

Melatonin and viral infections

J Pineal Res. 2004 Mar;36(2):73-9.

Bonilla E¹, Valero N, Chacín-Bonilla L, Medina-Leendertz S.

Author information

Abstract

The therapeutic effects of melatonin against viral infections, with emphasis on the Venezuelan equine encephalomyelitis (VEE), are reviewed. Melatonin has been shown to prevent paralysis and death in mice infected with the encephalomyocarditis virus and to decrease viremia. Melatonin also postpones the onset of the disease produced by Semliki Forest virus inoculation and reduces the mortality of West Nile virus-infected mice stressed by either isolation or dexamethasone injection. An increase in the host resistance to the virus via a peripheral immunostimulatory activity is considered responsible for these effects. It has also been demonstrated that melatonin protects some strains of mink against Aleutian disease, and prevents the reduction of B- and T-cells as well as Th1 cytokine secretion in mice infected with leukemia retrovirus. In VEE-infected mice, melatonin postpones the onset of the disease and death for several days and reduces the mortality rate. This protective effect seems to be due to the increase in the production of interleukin-1beta (IL-1beta), as 100% of the infected mice treated with melatonin die when IL-1beta is blocked with antimurine IL-1beta antibodies. Although melatonin administration raises serum levels of tumor necrosis factor-alpha (TNF-alpha) and interferon-gamma (IFN-gamma), the mortality observed in neutralization experiments with the corresponding anticytokine antibodies, suggests that neither TNF-alpha nor IFN-gamma are essential for the protective effect of melatonin on murine VEE virus infection. Melatonin treatment also enhances the efficiency of immunization against the VEE virus. Reactive oxygen species have been implicated in the dissemination of this virus, and their deleterious effects may be diminished by melatonin. This indole inhibits nitric oxide synthetase activity and it is a potent scavenger of nitric oxide, which also plays an important role in the spread of the VEE virus. In conclusion, the immunomodulatory, antioxidant, and neuroprotective effects of melatonin suggest that this indole must be considered as an additional therapeutic alternative to fight viral diseases.