WHAT IS THE IMPORTANCE OF MELATONIN IN SLEEPING PROGRESS?

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ABSTRACT

To undertstand the process of sleeping and how it controls from the brain parts. Moreover, not only the control of brain but also important role of of melatonin, what tasks does it controls and how it respond to the reaction of organism.

Key words:hypothalamus, suprachiasmatic nucleus, biological mechanisms, circadian rhythms, sleep-wake homeostasis,melatonin.

INTRODUCTION

Where situated controlers of sleeping?

The hypothalamus, a peanut-sized structure deep inside the brain, contains groups of nerve cells that act as control centers affecting sleep and arousal. Within the hypothalamus is the suprachiasmatic nucleus (SCN) – clusters of thousands of cells that receive information about light exposure directly from the eyes and control your behavioral rhythm. Some people with damage to the SCN sleep erratically throughout the day because they are not able to match their circadian rhythms with the light-dark cycle. Most blind people maintain some ability to sense light and are able to modify their sleep and wake cycle.

The brain stem, at the base of the brain, communicates with the hypothalamus to control the transitions between wake and sleep. (The brain stem includes structures called the pons, medulla, and midbrain.) Sleep-promoting cells within the hypothalamus and the brain stem produce a brain chemical called GABA, which acts to reduce the activity of arousal centers in the hypothalamus and the brain stem. The brain stem (especially the pons and medulla) also plays a special role in REM sleep; it sends signals to relax muscles essential for body posture and limb movements, so that we don’t act out our dreams.

The pineal gland, located within the brain’s two hemispheres, receives signals from the SCN and increases production of the hormone melatonin, which helps put you to sleep once the lights go down. People who have lost their sight and cannot coordinate their natural wake-sleep cycle using natural light can stabilize their sleep patterns by taking small amounts of melatonin at the same time each day. Scientists

believe that peaks and valleys of melatonin over time are important for matching the body's circadian rhythm to the external cycle of light and darkness.

METHODS

How is it controls?

Two internal biological mechanisms–circadian rhythm and homeostasis–work together to regulate when you are awake and sleep. Circadian rhythms *Melatonin has a role in psychiatric illness and the treatment of circadian rhythm sleep disorders.*It is the main hormone synthesized and secreted by the pineal gland. It is produced from a pathway that includes both tryptophan and serotonin. Melatonin displays high lipid and water solubility, which allows it to diffuse easily through most cell membranes, including the blood-brain barrier. Its half-life is about 30 minutes, and it is cleared mostly through the liver and subsequently excreted in the urine as urinary 6-sulfatoxymelatonin.In humans and most diurnal mammals, melatonin is secreted at night with a robust circadian rhythm and maximum plasma levels that occur around 3 to 4 AM. The daily rise of melatonin secretion correlates with a subsequent increase in sleep propensity about 2 hours before the person's regular bedtime. The time before this secretion is the least likely for sleep to occur, and when it starts, the propensity for sleep increases greatly as the "sleep gate" opens. The rhythmic release of melatonin is regulated by the central circadian rhythm generator-the suprachiasmatic nucleus (SCN) of the anterior hypothalamus. It appears that the function of melatonin is to mediate dark signals and provide night information, a "hormone of darkness," rather than be the hormone of sleep.It has also been thought to be an "endogenous synchronizer" that stabilizes and reinforces various circadian rhythms in the body. Although direct hypnotic effects have been seen, melatonin's effect on sleep appears more involved in the circadian rhythm of sleep-wake regulation. The phase shifting effects of melatonin appear to be due to the MT2 receptor, while the MT1 receptor is more related to sleep onset. The daily sleep-wake cycle is influenced by 2 factors: process C (circadian), an endogenous "clock" that drives the rhythm of the sleep-wake cycle; and process S (sleep), a homeostatic "sleep propensity" that determines the recent amount of sleep and wakefulness accumulated. The SCN interacts with both processes, and it is where the main component of process C is located. Excitatory signals from the SCN and subsequent melatonin suppression are thought to promote wakefulness during the day in response to light and the suppression of melatonin inhibition of the SCN. This inhibition is released in the dark phase and leads to melatonin synthesis/release with consequent sleep promotion. This period is inherited and is closely related to intrinsic circadian preference for nighttime (long period) or daytime (short period), which can be determined by measuring the timing of maximal secretion of melatonin and

