

LEVELED Book • V

Why We Sleep



MULTI
level
P•S•V

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Focus Question

How is sleep important to good health?

Words to Know

| | |
|--------------------|----------------|
| anabolic activity | monitor |
| brain waves | restores |
| catabolic activity | schedule |
| function | sleep-deprived |
| immune system | solidifying |
| molecules | temporary |

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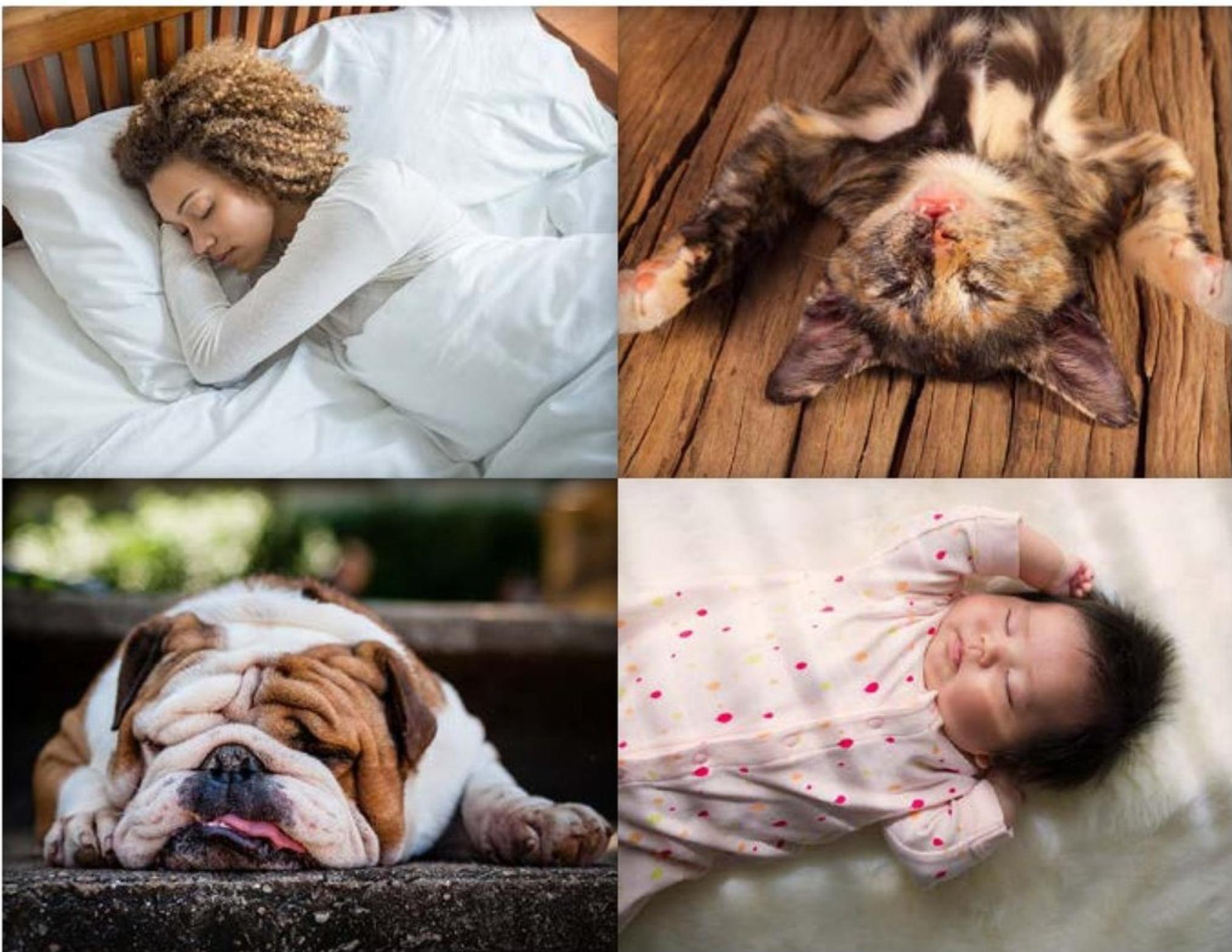
Correlation

| LEVEL V | |
|-------------------|----|
| Fountas & Pinnell | R |
| Reading Recovery | 40 |
| DRA | 40 |



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Introduction

Many know the pleasure of curling up between soft sheets and slowly fading into blissful slumber. Getting a good night's sleep is how we rest and recharge after a full day of busy activity. People and most other animals need sleep to **function** properly. Like food and water, sleep is necessary to keep minds sharp and bodies fit and ready to go.

Wowser!

Did you know that people spend about a third of their lives asleep? That means someone who is seventy-five years old has spent twenty-five years snoozing!

What Is Sleep?

