

為了安全飛行， 應有高品質的休息和睡眠

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何謂時差？

很多人到國外旅行，在到達目的地之後會抱怨時差問題，包括失眠、頭痛、食慾不振和疲勞。時差亦稱為時差症候群和非同時性症候群。其症狀包括在飛越至少四或五小時的時間差而抵達目的地之後的嚴重疲勞。時差對前往海外旅行的觀光客會產生不利的影響，尤其對在海外旅行的運動員和前往海外出差的人員更是如此。時差對航空公司的飛行組員和乘客也是一項嚴重的問題，例如，針對時差所作的一項調查顯示，約有90%的駕駛員曾體驗過時差的某種症狀。

時差會引起各種症狀，包括疲勞、想睡、睡眠障礙、食慾不振、反胃、頭暈、頭痛、眼睛疲勞和注意力降低。在這些症狀當中，有很多人似乎遭遇想睡和睡眠障礙，換句話說，他們雖然很疲倦，但卻不能入睡。

在由北往南的空中旅行，例如由日本成田飛往澳洲雪梨，只有一小時的時差，因此幾乎不會造成時差問題。然而，在向東和向西的飛行中，時差的症狀就會出現。當向東飛行時，時差症狀會比較顯著，例如從成田飛往檀香山或洛杉磯。此外，當從東京飛到倫敦而須經歷九小時的時間差異（所需對時區調適的時間亦為九小時），或從東京飛到紐約須經歷14小時的時間差異（所需對時區調適的時間為 $24 - 14 = 9$ 小時），則相對於東京的時間而言，日夜正好顛倒，因此會加劇時差的症狀。總之，當需要許多小時來調整時區或於東行而非西行時，則時差的症狀就會變得明顯。

時差是如何發生的？我們的生物和生理過程依循一個大約24小時的周期，稱之為晝夜節律，該節律的失常和時差有關。通常，我們在白天活動並於夜間休息，因此經由我們的內在生理時鐘重複一個24小時的覺醒/睡眠周期。此一每日節律是在身體內部所形成，並由於地球的轉動或燈光、溫度和其他環境變化而受到白天和晚上的影響。

在由一位名叫Aschoff的德國研究員所進行的一項20年研究中，參與研究的人員在一間維持於特定溫度的地下室內停留十天，完全和外界的聲音與自然光線隔絕，而且沒有時鐘。參與者的生理節律，如睡眠/覺醒周期和體溫



都被紀錄下來。結果顯示參與者（總數200多人）的生理節律大於24小時，平均為25小時。

曾有類似報告顯示，雖然我們依循24小時的節律，但在日常生活中，我們實際上卻擁有24小時的環境節律和25小時的生理節律。這表示25小時的生理節律通常和24小時的環境節律協調並相互配合。和協調有關的器官為松果腺、視網膜和大腦中的視丘上核，這三個器官被認為是隨著光線、褪黑激素等而調節我們的內在時鐘。然而，日常作息時間表，貓頭鷹型（即夜貓子）的生活方式等重大改變會使生理節律無法和日常作息時間表的差距同步，最終造成身心兩方面的傷害。

當空中旅行穿越許多時區時，生理節律仍然維持和它在本國的時候一樣，使其難以立即調整至新環境的節律。這會使生理機能造成暫時混淆，直到生理節律和在目的地的日常作息時間表同步為止。由內在時鐘所調節的體溫和睡眠/覺醒節律也被打亂了，這就是我們所感受到的時差。

時差只是暫時性，因此身體開始調整到在目的地的新環境節律。據說，向東飛行之後，也許需要兩天以上才能調適。我們如何才能應付時差？從時差中恢復的主要關鍵乃是儘快將生理節律（內在時鐘）調整到當地時間。因此，在飛行之前要有充足的睡眠，在抵達目的地之後小睡20-30分鐘，暴露在陽光下將有助於加速調適。然而，據說如果在目的地僅作短暫停留，則於回家之後可藉由依照日本時間（讓你的手錶停留在日本時間）進行例行活動，就能相當迅速重新獲得原來的節律。

