

Humane Endpoints and Euthanasia in Animal Experiments

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Outline

Humanitarian endpoint

- In conducting animal experiments, the experimenters and the conductor set humane endpoints in the planning stage in order not to inflict unnecessary pain on the animals. I am obliged to release from In most cases, small experimental animals are euthanized.
- Euthanasia procedure
Animal experiments should end with euthanasia. Keep in mind that housing itself causes pain to animals. Choose a method of euthanasia that causes as little pain as possible to the animal.



Responsibilities of animal experiment supervisors (experimenters)

【 Planning stage of animal experiments plan 】

At the stage of drafting an animal experiment plan, predict the degree of pain that will be caused by the treatment given to the animal and describe it in the plan. In doing so, the following matters should be considered.

- ◆ Treatments that cause pain to humans should also cause pain to experimental animals.
- ◆ Transition to the least painful treatment as long as the purpose of the experiment can be achieved.
- ◆ Specify appropriate pain relief or relief measures.
- ◆ For the purpose of education, etc., when a practitioner with low skill performs, the pain level category is set one level higher.
- ◆ The setting of the degree of pain is based on the degree of pain in humans when similar treatments are performed.

【 Animal testing in progress (after) 】

Observe animals carefully during and after treatment to determine if they are inflicting unanticipated distress. If you determine that you are in pain, take appropriate pain relief and relief measures. If it is determined that the pain cannot be eliminated, the decision to stop the experiment should be made.

⇒ **Setting up a humane endpoint**

*It is recommended to set in advance even for treatments with low pain category.



Humanitarian endpoint

【Humanitarian endpoint】

It refers to the timing of terminating the experiment to release the experimental animal from severe pain.

- It is a contrasting word to continuing the experiment until the experimental animal dies (Death as endpoint).
- In the case of medium-sized and large animals, this includes the timing of discontinuing the experiment because they acted violently when restrained. Also, depending on the condition of the animal, the experiment may be restarted after treatment, but in the case of small animals (rodents), euthanasia is almost always required, so the humane endpoint is euthanasia. It's time to take action.

【Setting up a humane endpoint】

- Appropriate humane endpoints should be set and rigorously enforced during the experimental design stage.
- For procedures using laboratory equipment or restraints, endpoints are also established to stop the experiment and release the laboratory equipment or restraints if the animal becomes violent or weak.



Humane endpoint

【 Animal Care Endpoint 】

Humane endpoints also apply to animals in captivity. Animals that have completed experiments, are not suitable for experiments, or are no longer used for breeding should be euthanized in an appropriate manner, rather than continuing to be kept, keeping in mind that rearing itself causes pain. to do.

In principle, animal experiments should end with euthanasia of the animal.

✂ However, it is worth considering using it for purposes such as animal therapy so that it can live out its remaining life.

After confirming that the transferee is active based on the Animal Welfare Management Act, discuss whether it is possible to use it.

When measuring the lifespan of experimental animals, instead of keeping them until they die, use indicators such as weight loss and changes in food consumption as criteria, and avoid keeping them until they die as much as possible. To set humane endpoints, it is effective to refer to similar experimental results and conduct preliminary experiments using a small number of animals.

Examples of humanitarian endpoints

- ☐ Lower body weight than a certain level compared to the control group (need to set numerical value)
- ☐ Rapid weight loss in a short period of time (value setting required)
- ☐ Persistent lying/crouching
- ☐ Rapid breathing, forced breathing, coughing, panting
- ☐ State of shock
- ☐ Heavy bleeding
- ☐ Severe diarrhea/vomiting
- ☐ Flaccid paralysis/spastic paralysis
- ☐ Circling behavior
- ☐ Progressive hypothermia
- ☐ When the weight of the tumor exceeds the specified value or the diameter exceeds the specified value (value setting required)
- ☐ Tumor ulceration, necrosis, infection
- ☐ Moribund



Pain index in experimental animals

Observe the animals during (after) the treatment, and judge whether unexpected pain is given by referring to the following indicators.

animal species	action	appearance	physiological function
mouse rat	Decreased activity, decreased water intake, anorexia, licking, hiding limbs, self-mutilation, increased aggression, vocalization, separation from the group, increased whisker movement (mouse)	Dirty body hair, raised hair, abnormal posture, crouching, red tears (rat), partially closed eyes, telangiectasia, nasal discharge, recumbency	Sleep disturbance, hypothermia, shallow breathing, labored breathing
dog	Biting, scratching, barking, defensive behavior, gasping, growling, non-squealing, intolerance or aggression to handling	Stiff posture, reduced activity, lying down, servile appearance, tucking the tail between the groins	Tremor, febrile tachypnea, gasping, urination
monkeys	High-pitched screaming, moaning, reduced food and water intake, increased aggression	Crouch, sad look, stop grooming	



Methods of euthanasia

【 Chemical method 】

① Pentobarbital overdose

Sudden loss of consciousness occurs without anxiety or excitement.

② Carbon dioxide gas

Loss of consciousness occurs due to the anesthetic effect of the gas, and death occurs due to lack of oxygen.

✕ Initial exposure to high concentrations of gas may cause distress.

③ Overdose of inhaled anesthetic

Useful when retention is difficult.

✕ It takes a long time.

④ Magnesium sulfate or potassium chloride administration

High doses cause complete nerve blockage and hypoxia leading to death.

✕ Performed under deep anesthesia.

(Because there is no analgesic/anesthetic effect)

⑤ Bleeding under deep anesthesia, perfusion fixation



Methods of euthanasia

【 physical method 】

① Cervical dislocation

No chemical contamination.

✕ Small laboratory animals only.

② Decapitation

No chemical contamination.

✕ Small laboratory animals only.

【 Unacceptable methods 】

- Single use of potassium chloride, neuroleptics
- Diethyl ether, chloroform, cyanide, chloral hydrate, strychnine
- Cranial contusion
- Air embolization
- Bleeding without anesthesia



When choosing a method of euthanasia, consider not only the animal but also the mental and physical pain of the operator.

Methods of euthanasia

Method	Barbituric acid derivatives	Injection anesthetic	Inhalation anesthesia	Carbon dioxide	Potassium chloride	Cervical dislocation	Decapitation
Conditions etc.				Gradual injection using high pressure cylinder	Under anesthesia	Preferably under anesthesia	Preferably under anesthesia
Rodent	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dog	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		
Monkeys	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		



Summary

1. Humane endpoint

Set appropriate humane endpoints during the experimental design stage.

It is desirable to set humane endpoints for breeding as well.

2. Euthanasia

Animals should be euthanized as soon as they are no longer used for experiments.

Regarding euthanasia, select the one that causes as little pain as possible to the animal and the implementer.



Question

Please check the correct answer below.

1. Considerations when setting humane endpoints include:

- ☐ If unpredictable, consider conducting preliminary experiments.
- ☐ Set only Category D actions in the SCAW classification.
- ☐ Referring to other materials and set standards that can be judged as objectively as possible.

2. Experimental animals that are no longer used for experiments

- ☐ In an appropriate environment, give enough food and water, and raise until death.
- ☐ If it is not a genetically modified animal, release it into the open.
- ☐ Euthanize as quickly and painlessly as possible.

