Grundsatzreferat in Anlehnung an den Medizin-Nobelpreis 2017

Chronobiology and Skin

Prof. Dr. med. Achim Kramer
Institut für Medizinische Immunologie
Charité Universitätsmedizin Berlin

Circadian clocks are endogenous oscillators that regulate the temporal organization of physiology, metabolism and behaviour. They provide organisms, ranging from unicellular algae to humans, with an internal representation of local time, thus allowing them to anticipate daily recurring chances and challenges in their environment.

Circadian clocks oscillate in a self-sustained manner with an endogenous (freerunning) period close to 24 hours. In a natural environment, these free-running rhythms are synchronized (entrained) to external time cues (Zeitgeber), such as 24-hour light-dark and ambient temperature cycles.

The master circadian clock resides in the hypothalamic suprachiasmatic nuclei (SCN) and not coordinates daily rhythms of sleep and wakefulness, core body temperature and hormone secretion. In addition, it keeps the clocks in peripheral tissues in synchrony with the outside world. Such peripheral clocks are present in virtually every cell of the body including dermal fibroblasts and epidermal keratinocytes.

Whole-genome microarray analysis of epidermis and dermis obtained throughout the day revealed a functional circadian clock in epidermal keratinocytes and dermal fibroblasts with hundreds of transcripts regulated in a daytime-dependent manner contributing to the daily rhythms of a huge variety of physiological and metabolic activities in skin such as proliferation and wound healing.