Depression behaviors and sleep disturbance following corticosterone injection up to three weeks in rats: the effects on locus coeruleus

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Background: Repeated corticosterone (CORT) injections reliably increase depression-like behavior and cause sleep disturbance in rats. It was postulated that pre-existing sleep abnormality may be a vulnerability factor for depression. On the other hand, disturbances of sleep are typical for most depressed patients and belong to the core symptoms of the disorder. The purpose of this experiment was to investigate the characterization of sleep pattern and depressive-like behavior following CORT administration and to explore the underlying neurobiological mechanism.

Methods: Rats received repeated injections of vehicle or 40 mg/kg CORT, and then were subjected to the behavioral test for depression and sleep monitoring. Brain areas of locus coeruleus (LC) were also dissected for protein assay.

Results: Three-weeks CORT injection induces depressive-like behavior, while the wakefulness enhancement already occurred at day 7 and diminished during last two weeks. Rapid eye movement (REM) sleep was progressively reinforced throughout the experiment. The level of tyrosine hydroxylase in LC was higher at day 7, and decreased at day14 and 21. The MR/GR imbalance in the LC also observed.

Conclusion: In conclusion, the present study provides information about the role of sleep abnormality on the development of depression, and suggests the corticosterone injection as a promising animal model for the investigation of interplay between sleep disorder and major depression.

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