

Melatonin and its neuroimmunological actions

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ABSTRACT

Introduction: Melatonin is a neurohormone, synthesized mainly in the pineal gland, which regulates the circadian rhythm.

Objective: To describe the neuroimmunological actions produced by melatonin.

Methods: A review on the subject was carried out using articles of free access in the Pubmed database from 2015 to January 2019.

Discussion: The effects of melatonin on the wake-sleep cycle are known. Recently it has been shown that this neurohormone can modulate the immune response and reduce seizures in autoimmune and rheumatologic diseases. It induces the pattern of regulatory T

lymphocytes and immunomodulatory cytokines maintaining the homeostasis of the internal environment. In the Central Nervous System inhibits the formation of free radicals, has antioxidant functions and can slow neurodegenerative processes. In the peripheral nerves decreases oxidative stress and cellular apoptosis. There are drugs that use melatonin as an active ingredient for its beneficial effects. In Cuba, only the history of a publication on this hormone is collected.

Conclusions: Melatonin can be a very useful element in the management of inflammatory and neurological diseases.

Keywords: melatonin, inflammation, neurological diseases, immunological diseases.

INTRODUCTION

Melatonin is a neurohormone, synthesized mainly in the pineal gland, which regulates the circadian rhythm. This protein can be synthesized in the skin, retina and bone marrow, and its receptors are distributed in different tissues. ^(1,2)

Foods rich in tryptophan favor its synthesis. Among its actions it can be mentioned that it diminishes the systemic manifestations of inflammation, participates in neurodevelopment, is antioxidant and immunomodulatory. ^(1,3)

The objective of this work is to describe the neuroimmune actions produced by melatonin.

METHODS

A review on the subject was carried out using articles of free access in the Pubmed database from 2015 to January 2019.

DEVELOPMENT

Melatonin is known to modulate the immune response under physiological conditions. T lymphocytes, macrophages, and other cells of innate immunity possess receptors of this neurohormone. Its regulatory actions seem to be related to the levels and activity activation of protein kinases and phosphatases.^(1,4)

In theory it could be used to prevent or treat neurodegenerative diseases because it inhibits the formation of tangles of tau protein and beta amyloid, it is capable of favoring interneuronal communication. However, its mechanism of specific action is currently unknown. Numerous teams of scientists are working to elucidate their functions in inflammation, infections, vaccines, immunosenescence, allergy but some of these results have only been achieved in animal models.^(2,3)

Another interesting aspect of which little is known in how it modulates the immune response in the nervous system under physiological conditions as well as in pathological processes. Many questions remain about this topic.

People are currently under stress, which has increased the incidence of psychosomatic manifestations such as severe headache, sleep disturbances, systemic inflammatory diseases, depression, cancer, cardiovascular diseases among others. Perhaps one of the main causes of these events is the imbalance of the circadian rhythm and therefore the production of melatonin.⁽⁵⁾

In the world there are many drugs that have melatonin as an active compound. Its majority use is for sleep disorders, but it is necessary to have other considerations for its use. For that reason, future studies are necessary to understand more about their actions at the molecular level.

The table 1 summarizes some of the effects that have been described to date.

Table 1- Neuroimmunological effects of melatonin

Nervous System	Neuroprotective and antiexcitatory action. It inhibits the formation of free radicals, modulates the antioxidant actions of vitamins in neurons. Delays neurodegenerative processes in Alzheimer's, Parkinson's and cerebral ischemia models. In the peripheral nerves, oxidative stress decreases, cell apoptosis and has anti-inflammatory effects. (6,7)
Immune System	In patterns of autoimmune encephalitis, the Th1, Th17 pattern and production of proinflammatory cytokines decrease. Induces the pattern of regulatory T lymphocytes and immunomodulatory cytokines. (8,9)
Reumatological diseases	Decreases the onset and severity of symptoms. It has been seen that in rheumatoid arthritis it increases the inflammatory mediators and can aggravate the clinical manifestations. (3, 10)

CONCLUSIONS

Melatonin can be a very useful element in the management of inflammatory and neurological diseases.

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