CHARACTERIZATION OF GASTROINTESTINAL FUNCTION IN NMRI AND C57BL/6J MICE: INTESTINAL MOTILITY AND GASTRIC ACID SECRETION

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INTRODUCTION
Potential effects of new drugs on the digestive system is routinely evaluated in a number of model systems such as intestinal motility and/or gastric secretion emptying in the mouse. Although well described in the literature, the choice of different strain of mice might have an important impact on the outcome of the study.

The aim of the present study was to evaluate potential at characterizing possible strain-related specifications of male NMRI and C57BL/6J mice on some of the most commonly used gastrointestinal assays such as the small intestinal (charcoal meal) or colonic (bead expulsion time) transit tests and the gastric acid secretion assay.

MATERIAL & METHODS

- **Test system**
  - Male Rj NMRI and C57BL/6J mice, weighing 21-29 g body weight range were used (n=4 to 10/group). They were supplied by Elevage Janvier, 53940 Le Genest-Saint-Isle, France.
- **Treatment**
  - Morphine dissolved in physiological saline at 8 mg/kg i.p., administered 30 minutes before charcoal meal or bead insertion.
  - Histamine dissolved in physiological saline at 10 mg/kg s.c., administered immediately after pylorus ligation.
- **Statistical analysis**
  - Unpaired Student’s t tests.

RESULTS

<table>
<thead>
<tr>
<th>Basal parameters measured in NMRI and C57BL/6J mice</th>
<th>Small Intestinal Transit</th>
<th>Colonic Transit</th>
<th>Gastric Acid Secretion</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Percentage of expulsion (%)</td>
<td>Small intestinal transit (cm)</td>
<td>Gastric fluid volume (ml)</td>
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<tr>
<td>NMRI</td>
<td>53 ± 2</td>
<td>0.11 ± 0.08</td>
<td>22.0 ± 5.47</td>
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<tr>
<td>C57BL/6J</td>
<td>NS 4.0</td>
<td>0.08 ± 0.05</td>
<td>27.3 ± 7.1</td>
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</tbody>
</table>

Both strains showed similar small intestinal and colonic transit and gastric content. In contrast, NMRI mice exhibited higher gastric acid secretion than C57BL/6J mice: increase in gastric volume (0.72 ± 0.08 versus 0.39 ± 0.08 ml, p<0.05) and total gastric acidity (37.5 ± 7.1 versus 16.2 ± 4.8 µEq/2h, p=0.05).

- **Experimental conditions**
  - **Colonic transit** was determined by monitoring over 3 (NMRI strain) or 5 (C57BL/6J strain) hours the time required for the expulsion of a 3-mm glass bead inserted 2 cm into the distal colon (h:min:s).
  - **Gastric acid secretion** (Shay’s Method) was determined by measuring the gastric fluid volume (ml) and the total acidity output (µEq/2h measured at pH 7) 2 hours after pylorus ligation.

CONCLUSION

These findings demonstrate that although there is no strain-related difference in gastrointestinal motility (small intestine or colonic) between NMRI and C57BL6/6J mice, there is a significant difference in basal gastric acid secretion between the two strains.

Furthermore, different levels of pharmacological response between the two strains were observed in the different tests. This confirms the importance of the strain selection in the evaluation of the safety or efficacy of a new compound.

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