

Journal of Clinical Endocrinology & Metabolism, Vol 61, 439-443,
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ARTICLES

Age-related changes in the circadian rhythm of plasma cortisol in man

B Sherman, C Wysham and B Pfohl

We studied the effect of age on the circadian rhythm of plasma cortisol in 34 normal subjects, aged 18-75 yr. Blood was sampled at 20-min intervals beginning at 2000 h, and the data were analyzed using the PULSAR program and the cosinor method. There was a negative correlation between age and the time of the maximum cortisol concentration ($r = -0.548$; $P = 0.001$), the time of the nadir cortisol concentration ($r = -0.543$; $P = 0.001$), and the acrophase ($r = 0.528$; $P = 0.001$). When the subjects were divided into those 39 yr of age and younger and 40 yr of age and older, the times of the cortisol nadir, maximum, and acrophase were significantly earlier in the older group. The interval between the nadir and peak cortisol levels was not significantly different, consistent with an age-related phase advance of the cortisol circadian rhythm.

Quantitative indices of adrenal function, including the 24-h mean cortisol concentration and the number of cortisol peaks as well as their amplitude and duration, were not different in the two groups. There was a significant negative correlation between age and customary bedtime ($r = -0.686$; $P = 0.001$) that may explain, in part, the phase advance in the older subjects. This observation strengthens the evidence that sleep onset is a major factor contributing to synchronization of the cortisol rhythm. Alternative explanations are that age-related changes in the control of hormonal and other rhythms have important

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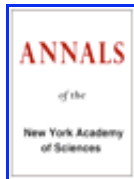
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influences on sleep and activity schedules, or that sleep and cortisol variables do not influence each other, but are both the final expression of some central change.

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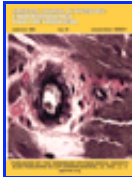
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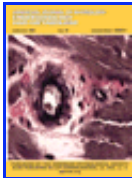
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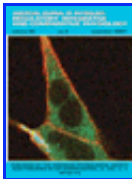
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