Increasing reliability of results from preclinical trials and animal studies – Zooming in on variation in adaptive response patterns within and between three mouse inbred strains.

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Background: Inter-individual differences in behavioural and physiological response in mouse inbred strains are often written off as unfortunate noise. We suggest that part of this variation may provide useful information on variation in adaptive capacities in response to aversive stimuli. Capturing part of this variation may improve control for confounding variables and as such improve reliability of preclinical results. In order to study this we developed a statistical approach for the assessment of temporal responses on an individual level. The present study was designed to assess the level of inter-individual variability in adaptive capacities in three commonly used mouse inbred strains.

Methods: Male mice of three mouse inbred strains [BALB/cAnNCrl, 129S2/SvPasCrl and C57Bl/6NCrl, N = 50 per strain] were tested repeatedly over four 5-minute trials in an initially unknown environment [the modified Hole Board]. Adaptive capacities were assessed by behavioural responses and corticosterone levels.

Results: We will assess how inter-individual variation in temporal response over time is expressed within and between strains. In addition, we will analyse whether we can identify adaptive response-types: sub-groups of individuals that consistently group together across multiple behavioural dimensions.

Conclusion: These findings will then subsequently be applied in a follow-up study that is designed to test whether taking this variation into account in composition of experimental groups results in increased reliability of results.

Societal impact: Despite extensive genetic and environmental standardisation of laboratory rodent models used in preclinical research, individual differences between animals of the same inbred strain are still found. Lack of control for this variation may result in decreased reliability and repeatability of results, which in turn is often compensated by an increase in the number of animals used. Improved control over this variation thus may not only improve the quality of animal experiments, but it may ultimately lead to a decrease in the number of experimental animals needed for testing.