

## Delta Sleep is Important for Health

My dream is to have two hours of Delta sleep (also known as Slow Wave Sleep or SWS) every night, because SWS restores and rejuvenates my body. But first, what is Delta or SWS?

Slow waves refer to the brainwaves that accompany this stage of sleep. Brainwaves are categorized as Delta, Theta, Alpha, Beta, and Gamma. Delta waves are the slowest brainwaves (< 3.5 cycles per second), which is why Delta sleep is also called Slow Wave Sleep. When the brain is generating Delta waves, the brain is almost switched off. There is no thinking or worrying. It is at rest and peacefully asleep. During this stage of sleep, our deepest stage of sleep, the body isn't moving, but other important healing processes are at work.

This is why Delta sleep is considered to be the most important stage of sleep. This stage of sleep prolongs sleep by shutting down brain function, and moving it into a state that is the furthest removed from wakefulness. Delta sleep is responsible for the secretion of growth hormone<sup>1</sup>, which causes cell repair and regeneration throughout the body. During SWS, DNA repair<sup>2</sup> occurs, as well as removal of beta-amyloid plaque from nerve cells associated with Alzheimer's Disease<sup>3</sup>, and balancing one's immune system<sup>4</sup>. To accomplish all of this under ideal circumstances, requires 2 hours.

Normally, as a 20 year old, we have about 2 hours of deep sleep. By the time we reach our 30's and 40's we have already begun to lose a significant amount of deep sleep and by 90 all of it<sup>5,6</sup>. Is it any wonder that we develop more illnesses as we age? Clearly, Delta sleep has a dramatic effect on health and longevity.

What can be done about increasing one's Delta sleep? In Ideal Normal Sleep, Delta sleep predominates in the early sleep cycles. Our body's circadian rhythm is accustomed to promoting deep sleep early in the night's sleep and our ultradian rhythm produces deep sleep early during the first 3 or 4 sleep cycles. Therefore, if we go to bed later than normal, there is a good chance our Delta sleep will be diminished. It pays to respect our circadian rhythm and go to bed about the same time each night.

Since Delta sleep functions to repair bone and muscle, in addition to other cells, it stands to reason that using bone and muscle during the day, signals to the body that more Delta sleep is required. Sure enough, 30 minutes of moderate aerobic exercise is an excellent promoter of Delta sleep<sup>7</sup>. Exercise also improves the quality of Delta sleep by increasing its' stability<sup>8</sup>.

A daily or almost daily exercise regimen can be very beneficial in promoting greater daytime functioning, and also more Delta sleep. However, it is important for each of us to determine what is the best time of day to exercise to obtain the best results. For many people exercising too late in the day, can make it more difficult to fall asleep.

Although Delta brainwaves accompany Delta or Slow Wave Sleep, it is not the brain (cerebral cortex) that initiates or drives Delta sleep. A much more primitive part of the nervous system, the parasympathetic division of the autonomic nervous system, is actually the driver or pacemaker of Delta sleep. This primitive aspect of the nervous system is connected through a series of neuronal connections to the cerebral cortex. Delta brainwaves are simply the result of its' activity. Scientific studies have nicely demonstrated that this primitive part of the nervous system is active 5 minutes in advance of the appearance of Delta brainwaves<sup>9</sup>.

Our night's sleep is organized so that SWS occurs mainly during the first half of the night, and dream sleep during mainly the last half of the night. SWS promotes a full night's sleep, staying asleep with fewer interruptions, thus allowing you to get all of your dream sleep too. For all of these reasons, SWS or Delta sleep is considered to be the most important stage of sleep.

Let's do a deeper dive into SWS. Since 2008, sleep authorities have simplified sleep stages into 3 categories, SWS (Delta or deep sleep), Light Sleep, including drowsiness, and REM (rapid eye movement or dream sleep). Prior to 2008, there were 4 stages of sleep, because SWS was split into two distinct stages of sleep (stages 3 and 4). When sleep is staged professionally, it is done in sequential, 30-second periods. To achieve stage 3 SWS, it was only required that 6 of those 30 seconds consist of Delta waves. Stage 4 SWS required 15 of the 30 seconds to be Delta waves. That's a big difference. Which stage would you prefer? Since stage 4 sleep predominates in youth, and is lost more quickly as we age, I would prefer stage 4 sleep to maximize my slow wave sleep and recuperation.

Most of us could use more sleep, especially SWS. What are your sleep goals?

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