

Category 6

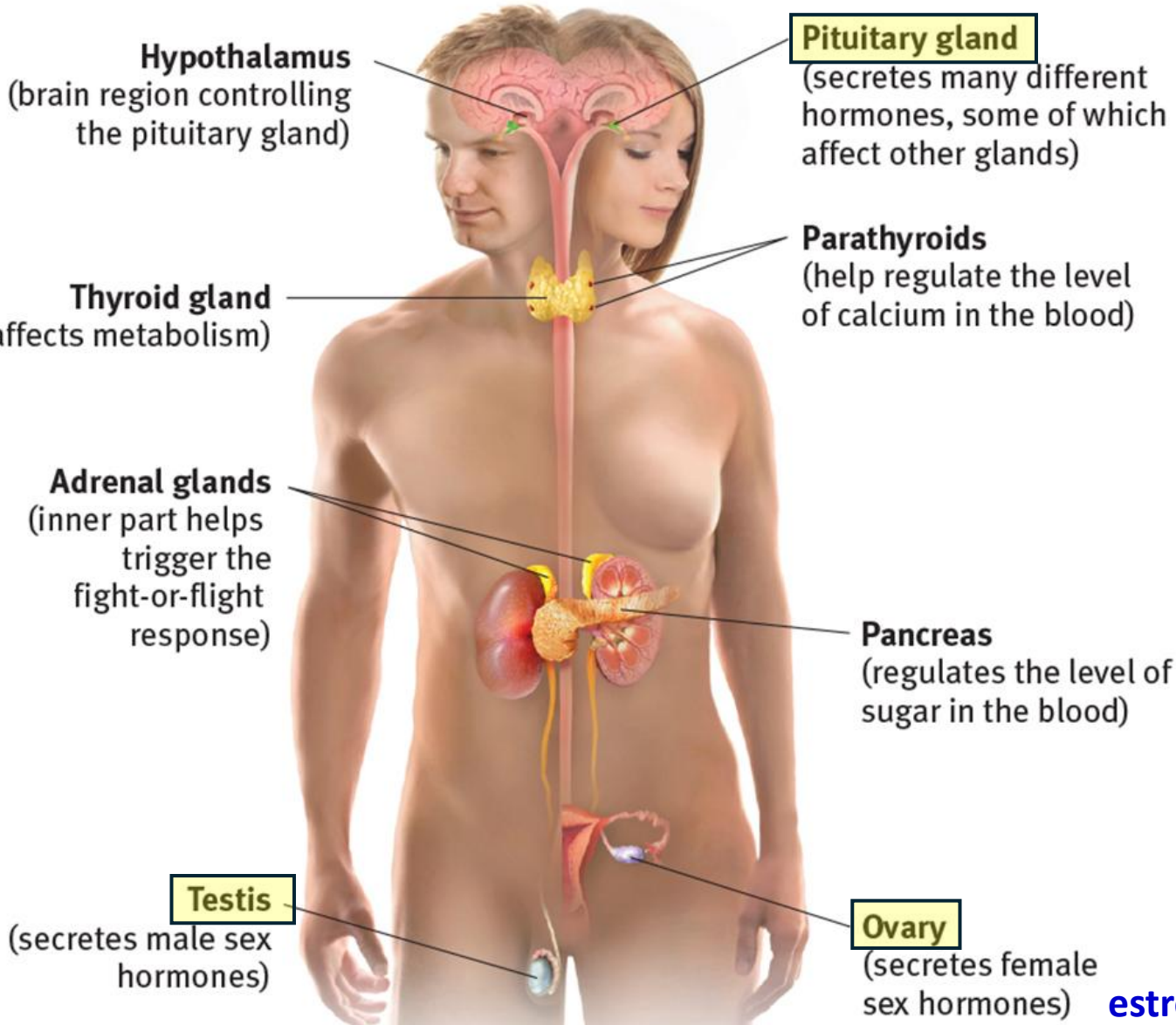


Sex

Sleep

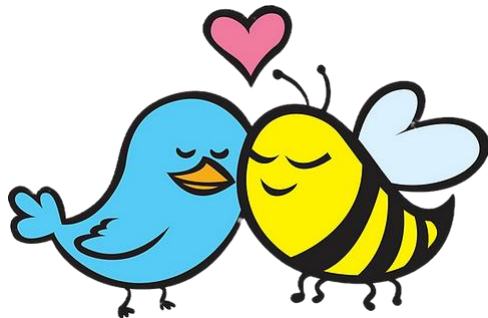
Dreaming





Most sex hormones are produced by the Pituitary and Gonads (ovaries & testes)

