

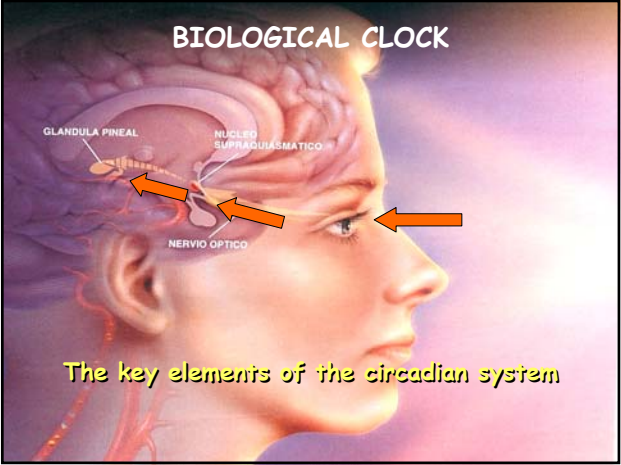
**Light Pollution and Melatonin
Suppression:
Implications for Pediatrics**

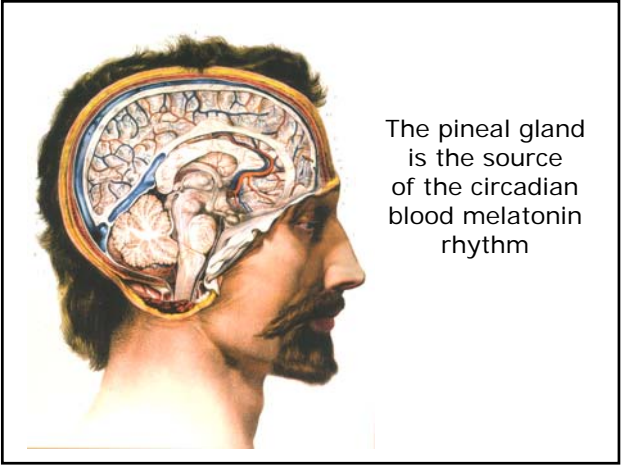
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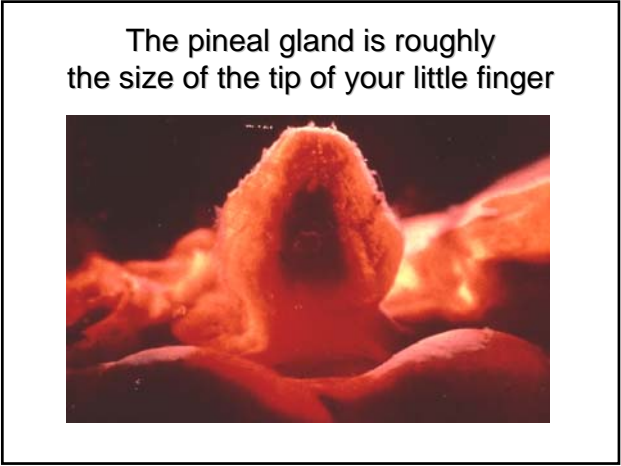
reiter@uthscsa.edu

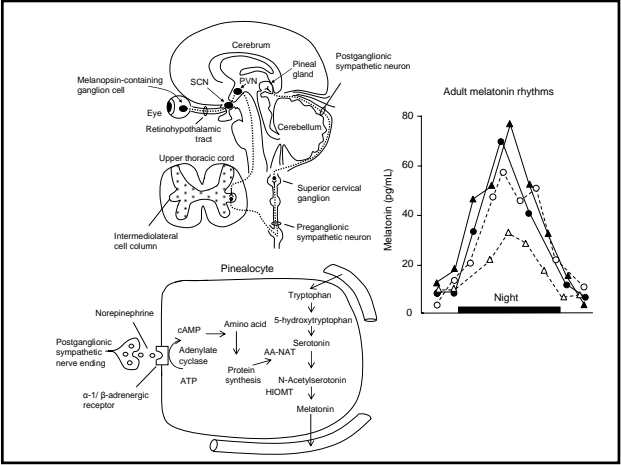
Evolution has dictated biological rhythmicity and
physiology influenced by the light/dark cycle