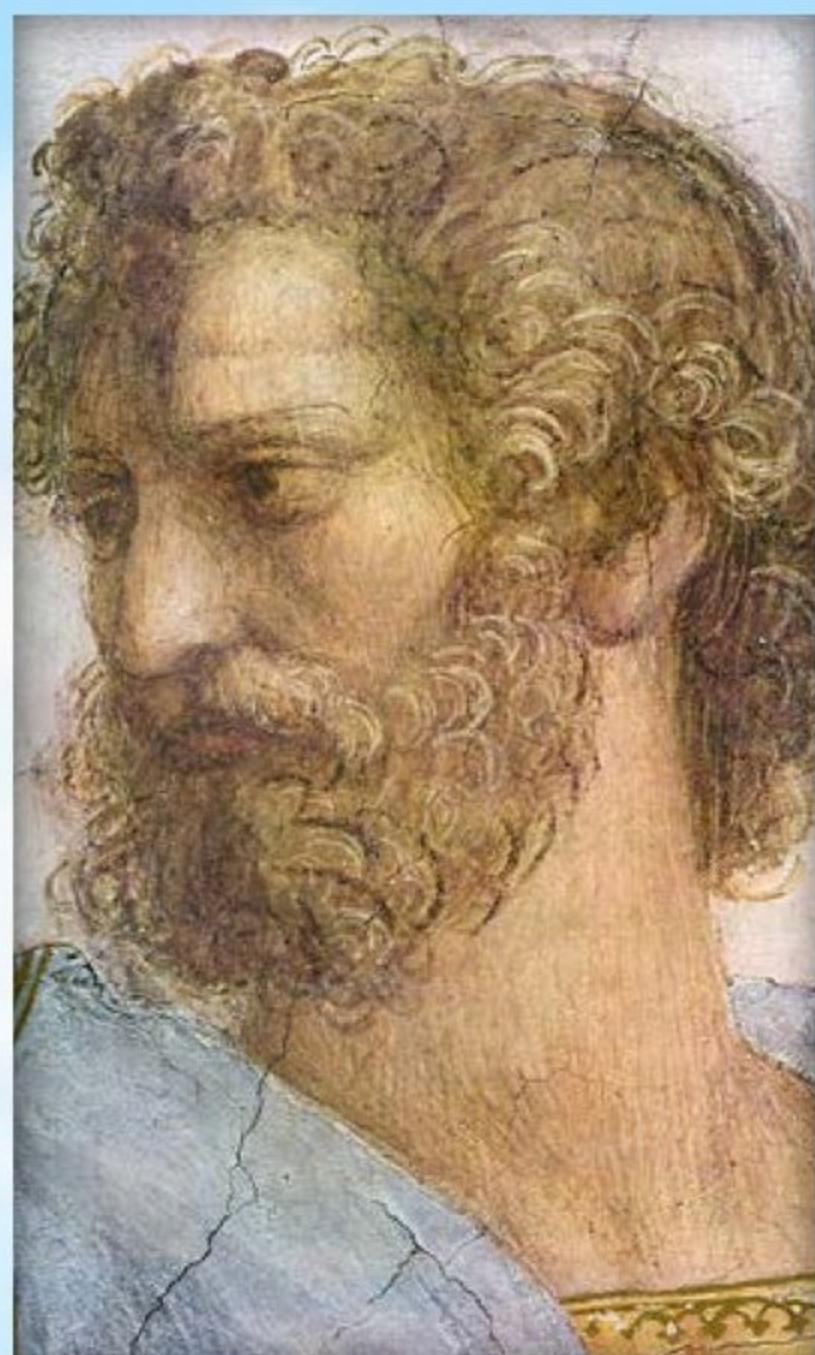
Falling asleep happens naturally and regularly. Sleep is also easily reversible; a loud noise is often all that is needed to wake a sleeping person.

So what is sleep, and what makes us fall asleep? People have struggled for centuries to answer these questions. The ancient Greek philosopher Aristotle considered sleep a quiet time of rest brought on by eating. That idea is not as strange as it sounds—most people are ready for a nap after enjoying a big meal.

