



Title: Pain, Distress, Analgesia, and Anesthesia

SOP Number: 061

Purpose: Researchers, faculty, employees and students must be concerned with the well being of their study animals. Health problems, pain and distress may introduce unwanted variables that can invalidate study results. Concern for animals also reflects a fundamental ethical principle that animals, regardless of species, should not undergo unnecessary pain or distress.

IACUC POLICY 04

It is the policy of the IACUC that appropriate sedative, analgesic or anesthetic agents be administered to animals utilized in approved research and teaching protocols according to the accompanying standard operating procedures. Different analgesics may be utilized if approved by the Clinical or Attending Veterinarian.

RECOGNITION OF PAIN

- A. According to the Animal Welfare Act, a painful procedure is defined as “... *any procedure that would reasonably be expected to cause more than slight and momentary pain or distress in a human being.*” Unless there is evidence to the contrary, the IACUC will assume that a procedure that causes pain in humans will cause pain in animals. Unless you have evidence to the contrary, it is assumed that a procedure or condition painful for humans will also be painful for animals.
- B. Procedures that may cause significant pain or distress to animals (Category D) will be performed with appropriate sedatives, analgesics or anesthetics, unless withholding such agents is justified for scientific reasons, in writing, by the P.I. and approved by the IACUC and will continue for only the necessary period of time (Category E).
- C. The detection of pain in animals relies on monitoring the following of an animal's physiological and behavioral responses (responses vary by species).
 1. Physiological responses that are indicative of pain include:
 - a. Increased heart rate
 - b. Increased blood pressure
 - c. Increase respiratory rate
 - d. Pupillary dilation
 - e. Excessive salivation, panting
 2. Behavioral responses. To detect behavioral signs of pain, the investigator must be familiar with the animal's normal behavior (i.e., must be capable of recognizing the normal before recognizing the abnormal). Behavioral responses to pain vary between species, within species, and even within the same animal.
 - a. General Behaviors to Evaluate Include:
 - 1) Sleeping
 - 2) Feeding
 - 3) Drinking
 - 4) Locomotion

- 5) Grooming
- 6) Exploration
- 7) Performance in learning and discrimination tasks
- 8) Mating behavior
- 9) Social interactions

b. Typical behavioral signs of **acute** pain include:

- 1) Guarding or protecting the painful area
- 2) Abnormal vocalizing, especially when the animal is forced to move, or the painful area is palpated.
- 3) Licking, biting, scratching, or shaking the painful area.
- 4) Restlessness, such as pacing and repeatedly lying down and getting up again.
- 5) Lack of mobility as seen with joint, thoracic or abdominal pain.
- 6) The animal's reluctance to move or a head-down stance.
- 7) Failure to groom, causing an unkempt appearance. Rats accumulate red porphyrin around the eyes when they fail to groom properly. Changes in coat appearance, ruffled fur, or a greasy look is indicative of a lack of grooming.
- 8) Abnormal postures. Changes in resting postures or ambulating. Limping or carrying a leg/arm, tensing of abdominal or back muscles to produce a '*tucked up*' appearance.
- 9) Failure to show normal patterns of inquisitiveness or alertness or lack of normal interest in surroundings.
- 10) Changes in appetite, leading to weight loss and dehydration.
- 11) Changes in '*personality or attitude*'.

- 3. Chronic pain can be more difficult to recognize because the animal becomes more tolerant of the pain and adjusts its behavioral patterns accordingly to minimize the pain.
- 4. Recognizing post-surgical pain in animals. Post-surgical animal pain poses special problems for researchers, faculty, employees and students and a plan for pain alleviation must be coordinated with the attending or clinical veterinarian. Animal surgery is to be done under complete anesthesia.

UNCONTROLLED PAIN VS. CONTROLLED PAIN

For research/teaching protocols in which animals will experience pain that is not to be controlled with analgesics, the investigator must justify to the satisfaction of the ACUC, why analgesics may not be used.

For research/teaching protocols in which animals will experience pain that is to be controlled with analgesics, the investigator will consult with the clinical and/or the attending veterinarian. The veterinarian will recommend analgesics which are appropriate for each species, will recommend appropriate dosages and routes of administration, and will advise the researcher of the expected duration of the analgesic agent so that the researcher will know how often to administer the analgesic.

Animals that would otherwise experience severe or chronic pain or distress that cannot be relieved will be painlessly euthanized at the end of the procedure or, if appropriate, during the procedure.

CONTROLLING PAIN IN ANIMALS

- A. The following guidelines may be helpful in relieving unnecessary pain and distress in animals.
 - 1. Keep the environment familiar. Animals seem to recover from surgery quicker when housed in familiar environments and handled by familiar persons.
 - 2. Maintain a stable environment. Removing excessive noises or other environmental stresses helps reduce anxiety.
 - 3. Accustom the animal to laboratory procedures. Fear can be a big component of pain perception. One way to relieve fear and its accompanying stress is to familiarize animals with the routine procedures, such as blood sampling, so they know what to expect.
 - 4. Interact with the animal. If acclimated to humans, talking, stroking and petting can reduce restlessness, rapid breathing, increased heart rates and other signs of discomfort.
 - 5. Handle the animals appropriately. Animal handling should be firm, consistent, and gentle to minimize and control the animal's discomfort.
 - 6. The use of drugs to control or relieve pain is listed elsewhere. Please contact the veterinarians if you have questions or concerns.
- B. Using Analgesics for Pain Relief after Surgical Procedures
 - 1. In keeping with generally accepted standards for veterinary care, and the GUIDE, the use of analgesics will be required for all major survival surgeries, unless specifically justified based on scientific justification.
 - 2. Minor surgical procedures are generally less painful and may not require analgesics. However, all animals recovering from surgery, whether major or minor, must be evaluated on an individual basis as many factors such as the amount of tissue manipulation, trauma, etc. contribute to the level of post-operative pain.
 - 3. The consideration for the use of analgesics must be indicated on the IACUC protocol. Any request for exemption from this policy should be accompanied by detailed scientific justification indicating that the use of analgesics will compromise the study.

