Brain Circuits that Play a Role in Sleep Problems

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Introduction

There are numerous reasons why sleep disorders are becoming more and more important in society. First of all, sleep disorders or disturbances in young people can have psychosocial effects on learning, working, and mental health, as well as contribute to unemployment. The use of social media and other forms of nocturnal entertainment by young people may, it is possible, muddy the clinical picture and occasionally make it more difficult to identify a true sleep issue. Second, accidents can be linked to decreased mental concentration brought on by tiredness, which has increased societal focus on the influence of sleep disorders concerning traffic safety issues. Young individuals are also more likely to have physiological tiredness or a delayed sleep phase, which can sometimes be assisted by social media use and nocturnal entertainment. Sleep disorders frequently begin at young ages, but they can also be difficult to identify because of this. The latter conditions could make diagnosing difficult, which would require laboratory assistance. The young narcoleptic instances linked to the pandemrix swine flu vaccine in Europe in 2009 and 2010 also brought attention to sleep problems as a whole, raising awareness among medical professionals as well as the general public, as well as boosting research activities.

A neuronal locus in the lateral hypothalamus, where cells that make hypocretin are badly impaired, is the injured area. Other sleep disorders, such as hypersomnias, for instance, have much less clear-cut etiologies and processes. Because it can be confused with normal physiological sleepiness or psychiatric problems, Kleine-Levin Syndrome (KLS), an uncommon form of recurrent hypersomnia, is crucial to detect. This emphasizes the significance of a proper differential diagnosis. The Delayed Sleep Phase Syndrome (DSPS) is an additional ailment of particular concern to young people. Finally, due to the condition's significant effects on work-life and long-term cardiovascular risks, there is growing interest in identifying and treating obstructive sleep apnea syndrome in many nations.

The fundamental elements of the sleep-wake regulating mechanisms were first identified by von Economo in his investigations on a particular hypersomnia disorder called encephalitis lethargica, which forms the basis for today's understanding of sleep physiology. Von Economy had already pinpointed the precise regions of the brain where injuries led to aberrant sleep-wake behavior at the beginning of the 20th century. More information about the brain circuitries and neurotransmitters involved in regulating sleep and wakefulness has recently been described as a result of these discoveries. However, our understanding of the brain mechanisms that control our circadian regulation of sleep and wakefulness is still lacking. In this article, larson-prior and colleagues evaluate what is known currently regarding the brain circuits involved in sleep and sleep disorders.

Novel insights into the brain's sleep wake regulating mechanisms can be gained from studying sleep disorders. Loss of hypocretin producing neurons in the hypothalamus is linked to narcolepsy, which is characterized by abrupt sleep bouts that can happen multiple times each day. One of the two main branches of the ascending arousal system, the hypothalamus is a crucial node. The thalamus, which may be impacted in KLS, is involved in the other branch. According to engström et alviewpoints paper, Functional Magnetic Resonance Imaging (FMRI) can find anatomical biomarkers of brain function linked to narcolepsy, KLS and their accompanying symptoms. The case study provides an intriguing illustration of decreased pontine and thalamic connection in KLS during a period of hypersomnia. Drug therapy could be used to study the neural circuits implicated in sleep disorders. In his case study on the use of lithium in KLS, Sveinsson addresses this issue, while Sarkanen and colleagues present data on psychosis in narcolepsy patients receiving sodium oxybate. Huynh and co-workers review a different strategy, Continuous Positive Airway Pressure (CPAP) in OSAS, interestingly employing a radiological volumetric result.

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