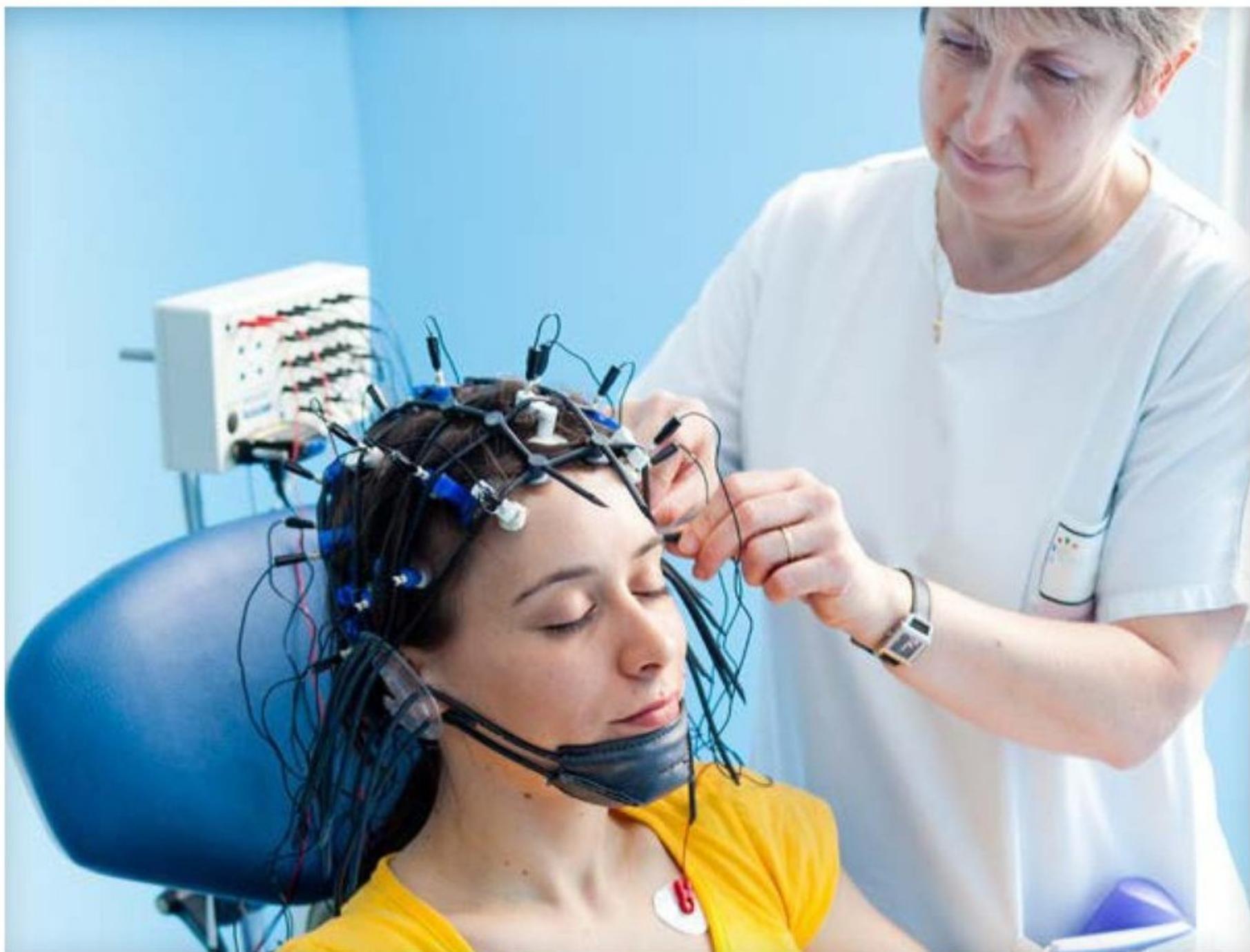
Do You Know?

Aristotle believed that digesting food sent warm vapors to the head. The vapors then cooled and went to the heart, causing people to feel sleepy.

While this is not true, how sleepy you feel does depend on the kind of food you eat. Some foods cause a sleepy feeling, while others, like chocolate, have caffeine. Those foods can make you perk up instead of wind down.



