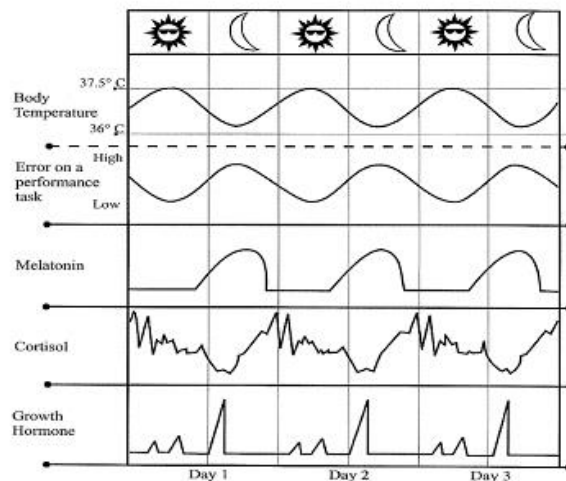


Body Rhythms

The human body functions in a rhythmic manner, according to our needs and changes to our surroundings. These fluctuations occur as periodic changes in the level of a bodily chemical or function, in what is known as *biological rhythms*. These changes influence several daily functions including when medication should be administered, and when we function most and least effectively, whether at work or school. As evident from the image below, not all biological rhythms display the same patterns of release.

Biological rhythms can occur endogenously where they occur within the body (ex. body temperature cycle) or exogenously where there is an internal change due to external stimuli (ex. sleep/wakefulness due to light and dark). Rhythms that occur within a period of approximately 24 hours are known specifically as *circadian rhythms* and are present in humans, animals and plants.

Circadian rhythms are controlled by a circadian clock, a tiny cluster of cells in the hypothalamus called the suprachiasmatic nucleus (SCN). This cluster of cells receives information from the eyes. By synchronizing with external cycles of light and darkness, the SCN regulates fluctuations in hormone and neurotransmitter levels, which then feed back to the SCN to change its secretion. As evident from the image on the right, not all circadian rhythms display similar patterns of release.



- 1) Provide an example for the biological rhythm that occurs: a) once a month b) seasonally c) less than 24 hours?
- 2) Explain how melatonin is regulated by the SCN and how it feedbacks to the SCN based on the light and dark cycle.
- 3) How does disruption of the circadian rhythm affect us physiologically?

Answers:

1. a) Once a month – female menstrual cycle; b) seasonally – deer and moose mating; c) less than 24 hours– body temperature, hormone secretions
2. During the dark hours, the SCN signals the pineal gland to release melatonin. In turn, melatonin will feedback to the SCN to ensure the biological clock is in phase with the light-dark cycle.
3. Disorders may develop when natural biological rhythms are disrupted. These disorders include: sleep disorders (insomnia, narcolepsy), jet lag, mood disorders and shift-work disorders.

