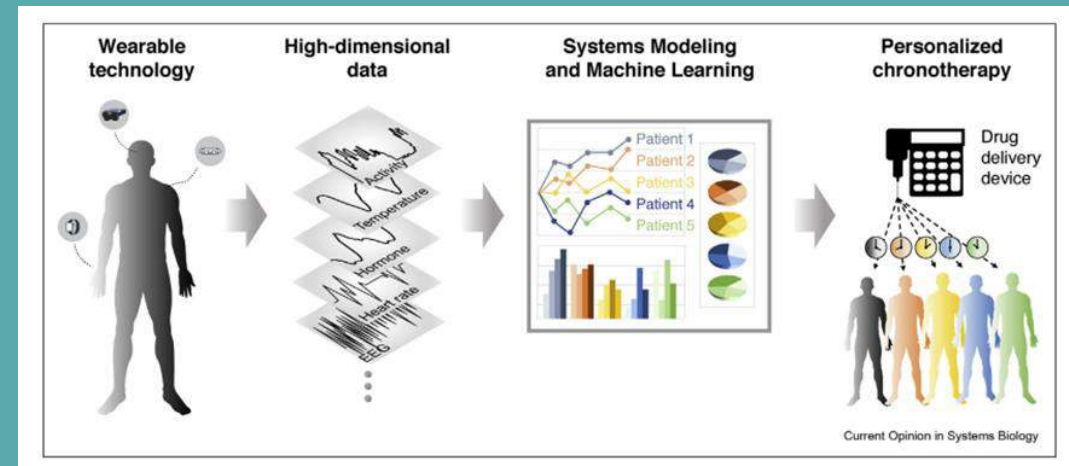


Julia M. Selfridge, Tetsuya Gotoh, Samuel Schiffhauer, Jingjing Liu,  
Philip E. Stauffer, Andrew Li, Daniel G. S. Capelluto, Carla V. Finkielstein





# Tecnologies per monitoritzar el son





# Sleep is integral to life!

Should sleep be considered a life protector?  
... a therapeutical remedy to fight disease?  
... a booster of pharmacological effect?  
... **a golden medicine by itself.**



Clinical services

Innovation



Specialized programs

Education



Gràcies per la vostra atenció!

Dr. Antoni Esteve

28 d'Octubre de 2021