Produce gonadotropic hormones: follicle-stimulating hormone and luteinizing hormone → these become testosterone, estrogen, progesterone



**Testosterone & androstenedione (androgens)
small amount of estrogen**

estrogen and progesterone, small amount of testosterone

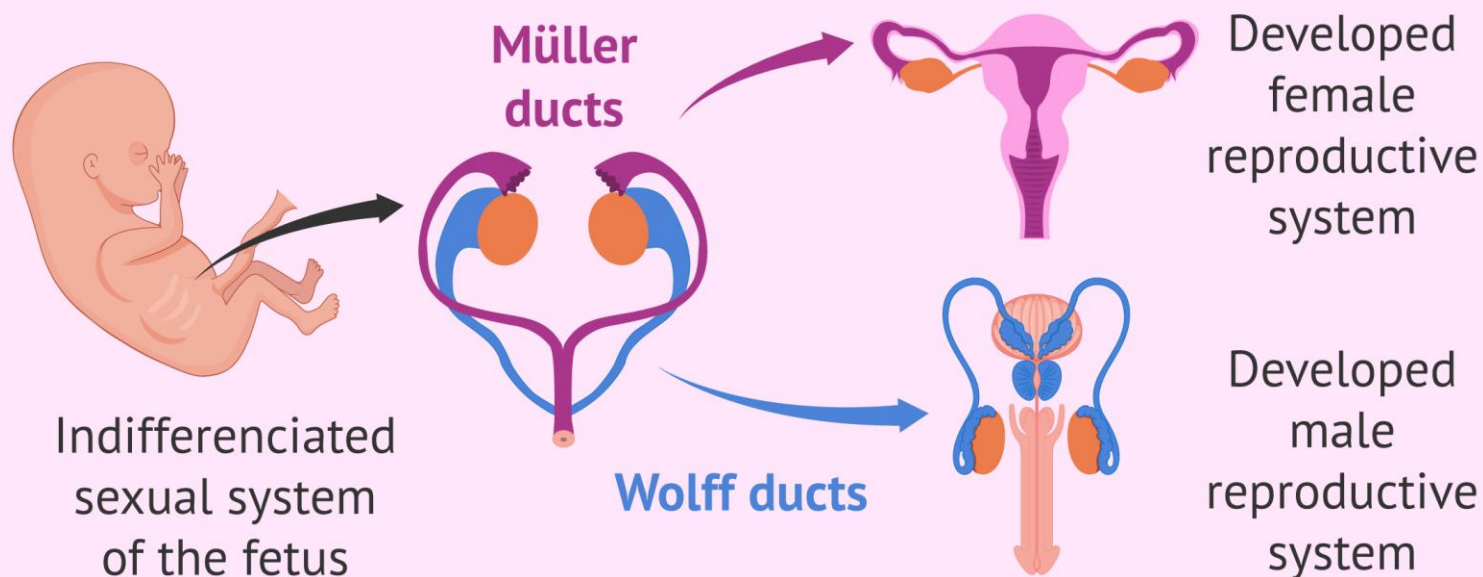


Sexual differentiation during fetal development

