# Fluid therapy in rodents

Fluid therapy could be indicated during surgery to prevent dehydration, and it could be indicated in the post-operative period to treat dehydration. When required, inject sterile, **body warm** fluids subcutaneously. The injected volumes must be planned on the basis of strain, weight, procedure length and the animal's hydration status

## *Preventive fluid therapy*

Fluids are administered to prevent dehydration due lacking intake and continuous metabolic and respiratory loss during anaesthesia, and potential blood loss during surgery. For shorter surgeries (less than 60 minutes) with no blood loss and with expectations of a quick recovery from anaesthesia, fluid therapy is generally not indicated. When preventive fluid therapy is indicated, isotonic crystalloid fluids should be administered at the beginning and end of surgery, when the animal is under anesthesia. If there are blood losses during surgery, the total volume of the planned injections should be increased correspondingly and could be injected during surgery (only relatively minor blood losses can be replaced with crystalloid fluids, as these fluids distribute in the entire body compartments). Crystalloid fluids can only be used to compensate loss of relatively limited blood volumes, as indiscriminate use in the face of marked blood loss will result in reduced oncotic plasma pressure and generalized edema.

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| Indicative doses: 10 ml/kg at the beginning of surgery and 10 ml/kg at the end of surgery*<br>Mouse 25g: Two doses à 0,25 ml<br>Rat 300g: Two doses à 3,0 ml<br><br>*For surgery lasting more than 3 hours an additional injection of 10ml/kg could be administered. |

## *Fluid therapy for the treatment of dehydration*

A sick or weakened animal will most likely have a reduced intake of fluid and food, and fluid therapy could be indicated both to restore dehydration and to administer maintenance fluid. Significant signs of dehydration: loss of skin turgor (lasting skin fold after lifting the skin), weight loss, reduced activity, sunken eyes and reduced or little feces and urine production. Dehydration is first visible when an animal is at least 5% dehydrated.

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| Fluid requirements for 5% dehydration: 0,05 x g BW = ml fluid<br>Mouse 25 g: 1,25 ml*<br>Rat 300 g: 15 ml* |

*The given volumes should be divided by two and injected at two time points, separated by at least 30 min. For animals that show clinical signs of dehydration there could be peripheral vasoconstriction and poor absorption. The level of absorption from time point one to time point two could give an indication of the animal's health status and information on how to proceed. Dehydrated animals require follow-up, and maintenance fluid (100-150ml/kg/24h) must be administered in addition for animals that do not drink.

## *Detailed advice on fluid requirements and fluid administration in rodents*

### *General fluid requirements in rodents*

Small rodents such as mice and rats have relatively high fluid requirements. Daily water consumption is estimated to be 150ml/kg/24h in mice and 100 ml/kg/24h in rats[1]. This estimates to about 4 ml in a 25g mouse and 30 ml in a 300g rat. Be aware that daily water intake varies dependent on e.g. strain[2], sex, weight, food intake and age. The estimation of the need for fluids is based on dehydration status and expected reduced intake.

### *Choice of fluid*

For fluid therapy, use 0,9% NaCl or Ringer-acetate. Ringer-acetate prevents and treats the metabolic and respiratory acidosis that evolves during anesthesia, and is the best choice for fluid therapy. For longer surgery, that last more than 3 hours, Ringer-acetate should be the primary choice.

### *Temperature*

To prevent cooling, the fluid must be warmed to 37-38°C before it is injected. There are different ways of heating the fluid, e.g. by using a baby bottle warmer.

### *Sterility and administration*

With regards to lowering the infection risk, a new, sterile package should be used. If a package is re-used, it should be dated and one must use a sterile technique of withdrawal. Opened packages should be discarded within a week. Administer the fluid sub cutaneously and distribute it at several injection sites with max 0,25 ml at each site for mice and 2,5 ml at each site for rats.

[1] Hankenson F.C. 2014. Critical Care Management for Laboratory Mice and Rats. CRC Press

[2] Bachmanov, A.A., Reed, D.R., Beauchamp, G.K. et al. Food Intake, Water Intake, and Drinking Spout Side Preference of 28 Mouse Strains. Behav Genet 32, 435–443 (2002). https://doi.org/10.1023/A:1020884312053