



How sleep deprivation can cause inflammation

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Inflammation is the body's natural response to disease and injury. When you come down with a respiratory infection or cut yourself, your immune system activates white blood cells, which in turn release cytokines and other inflammatory molecules that attack invaders and protect the body's tissues. When this response is temporary, it serves as an effective defense mechanism. But when inflammation doesn't let up, it can contribute to the development of heart disease, diabetes, stroke, cancer, and Alzheimer's disease.

Sleep deprivation is associated with markers of inflammation, such as increases in inflammatory molecules—including cytokines, interleukin-6, C-reactive protein* (a marker of inflammation that's elevated in people at risk for heart disease and diabetes), and others— among people who weren't sleeping well. While these signs of inflammation could be attributed to other factors—stress, smoking, or obesity, for example—they do suggest that sleep deprivation plays a role in the inflammatory process. And they could help explain why people who sleep poorly are at risk for cardiovascular disease, high blood pressure, and diabetes, among other chronic conditions.

How does a lack of sleep contribute to inflammation?

One theory focuses on blood vessels. During sleep, blood pressure drops and blood vessels relax. When sleep is restricted, blood pressure doesn't decline as it should, which could trigger cells in blood vessel walls that activate inflammation. A lack of sleep might also alter the body's stress response system.

In addition, a sleep shortfall interferes with the normal function of the brain's housecleaning system, termed the glymphatic system (not to be confused with the lymphatic system in the rest of the body). In the deepest sleep phases, cerebrospinal fluid rushes through the brain, sweeping away beta-amyloid protein linked to brain cell damage. Without a good night's sleep, this housecleaning process is less thorough, allowing the protein to accumulate—and inflammation to develop. Then, a vicious cycle sets in. Beta-amyloid buildup in the brain's frontal lobe starts to impair deeper, non-REM slow-wave sleep. This damage makes it harder both to sleep and to retain and consolidate memories.

Just one night of lost sleep can keep beta-amyloid levels higher than usual. The problem is not so much a single night's poor sleep, which you can compensate for, but a cumulative pattern of sleep loss, leading to decreases in the structural integrity, size, and function of brain regions like the thalamus and hippocampus, which are especially vulnerable to damage during the early stages of Alzheimer's disease.

*Note *: Your C-reactive protein levels can be checked through a routine blood test. Contemplate asking your Cardiologist to request this during your next visit.*