Undifferentiated gonads at conception

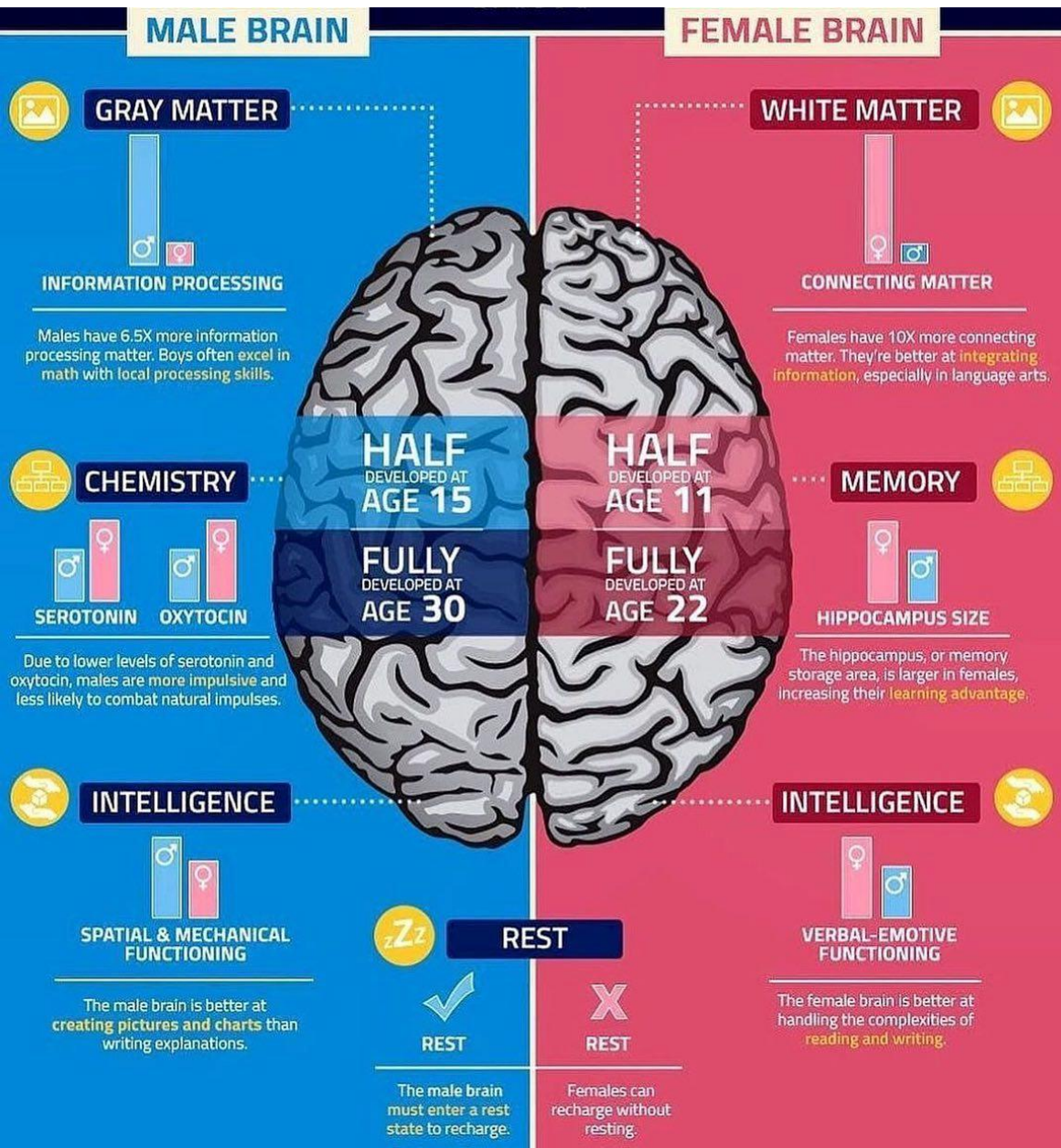
6 – 8 weeks post conception differentiation begins

**fetus exposed to androgens in second trimester
Wolff ducts develop
leads to male genitalia**



**fetus not exposed to androgens in second trimester
Müllerian ducts develop
Leads to female genitalia**

Fact or Fiction?



Some evidence that...

