



POSTER NO 6

Melatonin and Sleep - a Role for Honey

Pandi-Perumal SR, Srinivasan V, Maestroni GJ, Cardinali DP, Poeggeler B, Hardeland R, "Melatonin: Nature's most versatile biological signal?" **FEBS Journal**, Volume 273, Number 13, July 2006, pp. 2813-2838(26)
A Study from the Comprehensive Center for Sleep Medicine, Division of Pulmonary, Critical Care and Sleep Medicine, Mount Sinai School of Medicine, New York, NY 10029, USA.

SUMMARY

Melatonin is a ubiquitous molecule and widely distributed in nature, with functional activity occurring in unicellular organisms, plants, fungi and animals. In most vertebrates, including humans, melatonin is synthesized primarily in the pineal gland and is regulated by the environmental light/dark cycle via the suprachiasmatic nucleus. Pinealocytes function as 'neuroendocrine transducers' to secrete melatonin during the dark phase of the light/dark cycle and, consequently, melatonin is often called the 'hormone of darkness'. Melatonin is principally secreted at night and is centrally involved in sleep regulation, as well as in a number of other cyclical bodily activities. Melatonin is exclusively involved in signaling the 'time of day' and 'time of year' (hence considered to help both clock and calendar functions) to all tissues and is thus considered to be the body's chronological pacemaker or 'Zeitgeber'. Synthesis of melatonin also occurs in other areas of the body, including the retina, the gastrointestinal tract, skin, bone marrow and in lymphocytes, from which it may influence other physiological functions through paracrine signaling.

Melatonin has also been extracted from the seeds and leaves of a number of plants and its concentration in some of this material is several orders of magnitude higher than its night-time plasma value in humans. Melatonin participates in diverse physiological functions. In addition to its timekeeping functions, melatonin is an effective antioxidant which scavenges free radicals and up-regulates several antioxidant enzymes. It also has a strong antiapoptotic signaling function, an effect which it exerts even during ischemia. Melatonin's cytoprotective properties have practical implications in the treatment of neurodegenerative diseases. Melatonin also has immune-enhancing and oncostatic properties. Its 'chronobiotic' properties have been shown to have value in treating various circadian rhythm sleep disorders, such as jet lag or shift-work sleep disorder.

Melatonin acting as an 'internal sleep facilitator' promotes sleep, and melatonin's sleep-facilitating properties have been found to be useful for treating insomnia symptoms in elderly and depressive patients. A recently introduced melatonin analog, agomelatine, is also efficient for the treatment of major depressive disorder and bipolar affective disorder. Melatonin's role as a 'photoperiodic molecule' in seasonal reproduction has been established in photoperiodic species, although its regulatory influence in humans remains under investigation. Taken together, this evidence implicates melatonin in a broad range of effects with a significant regulatory influence over many of the body's physiological functions.

COMMENT

Melatonin is a multifaceted hormone that promotes sleep. Melatonin is also involved in immune function, anti-carcinogenic activity, anti-oxidant activity, anti-osteoporosis mechanisms, and may act as an anti-depressive hormone. The latest research on melatonin points to an important role in memory consolidation during rapid eye movement (REM) sleep.

Honey consumed prior to bedtime may promote sleep via release of melatonin as explained in the Honey - Insulin - Melatonin (HYMN) Cycle (see Poster No 14). Thus honey may be described as a natural facilitator or trigger for "optimized recovery physiology" during restorative sleep.