Pain and Distress in Rodents: Responsibilities, Recognition and Alleviation

Introduction

Animals can experience pain and distress. It is the ethical and legal obligation of all personnel involved with the use of animals in research to reduce or eliminate pain and distress in research animals whenever such actions do not interfere with the research objectives. The Institutional Animal Care and Use Committee (IACUC) has delegated responsibility and accountability for ensuring that all animals under their oversight are used humanely and in accordance with a number of Federal Regulations and policies[1-5]. The key to fulfilling this responsibility is for both the Principal Investigator (PI) and the IACUC to understand the legal requirements, to ensure that staff are able to distinguish pain and distress in animals from their normal state, and to ensure that potential pain and/or distress is relieved appropriately.

Regulatory Requirements

The IACUC must assure that all aspects of the animal study proposal (ASP) that may cause more than momentary pain and/or distress are addressed; alternatives to painful or distressful procedures are considered; and that methods, anesthetics and analgesics to minimize or eliminate pain and distress are included when these methods do not interfere with the research objectives. A written scientific justification is required to be included in the ASP for any procedure that may cause unrelieved pain or generalized discomfort.

The obligation to reduce pain and distress does not end with the review of the ASP. It is the responsibility of the PI, the animal care staff, the research staff, the IACUC, and veterinarians to continually monitor animals for pain, distress, illness, or mortality during the course of the research study. Animals should be monitored for evidence of pain or distress, and should be administered analgesics or have procedures instituted to relieve it, unless scientifically justified. Observations and actions taken to relieve pain or distress must be documented. These documents must be available to the IACUC, veterinarians, and animal care staff. The technician is responsible for documenting the use of analgesia on the cage card. If any procedures result in painful and/or distressful conditions that are not addressed in the approved ASP, further actions contributing to the condition are proscribed until the LAM veterinary staff can assess the animals and recommendations are provided. If it is necessary to make changes in the ASP procedures, the PI must submit a modification to the IACUC and receive approval prior to initiation.

Recognition of Pain and Distress

Critical to the assessment of the presence or absence of pain or distress is having the ability to distinguish between normal and abnormal animal behavior. This is especially true when dealing with rodents that often exhibit pain and distress with only subtle changes in their behavior (see table below).

Examples of Analgesics

It is difficult to provide precise recommendations on which analgesics to use routinely for each rodent species, how often to give them, and for what duration. It is strongly recommended that the PIs consult the veterinary staff prior to submission of the ASP and also to refer to the *ACUC Recommendations for Perioperative Analgesics* for guidance. Reduction of research associated pain/distress in animals can have a "dramatic affect on the speed with which animals return to normality following surgical procedures. It has been repeatedly demonstrated in humans that the provision of effective analgesia reduces the time taken for post-operative recovery" [6].

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Conclusion

The relief of pain and distress in research animals is ethically sound, humane, and promotes good science.

References

1. IRAC (Interagency Research Animal Committee). 1985. *U.S. Government Principles for the Utilization and Care of Vertebrate Animals Used in Testing, Research and Training*. Federal Register, May 20, 1985. Washington, D.C.: Office of Science and Technology Policy.
2. PHS (Public Health Service). 1996. *Public Health Service Policy on Humane Care and Use of Laboratory Animals*. Washington, D.C.: U.S. Department of Health and Human Services, 28 pp. [PL-99-158, Health Research Extension Act, 1985]
3. NRC(National Research Council). 1996. *Guide for the Care and Use of Laboratory Animals*. Washington, D.C.: National Academy Press.
4. Animal Welfare Act:
   Public Law 89-544, 1966, as amended, (P.L. 91-579, P.L. 94 -279 and P.L. 99-198) 7 U.S.C. 2131 et. seq. Implementing regulations are published in the Code of Federal Regulations (CFR), Title 9, Chapter 1, Subchapter A, Parts 1, 2, and 3.
5. NIH Policy Manual 3040-2, *Animal Care and Use in the Intramural Program*.
6. Smith, G. and B.G. Covino (1985). *Acute Pain*. Butterworths: London.

Potential Signs Associated with Pain or Distress in Rodents

	Mice	Rats
Decreased Food and Water Consumption	X	X
Weight loss	X	X
Self-imposed isolation/hiding	X	X
Self-mutilation, gnawing at limbs	X	X
Rapid Breathing	X	X
Opened-Mouth Breathing	X	X
Abdominal Breathing	X	X
Grinding Teeth		X
Biting/Growling/Aggression		X
Increased/Decreased Movement	X	X
Unkempt Appearance (Erected, Matted, or Dull Haircoat)	X	X
Abnormal Posture/Positioning (e.g., head-pressing, Hunched Back)	X	X
Tearing (including Porphyria), Lack of Blinking Reflex		X
Muscle Rigidity, Lack of Muscle Tone	X	X
Dehydration/Skin Tenting/Sunken Eyes	X	X
Twitching, trembling, tremor	X	X
Vocalization (Rare)	X	X
Redness or Swelling Around Surgical Site	X	X

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