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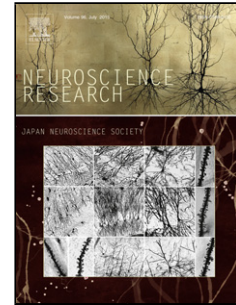
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Highlights:

1. *Drosophila* has been used for sleep studies for nearly 20 years.
2. *Drosophila* shares many common sleep related genes with mammals.
3. NMDAR and calcium signaling are important in sleep regulation in both *Drosophila* and mammals.
4. Mushroom bodies and central complex consist sleep regulating circuits.
5. More investigations are required to elucidate how sleep drive is controlled.

Abstract

Sleep is a universal physiological state evolutionarily conserved among species, but the molecular basis for its regulation is still largely unknown. Due to its electroencephalogram criteria, sleep has long been investigated and described mostly in mammalian species. The fruit fly, *Drosophila melanogaster*, has emerged as a genetic model organism for studying sleep. The *Drosophila* sleep is behaviorally defined, and is tightly regulated by circadian and homeostatic processes, like mammals. Genetic analyses using *Drosophila* have successfully identified a number of conserved regulatory mechanisms underlying sleep between flies and mammals. Identification of sleep-regulating neural circuits is required to further elucidate these molecular mechanisms. Two major brain regions, the mushroom bodies and the central complex, play crucial roles in sleep regulation in *Drosophila*. Noteworthy, many detailed

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