OMAHA SLEEP THERAPY

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# SLEEP SCIENCE FACTS

## Why We Sleep

- Almost all animals, from single cell amoebae to dolphins, require it. Chronic sleep deprivation results in death.
- Most sleep experts believe the main purpose of sleep is related to cell/tissue growth and repair, along with memory consolidation and learning.
- There are two distinct types of sleep: rapid eye movement (REM) sleep and non-rapid eye movement (NREM) sleep.
    - The purpose of REM sleep seems to be related to memory and learning, especially the transition of short-term memory into long-term memory (researchers have some disagreements about this). There is also some evidence to suggest that REM sleep reduces subjects' sensitivity to negative emotion and bolsters their response to positive affect.
    - Human Growth Hormone (HGH) is secreted during NREM sleep.

## Sleep Architecture – Stages and Cycles

Sleep Stages

- Stage 1 of NREM – drowsy, light, semi-sleep from which we are easily awakened (slow, rolling eye movement; bodily relaxation; muscle twitching preceded by fear of starting to fall)
- Stage 2 of NREM – still fairly light, but real, beneficial sleep (muscles relax, breathing, heart rate and temp drop)
- Stage 3 & 4 of NREM – deep, slow wave sleep (body's physiology slows to its most conservative state and sudden awakening from this state can cause grogginess and disorientation; bedwetting, night terrors and sleepwalking tend to occur here)
- REM sleep – characterized by rapid, darting movements of the eyes; physiologically active state similar to waking (often referred to as paradoxical sleep); dreaming with increased brain wave activity, heart rate and blood pressure; irregular breathing patterns; most vivid and prolonged dreaming; nearly complete loss of muscle tone – temporary paralysis; easier arousal

A sound night's sleep consists of the above stages in these percentages:
NREM 1 – 5%
NREM 2 – 50%
NREM 3 & 4 – 20%
REM – 25%

Sleep Cycles

Sleep moves through the above stages in 90-110 minute cycles, repeated 4-6x/night. The first half of the night, we experience a preponderance of deep sleep. During the 2nd half of the night, we sleep lighter and awakenings are more common. Most of us experience multiple awakenings each night, but we don't typically remember an awakening lasting less than about 5 minutes.

**Sleep-Wake Mechanisms**

Sleep Drive

- The homeostatic regulation of sleep based on length of prior wakefulness (sleep debt)
- Adenosine (inhibitory neurotransmitter) blood levels rise during the day, creating a feeling of tiredness and a desire for sleep
- NREM sleep erases the build up and lowers the sleep drive (This is why naps and afternoon caffeine – which inhibits adenosine buildup – are contraindicated when working on a sleep issue.)

Awake System

- The circadian alerting action that strengthens during the day to maintain alertness and weakens at night to invite sleep (internal biological clock)
- Affects sleep-inducing physiological processes such as increased melatonin secretion, reduction in core body temp, drop in cortisol levels, lower blood pressure, etc.
- Resets by morning sunlight so that you are ready for sleep 16 hours later; morning light is essential for optimal sleep

The Awake System opens a window of opportunity for sleep (determines sleep readiness); the Sleep Drive determines how well you take advantage of this opportunity. You must balance the two to get quality sleep.