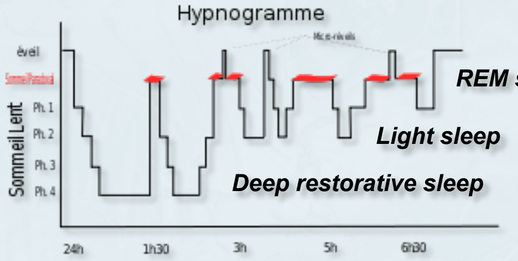
NORMAL SLEEP: AN INTRODUCTION



REM sleep, dreaming

Light sleep

Deep restorative sleep

ARCHITECTURE OF SLEEP:
PERIODIC STAGES OF SLEEP DEPTH

WE KNOW VERY LITTLE ABOUT SLEEP

"...very little is known about the mechanisms that force brain networks to change and stabilize their trajectory of activity during sleep." Gyorgy Buzsaki

SSRIs interfere with REM sleep.

Benzodiazepines block slow wave sleep.

Melatonin increases growth hormone release.

As we age, daytime cortisol increases and nighttime melatonin decreases.

Sleep, Learning, Memory, Neurology
Gyorgy Buzsaki

Normal sleep
- Medscape overview
- PubMed Overview

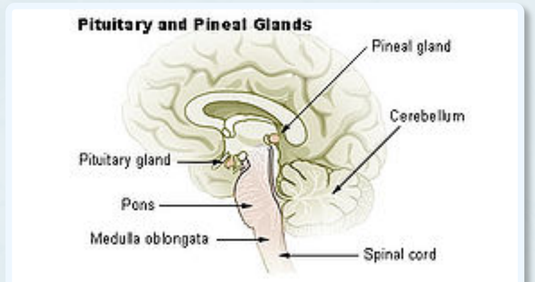
Neuroanatomy
- Sleep-Wake Switch
- Neurophysiology of Sleep, Arousal

Circadian rhythm
- PubMed review
- Circadian rhythms
- Role of cryptochrome
- PubMed: Circadian oscillators

Neurochemistry
- Hypocretin/orexin
- Melatonin and sleep
- Sleep Neurochemistry
- Histamine and sleep
- Histamine and wakefulness
- Galanin and sleep regulation

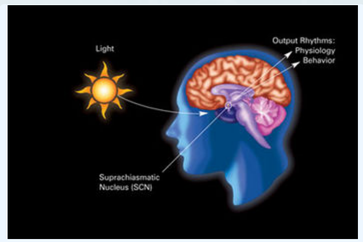
Electrophysiology
- Delta, SWS, benefits
- K-complex in sleep
- K-complex and memory
- Delta rhythms, deep sleep
- Sleep transitions, DC, Ca efflux

Sleep and hormone release
- Growth hormone overview
- Three important hormones
- Growth hormone secretion in SW sleep



HOW TO WE FALL ASLEEP?

Reduction of light signals retinal clock cells
Retinal cells signal suprachiasmatic nucleus (SCN)
SCN triggers pineal to release melatonin
Melatonin makes us drowsy
SCN also triggers slow brain waves (SWS)
During SWS, growth hormone is released
Growth hormone induces tissue repairs



THE SUPRACHIASMATIC NUCLEUS
IN THE HYPOTHALAMUS

During sleep, the brain is active while the body is passive. The brain essentially shuts itself off from the outside world to do its work of repair and rejuvenation, to consolidate memories which arrived since the last sleep period.

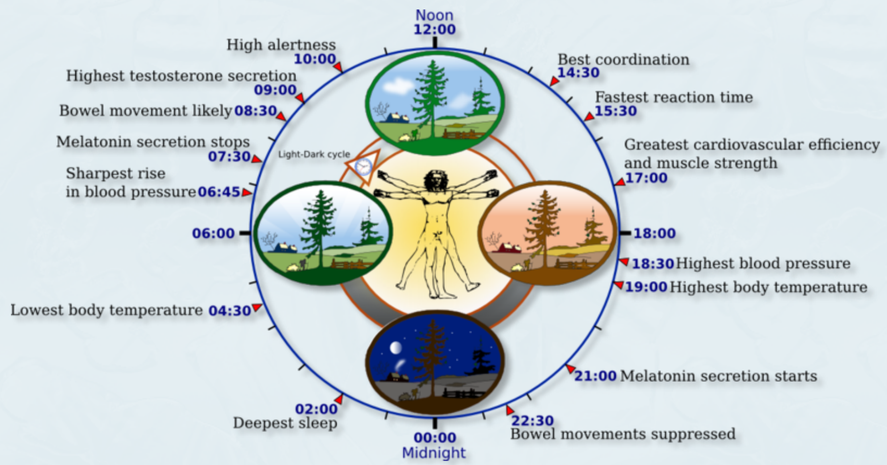
The world outside the brain arrives during the day as neuronal impulses initiated by daylight, sound, smell, taste, touch. At night, that world is normally reduced to starlight and natural electromagnetic fields, gravity and internal physiology -- reduced by rhythmic cascades of chemicals produced largely in the brainstem.

Artificial electromagnetic fields disrupt this dance. It is like noise which cannot be turned off, light which cannot be darkened. Depending on base and modulation frequencies, power densities, and variations in exposure durations, the brain is forced to cope with distractions from its other work, distractions outside its evolutionary experience.

We cannot know for sure what the biological effects are to this forced shift from our natural sleep physiology, our "default state" (Buzsaki). Some of what we think may happen has been shown to happen in research studies and anecdotal reports. For the rest, we can only theorize as too little is known about sleep.

This series of two maps introduces some of the features of normal sleep, and some of the known disruptions caused by EMF exposure.

CIRCADIAN RHYTHM: HORMONES AND ACTIVITY



IMPORTANT FEATURES OF RESTORATIVE SLEEP:

Optimal melatonin release
Optimal growth hormone release
Minimal histamine activity
Sufficient total sleep time
Appropriate delta rhythm
Appropriate number K-complexes
Sufficient slow wave sleep
Sufficient REM sleep
Optimal growth hormone release
Minimal distraction by symptoms

EFFECTS OF RESTORATIVE SLEEP:

Growth and repair optimized
Immune system facilitated
Memories consolidated
Sugar metabolism optimized
Endocrine function optimized
Seasonal adaptation optimized

Home: Oscillatorium
Newest version this map
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