Title: The 9 to 5 Rodent − Time for Change? Scientific and welfare implications of circadian and light effects on laboratory mice and rats

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The 9 to 5 Rodent - Time for Change? Scientific and welfare implications of circadian and light effects on laboratory mice and rats.

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Highlights

- Time of day and lighting can affect data obtained from rodents in neuroscience studies.
- Studying animals during their inactive period may be detrimental to their welfare.
- Where possible nocturnal animals should be tested during their active phase (night time).
- Studying behaviour in the active phase requires solutions such as automated testing.
- The time of day and lighting conditions should be reported for all studies.

Abstract

Rodents, particularly rats and mice, are the most commonly used laboratory animals and are extensively used in neuroscience research, including as translational models for human disorders. It is common practice to carry out scientific procedures on rats and mice during the daytime, which is the inactive period for these nocturnal species. However, there is increasing evidence for circadian and light-induced effects on rodent physiology and behaviour which may affect the validity of results obtained from mice and rats in neuroscience studies. For example, testing animals during their inactive periods may produce abnormal results due to cognitive deficits, lack of motivation to perform the task or stress from being disturbed during the resting period. In addition, conducting procedures during an animal's resting period may also pose an animal welfare issue, as procedures may be experienced as more stressful than if these were done during the active phase.

In this paper we set out the need to consider the impact of time of day and lighting conditions, when scientific procedures or routine husbandry are performed, on both the welfare of mice and rats used in neuroscience research and on data quality. Wherever possible, husbandry and experimental procedures should be conducted at times of day when the animals would be active, and under naturalistic lighting conditions, to minimise stress and maximise data quality and translatability.

Keywords: Rat, Mouse, Rodent, Animal Welfare, Circadian Rhythm, Day, Sleep, Light, Refinement; Validity