Topic category: Others

The Circadian Rhythm of Intestinal Melatonin-Synthesizing Enzymes

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Introduction: Melatonin is a hormone tightly related to circadian synchronization. Blood levels of melatonin oscillate in 24-h cycles in close accordance with the external illumination. Most circulating melatonin is assumed to be secreted by the pineal gland, whose activity is subordinated to the central circadian clock in the suprachiasmatic nucleus. Pineal melatonin is produced during the dark phase of the endogenous circadian cycle, and acts as a synchronizing signal for secondary oscillators in peripheral tissues. It is recognized that tissues other than the pineal gland synthesize melatonin, but the role of these alternative sources in the circadian melatonin circulation is not clear. The intestine has been shown to contain great amounts of melatonin, estimated to be several-fold larger than that of pineal. However, the origin of intestinal melatonin is debated, for there seem to be several sources besides local synthesis from which melatonin could be incorporated into the intestinal mucosa. Moreover, the relationship of this local melatonin with the pineal circadian activity is obscure.

Objective: To describe the relationship between the circadian rhythm with the intestinal melatonin-synthesizing enzymes

Material an**d Methods:** In this work we analyzed the presence of the main protein controlling melatonin synthesis, the enzyme aralkylamine N-acetyltransferase (AANAT) in the main different portions of intestine and the changes in its relative concentration along a 24-h cycle.

Results: We found that AANAT is present along the intestine with higher levels in the proximal portions. The concentration of AANAT in tissue lysates shows circadian oscillation that roughly parallels that of the pineal with a phase delay of around 4 h.

Conclusions: These results indicate that the intestinal wall produces melatonin with a circadian pattern and suggest that this activity is not related with central melatonin signaling but with local timing.

Keywords: circadian rhythm, aralkylamine N-acetyltransferase, melatonin, experimental animal

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