WHEN TO GIVE THE ANALGESIC

- A. For surgical protocols under general anesthesia, the most effective method of pain management includes the preemptive administration of the analgesic prior to emergence from the general anesthetic.
- B. As a general rule this involves injecting a systemic analgesic during the pre-anesthetic/induction phase or 15-30 minutes prior to the anticipated recovery time of the animal.
- C. Since some analgesics depress respiration, it is essential that the patient be adequately monitored during the recovery period.
- D. The ACS staff is available to discuss an appropriate analgesic protocol.

FREQUENCY OF ANALGESIC ADMINISTRATION

- A. It is generally recommended that a long-acting analgesic be selected for most procedures, since repeated dosing is often inconvenient, requiring after-hours administration.
- B. In some instances, when the analgesic is administered prior to general anesthesia recovery, only a single, or no subsequent dose is required, but all animals must be monitored for signs of pain, distress, discomfort, etc., and additional analgesics administered appropriately.
- C. It is well recognized that there are individual, intra- and interspecies differences in the response to injury and painful stimuli. This policy reflects the current level of understanding of pain management and is recommended as an acceptable standard of veterinary care.
- D. In most instances, the use of published dosages of analgesics, when used appropriately in a particular species will provide acceptable pain relief without undesirable side effects.
- E. It is most important to monitor all patients receiving pharmacological agents of this category for side effects.
- F. If any undesirable side effects are noted in any of the animals included in the experiments, report it to the Clinical and/or Attending Veterinarian. This includes both pre-and post-mortem findings. By assisting in monitoring for undesirable side effects, it will help provide better programs for pain management.

CHOICE OF ANALGESIC AGENTS

- A. The analgesic agents, dosages and routes of administration utilized at Texas Tech University are identified in a number of different sources including:
 - 1. *Research Animal Anesthesia, Analgesia and Surgery* (1994), published by Scientists Center for Animal Welfare and edited by Alison C. Smith, DVM, and M. Michael Swindle, DVM.
 - 2. *Recognition and Alleviation of Pain and Distress in Laboratory Animals* (1992), compiled by the Committee on Pain and Distress in Laboratory Animals, Institute of Laboratory Animal Resources, Commission on Life Sciences, and the National Research Council; published by National Academy Press.
 - 3. *Veterinary Pharmacology and Therapeutics* (1988), published by Iowa State University Press and edited by Nicholas H. Booth and Leslie E. McDonald.
 - 4. "Evaluation of a survey of the diplomats of the American College of Laboratory Animal Medicine on use of analgesic agents in animals used in biomedical research," in the *Journal of the American Veterinary Medical Association*, Vol. 209, No.5 (September 1, 1996) by John A.E. Hubbell, DVM, and William W. Muir, DVM.
 - 5. Anesthesia and Analgesia in Laboratory Animals. Kohn, Wixson, White, Benson eds. 1997. Academic Press, Orlando FL.
 - 6. Laboratory Animal Anesthesia. Second Edition. P.A. Flecknell. 1996. Academic Press, Orlando, FL.

7. Formulary for Laboratory Animals. C.T. Hawk and Leary, S.L. 1995. Iowa State Press, Ames, Iowa.
 8. Veterinary Drug Handbook. D.C. Plumb. 1995. Iowa State Press, Ames, Iowa.
- B. An up-to-date listing of all web sites relative to pain is available from Animal Care Services. Animal Care Services is always available for consultation on the appropriate choice and use of analgesics.

CATEGORIES OF PAIN ([IACUC Policy 02](#))

– United States Department of Agriculture (USDA)

Category A THERE IS NO USDA CATEGORY A.

Category B (USDA category B): ANIMALS BEING BRED, CONDITIONED, OR HELD FOR USE IN TEACHING, TESTING, EXPERIMENTS, RESEARCH, OR SURGERY BUT NOT YET USED FOR SUCH PURPOSES.

Category C (USDA category C): PROJECTS INVOLVING NO MORE THAN MOMENTARY OR SLIGHT PAIN OR DISTRESS WITH NO USE OF PAIN-RELIEVING DRUGS, OR NO PAIN OR DISTRESS.

Category D (USDA category D): PROJECTS INVOLVING PAIN OR DISTRESS APPROPRIATELY RELIEVED WITH ANESTHETICS, ANALGESICS AND/OR TRANQUILIZER DRUGS OR OTHER METHODS FOR RELIEVING PAIN OR DISTRESS.

Category E (USDA category E): PROJECTS INVOLVING PAIN OR DISTRESS THAT IS NOT RELIEVED WITH ANESTHETICS, ANALGESICS AND/OR TRANQUILIZER DRUGS OR OTHER METHODS FOR RELIEVING PAIN OR DISTRESS.

GUIDELINES FOR THE USE OF ANESTHETICS AND ANALGESIC AGENTS

Refer to tables available online at [Analgesic Use Policy](#)