

Understanding Light Sleep is Key to Sleep Therapy

From 1967 until 2008, sleep professionals followed the sleep staging guidelines proposed by Allan Rechtschaffen and Anthony Kales entitled, “A Manual of Standardized Terminology Techniques and Scoring System for Sleep Stages of Human Subjects”¹. This is also referred to as the R&K scoring system. It included 7 distinct stages (Wake, Movement Time, Stages 1, 2, 3, and 4 of non-REM sleep, and REM sleep).

In 2008, new guidelines were adopted by the various sleep societies, which reduced the 7 stage system to 5 stages (Wake, N1 – Drowsiness, N2 – Light sleep, N3 – Deep or Delta sleep, and REM sleep)². Obviously, a 5 stage system is simpler and easier to score, but what has been lost in the process? The Movement Time stage, which consisted of movements obscuring the polygraph tracing, was eliminated – no big loss, but Stages 3 and 4 were combined into Deep or Delta sleep. Sleep also became more commonly divided into REM (rapid eye movement) sleep and non-REM (N1 to N3 Sleep – Drowsy, Light, and Deep sleep).

Of note however, sleep experts generally agree that the most important stage of sleep is Deep or Delta sleep, because after sleep deprivation, Delta sleep rebounds the most, followed by REM sleep. Therefore, there should be quite a distinction between Delta sleep and Light sleep, which is why characterizing sleep as simply REM or non-REM, is generally no longer done.

Stage 2 sleep (R&K scoring system) or N2 sleep using the new guidelines, consists of a low voltage EEG with other distinctive EEG findings – sleep spindles and K-complexes, which are easily identified phenomena present in this stage of sleep. Sleep spindles are believed to facilitate neuroplasticity and processing during sleep, which supports learning, memory consolidation, and intellectual performance. K-complexes are believed to represent a mechanism that fosters greater sleep maintenance. Clearly Stage 2 sleep represents a stage of sleep. Neither spindles nor K-complexes are present in Stage 1 sleep.

Stage 1 sleep (R&K scoring system) or N1 sleep using the new guidelines, also consists of a low voltage EEG and typically precedes Stage 2 sleep. During this stage, the individual is in essence, drowsy, more easily aroused than in Stage 2 sleep, as they are in the process of falling asleep – transitioning to Light sleep. This “stage of sleep” could just as easily be classified as a lesser form of Wake. This stage of sleep occurs not only as the individual is falling asleep, but also frequently occurs during the night, as the individual oscillates between sleep and having some awakenings.

If we consider these periods more closely aligned with Wake versus Light Sleep in terms of therapeutic intervention, one can see the true possibilities for better sleep management.

References:

1. Rechtschaffen A, Kales A (Eds). A manual of standardized terminology and scoring system for sleep stages of human subjects. 204, United States Government Printing Office; National Institutes of Health, Washington, DC 1968.
2. Berry RB, Quan SF, Abreu AR, et al for the American Academy of Sleep Medicine. The AASM Manual for the Scoring of Sleep and Associated Events: Rules, Terminology and Technical Specifications, Version 2.6, www.aasmnet.org, American Academy of Sleep Medicine, Darien, IL 2020.