Aristotle



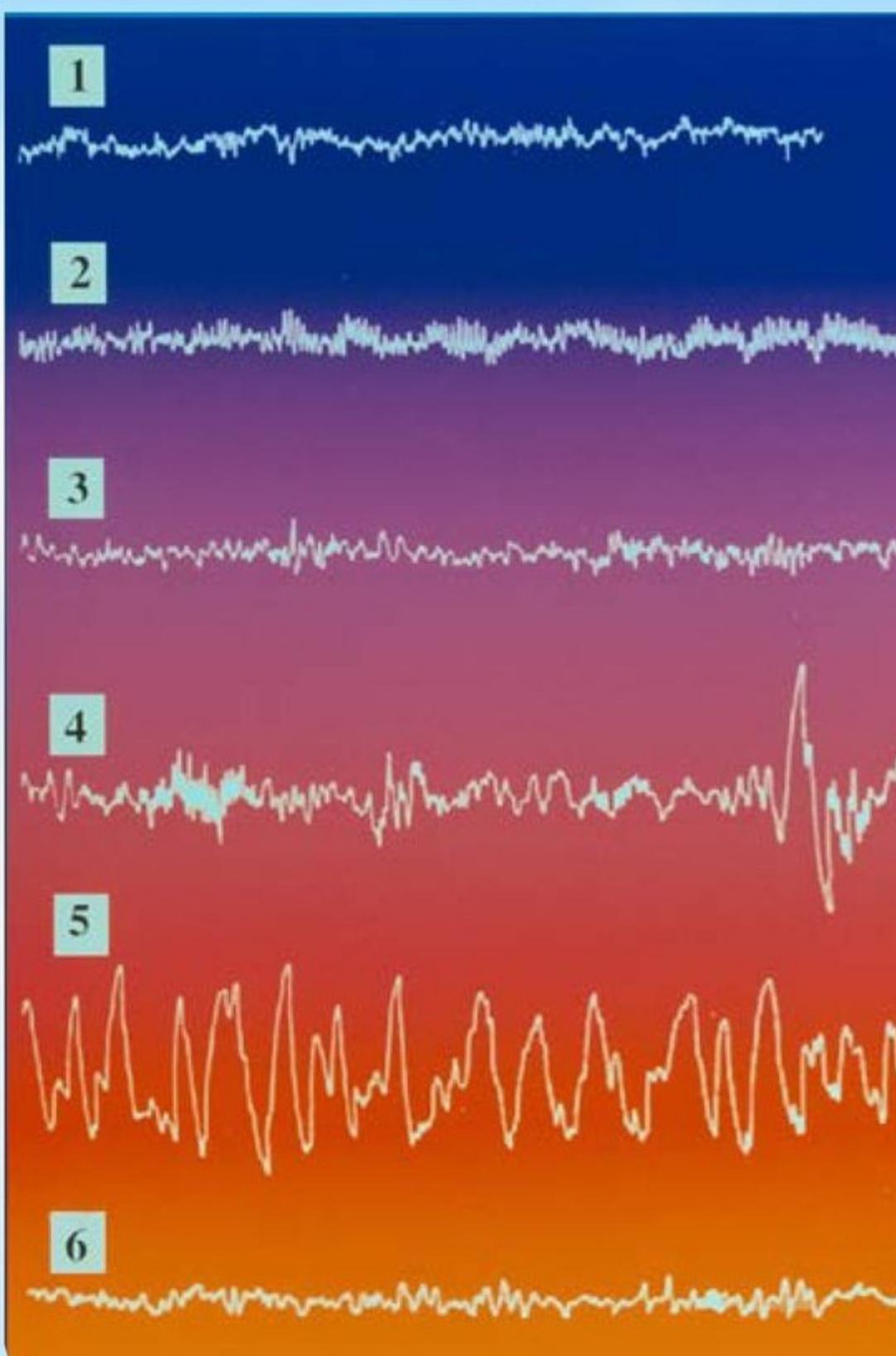
A special machine is used to record brain waves.

Some eighteenth-century researchers speculated that sleep was caused by “sleep toxins” that built up during the day and eventually caused the brain to shut down. As people slept, the substances faded away, and their effects wore off.

A better understanding of sleep emerged in the early twentieth century. Studies conducted by German researcher Hans Berger showed that the brain does not really shut down. Instead, brain activity changes as wakefulness shifts to sleep. The idea that the brain remains somewhat active during sleep was groundbreaking. Berger’s discovery prompted more research into how the brain functions during sleep.

Researchers wanted to know just what caused those changes in **brain waves**. Scientists learned that a buildup of a substance called *adenosine* affects the brain and triggers sleep. The body produces adenosine naturally as it expends energy. Over the course of a day, more and more of this substance travels to the brain. There, it acts to slow down many body processes that are active when we are awake. It seems that those eighteenth-century scientists who thought of sleep toxins were not that far off.

Awake and Asleep



- 1 awake
- 2 awake with eyes closed
- 3 falling asleep
- 4 asleep
- 5 deep sleep
- 6 asleep, dreaming

