

論 文 要 旨

Diurnal variation in trigeminal pain sensitivity in mice

マウスの三叉神経支配領域における痛みの日内変動

新納 彩子

Management of time and circadian disruption is an extremely important factor in basic research on pain and analgesia. Although pain is known to vary throughout the day, the mechanism underlying this circadian variation remains largely unknown. In this study, we hypothesized that the process of pain transmission to the central nervous system (after receiving nociceptive stimuli from outside the body) would show day-night differences. Ten-week-old male mice were kept under a strict 12/12-h light/dark cycle for at least 10 days. Formalin was then injected into the second branch region of the trigeminal nerve and the duration of pain-related behaviors (PRBs) was assessed. Immunohistochemical staining was then performed, and the c-Fos-immunopositive cells in the trigeminal spinal tract subnucleus caudalis (Sp5C) were counted. The results showed that the duration of PRBs was longer and the number of c-Fos immunopositive cells in the Sp5C was higher at nighttime than during the day. In addition, the trigeminal ganglia (TG) were extracted from the mice and examined by quantitative real-time PCR to evaluate the daytime and nighttime expression of nociceptive receptors. The results showed that the mRNA expression of transient receptor potential ankyrin 1 in the TG was significantly higher at night than during the day. These results suggest that pain in the trigeminal nerve region is more intense at nighttime, when rodents are active, than during the daytime, partly due to differences in nociceptor expression.