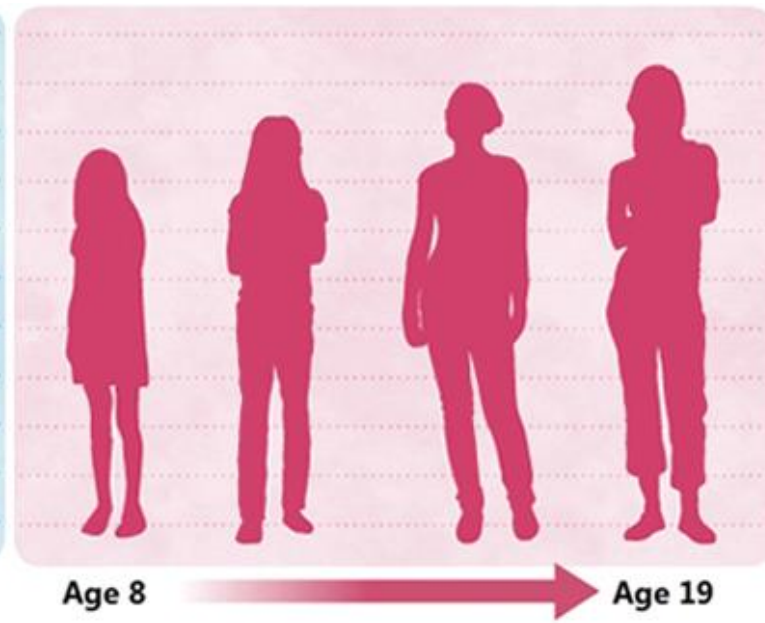
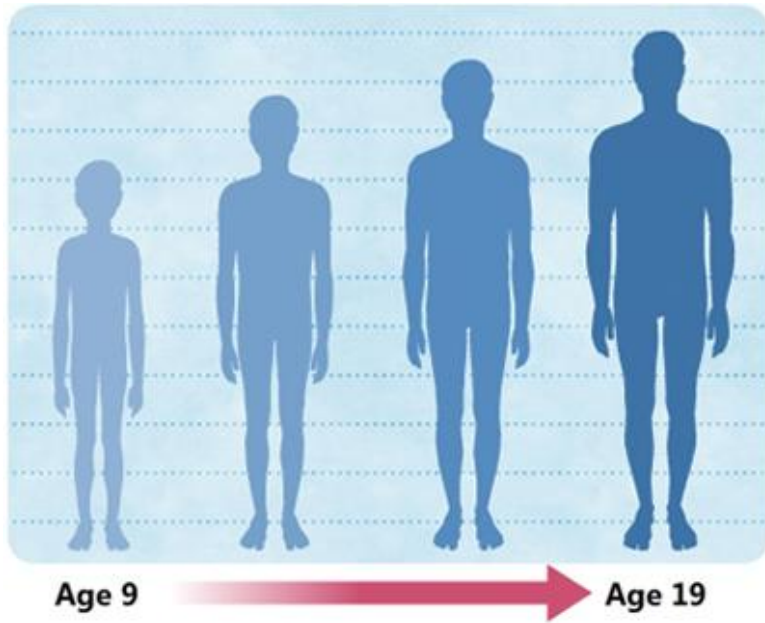
Size differences in hippocampus, corpus callosum, SCN

Visual-Spatial vs Verbal tasks

Could be genetically hardwired OR due to exposure to androgens pre and postnatally OR simply a function that male brains are larger than female brains.

When controlled for size, sex only explains 1% of “sexual dimorphism”. Eliot et al.

Eliot, L., Ahmed, A., Khan, H., & Patel, J. (2021). Dump the “dimorphism”: Comprehensive synthesis of human brain studies reveals few male-female differences beyond size. *Neuroscience & Biobehavioral Reviews*, 125, 667–697. <https://doi.org/10.1016/j.neubiorev.2021.02.026>



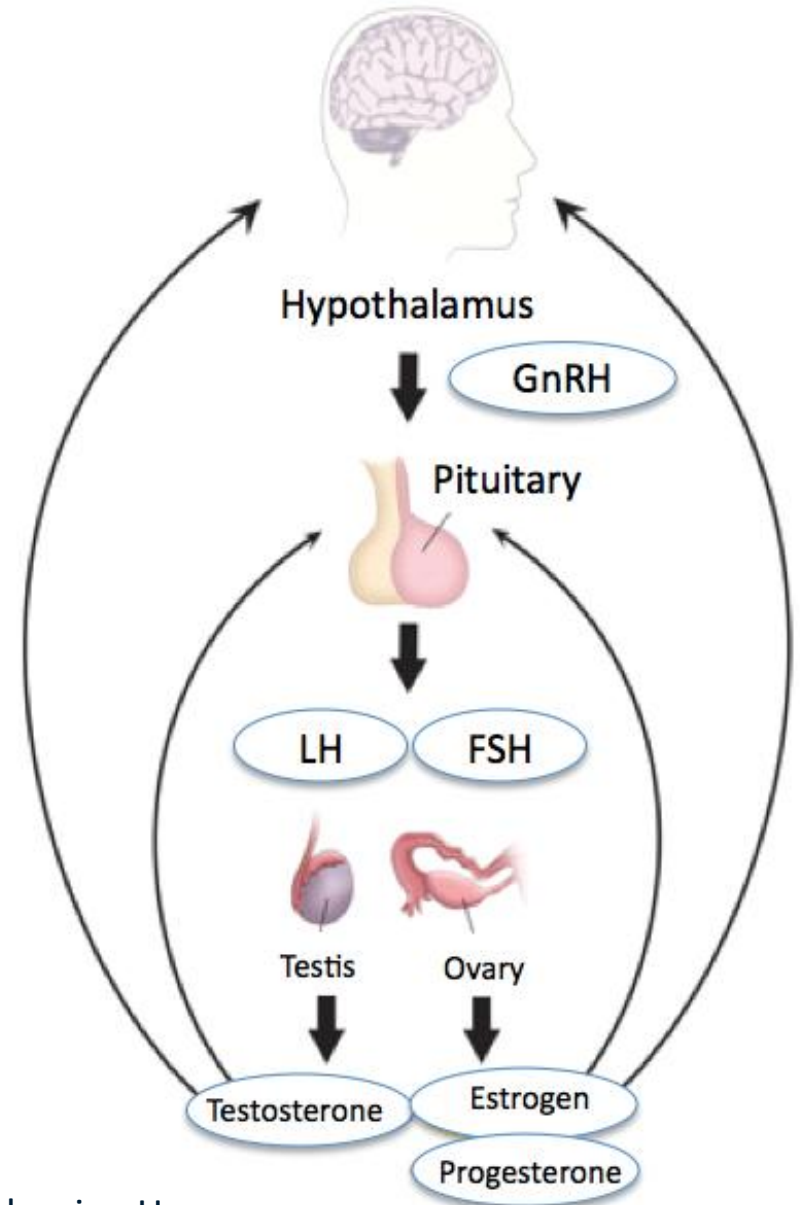
Puberty: increased gonadal hormones → secondary sex characteristics and development of reproductive system

