Stress response of mice under different volatile anaesthesia

A. Schlichting¹, J. Haberstroh², P.-P. Tsai³, H.D. Stelzer¹, H. Hackbarth¹
1. Institute of Animal Welfare and Behavior, University of Veterinary Medicine Hannover, Germany
2. Experimental Surgery, BioMed Center, University Medical Center Freiburg, Germany
Web: www.tierschutzzentrum.de

Introduction

Anaesthesia is often recommended to minimize discomfort caused by experimental procedures, e.g. blood sampling. However, it has been reported that anaesthesia with dietyether causes a pronounced endocrine stress response in rats.

The present study focused on the stress response of different anaesthetics (sevoflurane, isoflurane, ether and CO₂) in mice. As an indicator of stress response corticosterone (CORT) concentration and Open Field behaviour were measured.

Materials and Methods

After arrival 60 female BALB/cOlaHsd mice were randomly allotted into 6 groups with 10 animals per group and 5 animals per cage (Table 1). During 2 weeks of habituation animals were handled daily.

Table 1: Overview of experimental design

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Method</th>
<th>Group size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anaesthesia</td>
<td>Sevoflurane</td>
<td>10</td>
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<tr>
<td></td>
<td>Isoflurane</td>
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<td></td>
<td>Ether</td>
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<td>CO₂</td>
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<td>Control</td>
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<tr>
<td>Sham</td>
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</tbody>
</table>

To measure the basal CORT concentration blood was taken one week before starting the experiment with 8 weeks of age.

For the different anesthetics animals were placed into a box with a gas inflow of 5 l/min until their righting reflex was lost. Control and sham narcosis animals were taken out of the box after 78 sec.

Fifteen minutes after the experimental procedure blood was taken by retrobulbar puncture for the CORT measurement. Open Field Test was performed directly after this blood sampling.

Results

In comparison to the basal value the CORT concentration raised significantly due to anaesthesia, as well as due to sham procedure (Figure 1). The concentration of control group was also increased, but did not reach a statistical difference.

The present data anaesthesia (sevoflurane, isoflurane, ether and CO₂) leads to a significant increase of CORT concentration compared to the control and sham group. This indicates that all inhalation anaesthetics used in this study will cause temporary stress in mice and that there is no relevant difference between the different anaesthetics.

Discussion & Conclusion

According to the present data anaesthesia (sevoflurane, isoflurane, CO₂ and ether) leads to a significant increase of CORT concentration compared to the control and sham group. This indicates that all inhalation anaesthetics used in this study will cause temporary stress in mice and that there is no relevant difference between the different anaesthetics.