Recognizing Sick or Injured Mice and Rats – What It Is and What to Do About It

Thank you for attending this educational session! We hope it will be informative and useful.

Goals of this session:
- enable lab personnel to recognize common illnesses / conditions in rodents, in order to help them evaluate treatment options (if brought to their attention by a veterinarian or veterinary technician as a clinical health case) or to recognize a sick mouse or rat when they encounter one on their own in their colony, and what to do at that point
- give lab personnel an overview of how the Division of Laboratory Animal Medicine (DLAM) health maintenance and surveillance program works for rodents at UCLA
- provide a casual, question-and-answer forum

What is the function of DLAM?
To keep research animals healthy and reduce the danger of disease outbreaks
To make sure UCLA stays within the regulations (federal, state, UCLA, etc) – this applies to DLAM staff as well as lab personnel
To assist investigators and facilitate their research (“customer service”)

How are sick rodents identified and reported?
Husbandry staff checks every animal every day
Any abnormality results in a cage being tagged with a blue “Health Check” post-it and a report submitted to a veterinary technician
A veterinary technician evaluates every one of these animals; if they determine that it requires attention, it is submitted as a clinical health case to the veterinary staff; or, if any questions arise, the veterinary technician will ask a veterinarian to evaluate a mouse or rat directly before it is written up as a case
A veterinarian reviews the case reports in the computer that have been created by the veterinary technician, and either sends an email to the lab (most commonly) or telephones regarding the case and possible treatment strategies or euthanasia requests; if there are any questions or concerns, s/he will examine the animal personally before a case report is sent to the lab (due to the large number and wide geographical description of rodent health cases across campus – sometimes as many as 50 per day in 7 or more different buildings - not all clinical health cases are directly examined by a veterinarian before the lab is alerted to the presence of a particular case).

What do I do if I receive a clinical case email?
Information and instructions should be included in the case email. If you have any questions – from “I don’t understand where this animal is,” to “how do I apply eye ointment to a mouse?” to “This is expected as part of my study” to “I can’t treat this way, it will confound my whole experiment” – just let us know. Contact information for veterinarians and Pharmacy staff is contained in each case email.

What do I do if I find a sick animal about which DLAM has not contacted me, or marked the cage in any way?
If you come across a sick rat or mouse in a cage that does not have either a blue “Health Check” post-it or another color post-it and a DLAM treatment card (either orange, green, pink or purple), this means that our staff has not found this sick animal yet. Please obtain a blue “Health Check” post-it (they are usually in every animal room, or at the office for whichever vivarium you are in) and place it on the cage. Then, contact a member of our staff, either the veterinary technician for your area (if you know who s/he is) or the clinical rodent veterinarian (currently Dr Kelli Barnett) or the vivarium supervisor for your area. Email works best, but a telephone message could be left as well. The Animal Research Committee
ARC, the UCLA version of the Institutional Animal Care and Use Committee [IACUC]) does not allow lab personnel to begin treatment for a sick or injured animal until it has been evaluated by a DLAM veterinarian or one of his/her delegates (such as a veterinary technician), so please do not start treatment until we have evaluated the case and let you know what your treatment options are (or if euthanasia is necessary).

**How do I know which animal is sick?**

When you examine the occupants of a cage, whether prompted to by a case email or part of your regular colony maintenance, recognizing which animals are sick and possibly why, as well as the prognosis, can be very important. A summary of common conditions follows:

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**Common Rodent Health Conditions**

1. **Skin and Hair**
   
   **Alopecia** = hair loss, for various reasons. Some strains (such as some C57Bl’s) tend to have very thin hair coats. So long as the skin in the hairless or thinly-haired region looks normal (not pink or red, no breaks in the skin, or scabs, scratches, etc), the animal would not be considered a health case.

   **Barbering**, or behavioral hair-chewing, is a common finding in group-housed mice. Usually one mouse in a cage will chew off the hair of other mice in the cage, sometimes with truly spectacular results. Again, so long as the skin appears unbroken and normal, the mouse does not require treatment. If the barbering also includes the area around the eyes, it can cause irritation (tearing and redness) – if at any time there is any sign of skin irritation, the barberer (the mouse in the cage with all of its fur intact) should be separated out.