Factors affecting onset:

genetics, nutrition, healthcare, exercise, temperature, family size, low birth rate, race and ethnicity

** factors confound each other **

hypothalamic-pituitary-gonadal axis



GnRH = Gonadotropin-Releasing Hormone

Adult sexual behavior

Millions of dollars are spent annually to increase libido and performance

Reality: learning and experience are more important than hormones (opposite for animals lower on the phylogenetic ladder)



No predictable relationship between estrogen, progesterone, and libido. Menopause & ovariectomy typically have no effect on libido. When present, androgen supplements help (not estrogen).



A link between testosterone levels and libido is ONLY apparent if testosterone levels are below a minimum threshold.

Inconsistent relationship between erectile function and androgens.

Viagra does not affect androgen levels – it acts directly on penile tissue

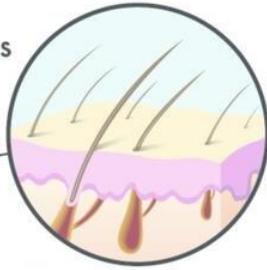


Menopause

Symptoms and Complications



Changes in mood and irritability



Thinning of scalp hair



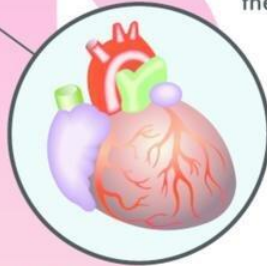
Loss of elasticity and thinning of the skin



Loss of firmness of the breast



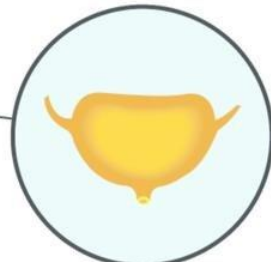
Amenorrhea and increased risk of vaginal infections