何謂睡眠？

睡眠被定義為對外界刺激的一種無意識和無反應的定期性重複狀態。這種狀態有別於由外部來源，如疾病或由人所引發的受損知覺，如麻醉，因此人可任何時間被喚醒。睡眠和覺醒乃是包括人在內的較高等動物的基本狀態。這表示，只要我們活著，我們始終處於睡眠或覺醒的狀態。

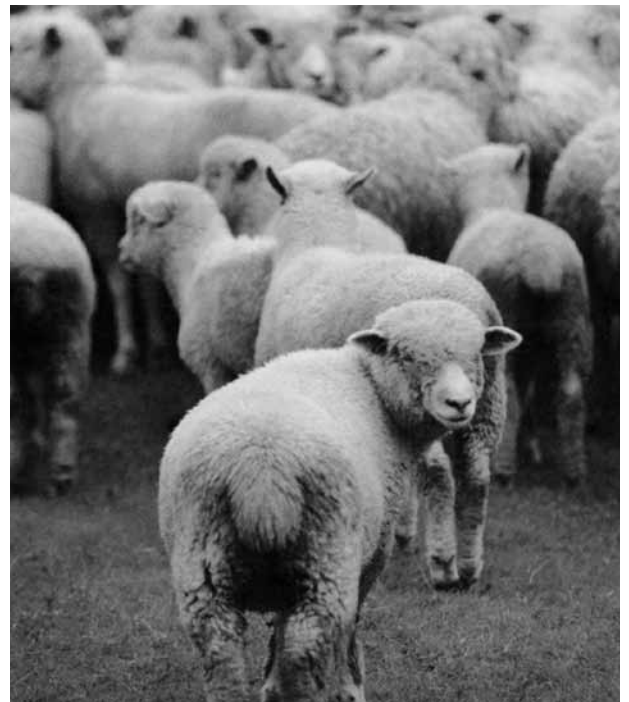
藉由分析腦波而對睡眠的階段作過廣泛研究。有兩個睡眠階段的品質不相同：NREM（非快速眼動期）和REM（快速眼動期）。在REM睡眠期間，縱然一個人已在熟睡之中，但其腦波卻類似在覺醒期間所紀錄到的腦波，而且眼球會快速移動。REM代表rapid eye movement（快速眼動），其特徵為自律神經系統不穩定和頻繁作夢。

雖然睡眠的本質尚未完全確定，但已有各種睡眠理論。例如，有一理論表示睡眠是一種天性，而另一理論則說睡眠是一種內部抑制以對付腦部的不良血液循環，腦部活動所引起疲勞物質的累積，和條件反射。還有另一種理論表示有一個睡眠中心，而另一種說法則稱睡眠係受到腦部網狀刺激系統的控制。在這些理論當中，通常被接受的是有一個睡眠中心和網狀結構。

網狀結構是一個網狀區域，從脊椎神經的上部延伸到延腦和小腦的下部。當網狀結構積極產生作用時，人就會醒來並且變成有完全意識；當它的作用降低時，人就會變成昏昏欲睡。

睡眠是一項非常重要的生理機能，以便舒緩白天的疲勞並補充身體所需的次日能量。心理或生理疾病可能會引起睡眠障礙，而且它也可能會反映出隨著生活環境的改變而出現精神上或身體機能的暫時改變。睡眠障礙包括失眠（過量降低的睡眠）、過量增加的睡眠、以及睡眠/覺醒節律的失調。

