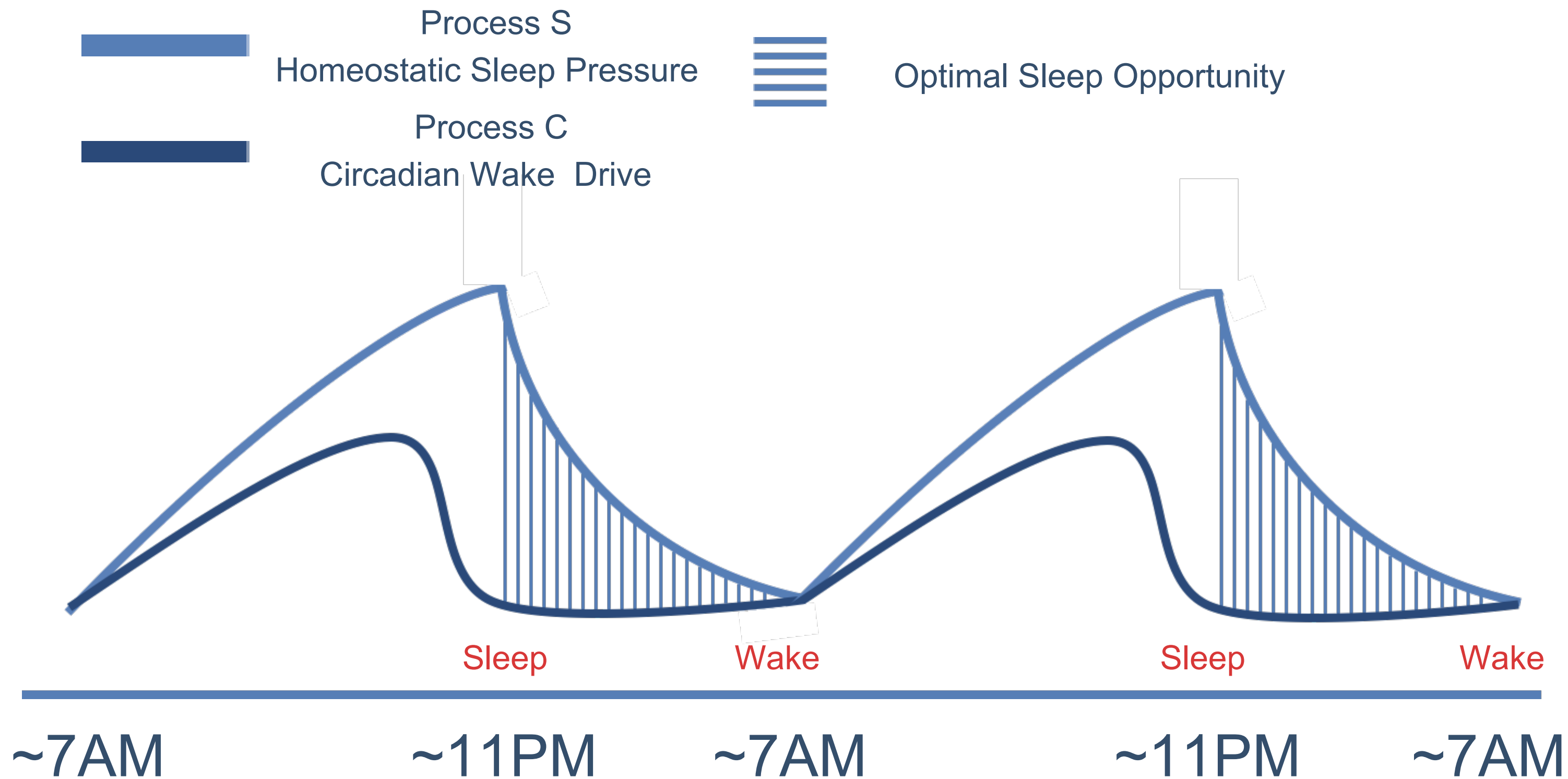


Two-Process Model of Sleep Regulation

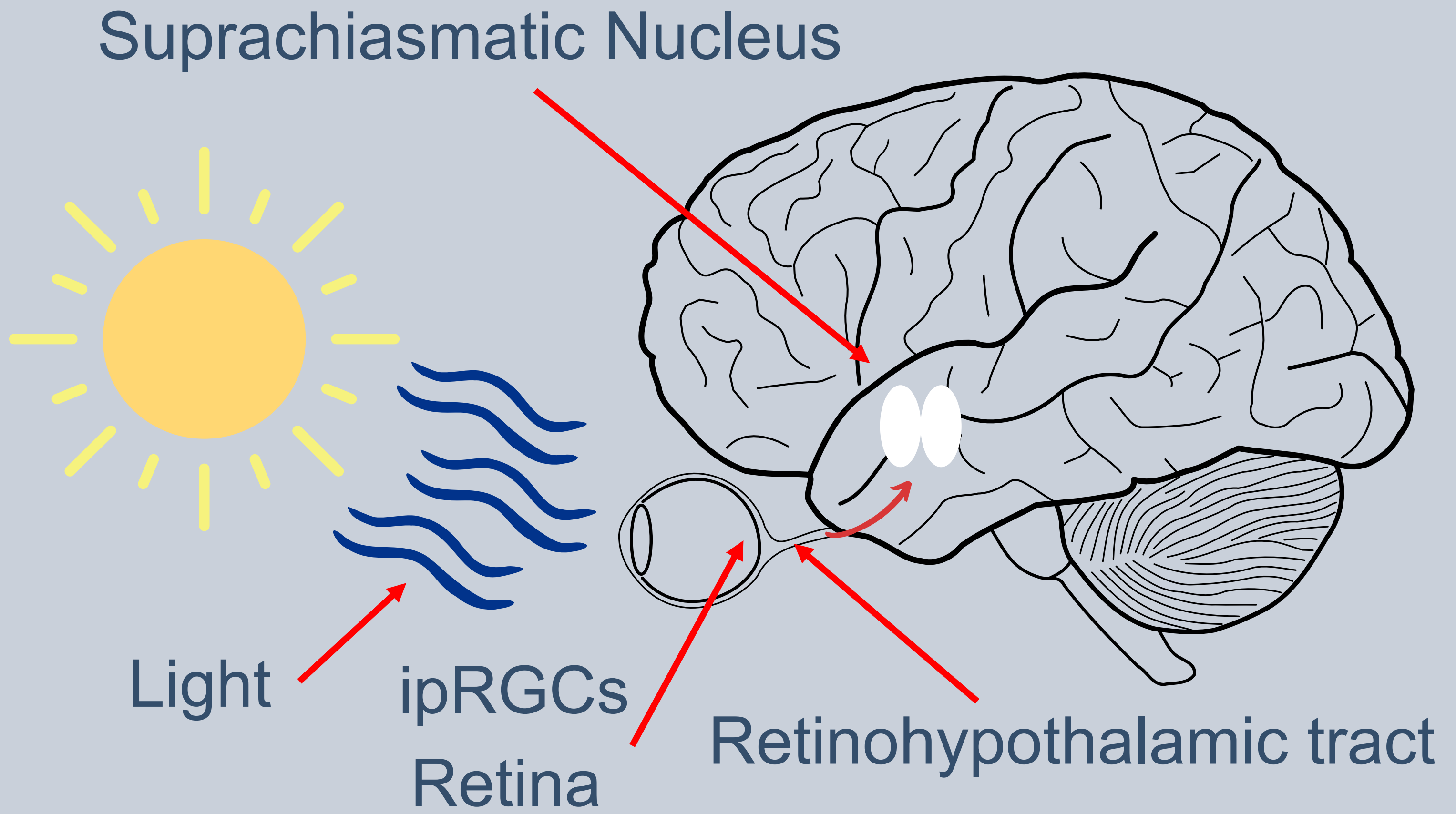


adapted from Borbely Hum Neurobiol 1982

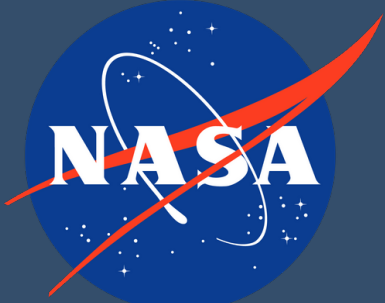
Sleep-Wake Regulation



