

aging is associated with a certain amount of amyloid deposits, a drug like melatonin that counter-acts in multiple ways the initiation of inflammatory responses and seems to possess additional anti-inflammatory properties, especially in a gerontological context, could be of considerable value for health maintenance in aging.

19.2.4 Telomere Attrition

The usual irreversibility of telomere attrition in differentiated non-tumour cells has been a reason for concluding on limits of lifespan by this process. However, the decisive question is that of whether telomere attrition is exclusively a matter of replication rounds, as originally assumed. Although it may be precocious to seek firm conclusions on a relationship between melatonin and telomere length, a few indications for this shall be mentioned. For instance, increased formation of reactive oxygen species has been observed in mutants of clock genes and these changes were associated with advanced telomere attrition.¹⁵³ With regard to melatonin's properties as an anti-oxidant agent and a regulator of circadian oscillators, one might assume an influence of the pineal hormone on telomere length. Moreover, SIRT1 was reported to attenuate telomere shortening.¹⁵³ The repeatedly described upregulation of SIRT1 by melatonin in non-tumour cells, as discussed above, might be interpreted in a corresponding way.¹¹ Telomere attrition is particularly relevant to immuno-senescence. However, lymphocytes have been reported to be capable of up-regulating telomerase expression, which might contribute to a delay in the aging-associated deterioration of the immune system.¹⁵⁴ It remains to be investigated to what extent melatonin's immune-stimulatory properties, which include modulation of number and function of lymphocyte subtypes, may influence telomere length in these cells.^{5,11}

19.3 Lifespan, Health, Deceleration and Deacceleration of Aging

An anti-aging drug may be associated with the expectancy of life extension. It seems important to properly distinguish between different processes that may limit lifespan. One of these is the lingering, slowly progressing aging in terms of a basal but poorly reversible change that starts relatively early in life, whereas others represent pathophysiologically relevant alterations that predominantly occur at advanced age and can strongly or even dramatically accelerate aging. Despite a lot of gerontological research, the mechanisms of basal aging are difficult to judge in respect to their relative contribution to the termination of life, perhaps, except for the statement that a well-functioning immune system may be the best predictor of longevity.^{120,155} Moreover, drugs have never been convincingly shown to decelerate the basal process of aging in mammals. However, life extension relative to the average population can also be the result of avoiding or counter-acting