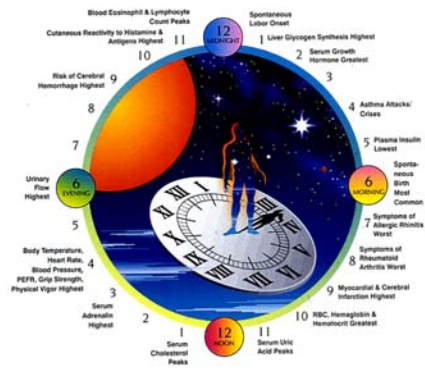




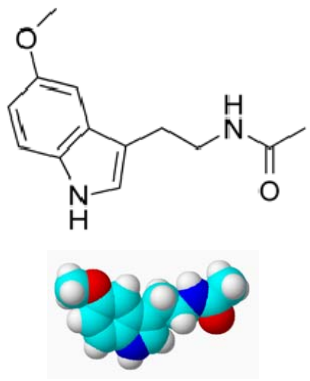


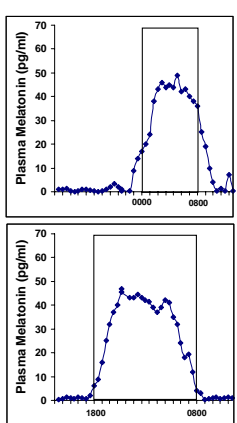


Essentially every function in the body exhibits a 24 hour rhythm



N-acetyl-5-methoxytryptamine (melatonin)



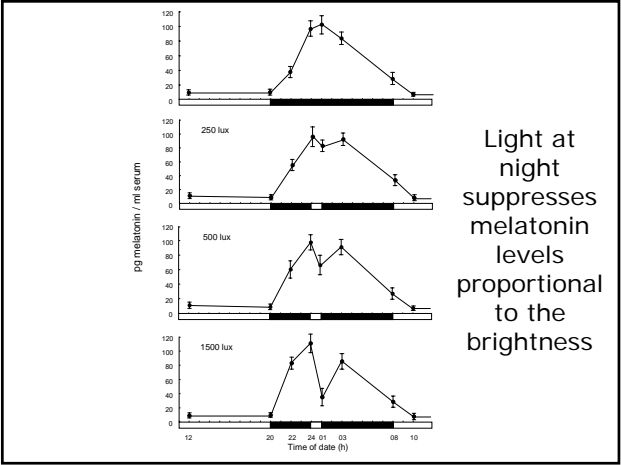


1879, a critical year for circadian rhythms

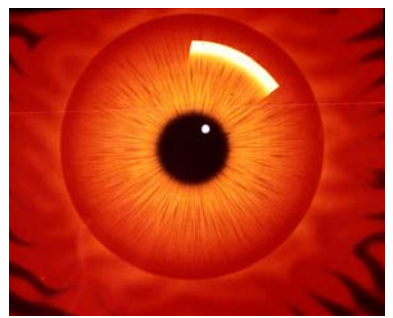
L:D 16:8

The quantity of melatonin produced is proportional to the duration of darkness

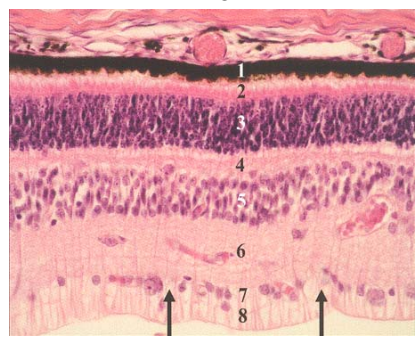
L:D 10:14



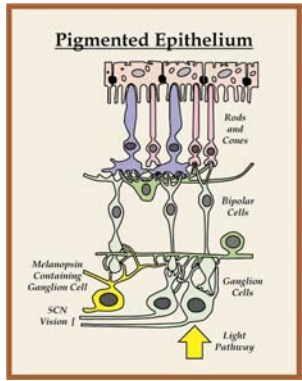
The eyes are required for light inhibition of melatonin production and for adjusting circadian rhythms