Process C (Circadian)
Wake Regulation

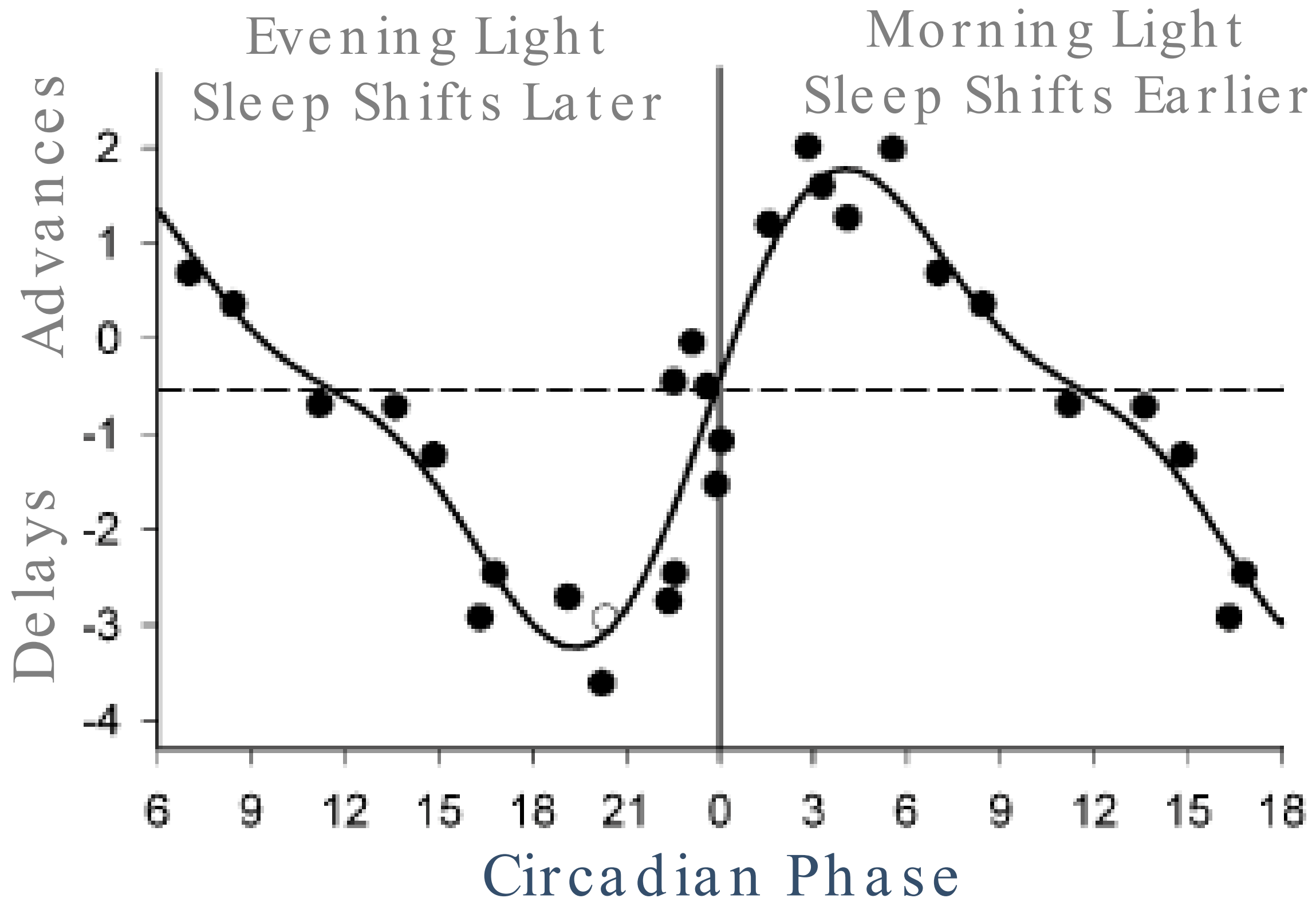


Circadian Rhythm Resetting



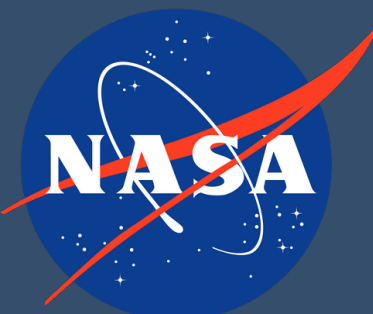
Process C (Circadian)
Wake Regulation


Phase Shift (h)



(Melatonin midpoint = 22 h) Khalsa et al. 2003 JPhysiol

Phase Response Curve to Light





Influence of light on circadian rhythms

Dependent on:

- Wavelength
- Pattern
- Duration
- Intensity

Circadian Rhythm Resetting

Do other factors influence the circadian rhythm?

