

# PINEAL GLAND

revised 18 February 2016

p 628: Thib & Pat: 419-420, Carola: 538, Creager: 410-412, Thib & Pat: 419-420, Carola: 538, Creager: 410-412, Martini 6<sup>th</sup>: 479, 587, Martini's 7<sup>th</sup>: 616, 8<sup>th</sup>: p 630, 10<sup>th</sup>: 634-635

**PINEAL GLAND:** "Neuroendocrine transducer" makes **melatonin** from serotonin

**"epithalamus"** embryonic part of diencephalon:

attached to rear of 3rd ventricle, extends into its interior, above superior colliculi.

Can be seen in X rays due to Ca and Mg salts = "brain sand"

**NERVOUS PATHWAY via visual collateral pathways:**

**retinohypothalamic tract**

*Suprachiasmatic nucleus* to the descending sympathetic fibers to the lateral grey horn

up chain ganglia to **superior cervical ganglia**

post synaptic nervi conarii release noradrenaline in **pineal gland**

N-acetyltransferase synthesizes **melatonin** from **serotonin**

(Synthesized from tryptophan)

N-acetyltransferase synthesis is **inhibited by light induced noradrenaline:**

50x as much N-acetyltransferase made in dark as light (i.e., melatonin is high in the dark)

light affects oscillatory machinery.

Melatonin synchronizes **circadian rhythms**,

Induces drowsiness: thus, tryptophan has been suggested as a sleeping aid

**Jet Lag:** circadian rhythm off because of time shift.

Best adaptation: spend time out in the sunlight (even if tired), and retires in dark bedroom even if not sleeping.

Melatonin inhibits development of gonads:

Melatonin synthesis declines just before puberty (i.e., therefore gonadotropins increase)

5 year olds have 4x melatonin as much as children at end of puberty

Boys with pineal tumors which interfere with melatonin synth. reach puberty at 4 years (famous 1898 study by Heubner)

This may be why children sleep more than adults

**melatonin inhibits release of gonadotropins** from adenohypophysis, esp. luteinizing hormone

**slows maturation of gametes and reproductive organs**

Melatonin induces sleep, may alter mood:

Seasonal Affective Disorder (SAD); changes in mood, eating habits, sleep patterns

**BUT...** women blind since 1st year of life (high melatonin) reach sexual maturity *earlier* than sighted women [Something is wrong with either the data or theory here...]

Melatonin secretion may decline with old age, could explain poor sleep patterns of elderly.



