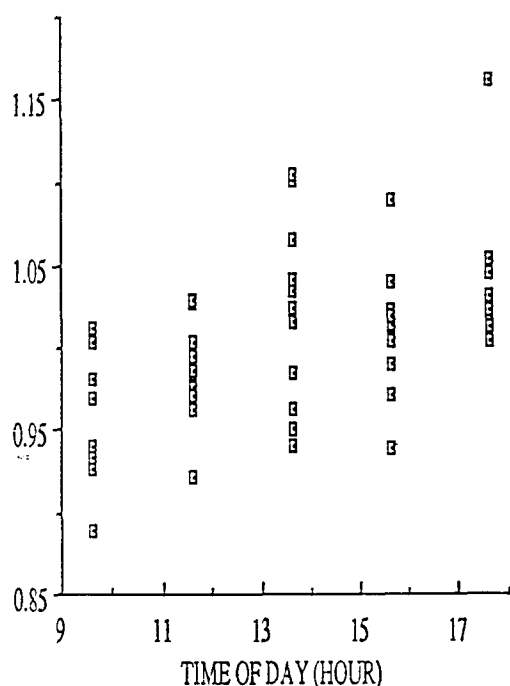


A CIRCADIAN PATTERN IN THE DEGREE OF HYDRATION OF THE STRATUM CORNEUM

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The presence of circadian patterns in a number of physiological parameters and functions including body temperatures, urine production and electrolyte levels is well documented (Bowman and Rand, 1980), and reports have been made of circadian dependence in the pharmaco-kinetics of a number of drugs. (e.g Bruguerolle and Prat, 1988). In this current study we present evidence, that, a circadian pattern also exists in the levels of hydration of the stratum corneum.

AMIDE BAND ABSORPTION RATIO



Graphical presentation of the amide I absorption band ratio amide II as function of time of day for all eleven volunteers

FIGURE

The water content of the stratum corneum was assessed by attenuated total reflectance infra-red spectroscopy (A.T.R.) using a technique described by Gloor et al (1981). This method monitors changes in the relative intensities of the water sensitive polypeptide amide I absorption band at 1645cm^{-1} and the water-insensitive amide II absorption band at 1545cm^{-1} . The ratio of the absorbances at the two wavelengths is related directly to the water content. A panel of eleven volunteers of both sexes with ages ranging from 19 to 50 years was used. At specified time intervals, an exact part of the flexor surface of the forearm of each volunteer was applied to the zinc selenide crystal of the A.T.R. unit and held firmly in place whilst an infra-red spectrum of the stratum corneum between 2000cm^{-1} and 1400cm^{-1} was recorded. The environmental conditions under which infra-red measurements were made showed very little variation in relative humidity and temperature. However a baseline recording (atmosphere alone) from the ATR unit was always made prior to the measurement of the skin surface.

The straightforward plot of the amide band ratio for the eleven volunteers against time is presented in the figure and analysis of variance of these data confirms a positive increase, on average, over the time period of 9.30-17.30hr. Since the time intervals were equally spaced it is possible to isolate the linear, quadratic, cubic and quartic components of any trend using orthogonal polynomials (Winner, 1971). The results

of this latter approach, show that for the F-ratios generated by comparing the mean square of each component of the time trend to the error mean square, only the linear component is of statistical significance. The observed value of 22.73 readily exceeds the critical value of 12.60 at the 0.1% level of significance. A limited investigation was also continued beyond 17.30hr, and these measurements have indicated that the level of hydration decreased as the evening progressed past 17.30hr, returning to an expected lower value by 9.30hr the following morning.

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