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Melatonin: Metabolic consequences and implications for disease prevention

Melatonin, an endogenously-produced indoleamine throughout the animal and plant kingdoms is a ubiquitously-acting molecule that functions as a circadian rhythm regulator, an antioxidant and an anti-inflammatory agent. Alternations in circadian rhythms which lead to chronodisruption are the basis of increasingly-identified number of diseases. Likewise, oxidative damage and inflammation contribute to a wide variety of disease processes. Due to its multiple actions, melatonin has the capability of ameliorating disease processes that involve circadian disturbances, accumulated free radical damage and inflammation. This lecture will relate particularly to the high efficacy of melatonin in reducing the progression of free radical-induced deterioration of the brain as occurs in Parkinsonism, Alzheimer's disease and stroke (ischemia/reperfusion injury). While melatonin is an endogenously-produced molecule,

its production in humans waves with increasing age; as a result, humans lose an important component of their intrinsic antioxidant defense system. This loss, coupled with the greater inefficiency of mitochondrial electron transport through the respiratory chain, greatly accelerates functional deterioration during aging. While this functional degeneration occurs in all organs as they age, it is particularly strongly-manifested in the central nervous system. The resulting glial and neuronal loss that occurs as a consequence of free radical damage contributes to reduced neural function in the aged. In all experimental models of progressive neural diseases of aging, exogenous administration of melatonin greatly ameliorates neural and glial loss and preserves neurobehavioral responses. One implication is that the loss of endogenous melatonin production during aging may contribute to neural diseases of the elderly.

Biography

Russel J. Reiter earned his Ph.D. in endocrinology and radiation biology; additionally he has been awarded three honorary doctor of medicine (M.D.) degrees and one honorary doctor of science (D.Sc.) degree. He has published 1,200+ articles in scientific journals/books and he has trained 140 postdoctoral fellows and 25 Ph.D. students. Dr. Reiter has received numerous awards for this research including the A. Ross McIntyre Gold Medal, Alexander von Humboldt Award, (Germany) Lezoni Lincee Award (Italy), etc. He is Editor-in-chief of the Journal of Pineal Research (Impact Factor 5.855) and he is/has been on the Editorial Board of 26 other journals.