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Melatonin, human aging, and age-related diseases

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Abstract

The worldwide prolongation of the mean life expectancy has resulted in a rapid increase of the size of the elderly population (over the age of 60), both in numbers and as a proportion of the whole. As a consequence, increasing the number of potential beneficiaries of health and pension funds, mainly those aged 65 and over raises many social and economic problems since they are supported by a relatively smaller number of potential contributors, i.e. those in the economically active ages between 18 and 64. Therefore, there is a search for any therapeutic agent improving quality of life in the elderly. A role for melatonin as such a compound was recently suggested. In this survey, data on the possible role of melatonin in human aging and age-related diseases are briefly presented. Undoubtedly the aging process is multi-factorial, and no single factor has been identified which satisfactorily explains the phenomenon. Although many theories relating the pineal gland and its secretory product melatonin to aging have been proposed, the role of this agent in the aging process is still unclear. However, for several reasons it seems reasonable to postulate a role for melatonin in this process. Melatonin levels decline gradually over the life-span and may be related to lowered sleep efficacy, very often associated with advancing age, as well as to deterioration of many circadian rhythms. Melatonin exhibits immunomodulatory properties, and a remodeling of immune system function is an integral part of aging. Finally, because melatonin is a potent free radical scavenger, its deficiency may result in reduced antioxidant protection in the elderly which may have significance not only for aging per se but also may contribute to the incidence or severity of some age-related diseases. Presently available data do not allow us to conclude that melatonin may have a role in extending normal longevity. However, although melatonin cannot be recognized as 'rejuvenating' agent, some of its actions may be beneficial for the aging process. Administration of melatonin may improve temporal organization in advanced age. Moreover, it has beneficial effects on sleep as well as age-related diseases. Although recommendations of melatonin supplementation in elderly should be considered, there is a need for extensive studies on the use of melatonin in order to improve the quality of life in advanced age.

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