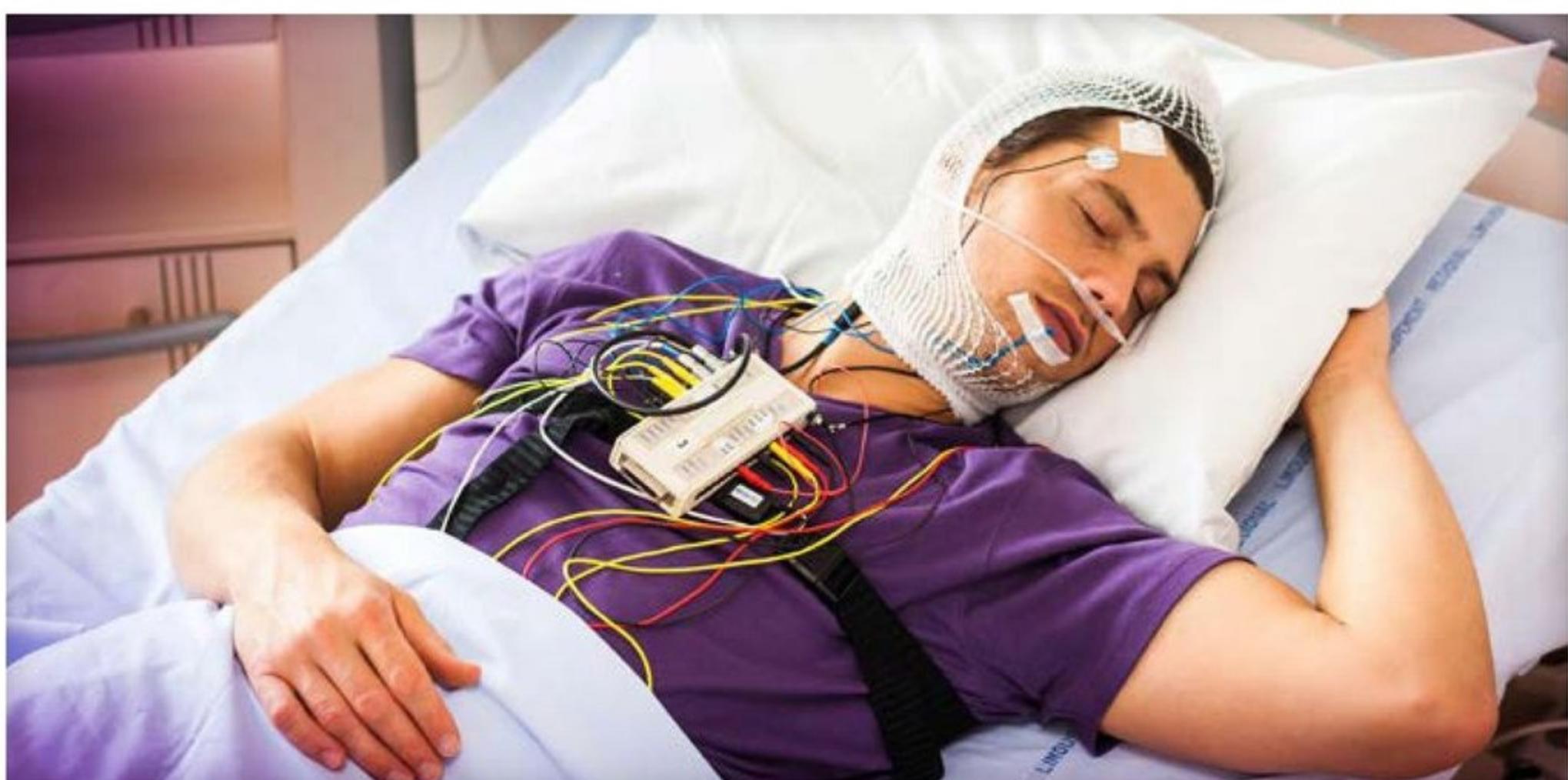
Machines that record brain activity show that a sleeping person's brain, particularly while dreaming, can be just as active as it is when that person is awake. Tighter waves indicate more activity in the brain, and looser waves occur during relaxation.

Source: VEM / Science Source

The Need for ZZZs

If our brain doesn't shut down while we snooze, what does it do? The answer: it helps us learn by **solidifying** memories and information for long-term use.

The brain first stores much of what we learn in what is called *short-term memory*. Short-term memory provides a good **temporary** storage site for new information, but it isn't big enough or strong enough to hold everything forever. We need to move information from short-term memory to *long-term memory*. This happens while we sleep. Our brain creates new connections to reorganize information and knowledge. Doing this cements information in long-term memory, making it easier to recall and use what we've learned.



Scientists examine a man's brain and body during a sleep study.

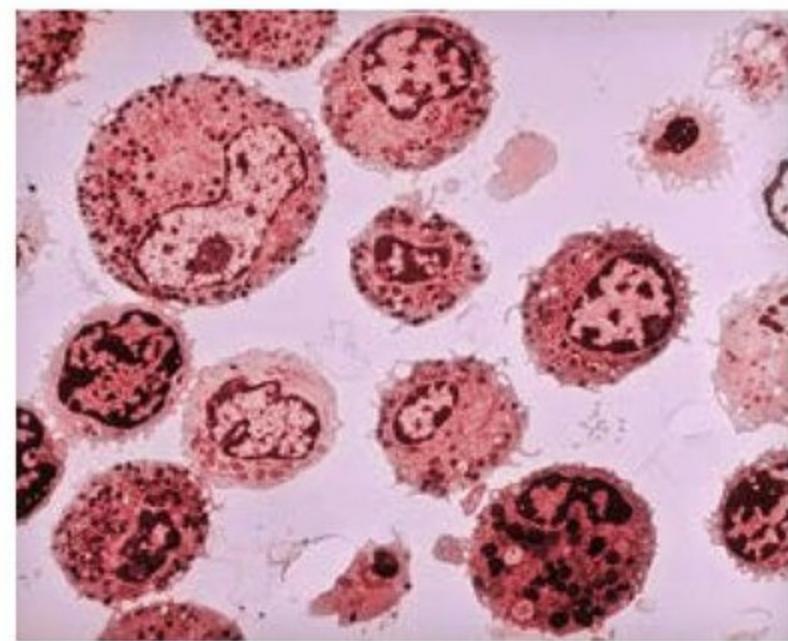


Professional athletes need sleep to strengthen body tissues and restore energy levels.