Risk of heart damage



Osteoporosis risk



Urinary incontinence and increased risk of urinary tract infections

Typically begins late 40's or early 50's
presence & severity of symptoms vary

Hormone replacement therapy

Estrogen with or without progesterone
can improve symptoms

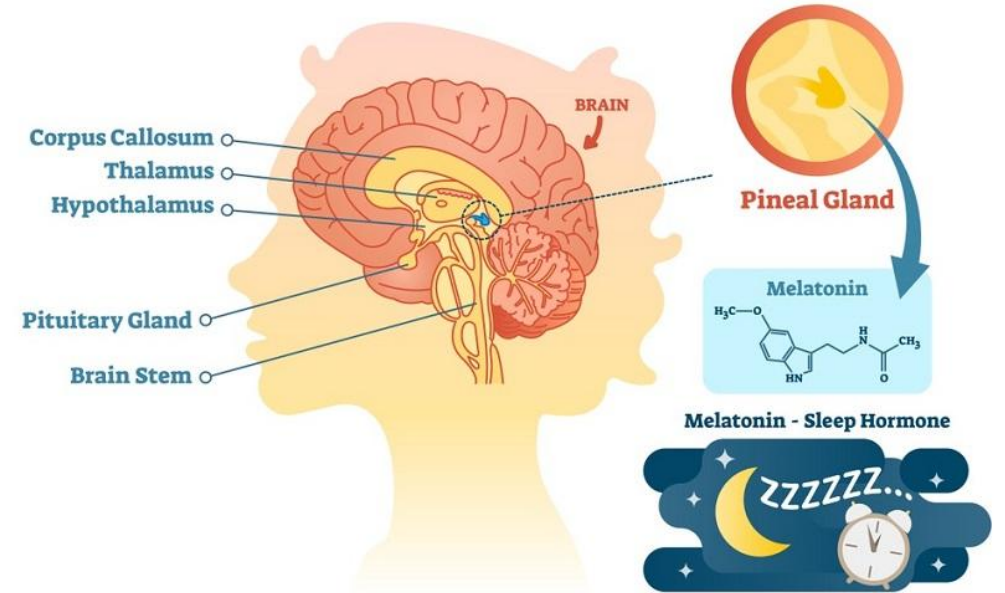
Does not improve sex drive directly

Some research suggests HRT-elevated risk of
blood clots, stroke, breast cancer

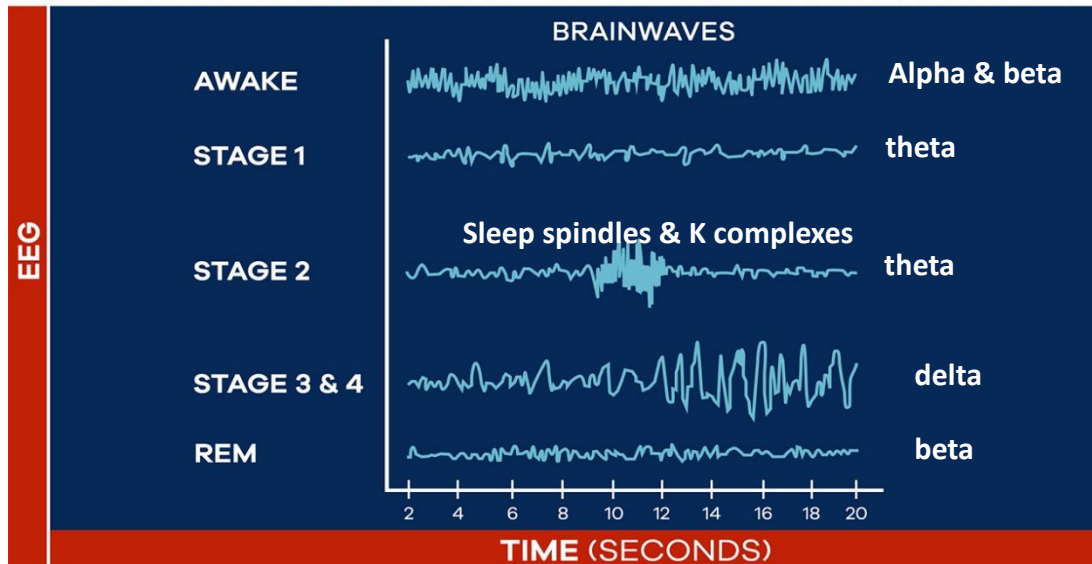




PINEAL GLAND

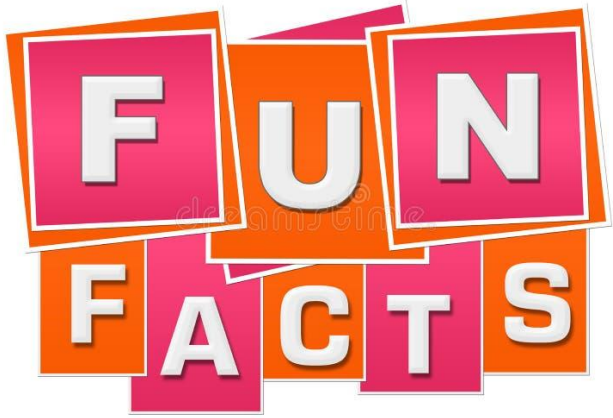


WHAT IS THE BRAIN DOING WHEN WE SLEEP?



Suprachiasmatic nucleus (SCN) of the anterior hypothalamus: regulates sleep by stimulating the pineal gland to release melatonin at night when it's dark.

REM deprivation: anxiety, irritability, poor cog perf
Insomnia: difficulty falling asleep, staying asleep, frequent wakening
Nightmares/Night terrors: cause sleeper to wake



Stage 5 REM sleep is called paradoxical sleep

EEG shows arousal pattern but brainstem blocks muscle movement

Stage 5 REM occurs 4-6 times nightly

Duration increases from ~ 10 min long to ~ 50 min long

Dreams occur outside of REM

but are most vivid during REM

When are you most difficult to wake up?

stage 3, 4, and REM

How long does it take to complete a cycle (stages 1-5)

90-100 minutes

Does everyone dream?

