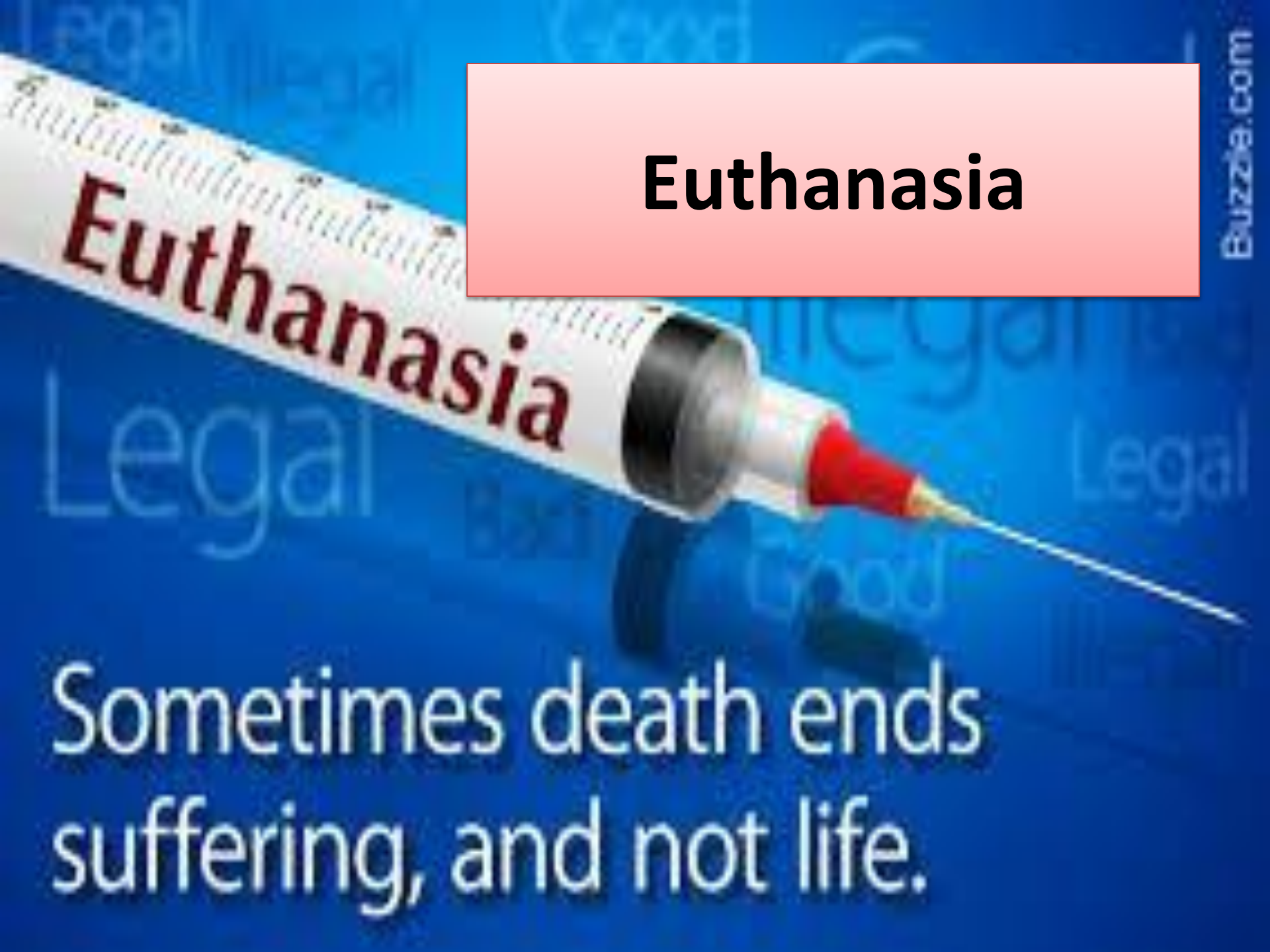
