Abstract

This thesis focuses on the development and function of the circadian system, which regulates biological processes in the body according to the 24-hour cycle. The circadian system and its key components, including the suprachiasmatic nuclei of the hypothalamus and peripheral oscillators, are introduced. The molecular operation of the circadian clock, which is influenced by two loops, is also discussed. A major theme is the ontogeny of the circadian clock, which occurs autonomously during embryonic stem cell differentiation. This process is influenced by various factors such as ultradian rhythms of the segmentation clock and the influence of maternal factors. However, not all signals are essential for the development of these clocks, and especially their rhythms, as revealed by in vitro methods. Furthermore, the thesis discusses how the behaviour of embryonic stem cells differs from cells differentiated from them, and why the circadian clock is dysfunctional in these cells. The work provides a deeper understanding of the ontogeny of the circadian system, its rhythms, and its regulatory mechanisms - that is, when, where and under what circumstances the clock starts to form and "tick".