

brain

BRIEFINGS

SUMMER 2007

EVIDENCE SHOWS THAT A LACK OF SLEEP CAN HAVE A NEGATIVE IMPACT ON OUR HEALTH, INCREASING THE RISK FOR ACCIDENTS AS WELL AS HEALTH PROBLEMS LIKE OBESITY, INFECTIONS, AND HEART DISEASE. EXTENSIVE RESEARCH IS BEGINNING TO GIVE SCIENTISTS CLUES AS TO WHY THIS MIGHT BE SO. SLEEP PLAYS A CRITICAL ROLE IN HOW WELL WE CONCENTRATE AND PERFORM, HELPS CONSOLIDATE MEMORIES AND SET THE STAGE FOR LEARNING, AND MAY AFFECT HOW THE IMMUNE SYSTEM RESPONDS TO ATTACK. TEASING APART PATTERNS LIKE THESE WILL HELP US UNDERSTAND WHY WE SLEEP AND HOW SLEEP HELPS KEEP US HEALTHY.

SLEEP DEFICITS

An apple a day may keep the doctor away, but can the same be said for 40 winks a day? Losing sleep can leave you more than just a little cranky. Evidence is building that sleep may have a fundamental role in keeping you healthy and in fighting off disease.

Sleep is critical for concentration, memory, and coordination. People simply don't perform as well when they shortchange sleep. Studies show, for example, that truck drivers and pilots are at greater risk of crashes and near misses as a result of sleep deprivation.

In fact, sleep loss can have as big an effect on performance as drinking. One study showed that truck drivers who had gone 28 hours without sleep performed as poorly as if they had blood alcohol levels of 0.1 percent, which is above the legal limit in much of the world.

Sleep is also important for our emotional health. Students who reported getting significantly less sleep on school nights in one study, for example, were more likely to say they felt hopeless, sad, or depressed.

And over time, the cumulative effect of shortchanging sleep can really wear down your health. Growing evidence suggests that a lack of sleep in-

creases the risk of a variety of health problems, including diabetes, cardiovascular disease and heart attacks, stroke, depression, high blood pressure, obesity, and infections.

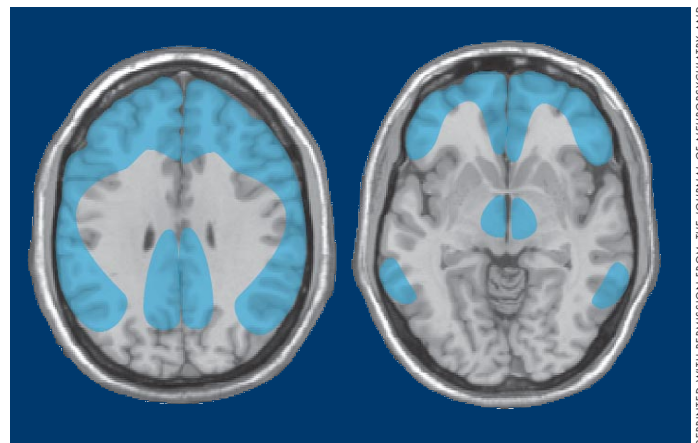
Working with animals as well as human subjects, scientists are tracking changes in the body across cycles of sleep and wakefulness, in health, disease, and injury. More research into the mechanisms of sleep may lead to:

- Greater appreciation of the importance of sleep in maintaining health.
- Better understanding of the biological function of sleep.
- Improved treatments for common health problems,

such as obesity.

Everyone knows what it means to be sick and tired. Sleep disorders are among the most common health problems in the United States, affecting up to 70 million people. And many of the 80 different sleep disorders, including sleep apnea, narcolepsy, and insomnia, are associated with other diseases and conditions, such as high blood pressure, Parkinson's disease, and depression.

Illness and sleep are linked in other ways as well. Injury or infection tends to increase the amount of time we sleep and can disrupt normal sleep patterns. In addition, heart at-



▲ THE TWO IMAGES ABOVE SHOW AREAS OF THE BRAIN WHERE BLOOD FLOW DECREASES WHEN A PERSON IS DEPRIVED OF SLEEP FOR 24 HOURS, COMPARED WITH WHEN THEY ARE RESTED. RESEARCHERS SUSPECT THAT REDUCED BLOOD FLOW IN SUCH AREAS AS THE PREFRONTAL CORTEX, LOCATED TOWARD THE FRONT OF THE HEAD (THE TOP OF EACH IMAGE), MAY BE LINKED TO DEFICITS IN CONCENTRATION AND OTHER KINDS OF COGNITIVE PERFORMANCE THAT ARE NOTED IN PEOPLE WHO HAVE LOST A LOT OF SLEEP.

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DAVID VAN ESSEN, PHD

President
Washington University
School of Medicine

EVE E. MARDER, PHD

President-Elect
Brandeis University

STEPHEN F. HEINEMANN, PHD

Past President
The Salk Institute

FOR MORE INFORMATION

Please contact the public
information department
at publicinfo@sfn.org or
(202) 962-4000

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tacks and strokes happen more often in the morning than at other times of the day, which may be linked to natural changes in body rhythms, including our regular cycles of sleeping and being awake.

Proper sleep also may help us maintain a healthy weight. Many studies show that inadequate sleep puts people at an increased risk of becoming overweight. Some also note a connection between *longer* sleep times and being overweight. Recent research tracking hormone levels may help scientists understand why.

Researchers following more than 1,000 people found that those who slept for five instead of eight hours had 15 percent lower levels of leptin and 15 percent higher levels of ghrelin. These two hormones regulate how hungry you feel, and lower levels of leptin and increased ghrelin both increase

appetite. An ongoing study is following a group of overweight subjects to study the impact sleep has on hormone levels and weight.

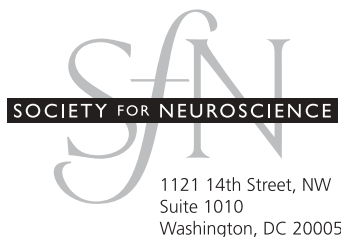
Many scientists studying the role of sleep in maintaining good health are also taking a close look at inflammation. Recent experiments indicate that when we fail to get enough sleep, inflammation may result. For example, one study showed that people who got only 4.5 hours of sleep 10 days in a row had levels of a protein marker for inflammatory processes that were three times higher at the end of that period than at the beginning. The protein, C-reactive protein, has been shown to predict the risk of stroke and heart attack. The elevated levels put some of the study's subjects in the high-risk range.

Another line of research has examined cellular chemicals

known as cytokines, which are among the first signals the body sends out in response to infection and injury. Based on a number of studies in animals, researchers suspect that cytokines known to cause inflammation also enhance sleep. Other cytokines that block inflammation tend to inhibit sleep. Taken together, these patterns give researchers hints as to why being sick makes us feel tired.

While the complicated interrelationships that connect sleep and health have not yet been fully mapped out, additional research may one day help us gauge what is a "healthy" amount of sleep. Evidence points to finding a happy medium for sleep: Too little—or too much—increases the risk of disease, and may even shorten your life. That makes those 40 winks a day as important as that apple.

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