

Animal Housing Circadian Effect On Data



Expertise in Light Exposure and Study Design

The circadian clock is responsible for regulating a variety of essential biological processes. Light exposure at night disrupts the production of melatonin, a key hormone in the circadian cycle. Light exposure at night and aberrant melatonin signaling have begun to be appreciated for their profound effects on human health in the last decade. However, the circadian clock is highly evolutionarily conserved, meaning that its function is important in many of the model systems that are used to further our understanding of human health and disease.

Robert Dauchy is an expert in the design of animal studies and facilities that take into account the circadian system and light exposure. His work with the Tulane Center for Circadian Biology, in particular the Blask and Hill Labs, is nationally and internationally recognized as being on the bleeding edge of this field, and has profound implications for the rigor and reproducibility of animal studies.

Dim Light Affects Outcomes and Behaviors

Regular circadian rhythms are important for synchronizing many different biological processes, notably DNA synthesis and repair and several metabolic pathways. Light exposure at inappropriate times or insufficient darkness can effectively shut down these downstream pathways. This can have a pronounced impact on a wide array of animal studies, in particular those involving cancer or any drug testing due to the pathways effected.

Most animal facilities are not designed to address these issues, and lab personnel are not always cognizant of the times and lighting conditions that may influence their results. Given the importance of rigor and reproducibility in preclinical model systems, addressing these issues is paramount. Our resident expertise at Tulane is more than prepared to help any concerned entity address these issues in their own study design and implementation, in addition to being available to help train relevant personnel.

Light Wavelength Impacts Biological Rhythms

Data out of Tulane and other circadian-focused research groups has long established the ability of even dim light exposure at night to disrupt circadian-regulated processes. Data out of the Circadian Biology Group at Tulane has now shown that not only is complete darkness at night important for the circadian rhythm, but that the wavelength of light during the day is also important.

Compared to animals exposed to the more broad-spectrum yellow-enriched light of traditional fluorescent bulbs, animals exposed to blue-enriched LED light during the day (bLAD, more like natural sunlight) had close to an order of magnitude more circulating melatonin at night. These data could be used to inform the design of animal housing units, which almost universally use more yellow lights. More bLAD that closely mimics sunlight in animal housing facilities will improve the accuracy, reproducibility, and rigor of studies conducted there.

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