Sleep better, live better: science could be of help

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What would your answer be if you were asked whether you feel you sleep well? If you couldn't immediately say yes, or even if you would categorically say no, don't worry; you are far from alone. Actually perhaps no one does. In a more and more accelerating world, we are getting more and more likely to cut down on our sleep so as to spare as much time as possible for what we have to do, which we believe is more important. However, sleep accounts for no less than one quarter to one third of our whole life time, so it greatly concerns our health. Can you guess what comes at the top of Google auto-complete suggestions when you start typing "Why a…"? You'll never guess; the answer is "Why am I so tired?" Yes, indeed everyone is tired, but what if you hear that basic science could be of help?

As you may think naturally, carrying out a study of sleep is challenging. We need to deal with human brains, and besides, everything happens under unconsciousness. For the most fundamental understanding of sleep, which can be accomplished by studying it in terms of molecular science, we must be equipped with highly developed science and technology. For these reasons, sleep had not been a subject of basic science for a long time until recently. What brought a completely new perspective was a series of studies carried out in this quarter century.

In 1998, a researcher group found a new neurotransmitter and named it "orexin."[1] A neurotransmitter is a molecule secreted by neurons, nerve cells of which our brains consist, playing a role in transmitting signals, in other words, information. They found that the cells producing orexin exist only in a brain part which is involved in appetite and body weight regulation, and that actually administration of orexin promotes subjects' feeding behaviors. According to this nature, orexin was named after an ancient Greek word meaning "appetite."

However, even when the orexin gene was deleted in mice, no loss of appetite or

weight loss was observed. After a prolonged struggle, they tried observing the mice's behavior at night, simply because they are nocturnal. As a result, they noticed that some active mice suddenly stopped moving, which closely resembled the symptom of a human sleep disorder called narcolepsy, where patients are suddenly attacked by drowsiness in daytime even if they sleep well at night[2]. A few years later, another study confirmed that human narcolepsy is also caused by a deficiency of orexin. They finally discovered that orexin regulates sleep and wakefulness.

Until this series of discoveries, the specific molecular mechanism of sleep had been a mystery for a long time. They shed light on the studies of sleep from a brand-new perspective, i.e., basic science. To a fundamental question "Why do we sleep?", for which there had been some hypotheses, the studies provided one powerful clue that orexin might be the "identity" of sleep. The discovery of orexin paved the way for a quest still ongoing today.

Achievements in basic research offer a fundamental understanding of that research field, so they also have possibilities of various practical applications. In this case of orexin, the results may lead to improvement of our sleep and development of a treatment for sleep disorders, such as insomnia. For example, drugs inhibiting the binding of wake-promoting orexin to its receptors can exert a therapeutic effect in insomnia.

Although this discovery is considered important in the medical and neuroscience researchers' community, thanks to the consequences above, it does not seem that researchers in other fields fully appreciate it. If researchers in fields such as pharmacology, psychology, or even sociology create close linkages with basic science, they can have more possibilities of further applications in their own fields.

Not only researchers, but this discovery affects EVERYONE. The reason is just simple; no one does not sleep. Plus, no matter whether you are aware or not, there may be certain room to improve your sleep. A survey shows that as much as two thirds of Japanese people feel they do not sleep well on weekdays. Another shows that Tokyo has the shortest

sleep hours in the world, around only six hours a day. This tendency is worldwide, and it is accelerating day by day. Chronically short, irregular or poor-quality sleep leads you to depression, obesity, and any kind of malfunction of your mind and body such as memory, circadian rhythm or metabolism.

Now researchers have a fundamental understanding of the mechanisms of sleep and even some applications. If we all get more interested in and pay more attention to this basic research of sleep, studies will be further promoted and developed, and will certainly bring to us a new comprehension of sleep and ways of improving ours. Once such reactions are realized between researchers and us, there must be waiting a brighter future, where people are even happier and more energetic. Even though research of basic science may seem totally irrelevant to our real life, it is not. Quite the contrary, as we have seen, it tightly connects with us. Basic science can potentially transform our lives, and the world.

References

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