

Sleep 101: Understanding Why and How

Sleep. A time to revitalize, refresh, and realign. Long thought to be a passive activity, modern scientific research has shown that sleep is an active process, engaging the brain on many levels.

So, why is it important for us to experience quality sleep? And what happens to our bodies between the time we drift off and the time we wake up to the buzzing of the alarm clock? The basic dynamics are pretty easy to understand.

We've all experienced that "I can take on the world" feeling after a good night's rest. Our energy level is high and we operate with a heightened sense of focus. When you consider that not getting quality sleep—even for one night—can negatively affect mood, as well as the ability to remember things and make decisions throughout the day, the importance of sleep becomes quite clear.

In a scientific study, researchers found that rats who would normally live for two to three years, survived for only about three weeks when deprived of sleep. Those same studies proved that repeated sleep deprivation causes an impaired immune system, leading to a greater chance of disease and even death. Sleep not only affects our daily functioning, it affects both our mental and physical health. It's necessary for our nervous systems to work properly. Sleep is a time for our bodies to repair damaged cells and grow new ones, as well as an opportunity for our brains to consolidate memory.

That's the *why*. Now let's talk about the *how*.

Special chemicals in the brain, called *neurotransmitters*, control the physical act of sleep. These nerve-signaling chemicals regulate different groups of cells—or *neurons*—throughout the brain, deciding when we're going to be awake or asleep. You can think of neurons like microscopic light switches. When you're ready to fall asleep, they "turn off" the signals that keep you awake.

Though there are exceptions, most people experience a cycle of five phases of sleep. These are stages 1, 2, 3, 4, and REM sleep. Once a person achieves REM sleep, the whole cycle

starts again. Each cycle can last anywhere from 90 to 110 minutes and happens several times over the course of a night.

We can be awakened easily as we drift in and out of stage 1 sleep. Our eyes move very slowly, and our muscle activity decreases. Stage 2 sleep puts a halt to eye movement and slows down our brain's activity a great deal. However, sudden bursts of quickening brain waves called *sleep spindles* may occur.

During stage 3, extremely slow brain waves called *delta waves* appear, combined with short, faster ones. By the time a person reaches stage 4 sleep, they experience the slowest brain activity of all stages. Stages 3 and 4 combine to form "deep sleep." The eyes are completely still, as is any sign of muscle activity. It's difficult to wake someone from deep sleep.

The last stage of the cycle is REM sleep. It usually occurs 70 to 90 minutes after we fall asleep. Breathing becomes rapid, shallow, and often irregular. Our eyes move rapidly in a variety of directions. Muscles become temporary paralyzed. Our heart rate increases, as does our blood pressure. This is the stage where dreams occur.

The sleep cycles a person experiences during the first part of the night include longer periods of deep sleep and shortened REM stages. As the night progresses, those ratios are reversed. By morning, most people spend nearly all of their sleep time in stages 1, 2, and REM.

It's easy to see *why* we need consistent, quality sleep each night. And thanks to research, we have a much better idea of *how* our brains and bodies function as we drift off to dreamland. By also understanding external factors that affect sleep—like diet, exercise, and mattress quality—scientists and product manufacturers are developing ways to make sleep a more productive, restorative activity in the future.

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