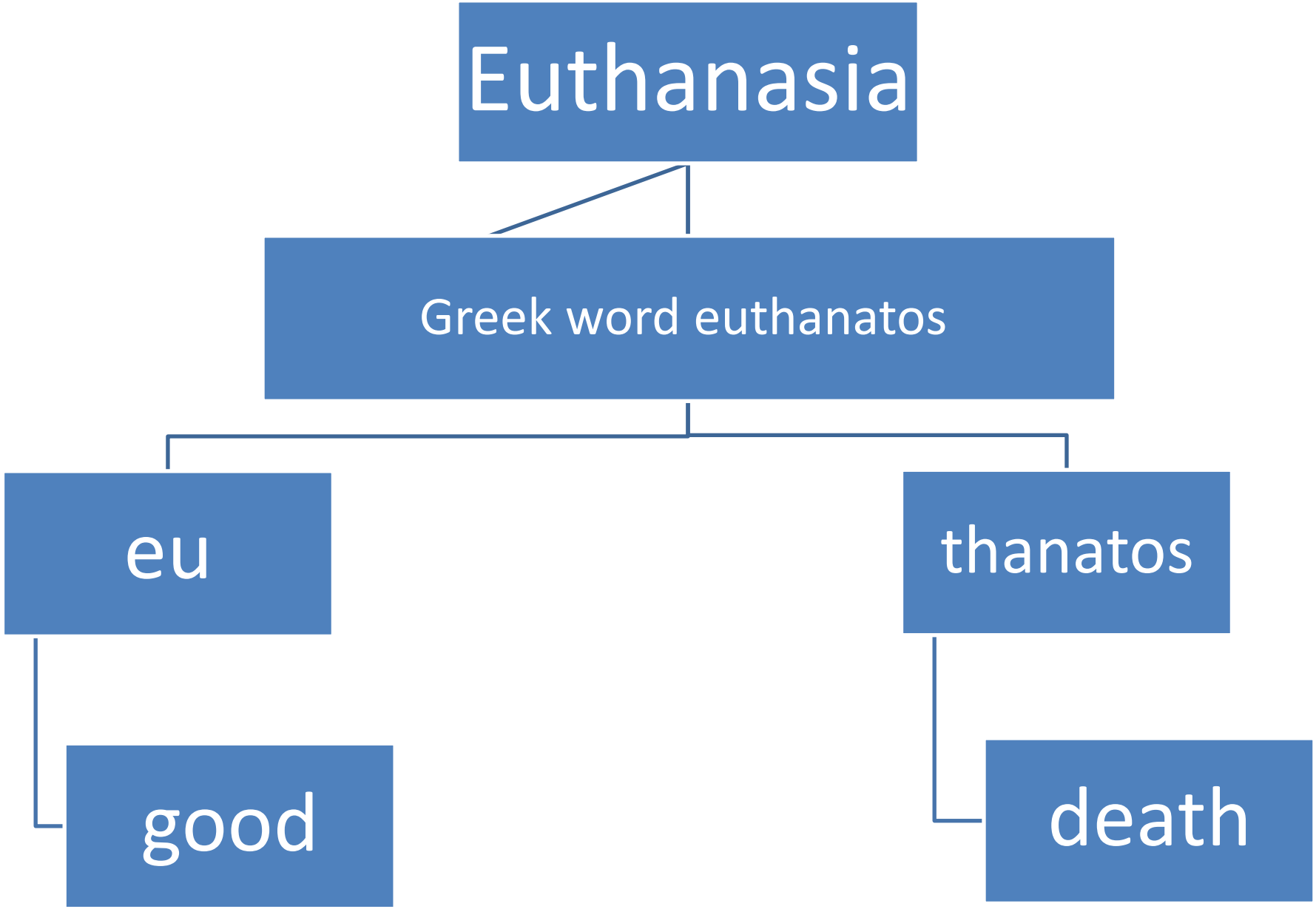