Not only does falling asleep involve a change in brain activity, but the body's processes change as well. When we are awake, the body breaks down cells and **molecules** as we use energy. This breaking-down process is called **catabolic activity**. When we are asleep, the body shifts to **anabolic activity**, when new molecules form and cells are built up. This process **restores** body tissues and helps them grow.

For this reason, sleep is essential to athletes. During training, they constantly break down cells and tissue. They need adequate rest to restore those tissues and make them stronger. Anabolic processes are also the reason that new babies sleep so much. Most infants double their birth weight in five months. That rate of growth can only happen if there is more building-up activity than breaking-down activity.

We also need sleep to help our bodies fight illness and heal wounds. Sleep strengthens the body's **immune system**—the network of cells and tissues that work to fight infection. The body focuses its energy on healing rather than other activities. Studies show that during sleep, the body produces more white blood cells, which fight illness. That's why doctors recommend bed rest for their sick patients.



During sleep, white blood cells multiply to strengthen the immune system and fight sickness.

Sleep Disorders

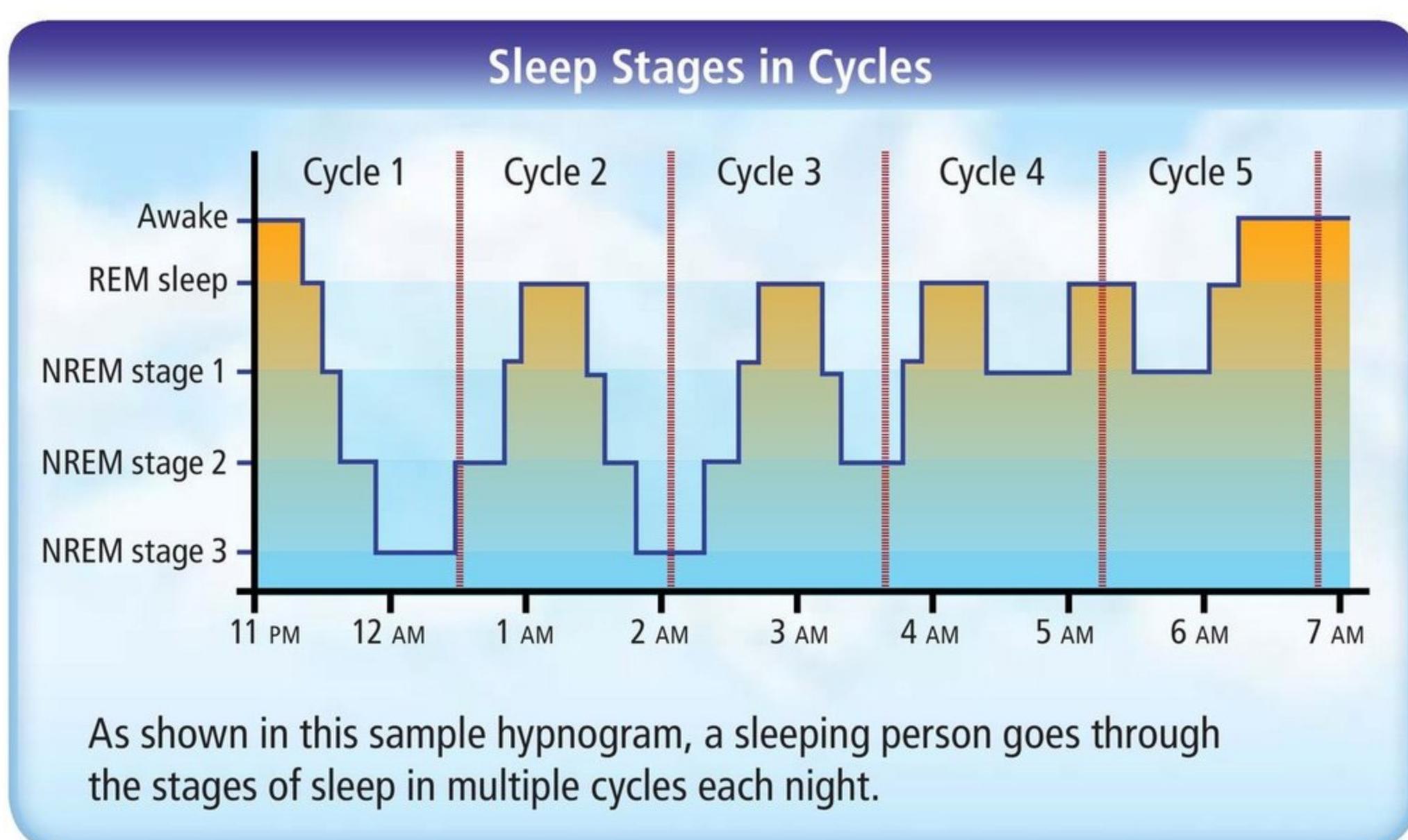
There are a number of different sleep disorders. Here are three of the best-known ones.

