

## The iMouse System – A visual method for standardized digital data acquisition reduces severity levels in animal-based studies

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In translational research, using experimental animals remains standard for assessing the effectiveness of potential therapeutics. At the same time, minimizing the impact on the well-being of the animals regarding the 3R is mandatory. To fulfil this goal and therefore evaluate the severity level, animals must be inspected several times a day. It is noted that these visual assessments disrupt the animals during their resting periods, resulting in elevated stress levels and consequently affect the results of scientific studies. We examined the feasibility of implementing a digital monitoring system (iMouse) in a translational study conducted within home-cages. Our objective was to reduce or replace manual visual inspections during experiments and to examine whether digitally available data from this study can be used to train an algorithm capable of distinguishing between activities. We successfully demonstrated the feasibility of integrate the system into the existing IVCs and established remote access to the overserved home cages. Accordingly, digital surveillance of the experimental animal reduces their stress level. Furthermore, the digitally acquired data out of the home cages proved instrumental in training algorithms capable of analysing e.g. the long-term drinking behaviour of the animals. In summary, our work has yielded an integrated, retrofittable, and modular system that serves two critical criteria for the 3R. Firstly, it reduces the severity level of the animal by executing visual inspections. Secondly, it refines the traceability and transparency of animal-based research studies. The standardized iMouse system enables the analysis of data sets and the generation of new digital biomarkers.