Euthanasia
Sometimes death ends suffering, and not life.
Buzzle.com

Euthanasia


Euthanasia
Greek word euthanatos
eu
thanatos
good
death


DEFINITION

Euthanasia

- is the act of humanely killing animals by methods that Induce rapid unconsciousness and death without pain or distress.

Euthanasia

- Is the process of inducing a painless death.

Euthanasia

- term is usually used to describe ending the life of an individual
- animal in a way that minimizes or eliminates pain and
- distress.

Goals of Euthanasia

1-Humane treatment at all times.

2- Acceptable method (Quick, efficient and humane).

3-Minimize or eliminate pain, anxiety, and distress prior to death.

4-Minimize negative psychological impact (Animal owners and caretakers, responders, public)

5-Prevent disease spread.

Precautions (recommendations) for euthanasia

- As veterinarians and human beings it is our responsibility to ensure that if an animal's life is to be taken, it is done with the highest degree of respect.
- making the death as painless and distress free as possible.
- the technique employed should result in rapid loss of consciousness followed by cardiac or respiratory arrest and, ultimately, a loss of brain function.
- animal handling and the euthanasia technique should minimize distress experienced by the animal prior to loss of consciousness.
- understand that, in some instances, agents and methods of euthanasia identified as appropriate for a particular species may not be available or may become less than an ideal choice due to differences in circumstances.

Precautions (recommendations) for euthanasia (persons)

- Personnel who perform euthanasia must demonstrate proficiency in the use of the technique in a closely supervised environment.
- ensure the facility or institution operates in compliance with federal, state, and local laws.
- experience in the humane restraint of the species of animal to be euthanized is important and should be expected, to ensure that animal pain and distress are minimized.
- Selection of the most appropriate method of euthanasia in any given situation depends on the species and number of animals involved, available means of animal restraint, skill of personnel, and other considerations.
- If drugs have been used, careful consideration must be given to appropriate disposal of the animal's remains and steps should be taken to avoid environmental contamination and human and animal exposures to residues.

Panel of euthanasia (POE)

The POE recognized that complete absence of pain and distress cannot always be achieved.

The POE criteria;

(1) ability to induce loss of consciousness and death with a minimum of pain and distress.

(2) time required to induce loss of consciousness.

(3) reliability.

(4) safety of personnel.

(5) irreversibility.

(6) compatibility with intended animal use and purpose.

(7) documented emotional effect on observers or operators.

Panel of euthanasia (POE) criteria

(8) compatibility with subsequent evaluation, examination, or use of tissue.

(9) drug availability and human abuse potential.

(10) compatibility with species, age, and health status.

(11) ability to maintain equipment in proper working order.

(12) safety for predators or scavengers should the animal's remains be consumed.

(13) legal requirements.

(14) environmental impacts of the method or disposition of the animal's remains.

Mechanism

Direct depression of neurons necessary for life function

- loss of consciousness followed by death.
- Depending on the speed of onset of the agent or method used.
- **Symptoms**
- inhibition of motor activity
- Vocalization
- muscle contraction

Hypoxia

- achieved by exposing animals to high concentrations of gases that displace oxygen such as carbon dioxide, nitrogen, argon or carbon monoxide to block uptake of oxygen by red blood cells.

- **Symptoms;**
- loss of consciousness .
- animals may exhibit motor activity
- convulsions
- not be appropriate for species that are tolerant of prolonged periods of hypoxia.

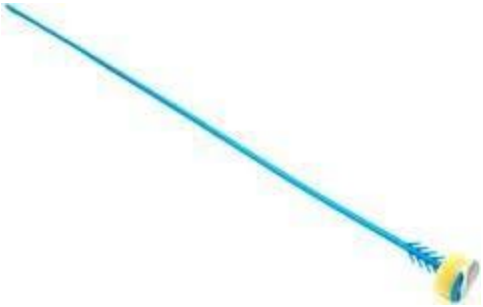
Physical disruption of brain activity

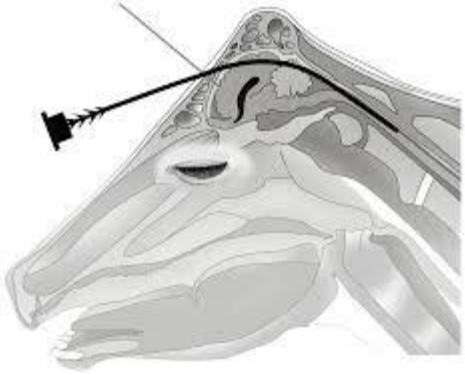
- produced through a blow to the skull resulting in concussive stunning.
- through direct destruction of the brain with 1)a captive bolt 2)bullet 3)pithing rod 4)through depolarization of brain neurons following electrocution.
- **Symptoms;**
- loss of consciousness.
- respiration and cardiac activity fail
- Convulsions
- exaggerated muscle activity
- **Ch.by;**
- Inexpensive.
- humane.
- painless if performed properly.
- leave no drug residues.
- Animal express less fear and anxiety .
- **Physical methods must be skillfully executed to ensure a quick and humane death**

Confirmation of death

- **Death must be confirmed before disposal of any animal remains;**
- lack of pulse, breathing.
- corneal reflex and response to firm toe pinch.
- inability to hear respiratory sounds and heartbeat by use of
- a stethoscope.
- graying of the mucous membranes.
- rigor mortis.
- None of these signs alone, except rigor mortis, confirms death.