subsequent related core body temperature (CBT). Maximum sleepiness occurs when CBT is at its lowest and melatonin levels are at their highest. Many exogenous and endogenous factors (called zeitgebers) can shift a circadian rhythm. Light, medication, and behavior can also change melatonin levels. The pharmacokinetics and pharmacodynamics of exogenous melatonin may also lead to the inconsistent effects in many clinical spheres as well.Melatonin appears to have 2 probable interacting effects on the sleep-wake cycle. First, it entrains and shifts the circadian rhythm (process C) in a “chronobiotic” function. Second, it promotes sleep onset and continuity in a “hypnotic” function by increasing the homeostatic drive to sleep (process S). These effects appear to be equal.Sleep-wake homeostasis keeps track of your need for sleep. The homeostatic sleep drive reminds the body to sleep after a certain time and regulates sleep intensity. This sleep drive gets stronger every hour you are awake and causes you to sleep longer and more deeply after a period of sleep deprivation.Duration of sleeping changes in a different ages.Most adults need 7-9 hours of sleep a night, but after age 60, nighttime sleep tends to be shorter, lighter, and interrupted by multiple awakenings.In general, people are getting less sleep than they need due to longer work hours and the availability of round-the-clock entertainment and other activities. Many people feel they can "catch up" on missed sleep during the weekend but, depending on how sleep-deprived they are, sleeping longer on the weekends may not be adequate.

What happens if lights hit your skin?

Our bodies' physical repair occurs between 10pm and 2am, after which psychogenic (mental) repair takes place until we wake up. When light hits your skin, your brain and hormonal system think it is morning. The stress hormone cortisol is released, stimulating the body for movement.Moreover, each person should control lasts of sleeping.

RESULTS

Short-term use of melatonin has few side effects and is well-tolerated by the majority of people who take it. The most commonly reported side effects are daytime drowsiness, headaches, and dizziness, but these are experienced by only a small percentage of people who take melatonin.In children, the reported side effects of short-term use are similar as in adults. Some children may experience agitation or an increased risk of bedwetting when using melatonin.For both children and adults, talking with a doctor before taking melatonin can help prevent possible allergic reactions or harmful interactions with other medications. People taking anti-epilepsy and blood thinning medications, in particular, should ask their physician about potential drug interactions.

The American Academy of Sleep Medicine recommends against melatonin use in people with dementia and there is little research about its safety in women who are pregnant or breastfeeding.There is also very little data about the long-term effects of melatonin supplements in children or adults. There is some concern that sustained use of melatonin could affect the onset of puberty in children, but research so far is inconclusive. Because the long-term effects are unknown, people should maintain an ongoing conversation with their doctor about using melatonin and the quality of their sleep and overall health.

DISCUSSION

People with insomnia have trouble falling asleep, staying asleep, or both. When symptoms last a month or longer, it's called chronic insomnia.According to practice guidelines from the American Academy of Sleep Medicine(2017) and the American College of Physicians (2016), there's not enough strong evidence on the effectiveness or safety of melatonin supplementation for chronic insomnia to recommend its use. The American College of Physicians guidelines strongly recommend the use of cognitive behavioral therapy for insomnia (CBT-I) as an initial treatment for insomnia.

CONCLUSION

Numerous studies have found that insufficient sleep increases a person's risk of developing serious medical conditions, including obesity, diabetes, and cardiovascular disease.Lack of adequate sleep over time has been associated with a shortened lifespan.Secondly, If you do not get enough sleep, it can affect your ability to think, remember and process information. You may become less likely to participate in normal daily activities or to exercise.

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