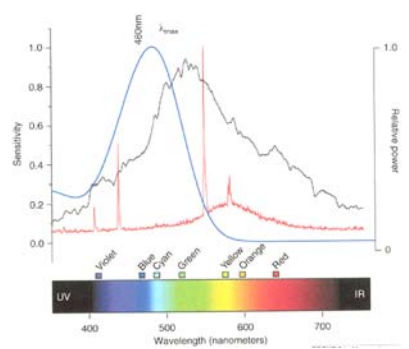
Classic photoreceptors (rods and cones) are not involved in regulation of circadian rhythms



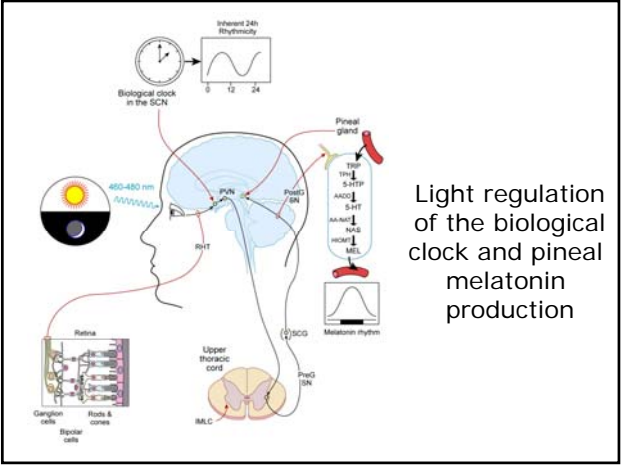
Light regulation of circadian rhythms involves a unique set of ganglion cells and melanopsin



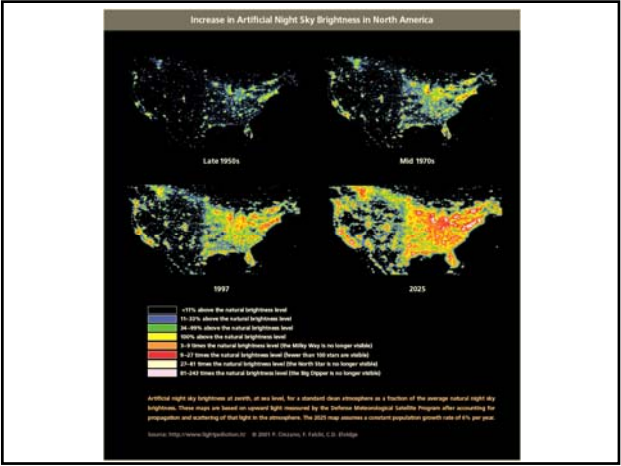
Blue-green wavelengths (peaking at 480 nanometers) is most inhibitory to the biological clock and melatonin levels

