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High throughput automated data collection of rodents behavior via digital cages

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Automatic analysis of rodent behavior has been receiving growing attention in recent years, since rodents have been the reference species for many neuroscientific studies. In parallel, a number of technologies have been developed in a bid to automate the data interpretation. Thanks to the Digital Ventilated Cage (DVC by Tecniplast), a system relying on the detection of animal activity via the generation of tiny electromagnetic fields, we have recently obtained an unbiased understanding of in-cage spontaneous mouse behavior and longitudinally tracked locomotor activity in the two sexes of three non-genetically altered mouse strains during a 24-h period for two months. The recorded locomotor activity of the three mice strains was analysed by relying on different and commonly used circadian metrics (i.e., day and night activity, diurnal activity, responses to lights-on and lights-off phases, acrophase and activity onset and regularity disruption index) to capture key behavioral responses. We compared the 24-h spontaneous locomotor activity of the mice and extrapolated key aspects of the day and night activity patterns for each strain. All analysed metrics clearly show significant differences in the circadian activity of the three selected strains, identifying key differences characterizing strain-specific spontaneous locomotor patterns during the 24-h period. The behavioral differences were also analysed by an unsupervised machine learning approach. Each strain corresponded to a cluster, and notably the repeated and longitudinal measurements of all circadian metrics confirmed that data referring to cages housing each strain were included in a specific cluster. A further analysis is in progress to identify the spatial pattern of in-cage recorded spontaneous locomotor activity of the same mice strains.

Fuochi et al. 2021. Phenotyping spontaneous locomotor activity in inbred and outbred mouse strains by using Digital Ventilated Cages. Lab Anim (NY) 50(8):215-223. doi: 10.1038/s41684-021-00793-0.

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