



Important Things to Know About the Body Clock

- Your body has an internal clock that makes you feel sleepy at night and awake during the day.
- Even though there are 24 hours in a day, this clock is actually on a slightly longer cycle (24.1 hours).
- Being exposed to sunlight adjusts the clock so that it stays aligned with day and night.
- This clock is controlled by a part of the brain known as the suprachiasmatic nucleus (SCN).
- When this clock tells your body to sleep, a hormone known as melatonin is involved.

What makes you tick?

It might surprise you to know that your brain has a kind of clock in it. This keeps things ticking over every day. As humans, we prefer to sleep at night and be up during the day. This isn't due to habit or work schedules or convenience. It is driven by the body clock. Even if we don't know what time it is, we still do things in cycles that go for about 24 hours. We sleep for part of every 24 hours and our body temperature rises and falls with a cycle length of about 24 hours. We have hormones and other systems in our body that go through this daily cycle as well. Exactly the same pattern is seen in almost every living thing on the planet. They all have some kind of clock that controls when they do things. The daily rhythms are known as circadian rhythms. Our health and wellbeing depends on this ticking all the time. This also needs to tick at the same time as everything around us. This is called being 'synchronised'.

Where is the clock?

Scientists have known for a long time that daily rhythms are driven by some kind of clock in our bodies. But they didn't work out exactly where it was until the middle of the 20th

century. They found this out when they did surgery on hamsters. They took out a tiny part of the brain of hamsters called the suprachiasmatic nucleus (SCN). After this, the hamsters totally lost their rhythm – and not just on the hamster wheel. It used to be easy to predict when the hamsters would run on a wheel. But after they lost the SCN, they ran at any and all times of the day and night. That was the first big step in understanding.

How does it work?

How the rhythms are produced is complex. But we can sum things up as follows: special clock genes in the SCN switch on which cause proteins to be made. As these proteins accumulate, along with other chemicals, they switch off the clock genes. The level of proteins then drop to point where the genes are able to switch on again and the cycle restarts. This cycle of switching off and on happens about once every 24 hours. The SCN sends out signals to the rest of the body that vary according to this cycle. The cycle is not just determined by the SCN itself: it responds and adapts to signals from outside the body (principally light and dark) to keep the organism synchronised with the world around it – that is, ticking at the right time.

Is light important to how the body clock works?

The most important external signal for the biological clock is light. When the eye senses light, it sends signals to the SCN. This resets the clock every day. Our body does this to make sure rhythms don't drift out of line with the environment. Although our rhythms cycle about once every 24 hours, without light and dark (for instance with total blindness) humans actually tick a little more slowly – about 24.1 hours. Thus, if we didn't have daylight we would get out of synchrony with night and day.

People with **Delayed Sleep Phase Syndrome** have trouble adjusting and go to bed and wake up late, which can be inconvenient when trying to schedule activities such as work and school. **Shift workers** often have trouble totally adjusting to being up at night and sleeping in the day. The external light/dark cycle tends to keep them on a day shift pattern. The influence of light also explains why we can adjust to a new time zone if we fly abroad. The light in the new time zone sends a signal to our clock which causes it to get synchronised with the new time zone. This usually takes several days. Of course, while we adjust we suffer from symptoms of **Jet Lag** (see our Tip Sheets), which aren't much fun.

Why is the clock important for sleep?

The cycle of sleep and wake is one of the most obvious circadian rhythms in humans. Sleepiness is highest at night and lowest in the day. At night, we get the best quality sleep, and the longest blocks of sleep without waking up. Sleep during the day is more broken up. It tends to be lighter as well. This means we sleep less. **Melatonin** and body temperature are also driven by the body clock. These are also well known circadian rhythms. At night, core body temperature is low and levels of melatonin are high. Getting these rhythms aligned with each other as well as the external environment gives us the best chance for good quality sleep.

Where can I get further information?

http://psychology4a.com/biological_rhythms.htm

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Sleep Health Foundation ABN 91 138 737 854

114/30 Campbell Street, Blacktown NSW 2148

T: +61 (0) 2 8814 8655 F: +61 (0) 2 9672 3884