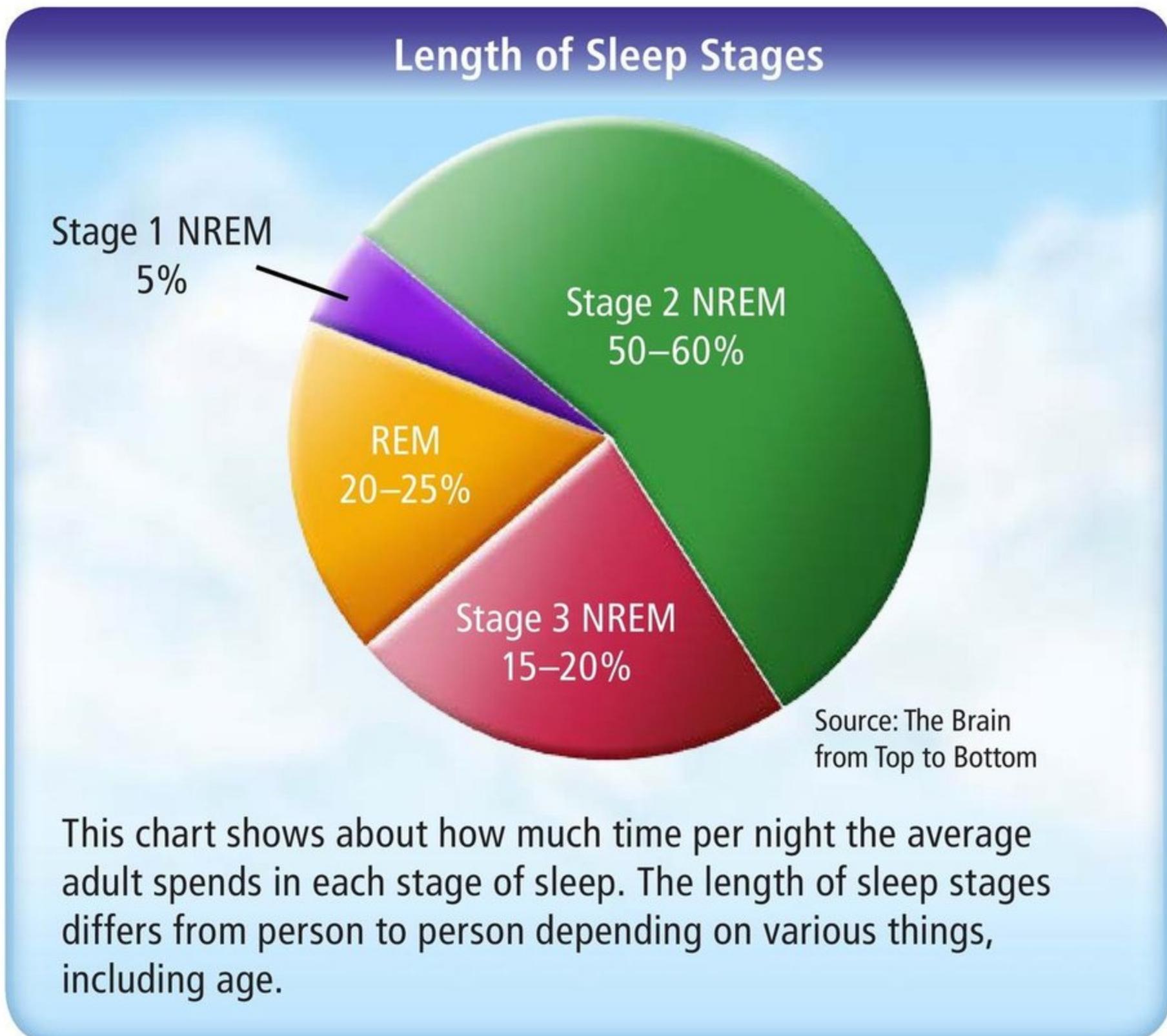
- *Insomnia* is an inability to fall asleep. People may suffer from insomnia for any number of reasons. Stress and worry may cause insomnia. Chronic pain or disease may make it impossible to sleep.
- *Narcolepsy* is almost the opposite of insomnia. People affected with narcolepsy may automatically fall asleep at any time. They may experience sudden muscle weakness that causes them to fall to the ground, unable to move. These sleep attacks can be startling to observers.
- *Sleepwalking* is fairly common among teens. It is rare in adults. Sleepwalkers move about with their eyes open and engage in everyday activities such as walking, talking, or doing chores. A sleepwalking episode usually lasts less than ten minutes. It is not dangerous or harmful to wake a sleepwalker, but it's best to simply lead the person back to bed.