   If a mouse has any dermatitis (crusty or red, raw skin lesions), it will then need treatment…

   This is lesion of a disease in C57Bl6 mice called **ulcerative dermatitis**. Of uncertain etiology, this disease involves very pruritic (itchy) skin lesions, often seen over the nape of the neck, but also over the flanks or under the chin. If the lesion is small or in one area, treatment may be successful.

   If the lesions are multi-focal or very widespread in one area of the body, they are much less likely to respond to therapy; mice with extensive lesions should be euthanized, unless they are very valuable.

   Some mice develop an **ear syndrome** condition, sometimes stimulated by the presence of an ear tag. The ear gets very swollen, and can be red and itchy. The mouse sometimes can scratch the ears so badly that surgical amputation may be necessary.

   A condition sometimes seen in nude mice is **flaky skin disease**, caused by a skin infection with *Corynebacterium bovis*, a gram-positive bacterium. Treatment for a case like this usually consists of oral antibiotics (in the drinking water) and is often very effective. This condition is infectious, however, so you should be careful when handling these mice – if you have many nude mice, and one cage has this condition, handle this cage last.

2. **Fight Wounds**

   Male mice, when housed together, often fight. In some strains (BALB/c, SJL, FVB), even littermates raised together will fight. Mice will fight to the death! Separate them quickly (if DLAM staff has not already done so)! And do NOT re-combine them again.
Characteristic wound locations on fleeing mice: tails, rear feet, genitals. Can also be around their front legs if they have stood and fought.

Fight wounds are sometimes restricted only to the tails. As the clinical case email should indicate, these mice could also be treated, using a pain reliever and antibiotic, and perhaps surgical amputation of the affected portions of their tails (DLAM can do this for the labs), as these wounds will likely lead to death of the tail tissue.

If wounds are severe, the mice should be euthanized. Multiple bite wounds over the back may not look bad at first, but many develop into severe infection: until the overlying skin dies and sloughs off, the mouse may look pretty OK, just hunched and less active.

Fresh bite wounds will be evident by blood on the fur or in the cage.

There is typically a dominant aggressive mouse. Even if you remove the aggressor, another mouse may take his place.

3. General sick mice
A very typical sick mouse: hunched, sometimes with a “round” appearance, reluctance to move, with ruffled fur and squinted eyes.

Hydrocephalus = a swelling or malformation of the brain and overlying skull (usually the forehead region). This condition cannot be treated, and results in a rapid decline and death.

4. Weight problems
While regular weighing (at least monthly) is recommended to detect weight loss, the use of a “body condition score” (BCS) system can also be used – make sure you know what is called for in your protocol. The BCS system in use here at UCLA can be found online at http://www.research.ucla.edu/rats_help/manual/rodent-body-condition-score.doc.

Too Thin: Ribs, vertebrae, pelvic bones and all bony prominences evident when feeling animal through its fur (or just by looking at a nude mouse). The coat is often rough and unkempt. A mouse in this condition will likely have lost 15% or more of its body weight.

Ideal: Ribs are just palpable through a covering of fat, but cannot feel the spine. The coat is thin and glossy.

Too Heavy (not often a problem in mice unless part of the experiment): Massive fat deposits over thorax, spine and base of tail. Fat deposits on neck and limbs. Obvious abdominal distention.

Make sure that you know what the maximum allowed weight loss (or gain) is stated in your ARC-approved protocol…

5. Distended Abdomen – “big mice”
The only mouse that should normally have a large or distended abdomen is a pregnant mouse (and even that can be abnormal, see below). Marked abdominal distension present in a mouse that is not pregnant may be due a very large abdominal tumor, or fluid in the abdomen (may be secondary to a tumor or to something like liver failure) or other anatomical problem (such as polycystic kidneys).
Dystocia = trouble in delivering pups in a normal manner. A normal mouse should birth all her pups in about an hour. If she is disturbed in this process, it may take a little longer, but should certainly be finished within a few hours at most. If she has a very large abdomen, with discharge around the vulva to which bedding is adhering, this is a problem that requires immediate attention to save the dam or the pups. The dam might be euthanized and a post-mortem C-section performed to see if any of her babies are still alive, then fostered onto another lactating dam, if one is available from the colony. If it is the dam that is very valuable, we might try C-section delivery under anesthesia (if she is strong enough for that) and recovery of the dam, but she is not likely to be able to successfully carry and deliver any more pups.