失眠是一種狀況，也就是當一個人縱使已經非常疲倦，但卻難以入睡而造成痛苦。失眠的症狀包括入睡有困難和醒來後又不能再入睡，或提前醒來並在此後一或二小時感到頭昏眼花。每晚的睡眠期間異常短的任何情況都被視為失眠症。健康人的平均睡眠時間會隨年齡而改變，而且在個人之間也會有極大變化。多數成年人似乎經常在晚上十點或十一點就寢並在早上六點或七點醒來，因此每晚平均睡七到八小時。有些人宣稱每晚須要九或十小時的睡眠第二天才有工作效率，而其他人則睡五或六小時就已足夠。此外，有些人，雖然為數不多，每晚只睡三至四小時就能保持最佳工作狀態。個人的此種差異究竟是基因或環境所造成的尚不清楚。在人生的不同階段中，嬰兒通常睡13到14小時，而多數青少年和成年人則睡七至八小時。這顯示人的年紀越大，往往睡眠越少，而老年人的睡眠甚至



更少。

患有失眠症的多數人表示，儘管他們實際睡覺的時數並不短，但卻覺得欠缺熟睡，而且不斷作夢。然而，儘管他們宣稱整夜都不能睡好，但他們實際上可能有大約四到五小時的睡眠。最好是儘可能避免使用安眠藥，學習睡眠，並了解它並不是一種疾病。

另一方面，那些顯然睡眠較少的人會擔心睡眠不足並抱怨身心方面的傷害，諸如記憶力喪失、注意力降低、覺得頭昏眼花、感覺不舒服等，他們可能需要接受醫療。失眠症只是一種症狀，因此它本身並不是一種疾病；亦即，有一種潛在的疾病。雖然失眠症的最常見原因為精神官能症，但重要的是，縱使已認出失眠的症狀，但仍應接受醫生的診斷和治療。安眠藥已大幅改進而且副作用更少，但如任意使用則可能會造成肝臟、血液和神經的傷害。

最後，下列秘訣可用來應付日常生活中的失眠症：

- (1) 遵循規律的生活常規，
- (2) 維持一貫的睡眠/覺醒作息時間，
- (3) 避免在就寢之前大吃大喝，
- (4) 在白天作輕度運動，
- (5) 注意白天的午睡，因為它會造成夜間的失眠，尤其是老年人，等等。

在睡前洗一個熱水澡、作輕度運動等也能有助於入睡。厚重的毯子和緊身睡衣則會阻礙夜間的良好睡眠。此外，也要考慮枕頭的高度。✍

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HIGH QUALITY REST AND SLEEP FOR SAFE FLIGHTS

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What Is Jet Lag?

Many people who travel overseas complain about jet lag, which covers such symptoms as insomnia, headache, loss of appetite and weariness after arriving at their destination. Jet lag is also called jet lag syndrome and desynchronization syndrome. The symptoms include severe fatigue after flying to a destination across a time difference of at least 4 or 5 hours. Jet lag has a detrimental effect on tourists traveling abroad and especially on athletes who tour overseas and people on overseas business trips. It is also a serious problem for airline flight crews as well as passengers. For example, one survey on jet lag reported that approximately 90% of pilots have experienced some kind of symptoms of jet lag.

Jet lag produces various symptoms including fatigue, drowsiness, sleep disruption, loss of appetite, nausea, dizziness, headache, eyestrain, and decreased concentration. Among these symptoms, many people seem to suffer from drowsiness and sleep disruption, in other words, the inability to sleep despite being very tired.

Air travel in a north-south direction, for example, a flight from Narita to Sydney in Australia, involves a time difference of one hour and therefore rarely causes jet

