Circadian Changes in the Temperature of Human Beings

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I. Introduction

As is true for most if not all, physiological variables, both skin and core (rectal and oral) temperatures are not constant as a function of time. On the contrary, they exhibit regular and predictable changes with period, τ, of ~24 h (circadian rhythm), ~7 days, ~30 days, ~1 year (circannual rhythm, etc.). The study of these bioperiodic phenomena in man, and other animals, as well as in plants corresponds to a rapidly growing branch of quantitative biology: chronobiology.

Both thermographists and chronobiologists are, therefore, interested in temperature changes. As demonstrated by GAUTHERIE [1] circadian rhythms (among others) in skin (fingertip) temperature have to be taken into consideration for a better understanding of thermographic measurements from both a pratical and a theoretical point of view.

II. Chronobiology: Aims and Definition

Biological rhythms can be defined as statistically validated physiologic changes recurring with a reproducible waveform [2, 3]. With the help of electronic computers and special programs – developed for this purpose at the University of Minnesota [4] – it is now possible to obtain a characterization and quantification of rhythm. From biological time series a rhythm can be objectively detected ($p < 0.05$) and then characterized by the statistical estimation of several parameters: (average) period, τ, and/or (average) acrophase-crest time, $\varnothing$, or crest angle, φ, amplitude, A, and (average)