A mammalian clock protein responds directly to light

July 1 2008

We all know that light effects the growth and development of plants, but what effect does light have on humans and animals? A new paper by Nathalie Hoang et al., published in *PLoS Biology* this week, explores this question by examining cryptochromes in flies, mice, and humans. In plants, cryptochromes are photoreceptor proteins which absorb and process blue light for functions such as growth, seedling development, and leaf and stem expansion.

Cryptochromes are present in humans and animals as well and have been proven to regulate the mechanisms of the circadian clock. But how they work in humans and animals is still somewhat of a mystery.

When plants are exposed to blue light, they experience a reduction in flavin pigments. This reduction activates the cryptochromes and thus allows for growth and seedling development. Hoang et al. sought to study the effect of blue light on fly, animal, and human cryptochromes by exposing them to blue light and measuring the change in the number of oxidized flavins. After a prolonged exposure to blue light, the authors found that the number of flavins did in fact decrease, as they do in plants.

While this research reveals a similarity in the responses of flies, mice, humans, and plants to blue light, the decrease in flavins affects circadian rhythms differently. The mouse cryptochromes, Mcry1 and Mcry2, interact with key parts of the circadian clock: mice with these cryptochromes missing exhibited a complete loss in circadian rhythm

behaviors such as wheel-running. However, this change in behavior was independent of light exposure.

Although this paper by Hoang, et al, shows that cryptochromes in animals and humans do respond to light in a similar fashion to those in plants, the question as to how exactly light effects them is still open for further research. Although cryptochromes are mainly found in the retina of the eye, they are also present in many different tissues of the body that are close to the surface. This suggests that cryptochromes may have non-visual functions, and may also affect protein levels and behavior.

Citation: Hoang N, Schleicher E, Kacprzak S, Bouly JP, Picot M, et al. (2008) Human and Drosophila cryptochromes are light activated by flavin photoreduction in living cells. PLoS Biol 6(7): e160. doi:10.1371/journal.pbio.0060160 (biology.plosjournals.org/perls … journal.pbio.0060160)

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