AMINO ACID TRANSPORTERS: THE SANDMAN'S NEW PARTNERS

The sleep-wake cycle, or circadian-rhythm, regulates the behaviour and physiology of numerous organisms. However, which physiological mechanisms allow animals to adapt to the sleep-wake rhythm? This question deserves attention and the 2017 Nobel Prize awarded American researchers for their pioneering work on the molecular mechanisms of the circadian-rhythm in drosophila (fruit flies). To shed light on the many remaining grey areas, the team led by Laurent Seugnet (Lyon Neuroscience Research Center) worked in collaboration with the CSGA's 'Sensory Perception, Interactions between Glia and Neurons' team directed by Yaël Grosjean. Together, these teams aim to find out whether amino acid transporters are involved in sleep-wake regulation in drosophila. These transporters are located in cell membrane and regulate the transport of amino acids towards the inside or outside of cells.

More specifically, the researchers studied the role played by two transporters called Minidiscs and JhI-21 (related to the human transporter LAT-1). To achieve this, they used genetic tools to block specifically these transporters in dopaminergic neurons. They found that blocking the transporters led to an increase in the flies' sleep phases which proves that the transporters are involved in sleep regulation. The researchers also showed that JhI-21, a homolog to the human transporter LAT-1, is involved in the transport of L-DOPA, a precursor of dopamine which controls the sleep-wake cycle.

This study has shown for the first time that LAT-1-like amino acid transporters present in dopaminergic neurons play a fundamental role in sleep regulation. This discovery should allow researchers to better understand the role of nutrients such as amino acids in the regulation of the sleep-wake cycle.

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To know more

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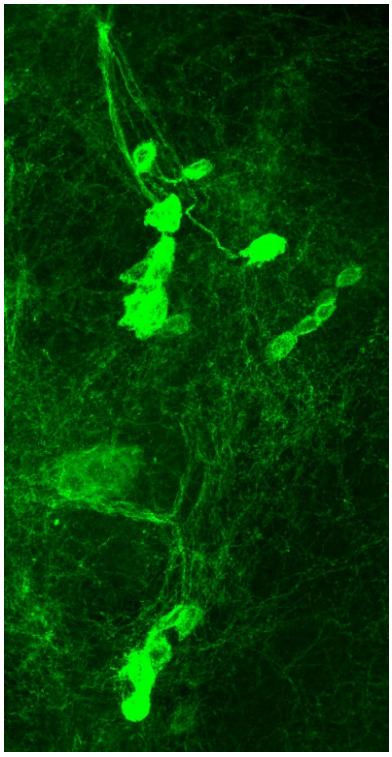
Keywords

Circadian-rhythm; sleep; amino acid, transporter, dopamine, drosophila, genetic



Legend : Dopaminergic neurons (labelled here by GFP in the adult brain of drosophila) regulate sleep via two amino acid transporters, Minidiscs and JhI-21.