Sleep Patterns

The benefits of sleep don't all happen at once. Sleep goes through multiple cycles. To understand how sleep works, researchers **monitor** brain activity, eye movement, breathing rates, and heart rates in sleeping people. They record all these measurements in a single graph called a *hypnogram*. The hypnogram shows a pattern of different stages of sleep.

There are two types of sleep—rapid eye movement (REM) sleep and non-rapid eye movement (NREM) sleep. NREM sleep has three different stages. During the first stage, people feel drowsy and start to doze. They may twitch and suddenly jerk awake, imagining they are falling. This stage doesn't last more than ten minutes.





During stage 2 NREM, muscle activity decreases and the sleeper becomes less aware of the outside world. This is when memories start to shift from short-term to long-term. Half or more than half of all sleep time is spent in stage 2 NREM sleep.

During stage 3 NREM, sleepers begin to dream and form permanent memories. Breathing rate, heart rate, blood pressure, and brain temperature are lowest during this stage. It is usually very hard to wake someone from this deep sleep. This stage lasts for nearly a quarter of sleep time.

After cycling through NREM stages, sleepers enter REM sleep, which is quite different from the other stages of sleep. As the name suggests, closed eyes move rapidly from side to side. It's as if they are watching a ping-pong match. Brain activity, breathing, and heart rate are almost at waking levels. Instead of resting, the brain is speeding along, yet the sleeper's body is completely still. Muscles become almost completely paralyzed during this stage. Perhaps that is because of the wild dreams that take place during REM sleep.

Sweet (and Not So Sweet) Dreams

Dreams occur during REM and deep sleep. We dream every night, although we don't always remember our dreams. All dreams have two things in common. They are story-like narratives, and they generally include the dreamer as a main character.

Not all dreams are pleasant. Nightmares are frightening dreams that may cause sleepers to wake up distressed. Young children can experience extreme nightmares called *night terrors*. Night terrors can cause them to scream and thrash about without being fully awake.

For centuries, people have pondered the meaning of dreams. Ancient cultures believed they were messages from the gods. Today, some people think that dreams are a product of imagination. Others think dreams may contain some kind of hidden message.



Getting a Good Night's Rest

Many things should happen when our tired head hits the pillow. When they don't, it can cause trouble for us during the day.

When we are **sleep-deprived**, we can become cranky and make more mistakes when working. We are also less creative and have difficulty with problem solving. Our brain doesn't struggle alone—studies show that the body has a harder time maintaining a stable body temperature without enough sleep. Wounds even take longer to heal.



Naps don't always make up for a lack of good nighttime sleep, but a quick nap can help improve mood, alertness, and performance.



Sticking to a sleep schedule, even on weekends, can help you fall asleep and stay asleep all night.

It is vital to maintain good and consistent sleep habits. Try to go to bed and wake up at the same time each day. This helps keep your body on a regular **schedule**. It also helps if you limit screen time; try not to watch television, do computer work, or even use a tablet or smartphone right before turning in for the night. Avoid intense activity before going to bed; going for a walk is fine, but anything more could increase your body temperature and make it hard to fall asleep.

If you do have trouble falling asleep, try taking a warm bath or shower beforehand. Either one will relax your muscles and help you slip into a peaceful slumber.

Good sleep habits keep the body healthy and the mind sharp. Remember, if you don't snooze, you just might lose!

Glossary

| | |
|-----------------------------------|---|
| anabolic activity (n.) | a metabolic process during which the body builds or mends cells (p. 9) |
| brain waves (n.) | patterns of brain activity that can be measured in electric currents (p. 7) |
| catabolic activity (n.) | a metabolic process during which the body breaks down cells to use for energy (p. 9) |
| function (v.) | to act or work as expected (p. 4) |
| immune system (n.) | a system that moves antibodies through the body to fight infection (p. 10) |
| molecules (n.) | the smallest parts of a substance that can exist by themselves, each made of one or more atoms (p. 9) |
| monitor (v.) | to observe or check the progress of something over time (p. 11) |
| restores (v.) | returns something to its original condition (p. 9) |
| schedule (n.) | a plan for when and where one or more events will take place (p. 15) |
| sleep-deprived (adj.) | not having enough sleep (p. 14) |
| solidifying (v.) | making stronger or more definite; reinforcing (p. 8) |
| temporary (adj.) | lasting for a limited amount of time (p. 8) |

Why We Sleep

A Reading A-Z Level V Leveled Book

Word Count: 1,137

Connections

Writing

Think about your bedtime routine and sleep habits. Using information from the book, write about whether you would change your habits.

Math

If people spend about one-third of their lives asleep, how many years have you spent asleep so far?



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