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The Relationship Between Chronic Sleep Deprivation and Immune Function

Sleep is regulated by the circadian system and plays a direct role in the production and deployment of immune cells. In populations where work demands or environmental conditions consistently reduce sleep duration below seven hours per night, measurable changes in immune response have been documented across multiple study designs. This essay argues that chronic sleep deprivation suppresses both innate and adaptive immune function, and that the magnitude of this effect is sufficient to warrant clinical attention alongside conventional risk factors such as diet and physical activity.

Chronic sleep restriction reduces natural killer cell activity, impairing the immune system's first-line response to viral infection. In a controlled study by Irwin et al. (2016), participants restricted to four hours of sleep per night for a single week showed a 28 percent reduction in natural killer cell cytotoxicity compared to their fully rested baseline. Natural killer cells do not require prior antigen exposure to act; they are the immune system's immediate response to cells displaying markers of infection or malignancy. A 28 percent reduction in their activity means a meaningfully slower initial response to viral replication, extending the infectious window before adaptive immunity engages. This is not a marginal effect: a comparable reduction produced by a known immunosuppressant would receive clinical attention as standard.

The evidence positions chronic sleep deprivation as a clinically significant immune suppressant, not a lifestyle inconvenience. Reductions in natural killer cell activity at realistic sleep restriction levels (four to six hours) are comparable in magnitude to the effects of

recognised immunological risk factors. Clinical guidelines addressing immune resilience in high-risk populations should incorporate sleep duration screening alongside dietary and physical activity assessment, rather than treating sleep as secondary to those measures.