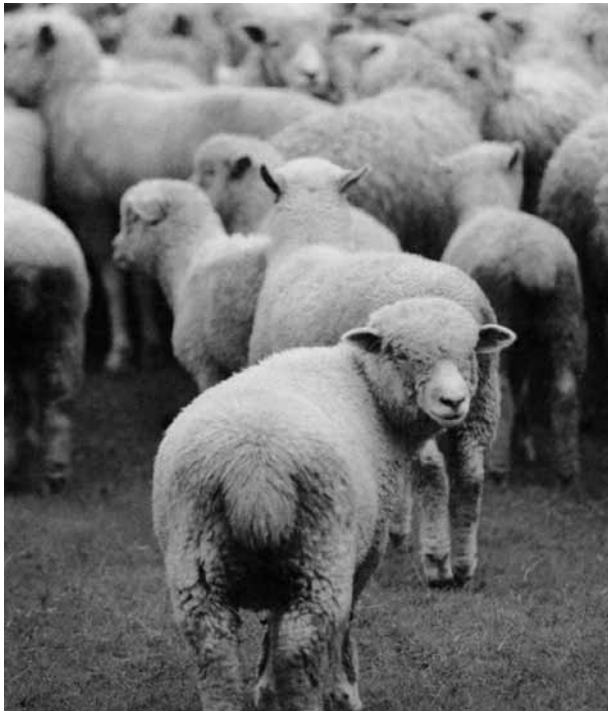
lag. In eastbound and westbound flights, however, symptoms of jet lag appear. The symptoms are stronger when flying east, for instance from Narita to Honolulu or Los Angeles. Also, when experiencing a nine-hour time difference, such as when flying from Tokyo to London (time needed to adjust to the time zone is also nine hours) or a fourteen-hour time difference such as when flying from Tokyo to New York (time needed to adjust to the time zone is $24-14=10$ hours), day and night are reversed relative to the time in Tokyo. This intensifies the symptoms of jet lag. In short, the symptoms of jet lag become significant when many hours are required to adjust to the time zone or when flying east rather than west.

How does jet lag occur? Our biological and physiological processes follow a roughly 24-hour cycle, referred to as circadian rhythms. Disruption of the rhythms is related to jet lag. Normally, we are active during the day and we rest during the night, thus repeating a wake/sleep cycle of 24 hours through our internal body clock. This daily rhythm is formed internally and influenced by the distinction between day and night due to the rotation of the earth or environmental variations in light, temperature and other inputs.

In a 20-year study by a German researcher named Aschoff, the participants spent ten days in a basement that was maintained at a specific temperature, was completely isolated from outside sounds and natural light, and had no clock. The participants' biological rhythms such as sleep/wake cycles and body temperature cycles were recorded. The results revealed that the biological rhythms of the participants (more than 200 in total) were longer than 24 hours, averaging 25 hours.

There have been similar reports showing that even





though we follow a 24-hour rhythm, we actually have both an environmental rhythm of 24 hours and a biological rhythm of 25 hours in daily life. This means that the 25-hour biological rhythm normally harmonizes and interacts with a daily cycle of 24 hours. Organs related to the harmonization are the pineal gland, retina and suprachiasmatic nucleus in the brain, and these three organs are considered to regulate our body clock with light, melatonin, etc. involved. However, significant changes in the daily schedule, night-owl lifestyle, etc. make it impossible for the biological rhythm to synchronize the gap in daily schedule, ultimately resulting in impairment of the body and mind.

When traveling by air across many time zones, the biological rhythm remains the same as it was in Japan, making it difficult to immediately adjust to the new environmental rhythm. This temporarily confuses the biological functions until the biological rhythm is synchronized to the daily schedule at the destination. Body temperature and sleep/wake rhythm regulated by the internal body clock are also disturbed, which is what we feel as jet lag.

Jet lag is only temporary, and thus the body begins to adjust to the new environmental rhythm at the destination. It is said that it may take more than a couple

of days to adjust after flying east. How can we cope with jet lag? The major key to recovery from jet lag is to adjust the biological rhythm (body clock) to the local time as soon as possible. Therefore, plenty of sleep of sleep before the flight, a short nap of 20-30 minutes after arrival, exposure to sunlight, etc. will help to accelerate the adjustment. However, it is said that if it is a short stay at the destination, the original rhythm can be regained relatively quickly after returning home by performing routine activities according to Japan time (with your watch kept on Japan time).

What Is Sleep?

Sleep is defined as a periodically repeated state of unconsciousness and nonresponsiveness to external stimuli. This state is distinguished from impaired consciousness caused by an external source such as disease or man-induced impaired consciousness such as anesthesia, in that a person can be aroused any time. Sleep and wake are the basic states of higher-order animals including humans. This means that we are always in either the sleep or awake state as long as we are alive.

