Abstract

Circadian rhythm orchestrates a wide array of biological processes to period in a 24-hour rhythm, prioritizing the body functions according to the time of the day. These predictions maximize survival resulting in increased fitness of such organisms. Circadian rhythm influences several physiological processes such as the sleep-wake cycle, metabolism, immunological responses, hormonal release, body cell regeneration, ultimately regulating most of the physical, mental and behavioral changes in the body. Dysregulation of this process creates havoc and is linked to several disorders such as sleep disorders, depression, bipolar disorders, seasonal defective disorders, obesity, and diabetes. Thus, it is pertinent to understand the effects of body clocks on the regulation of various processes in the body. This study focuses on deciphering the molecular pathway that correlates circadian rhythm with hematopoiesis using *Drosophila melanogaster* as a model system. The primary organ of interest was chosen to be lymph gland, the larval hematopoietic organ in *Drosophila*. Light is a potent zeitgeber and is used as a tool to be the creator of imbalance to a perfectly regulated circadian rhythmicity. Such a turmoil in circadian rhythm in *Drosophila* larvae resulted in an elevation in the number of differentiated cells in lymph glands, even when the size of lymph glands remained the same. This elevation of the differential index is caused by the distressed levels of ecdysone signaling in the lymph gland. We have been able to chart out a link that connects the sink in ecdysone levels in animals entrained towards altered light regiment resulting in an increase in the differentiated index of lymph gland. The light is perceived and integrated into the homeostasis of *Drosophila* larvae via neurohormone Pigment-dispersing factor (PDF), is shown to be photoperiodic. PDF is upstream is of Prothoracicotropic hormone (PTTH), which then modulates ecdysone synthesis. Current study puts forth a linear molecular pathway linking circadian rhythm to hematopoiesis in *Drosophila melanogaster*.