Probably – they just don't remember
You are more likely to recall a dream
if you wake up during REM

What is a lucid dreamer?

Someone who can control the content and course of a dream while still dreaming

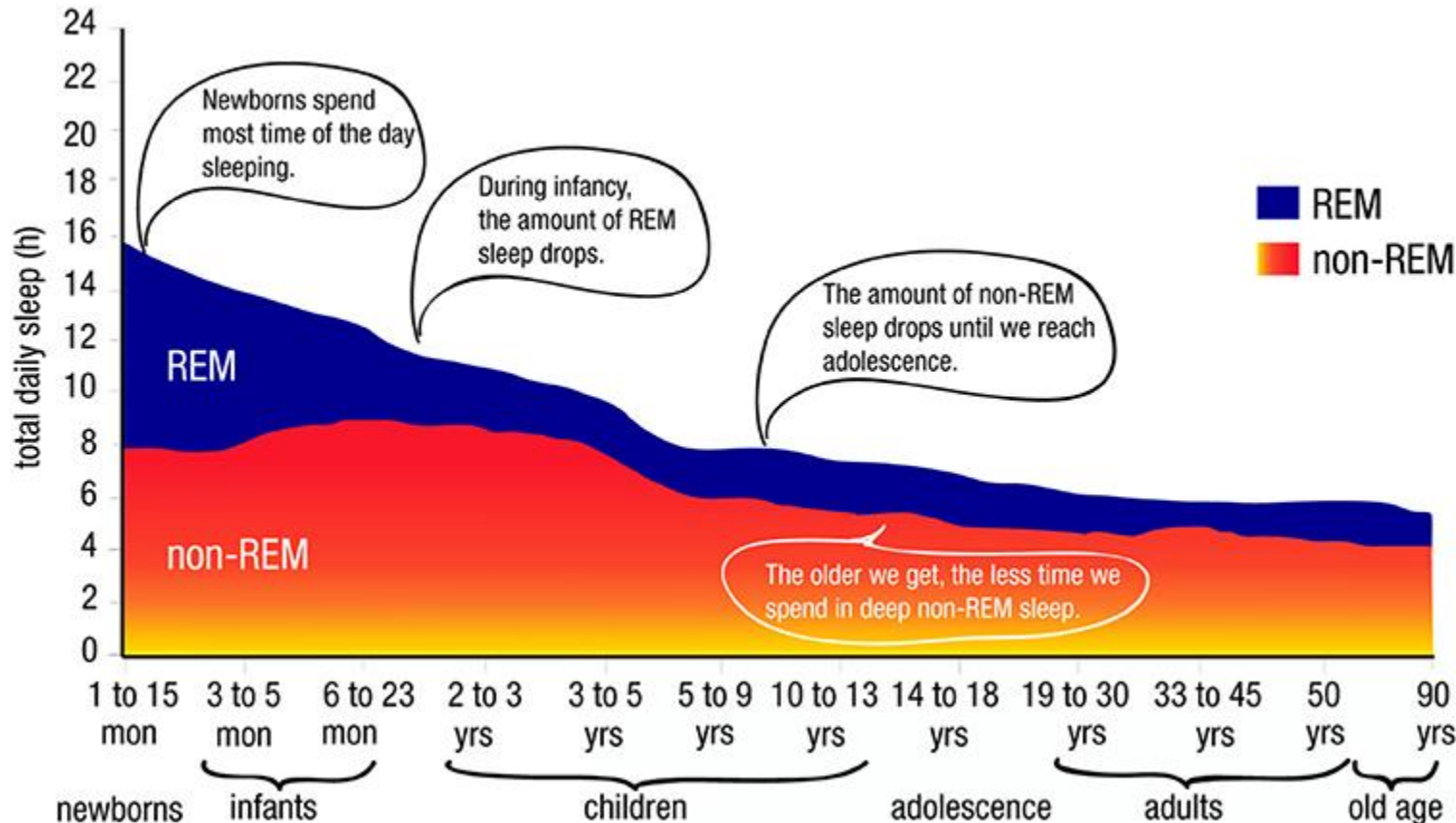
Sleep across the lifespan

Newborns – 2 months: start immediately with REM
their NREM is mostly slow wave

The four stages of NREM are not distinguishable until
6 months of age

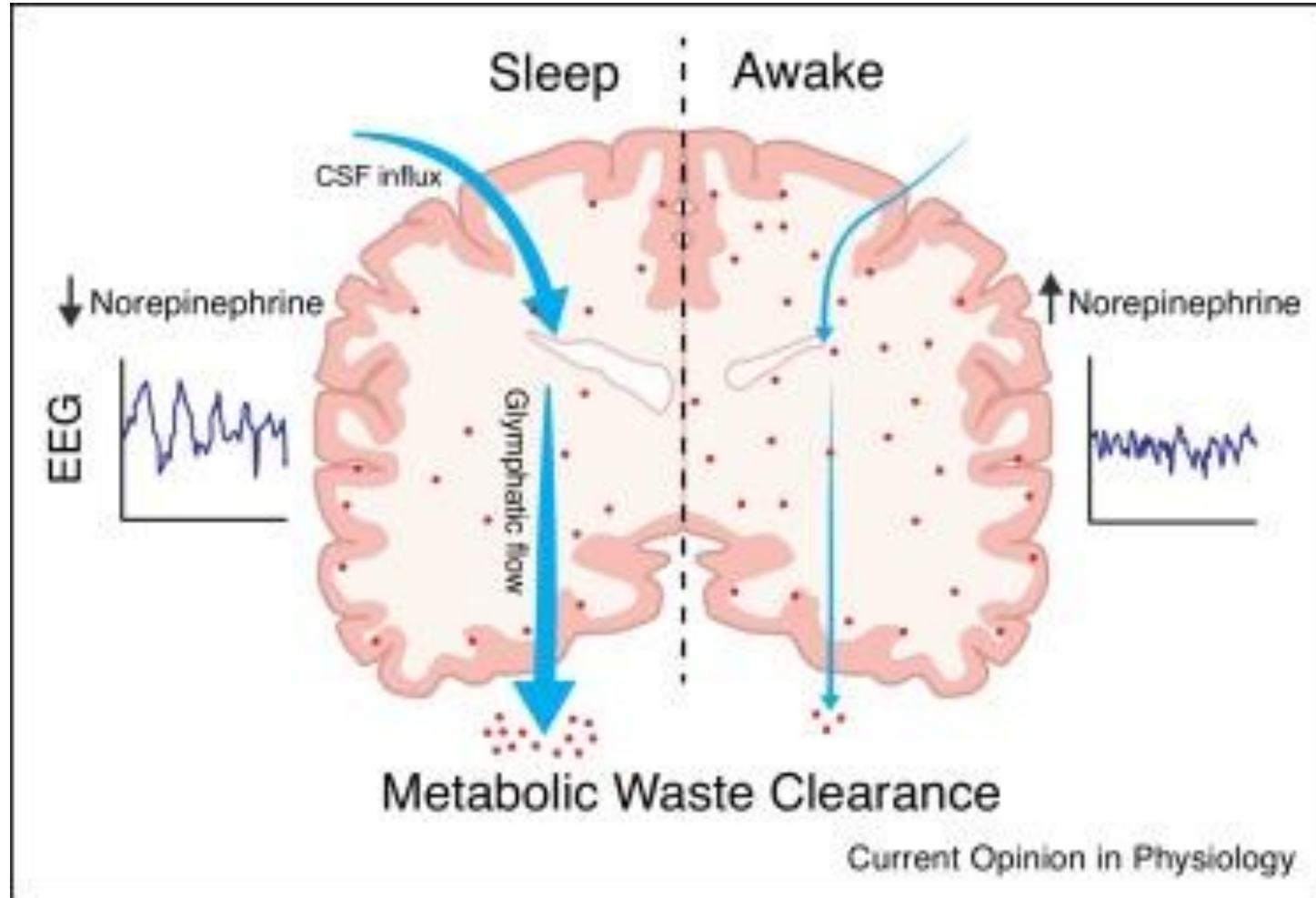
Total sleep time, stage 4, and REM decrease with age

Elderly individuals get less sleep because they have
trouble falling asleep and wake often



Excessive sleeping and vivid disturbing dreams has been associated with later stage dementia

Reasons to sleep



The Glymphatic system is active during sleep & clears away neurotoxins

May protect against neurodegenerative disorders

Some sleep aids inhibit this system

Sleep aids with memory consolidation

Sleep helps restore homeostasis which improves immune system, cardiovascular health, glucose metabolism, stress