The stages of sleep have been extensively studied by analyzing brainwaves. There are two stages of sleep that are different in quality: NREM and REM. During REM sleep, even though a person is deeply asleep, the brainwaves are similar to those recorded during waking and the eyeballs move rapidly. REM, which stands for rapid eye movement, is characterized by unstable autonomic nervous system and frequent dreaming.

Although the nature of sleep has not been completely determined, there are various theories about sleep. For instance, one theory states that sleep is an instinct, and another states that sleep is internal inhibition against poor blood circulation in the brain, accumulation of fatigue substances brought about by brain activity, and conditioned reflex. Yet another states that there exists a sleep center, and another states that sleep is subject to the reticular activation system in the brainstem. Among these theories, the existence of a sleep center and the reticular formation are generally accepted. The reticular

formation is a reticulated region spreading from the upper portion of the spinal cord to the medulla oblongata and the lower portion of the cerebrum. When the reticular formation functions actively, a person awakens and becomes fully conscious; when it functions less, the person becomes sleepy.

Sleep is an extremely important physiological function for easing daytime fatigue and supplying the body with energy for the following day. A sleep disorder may occur as a result of mental or physical illness, and it also may reflect a temporary change in mind or body function accompanied by a change in life environment. Sleep disorders include insomnia (excessively decreased sleep), excessively increased sleep, and sleep/wake rhythm disorder.

Insomnia is a condition in which a person has difficulty sleeping despite being very tired, causing distress. Symptoms of insomnia include trouble falling asleep, waking up and not being able to go back to sleep, or waking up early and feeling groggy for 1 or 2 hours afterwards. Any condition in which the total sleep duration per night is abnormally short is regarded as insomnia. The average sleep time of healthy persons varies with age and also varies widely among individuals. Most adults seem to usually go to sleep at about 10 or 11 pm and wake up at about 6 or 7 am, and therefore sleep 7 to 8 hours per night on average. Some people claim to need 9 or 10 hours of sleep per night to perform effectively the following day while others do well with 5 or 6 hours. And some, although not many, are capable of working optimally with only 3 to 4 hours of sleep per night. It is not known whether such variation in individuals is due to genetic or environmental factors. In



the different stages of life, infants generally sleep 13 to 14 hours while most adolescents and adults sleep 7 to 8 hours. This shows that people tend to sleep less as they get older, and the elderly tend to sleep even less.

The majority of people suffering from insomnia report the feeling of a lack of deep sleep despite the fact that the actual hours of sleep are not short, as well as constant dreaming or the like. However, they probably had approximately 4 to 5 hours of sleep in reality despite of their claiming that they were not able to sleep well through the night. It is best to avoid using sleeping pills as much as possible, to learn about sleep, and to understand that it is not a sickness.

On the other hand, those who clearly sleep less, are worried about not getting enough sleep and complain about impairment of body or mind such as memory loss, decreased concentration, feeling of grogginess, feeling of malaise, etc., may need medical treatment. Insomnia is only a symptom and is not a causative illness itself. That is, there is an underlying illness. Although the most common cause of insomnia is neurosis, it is important to avoid self-treatment, even when symptoms of insomnia are recognized, and to receive diagnosis and treatment from a doctor. Sleeping pills have been greatly improved and have fewer side effects, but may cause damage to the liver, blood and nerves if used haphazardly.

Finally, listed below are tips for coping with insomnia in daily life:

- (1) Follow a regular routine.
- (2) Maintain a consistent sleep/wake schedule.
- (3) Avoid excessive eating/drinking before going to bed.
- (4) Exercise lightly during the day.
- (5) Be careful with daytime napping since it causes sleeplessness during the night, especially in the elderly, and so on.

Taking a warm bath, doing light exercise before going to bed, etc., can also help you to fall asleep. A heavy blanket and tight pajamas can prevent a good night's sleep. Also consider the height of your pillows. 🛏

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