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综述

腺苷和睡眠觉醒调节

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摘要：

腺苷作为神经调质，调节多种神经生物学功能。随觉醒时间延长，动物脑内腺苷水平逐渐增高，在睡眠期显著降低。因此，腺苷被认为是调节睡眠的内稳态因子之一。腺苷受体(receptor，R)有A_1R、$A_{2A}R$、$A_{2B}R$和A_3R四种亚型，其中A_1R和$A_{2A}R$与诱导睡眠相关。激活A_1R可抑制促觉醒神经元诱导睡眠，也可抑制促眠神经元导致觉醒，其作用存在脑区依赖性。$A_{2A}R$介导内源性前列素D_2的促眠作用，$A_{2A}R$激动剂具有最强的促眠效应，阻断$A_{2A}R$引起觉醒，在睡眠觉醒调节中扮演重要角色。本文综述腺苷调节睡眠和觉醒的研究进展，讨论腺苷受体激动剂和拮抗剂在睡眠疾病治疗中的潜在价值及存在问题。

关键词： 腺苷 前列腺素D_2 受体 睡眠 觉醒

Adenosine and Sleep-Wake Regulation

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Abstract:

Adenosine may function as a neuromodulator in the central nervous system. The extracellular concentration of adenosine increases in the brain during prolonged wakefulness and decreases during the sleep recovery period. Therefore, adenosine is proposed to act as one of homeostatic regulators of sleep. There are four adenosine receptor subtypes, adenosine A1 receptor (A_1R), $A_{2A}R$, $A_{2B}R$ and A_3R. Both the adenosine A_1R and $A_{2A}R$ are demonstrated to be involved in sleep induction. Inhibition of wake-promoting neurons via the A_1R mediates the sleep-inducing effects of adenosine, whereas activation of A_1R in sleep-promoting neurons induces wakefulness, suggesting that A_1R regulates the sleep-wake cycle in a site-dependent manner. On the other hand, the $A_{2A}R$ mediates the somnogenic effects of endogenous PGD_2. $A_{2A}R$ agonist induces the most potent sleep similar to physiological sleep among somnogens reported so far, whereas blockade of $A_{2A}R$ induces wakefulness. Among adenosine receptors responsible for sleep induction, the role of $A_{2A}R$ is predominant. This paper presents an overview of the current knowledge about the role of adenosine in the sleep-wake regulation and briefly discusses the potential therapeutic applications of agonists and antagonists of these receptors in sleep disorders.

Keywords: Adenosine Prostaglandin D_2 Receptor Sleep Wake

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