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## Antistress and antioxidative effects of melatonin

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Melatonin is a hormone, also known chemically as N-acetyl-5-methoxytryptamine; a derivative of tryptophan. It was discovered 2300 years ago by Hirophilus, an Alexandrian anatomist. It is a naturally occurring compound found in animals, plants and microbes. Melatonin is produced by the pineal gland, a tiny, rice grain sized and pine cone shaped endocrine gland situated at the centre of the brain, outside the blood brain barrier. In animals, circulating levels of melatonin vary in a daily cycle. Allowing the regulation of the circadian rhythms of several biological functions, including the sleep-wake cycle. Biological effects of melatonin are produced through the activation of melatonin receptors. The secretion of melatonin increases in darkness and decreases during exposure to light, hence labeled "the darkness hormone" or "Dracula of hormones" in both diurnal and nocturnal animals. It may be also be produced by a variety of peripheral cells such as bone marrow cells, lymphocytes and epithelial cells. It is implicated in the regulation of mood, learning and memory, immune activity, cancer, fertility and reproduction. Melatonin is also an effective antioxidant. Melatonin is categorized by the US Food and Drug Administration (FDA) as a dietary supplement, not a drug. Melatonin supplements are used to treat jetlag or sleep problems. Melatonin, a derivative of the amino acid tryptophan, is produced in humans, other mammals, birds, reptiles, and amphibians. The precursor to melatonin is serotonin, a neurotransmitter that itself is derived from tryptophan. Within the pineal gland, serotonin is acetylated and then methylated to yield melatonin. Melatonin exerts its effects through activation of two high-affinity G-protein-coupled receptors, melatonin receptor 1 (MT1) and melatonin receptor 2 (MT2). MT1 receptors are expressed in many regions of the central nervous system (CNS): suprachiasmatic nucleus (SCN) of the hypothalamus, hippocampus, substantia nigra, cerebellum, central dopaminergic pathways, ventral tegmental area and nucleus accumbens. MT1 is also expressed in the retina, ovary, testis, mammary gland, coronary circulation and aorta, gallbladder, liver, kidney, skin and the immune system. MT2 receptors are expressed mainly in the CNS, also in the lung, cardiac, coronary and aortic tissue, myometrium and granulosa cells, immune cells, duodenum and adipocytes. Its production is influenced by the detection of light and dark by the retina of the eye. The suprachiasmatic nucleus is the master clock controlling behavioral, metabolic and physiological rhythms, including the synthesis and release of melatonin from the pineal gland. Endogenous pineal melatonin feeds back onto the master clock and regulates neuronal activity and circadian rhythms through activation of MT1 and MT2 melatonin receptors. In the suprachiasmatic nucleus melatonin inhibits neuronal firing via MT1, but it phase shifts neuronal firing rhythms through activation of MT2 melatonin receptors. Melatonin has been reported in foodstuffs including bananas, cherries grapes, rice cereals, herbs, olive oil, wine and beer. While no food has been found to elevate plasma melatonin levels in humans, when other animals consume melatonin-containing food, blood levels of melatonin do increase. Melatonin is categorized by the US Food and Drug Administration (FDA) as a dietary supplement, not a drug. Melatonin supplements are used to treat jetlag or sleep problems.

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