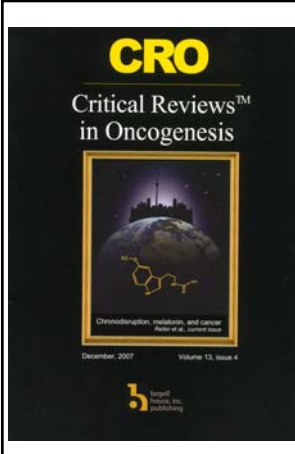


Light regulation of the biological clock and pineal melatonin production

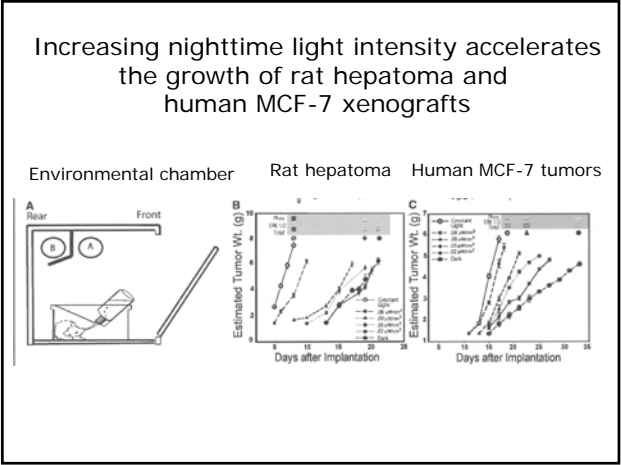


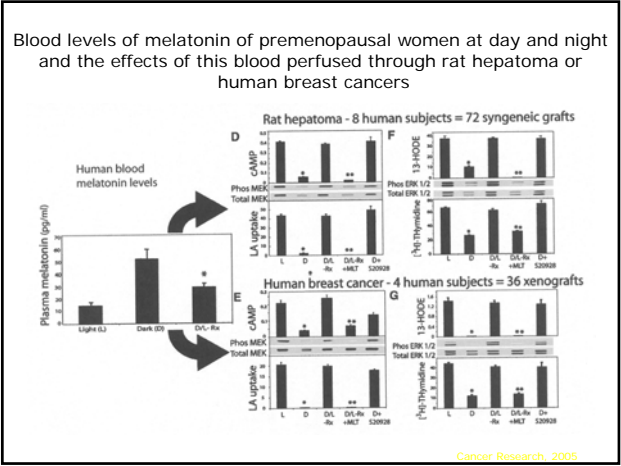


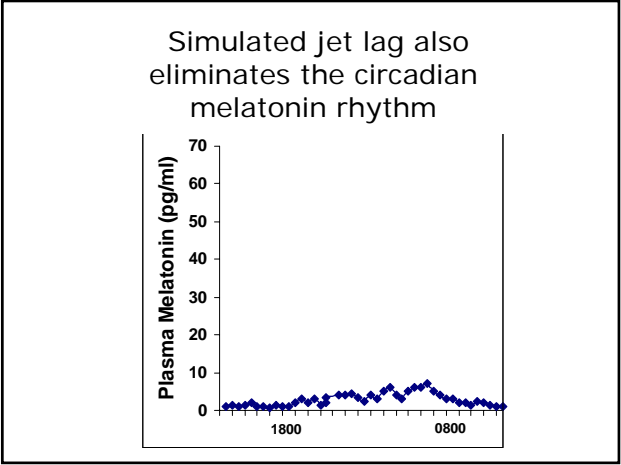


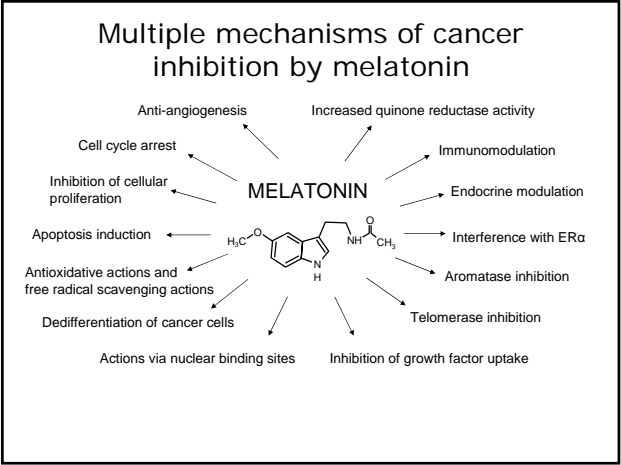


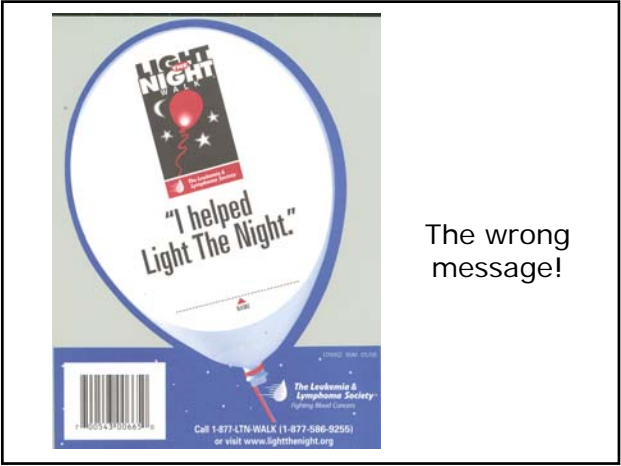
The World Health Organization has classified light at night as Group 2A carcinogen due to
 (a) melatonin suppression
 (b) chronodisruption
 (c) or both