EXERCISE/ACTIVITY



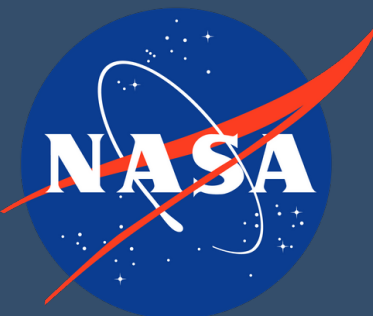
TIMED FOOD INTAKE



MEDICATIONS



Weak Non-photic Zeitgebers



Do other factors influence the circadian rhythm?

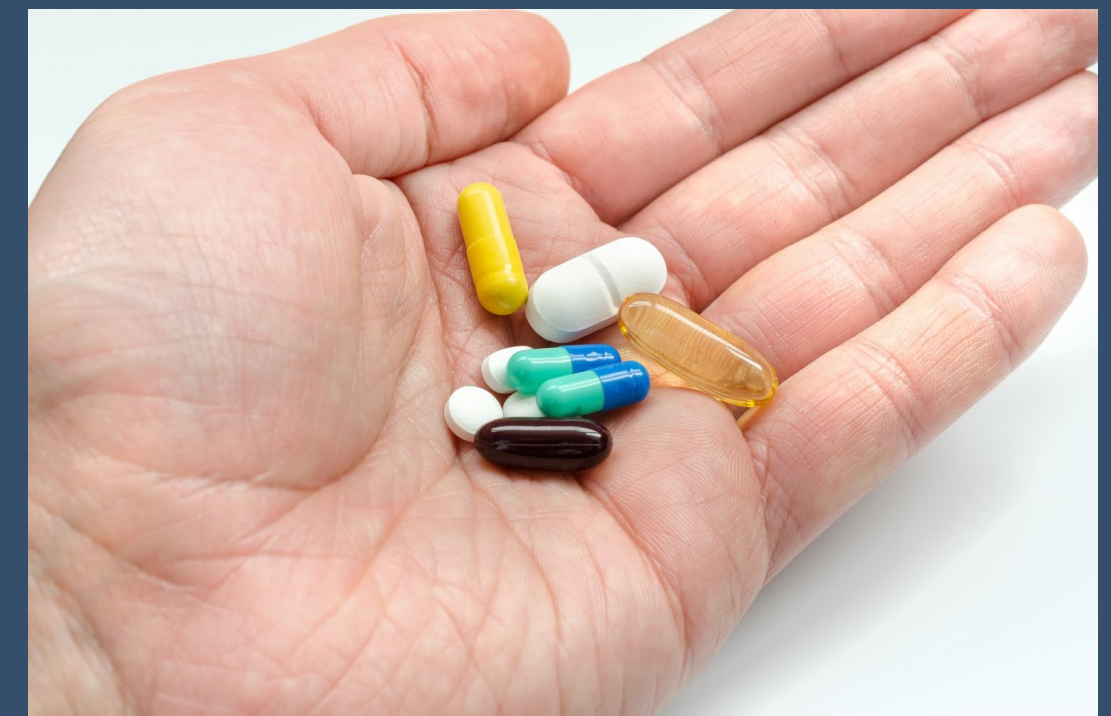
EXERCISE/ACTIVITY

- Intense exercise in the evening can cause moderate phase delays (30 min - 2 h; Mistleberger and Skene 2005)
- Influence on phase advances less clear (Mistleberger and Skene 2005)
- Difficult to disentangle light effects from exercise effects (Atkinson et al. 2007)
- Regular exercise can aid in sleep consolidation (Driver and Taylor 2000)