Anasarca = generalized edema or swelling. This is very unusual, but can occur, usually with cardiac or cancer models…

6. “Lumps and Bumps”

Tumors (either experimentally-induced or spontaneous)

The ARC has upper limits on how large a tumor or mass may grow, typically 1.5 cm in mice or 2.5 cm in rats, measured at the largest diameter of the mass. This limit may be altered by ARC approval. This rule applies not only to tumors that are expected as part of a study, but also to “spontaneous” tumors, such as mammary tumors, as well as to enlarged lymph nodes that some mice (such as lpr -/-) can develop.

Any ulcerated tumor regardless of size requires that the mouse be euthanized unless the lab has ARC permission (in their protocol) to keep them…also, remember that for multiple tumors, it’s the summation of the diameters that counts towards the total measurement…

Hernias

Some strains of mice (FVB, others) are very prone to hernias, both in the males and females. These usually occur in the flank region (females) or in the inguinal or peri-anal region (males). If they can be reduced, and the animal is not distressed, the mice can remain, with close observation.

Abscesses

An abscess is an accumulation of dead inflammatory cells (“pus”) that sometimes occurs around a wound or other site of infection. In mice, these commonly occur in the face (due to hair getting stuck in their teeth and gums) or elsewhere on the body, often secondary to fight wounds (usually around the genital area or over the flanks or back). As per the case email, these are typically treated by lancing the abscess, followed by oral antibiotics in the drinking water.

7. Malocclusions

A mouse’s incisors grow continuously over the course of its life. If they don’t align properly, they don’t wear down evenly as they gnaw on their hard kibble, leading to overgrowth and difficulty eating…this can also be easy to miss, unless you take the mouse out of the cage and turn it upside-down to get a good look at the teeth…If one mouse in a cage is small, likely it’s malocclusion…

8. Rectal or Uterine or Penile Prolapse

The last few millimeters of rectum may prolapse, or protrude from the body, sometimes in a dam after she has delivered her pups, or due to GI problems, etc. Depending on how severe the prolapse is, it may or may not respond to therapy. If it is larger than a few millimeters, it is not likely to respond. If a dam
prolapses her uterus, it cannot be replaced back into the body. If she is alert and healthy and tending to her pups, DLAM can surgically remove the prolapse so she can tend to the current litter. For the boys, sometimes they get a little too active in breeding, which can result in injury and prolapse to the penis. Or fighting can also produce this, sometimes just general malaise can result in extrusion or prolapse of the penis. Separation into their own cage to avoid further trauma (either due to fighting or breeding) plus antibiotic therapy is often helpful, but if scar tissue forms, he might not be useful again as a breeder.

9. **Diarrhea**
Clinical signs of diarrhea in mice and rats can be very subtle – all you may see is flecks of bedding adhered to the body around the tail. If very severe (such as with inflammatory bowel disease or in colitis models), you may see feces smeared on the sides of the cages, sometimes containing specks of blood as well.

10. **Head Tilt**
Sometimes associated with an ear infection, these can respond to oral antibiotics and supportive care (as per the vet’s instructions). These mice may also “spin” when picked up by the tail. Sometimes their disequilibrium can be so severe that they roll constantly on the cage floor, and are unable to reach food and water – euthanasia would be quickly required in such a case.

11. **Paralysis**
Paralysis (loss of movement, usually of the hind limbs) typically occurs due to trauma (such as fighting severe enough to break the back), or can be expected as part of the experiment (such as EAE). It is typically musculoskeletal or neurologic in nature, and not subject to treatment. If it is expected as part of a study, that should be clearly indicated in the protocol and other criteria for premature euthanasia spelled out, as well as supportive care measures for the affected mice, should they remain to meet experimental end-points. As some mouse viruses can also produce this condition, if you see it in your colony more than just once or twice, please alert a veterinarian promptly so an infectious etiology might be explored.

12. **Facial Dermatitis**
Dermatitis (skin infection) over the face can develop in mice and in rats. In rats, it can extend up onto the top of the head, along the cheek, onto the shoulders – this usually responds to therapy quite well, not always the case in the mice.

