Activity monitoring by ecological neurobehavioral logger (ECOLOG) and analysis of circadian period and fluctuation

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Objective: The increase of children who feel fatigue is a severe problem in Japan. Many complain of difficulty in daily life. Some of them cannot leave bed because of their severe illness. This study is intended to elucidate important factors of child health care through analysis of daily life activity and to establish a method to protect their healthy life.

Subjects: Healthy elementary school students, high school students, university students, adults, and inpatients who complain of sleep disturbance, chronic fatigue, headache, stomachache, etc.

Method: Activity is monitored with Ecolog, developed by Yamamoto et al. and Seiko Instruments. Then, fluctuation and circadian are analyzed. Ecolog is worn on the watch-side wrist to avoid stress caused by the unfamiliar device; activity is monitored for 8 days. There is no restriction of subjects' life through the monitoring term. Two methods are used for activity analysis. One is circadian period analysis with autocorrelation. Another is micro structure analysis of activity, such as power spectrum, fluctuation and time-scale (frequency) analysis by maximum entropy method and wavelet analysis.

Results: Elementary school students showed a very regular circadian period, but even healthy university students and adults exhibited an irregular daily life. Circadian period rhythm of inpatients improved relatively because of hospital life as a synchronizing factor, but there were some disturbances in activity micro structure.