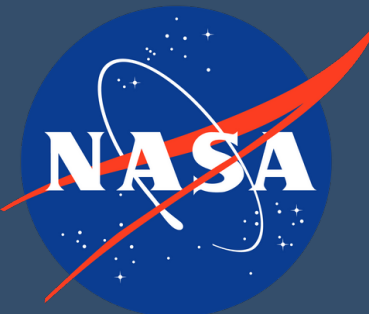
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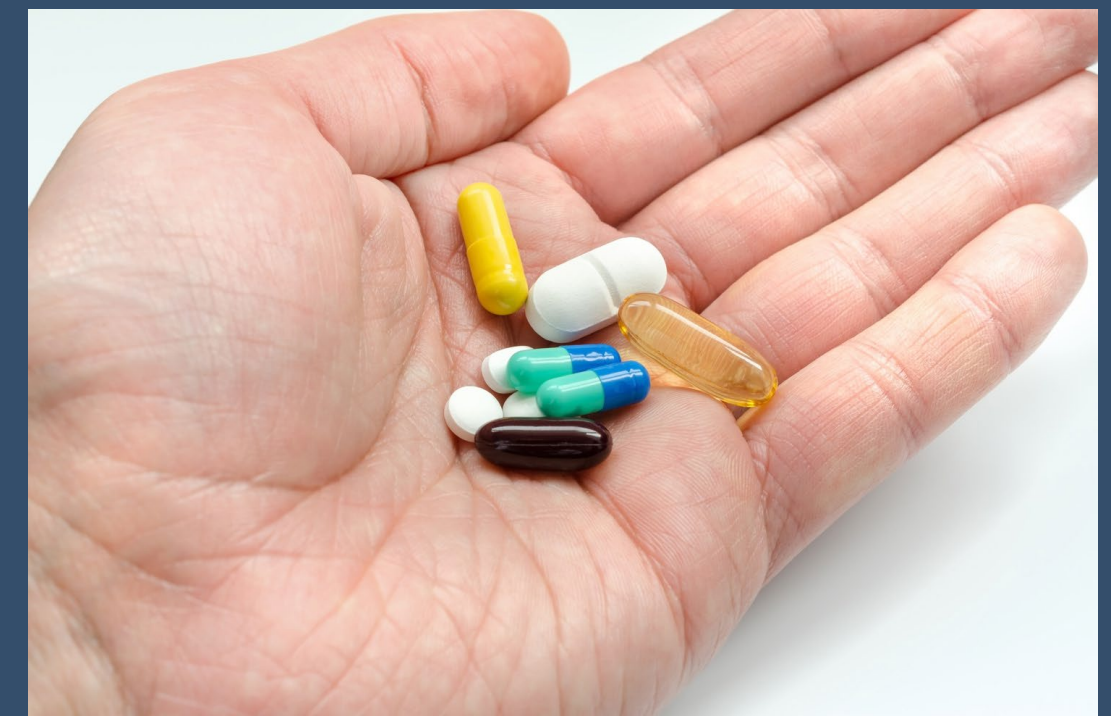
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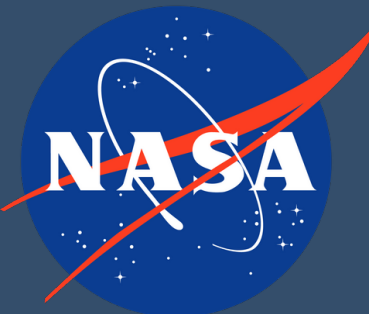
TIMED FOOD INTAKE

- Time-restricted feeding in rodents shifts the circadian rhythm (Pendergast et al. 2018)
- Peripheral oscillators in the liver and gut (Brown et al. 2019)
- Limited evidence to support a role for circadian shifting via timed food intake in humans (Adafer et al. 2020)
- Eating at adverse circadian phases may lead to diabetes & obesity (Mason et al. 2020)

MEDICATIONS



Weak Non-photic Zeitgebers



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MEDICATIONS

- Chronobiotics such as melatonin and tasimelteon can cause phase advances when taken in the evening (Arendt et al. 1997; Lockley et al. 2015)
- Caffeine may have a modest phase shifting effect (Burke et al. 2015)
- Hypnotics do not shift the circadian rhythm
- Limited/unknown effects of other medications

Weak Non-photic Zeitgebers

