CIRCADIAN RHYTHM OF MOTOR ACTIVITY IN DISC1 MUTANT MICE

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It is well known that circadian rhythm is disrupted in patients with psychiatric disorders and that the impaired circadian rhythm is implicated into pathophysiological mechanisms of psychiatric disorders. Hence, we assume that genetic animal models of psychiatric disorders will demonstrate altered circadian activity in comparison with wild-type mice. So, the aim of our current study was to describe circadian rhythm of motor activity in DISC1 mutant female mice, which model schizophrenia-related phenotypes (DISC1-L100P) and depression-like behavior (DISC1-Q31L) in comparison with wild-type (WT) [C57BL/6NCrl] mice. The experiment was performed using IntelliCage system, which recorded the total number of visits for each animal. Mice were kept on a 12:12 light:dark cycle with lights on at 18:00. The obtained results were processed by using cosinor analysis, the classical technique for rhythm detection and parameter estimation in chronobiology. Analysis of circadian rhythm of motor activity revealed that WT mice have acrophase (time of maximal activity) at 9:55±0:15 h, MESOR (Midline Estimated Statistic Of Rhythm) equals 16.7±2.00 visits, and amplitude (peak amplitude) is 10.0±1.46 visits. Circadian rhythm of motor activity parameters in DISC1-L100P mice were as follows: acrophase - 8:40±0:09 h (significantly earlier than in WT); MESOR – 15.6±0.96 visits (not differs from WT); and amplitude - 12.5±1.10 visits (not differs from WT). DISC1-Q31L mice shows acrophase at 8:58±0:16 h (significantly earlier than in WT); MESOR 12.1±0.92 visits (not differs from WT and DISC1L100P); and amplitude 6.6±1.06 visits (significantly lower than both WT and DISC1L100P). Notably, that DISC1-Q31L mice demonstrated the decreased motor activity (low amplitude) than WT animals perhaps, in parallel with depression-related behavior in DISC1-Q31L genetic line. DISC1-L100P mice showed the increased amplitude and later acrophase in comparison with DISC1-Q31L strain, suggesting higher motor activity and different activity pattern. Overall, analysis of circadian rhythms of motor activity revealed that DISC1 mutant mice demonstrate circadian pattern of motor activity which differs from WT animals, also DISC1-Q31L and DISC1-L100P mutants differ between each other by motor activity.

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