- In small animals, particularly in animal shelter settings, verification of death may be supplemented by percutaneous cardiac puncture after the animal is unconscious. Failure of the needle and attached syringe to move after insertion into the heart (aspiration of blood provides evidence of correct location) indicates lack of cardiac muscle movement and death.





pithing rod

bullet

captive bolt

Methods of Euthanasia

- Euthanasia methods are classified in the Guidelines as
- Acceptable.
- acceptable with conditions.
- unacceptable.

Acceptable methods

are those that consistently produce a humane death when used as the sole means of euthanasia.

acceptable with conditions

are those techniques that may require certain conditions to be met to consistently produce humane death, may have greater potential for operator error or safety hazard, are not well documented in the scientific literature, or may require a secondary method to ensure death.

Unacceptable techniques

are those methods deemed inhumane under any conditions.

Or that the POE found posed a substantial risk to the human applying the technique.

Or are those methods that should not be used as a sole method of euthanasia, but that can be used in conjunction with other methods to bring about euthanasia

Methods of Euthanasia

1-Inhaled agents.

2- Non inhaled agents.

3- Physical method.

1-Inhaled agents

-Overdoses of inhaled anesthetics (eg, ether, halothane, methoxyflurane, isoflurane, sevoflurane, desflurane, enflurane) have been used to euthanize many species.

-Presently, only isoflurane, enflurane, sevoflurane, and desflurane are clinically available in the United States, although halothane and methoxyflurane are still available elsewhere in the world.

Inhaled vapors and gases require a critical concentration within the alveoli and blood for effect resulting in potential adverse effect on animal welfare because onset of unconsciousness is not immediate and consequently distress may occurs.

1-Inhaled agents

causes of distress;

A- by properties of the agent (eg, pungency, hypoxia).

B-conditions under which the agent is administered (eg, home cage or dedicated chamber, gradual displacement or prefilling of the container).

Signs of distress

behaviorally (eg, overt escape behaviors, approach avoidance preferences [aversion]).

physiologically ; markers of a stress response

(eg, changes in heart rate, sympathetic nervous system [SNS] activity, hypothalamic-pituitary axis [HPA] activity).

1-Inhaled agents

Advantages of inhaled agents;

(1) Inhaled anesthetics are particularly useful for euthanasia of smaller animals (<7 kg or for animals in which venipuncture may be difficult.

(2) Inhaled anesthetics can be administered by several different methods depending on the circumstances and equipment available

(eg, face mask, open drop where the animal is not permitted to directly contact the anesthetic liquid, precision vaporizer, rigid or nonrigid containers).

(3) Halothane, enflurane, isoflurane, sevoflurane, desflurane, methoxyflurane, and N2O are nonflammable and nonexplosive under usual clinical conditions.

(4) Inhaled anesthetics can be useful as primary or secondary method of death.

1-Inhaled agents

disadvantages of inhaled agents;

(1) Inhaled anesthetics are aversive to rabbits and laboratory rodents and the same may be true for other species.

(2) Ether is irritating, flammable, and explosive.

(3) Induction with methoxyflurane is unacceptably slow in some species.

(4) Nitrous oxide used alone will create a hypoxic atmosphere prior to loss of consciousness.

(5) longer induction time; time to death may be prolonged as O2is commonly used as the vapor carrier gas.

(6) Personnel and animals may be injured by exposure to these agents.

(7) challenging for food-producing animals due to potential for tissue residues.

1-Inhaled agents

percautions of inhaled agents;

(1) In those species where aversion or overt escape behaviors have not been noted, exposure to high concentrations resulting in rapid loss of consciousness is preferred.

(2) Order of preference is isoflurane, halothane, sevoflurane, enflurane, methoxyflurane, and desflurane, with or without N_2O is irritating, flammable, and explosive.

(3) Nitrous oxide should not be used alone.

(4) Methoxyflurane is acceptable with conditions only if other agents or methods are not available.

(5) Ether is not acceptable for euthanasia.

(6) not used for larger animals because of cost and difficulty of administration.

(7) Exposure of workers to anesthetics must be under federal occupational health and safety regulations.

Other gases used for inhalation euthanasia

Carbon monoxide

Carbon monoxide is a cumulative poison that produces fatal hypoxemia.

it readily combines with hemoglobin

↓

blocks uptake of O2 by erythrocytes

↓

by forming carboxyhemoglobin.