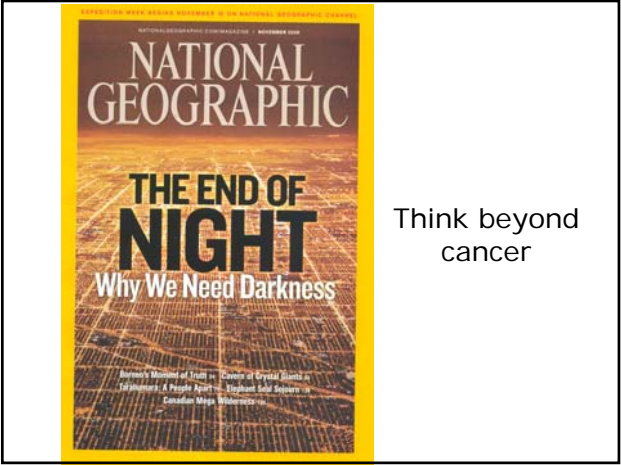








The wrong message!



Think beyond cancer

**Melatonin use in childhood
sleep disorders**

- ADHD and melatonin – 19 references
- ASD and melatonin – 35 publications
- Neurodevelopmental disorders and melatonin – 8 publications

Melatonin is the most widely recommended treatment for childhood sleep disorders in the United Kingdom

Potoki, L...Reiter, R.J., Lupski, J.R.

Circadian rhythm abnormalities in Smith-Magenis syndrome.

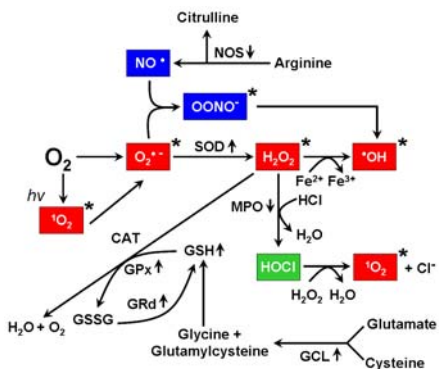
J. Med. Genet. 2000; 37:428-433

These individuals have an inverted melatonin rhythm

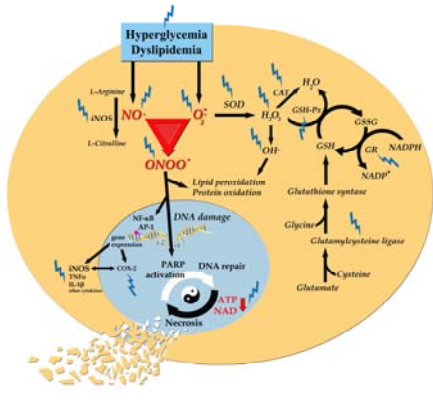
Melatonin: Current research

- Melatonin-antioxidant 1,321 ref
- Melatonin-diabetes 133 ref
- Melatonin-obesity 93 ref
- Melatonin-metab syndrome 7 ref

Oxygen and nitrogen-based reactants and their removal by melatonin



Diabetes, hyperglycemia and melatonin



Safety of Melatonin

- No LD₅₀ has been determined
- Despite its use for three decades, no toxicity has been reported
- When test in pregnant animals at exceptionally high doses (>200 mg/kg) no fetal or maternal toxicity

Light as a "drug"

- 1. It synchronizes circadian and circannual rhythms
- 2. It inhibits melatonin synthesis and changes the phasing of circadian rhythms

As a result of these effects it influences metabolism

Melatonin is a readily available and is absorbed when administered via any route