The effect of relative humidity on water intake of C57BL/6J mice housed under conditions of controlled relative humidity at cage level

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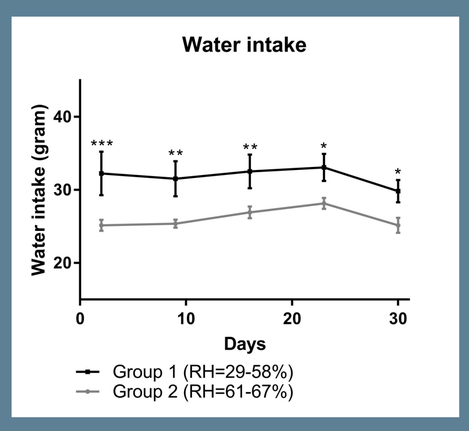
Conclusions:

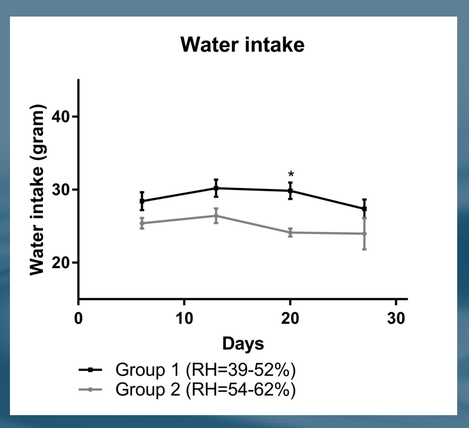
Our results suggest that RH can affect the water intake of C57BL/6J mice. When tightly controlling RH within the regulatory requirements the mice drink significantly less than when the animals are housed under room controlled RH. To ensure accurate data results and reproducibility of studies, it can be of great value to steadily control the RH.

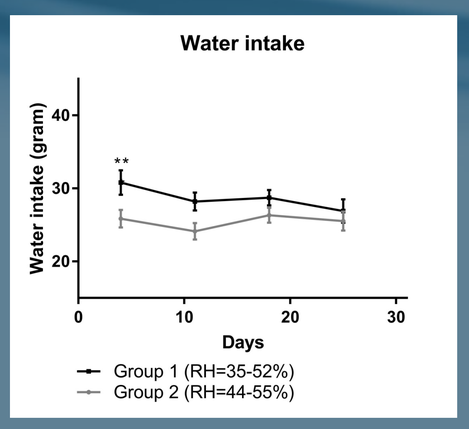
Aim of the study:

In the current study we aimed to investigate the effect of relative humidity on water intake of mice housed at relative humidity (RH) controlled steadily at cage level, compared to mice housed in cages with RH controlled less steadily at room level. Controlled RH at three different levels was compared with RH controlled at room level. The rationale for the study was to evaluate potential effects of RH on water intake, which can potentially affect reproducibility in experimental results.

Results:







Group 1

- C57BL/6J (♀+♂)
- n = 16
- Humidity controlled at room level

Group 2

- C57BL/6J (♀+♂)
- n = 19
- Humidity controlled by air handling unit at 45%, 55% and 65% respectively

Materials and Methods:

For group 1 a setup with an air handling unit not controlling RH was used, and the animals in this system were subject to RH controlled at room level. For group 2 an air handling unit capable of controlling RH (ScanClime®) was used to control RH at 45%, 55% and 65% for one month respectively (three months in total). Both groups were housed in the same room with 2-4 animals in each IVC cage. Water intake was measured on a weekly basis as an average pr. mouse pr. cage. The statistical analyses used were repeated measurements ANOVA (SAS Enterprise Guide 7.1). Welfare assessments were performed daily and a thorough check once weekly. The Home Office UK issued the license to carry out the study (No. X7069FDD2).

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Aim of study: Food and water intake of laboratory animals are parameters measured in various research fields such as diabetes, obesity and behaviour. The housing environment can affect these parameters and e.g. it has been shown that rats housed under low relative humidity (RH) had a higher food intake than rats housed at high RH[1]. Furthermore, housing conditions can affect the water balance of mice[2]. In the current study we aimed to investigate the effect of relative humidity on water intake of mice housed at RH controlled steadily at cage level when compared to mice housed in cages with RH controlled less steadily at room level. To evaluate the effect of RH on water intake of mice, controlled RH at three different levels was compared with RH controlled at room level. The rationale for the study was to evaluate potential effects of RH on water intake, which can potentially affect reproducibility in experimental results.

Material and Methods: To investigate the effect of controlled RH on murine water intake an air handling unit capable of controlling RH (ScanClime®) was used. This air handling unit accurately controlled RH in IVC systems from Tecniplast, at three different levels within regulatory requirements (45%, 55% and 65%). A setup using the same IVC cages connected to an air handling unit not controlling humidity was used for comparison. The latter system was subject to RH controlled less stable at room level. The study performed over three months. For the first month RH was set to 65%, the second 55% and the last 45%. Two groups with a mix of female and male C57BL/6J mice were compared (N=35). 2-4 animals were housed in each cage. Water intake was measured on a weekly basis as an average pr. mouse pr. cage. The statistical analyses used were repeated measurements ANOVA (SAS Enterprise Guide 7.1). Daily welfare assessments were performed together with a thorough check at the weekly cage changes. The study was carried out under license No. X7069FDD2 issued by the Home Office UK.

Results: The results of comparing a RH of 65% with room controlled RH of 30-70% showed that mice housed in the controlled environment drank significantly less during the one month test period. The same was shown for the months of testing RH at 55% and 45% compared to room controlled RH. Here one of the weekly water intake measures were significantly lower than the measures of mice housed under room controlled humidity, respectively.

Conclusion: Our results suggest that RH can affect the water intake of C57BL/6J mice. When tightly controlling RH within regulatory requirements the mice drink significantly less than when the animals are housed under room controlled RH. To ensure accurate data results and reproducibility of studies, it can be of great value to steadily control the RH.

References:

1. Clough G. Environmental effects on animals used in biomedical research. Biological reviews of the Cambridge Philosophical Society. 1982;57 (Pt 3):487-523.
2. Nicolaus ML, Bergdall VK, Davis IC, Hickman-Davis JM. Effect of Ventilated Caging on Water Intake and Loss in 4 Strains of Laboratory Mice. J Amer Assoc Lab Anim Sci. 2016;55(5):525-33.