LAB MICE
Health Evaluation
Guide for the Care and Use of Laboratory Animals

The purpose of the Guide [...] is to assist institutions in caring for and using animals in ways judged to be scientifically, technically, and humanely appropriate.

The Guide is also intended to assist investigators in fulfilling their obligation to plan and conduct animal experiments in accord with the highest scientific, humane, and ethical principles.

**Replacement** → use of methods that avoid using animals
- Absolute replacements: replacing animals with inanimate systems such as computer programs
- Relative replacements: replacing animals such as vertebrates with animals that are lower on the phylogenetic scale

**Refinement** → modifications of husbandry or experimental procedures to enhance animal well-being and minimize or eliminate pain and distress

**Reduction** → strategies for obtaining comparable levels of information from the use of fewer animals or for maximizing the information obtained from a given number of animals (without increasing pain or distress) so that in the long run fewer animals are needed to acquire the same scientific information.

Mouse physiological data

General
- Age and Body Weight: 20-40 gr at 6 weeks
- Average Body Temperature: 37° C
- Heart Rate (bpm): 310-840
- Water Consumption (per day): 4-7 ml
- Respiration rate: 163 (84-230)/minute
- Tidal volume (ml): 0.15 (0.09 - 0.23)
- Basal metabolism: 1530 mm3 O2/g per hr
- Resting metabolism: 3500 mm3 O2/g per hr

Life cycle
- Life Span: 1-3 years
- Breeding age: 50 days
- Gestation Period (days): 17-21 days
- Estrus cycle: 4-5 days
- Litter Size: 1-23 (10-12 avg.)
- Breeding life: male 18 months; female 6-10 litters

Hematological values
- RBC: 7.712.5 $10^6$/mm³
- Hb: 14.8 gr/100ml
- Platelets: 245-340 $10^3$/mm³
- WBC: 8 $10^3$/mm³
- Neutros: 2 $10^3$
- Eosinos: 0.15 $10^3$
- Basos: 0.05 $10^3$
- Lumphos: 5.5 $10^3$
- Monos: 0.3 $10^3$

From: https://www.research.uky.edu

From:
https://www.msdvetmanual.com/
http://www.informatics.jax.org/greenbook/contents.shtml
Mouse health assessment

Behavior
- Cage activity
- Motility, aggressiveness, fear, stereotypies

Observation and physical examination
- Coat and skin
- Wounds
- Hydration
- Breathing
- Body condition (from emaciation to obesity)
- Face and mouth
- Feet and limbs
- Genital abnormalities
- Abdominal palpation
- Presence of palpable tumors

# Mouse health assessment

Clinical Presentations Associated with Strain or Background

<table>
<thead>
<tr>
<th>Strain or Stock</th>
<th>Predisposed to conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>C57BL/6</td>
<td>Hydrocephalus, Microphthalmia, Anophthalmia, Age related hearing loss, Malocclusion, Barbering, Ulcerative dermatitis</td>
</tr>
<tr>
<td>BALB/c</td>
<td>Male aggression, Heart ventricular mineralization, Corneal opacities, Conjunctivitis, Blepharitis, Periorbital abscesses, Age related hearing loss</td>
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<tr>
<td>C3H/He</td>
<td>Blindness, Corneal opacities, Age related hearing loss, Mammary tumors</td>
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<tr>
<td>FVB/N</td>
<td>Blindness, Seizures, Mammary hyperplasia (tumors rare), Hyperactivity</td>
</tr>
<tr>
<td>129</td>
<td>Blepharitis, Conjunctivitis, Megaesophagus</td>
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<tr>
<td>Swiss</td>
<td>Retinal degeneration, Amyloidosis</td>
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<tr>
<td>SJL/J</td>
<td>Blindness</td>
</tr>
<tr>
<td>A/J</td>
<td>Early hearing loss</td>
</tr>
<tr>
<td>DBA/2J</td>
<td>Audiogenic seizures, Early hearing loss</td>
</tr>
</tbody>
</table>

# Mouse health assessment

<table>
<thead>
<tr>
<th>PAIN AND DISTRESS ASSESSMENT</th>
<th>EXAMPLES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) no indication of pain and distress</td>
<td>Normal; well groomed; alert; active; good condition; asleep or calm; normal appetite; BCS=3, 4 or 5</td>
</tr>
<tr>
<td>2) mild or anticipated pain and distress</td>
<td>Not well groomed; awkward gait; slightly hunched; looks at wound or pulls away when area touched; mildly agitated; BCS=2</td>
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<tr>
<td>3) moderate pain and distress</td>
<td>Rough hair coat; dirty incision; squinted eyes; moves slowly; walks hunched and/or slowly; depressed or moderately agitated; slight dehydration; pruritic; restless; uncomfortable; not eating or drinking; BCS=2-</td>
</tr>
<tr>
<td>*4) severe pain and distress</td>
<td>Very rough hair coat; eyes sunken (severe dehydration); slow to move or non-responsive when coaxed; hunched; large abdominal mass; dyspnea; self mutilating; violent reaction to stimuli or when approached; BCS=1</td>
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</tbody>
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Human Endpoints

CLINICAL CONDITIONS

• Score of 3 or 4 in the pain and distress scale
• BC 1 score on the body condition scale and/or rapid or progressive weight loss ≥ 20% of body weight
• Combination of the following indicators: poor physical appearance (very coarse hair, abnormal posture, rales); abnormal behavior (reduced mobility or lethargy, self-mutilation, abnormal responses to external stimuli such as excessive aggression, flight or escape during operator manipulation)
• Severe respiratory distress
• Presence of a serious injury or trauma from which recovery is unlikely
• Neurological signs (e.g. persistent seizures, paresis) that interfere with the ability to feed and hydrate and from which recovery is unlikely
• Blood loss from any orifice
• One or more skin ulcers that do not heal, depending on the type and severity of the ulcers.
• Presence of masses (greater than 15% of normal body weight) that interfere with normal function or ulcerate without the possibility of healing.
• Debilitating diarrhea
• Noticeable abdominal enlargement or ascites
• Any condition that interferes with daily activities (e.g. eating or drinking, walking)
# Sample Animal Monitoring Sheet

<table>
<thead>
<tr>
<th>Date</th>
<th>Cage</th>
<th>Mouse</th>
<th>Procedure</th>
<th>Indicator</th>
<th>Indicator</th>
<th>Indicator</th>
<th>Notes</th>
<th>Signature</th>
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</thead>
<tbody>
<tr>
<td>xx/xx/xx</td>
<td>#</td>
<td>#, geno, sex</td>
<td>Behavior or Treatment</td>
<td>General conditions</td>
<td>Behavior</td>
<td>Other</td>
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<td>Motility</td>
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<td>Aggressiveness</td>
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<td>Sterotypies</td>
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