PINEAL GLAND

revised 18 February 2016

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.