13. **Porphyrin**
Porphyrin (or, more scientifically, chromodacryorrhea) is a red substance secreted by the Harderian gland (located behind the eye) and appears around the rat’s eyes, also around eth muzzle or even spread along the body due to grooming. This red substance looks like red tears or blood, and can be startling to those who are unfamiliar with rats. Occasional low levels of porphyrin staining are normal, but regular large amounts of porphyrin indicate stress, sickness, or poor diet.

14. **Eye problems**
Indications that there is an eye infection or other eye problem include: discharge from the eyes (either clear or thick and opaque); swelling and/or redness of the eyelids; squinting; and / or skin lesions around the eyes, likely caused by scratching. Treatment for eye infections typically includes an oral antibiotic in the drinking water, plus a topical ophthalmic ointment, applied at least once daily (DLAM can show you how to apply the ointment, if you have any questions)...

**Proptosis** = distension or protrusion of the globe of the eye. Might be seen with complications from retro-orbital eye bleeding, or due to a tumor or abscess behind - or even within - the eye.
15. Tail Lesions that aren’t fight wounds
Sometimes these tail lesions are self-inflicted, and not from fight wounds – as prescribed, a few days of therapy with an analgesic (carprofen works best) and topical antibiotics often provides a cure…

16. Degloving injury – loss of flesh from around the bone of a rodent tail. This can be caused by picking up the rat too close to the tip of its tail; always grasp a rat’s tail as close to the base (as close to the rat’s body) as possible…

17. Tail vein injection reactions
Sometimes a compound that is injected into tail vein may leak out of the vein and cause localized tissue damage. Or, an injection site can become infected. Necrosis (tissue death) of the tail can result. This can usually be treated with amputation of the tail and antibiotics. Necrotic tissue cannot be allowed to remain – even though the mouse may appear healthy at the time the condition is diagnosed, the dying tissue will eventually cause the animal to become sick. If further training or practice in tail vein injections is needed, our training team will be more than happy to assist.

18. Foot / leg caught in cage
Sometimes, as the mice crawl around on the underside of the wire lid, they get their little feet or legs stuck, sometimes with disastrous results (broken bones) but often just some trauma to a toe (or amputation of a toe). Mice are very resilient, and will respond well to this type of injury with pain meds and antibiotics. But, of course, if the leg or foot is broken, euthanasia is required (can’t split mouse legs)…

Odds and Ends:

Overdue Wound Clips - Unless approved by the ARC, wound clips or sutures used to close the skin must be removed by 14 days post-surgery (typically healed by 7 to 10 days). Hair growth should not be evident in-between the clips at that time; if so, check the sharpness of your clipper blades…

No water / Low Food
What may sound like obvious things to check might not be so obvious: when you peer into the bottom of a cage to check on your mice, also glance up to the top of the cage, to make sure there is adequate food and water (especially important if the lab is giving its own medicated or special food or water, and is therefore responsible for replenishing it)…

Flooded Cage
Flooded cages can literally be deadly for mice, especially for young pups – the water causes hypothermia (a drop in body temperature) pretty quickly, and animals have nowhere to go to escape the water and dry off. Once found, the mice should be changed into a dry cage, using paper toweling to dry off their fur as best as possible. If mice appear chilled (e.g. are shivering or hunched), transfer the cage to the hood and place on a heating pad, set on low or medium, for 15 to 30 minutes, or longer if needed (DO NOT leave mice unattended during this time) OR use a chemical-activated heat pack (available from our Pharmacy or over the counter) placed in one corner. As a temporary measure, you could fill a clean, empty cage bottom with warm water and place the cage in / on top of it – this will supply some heat short-term to the cage, but should be removed once a chemical heat-pack can be obtained, or once the mice dry off. Also add extra shredded nestlets to the new cage. Check on the mice at least once daily after being found in a flooded cage. Some develop dermatitis over the delicate skin of the feet and tails, while others may not recover from the stress and require
euthanasia…Sometimes all you will notice will be particles of wet bedding stuck to the sides of the cage, and condensation on the inside of the cage as well…

Old mice

Sometimes, older mice can look like sick mice, with more ruffled hair coats and decreased activity. Age is not a disease! If you get a notice that a mouse is sick, and it’s just old, please let us know, we don’t want you to euthanize an animal just because it is old.

We hope you have found this session informative. Please don’t hesitate to contact me (or any DLAM staff member!) with your animal health questions.

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