Carbon monoxide

Advantages

(1) Carbon monoxide induces loss of consciousness without pain and with minimal discomfort, depending on species.

(2) Death occurs rapidly if concentrations of 4% to 6% are used.

Disadvantages

(1) Carbon monoxide is an aversive agent for laboratory rodents.

(2) Safeguards must be taken to prevent and monitor exposure of personnel.

(3) Electrical equipment exposed to CO (eg, lights and fans) must be spark free and explosion proof.

Other gases used for inhalation euthanasia

Nitrogen, Argon

These gases function in the current context by

displacing air (and the O2 it contains),

causing anoxia.

Nitrogen, Argon

Advantages

(1) Nitrogen and Ar do not appear to be non-aversive or only mildly aversive to chickens or turkeys or pigs.

(2) Nitrogen and Ar are nonflammable, nonexplosive, and readily available as compressed gases.

(3) Hazards to personnel are minimal when used with properly designed equipment.

Disadvantages

(1) Hypoxia resulting from exposure to these gases is aversive to rats, and mice.

(2) Loss of consciousness will be preceded by open mouth breathing and hyperpnea, which may be distressing for nonavian species.

(3) Reestablishing a low concentration of O2 in the chamber before death will allow immediate recovery.

(4) These gases tend to cause more convulsive wing flapping in poultry than CO2 In air mixtures.

Other gases used for inhalation euthanasia

Carbon dioxide

Inhalation of CO_2 causes

↓

respiratory acidosis

↓

produces a reversible anesthetic state

↓

by rapidly decreasing intracellular pH.

Carbon dioxide

Advantages

(1) The rapid depressant, analgesic, and anesthetic effects of CO_2 are well established.

(2) Carbon dioxide is readily available in compressed gas cylinders.

(3) Carbon dioxide is inexpensive, nonflammable, and nonexplosive and poses minimal hazard to personnel.

(4) not result in accumulation of toxic tissue residues in animals from which food is produced.

Disadvantages

(1)can be aversive to some species, and therefore potential exists to cause distress.

(2) Immature individuals and some aquatic and burrowing species may have extraordinary tolerance for CO_2.

(3) Reptiles and amphibians may breathe too slowly for the use of CO_2.

(4) Induction of loss of consciousness at concentrations <80% may produce postmortem pulmonary and upper respiratory tract lesions.

(5) incomplete filling of a chamber may permit animals to climb or raise their heads above the effective concentrations and avoid exposure.

1-Noninhaled agents

Noninhaled agents of euthanasia include chemical agents that are introduced into the body by means other than through direct delivery to the respiratory tract.

-The primary routes of their administration are

1-Parenteral injection

2- Topical application

3- Immersion.

1-Noninhaled agents

Precautions

1- species involved must be considered.

2-the pharmacodynamics of the chemical agent.

3-degree of physical or chemical restraint required.

4-potential hazards to personnel (consumption of the animal's remains by humans and other animals).

5-potential hazards to the environment from chemical residues.

6-death must be confirmed prior to final disposition of the animal's remains.

Routes of administration

Parenteral Injection

The use of injectable euthanasia agents is one of the most rapid and reliable methods of performing euthanasia.

-It is usually the most desirable method when it can be performed without causing fear or distress in the animal.

Routes of administration

Parenteral Injection

Mechanism of action:

injectable euthanasia agents

↓

smooth loss of consciousness

↓

cessation of cardiac and/or respiratory function

↓

minimizing pain and distress to the animal.

-Heightened awareness for personnel safety is required to avoid severe adverse effects resulted from needle-stick injuries.

Parenteral Injection

Intravenous injections deliver euthanasia agents directly into the vascular system

↓

rapid distribution of the agent to the brain or neural centers

↓

resulting in rapid loss of consciousness

Parenteral Injection

Aggressive or fearful animals should be sedated prior to restraint for IV administration of the euthanasia agent. Paralytic immobilizing agents (eg, neuromuscular blocking agents).

-paralytic immobilizing agents may only be used if the chosen method of euthanasia (eg, captive bolt, IV injection of euthanasia solution).

-When intravascular administration is considered impractical or impossible, IP or intracoelomic administration of a nonirritating solutions.

-In anesthetized mice, retrobulbar injection is acceptable for low quantities.

-intraosseous catheters, intracardiac, intrahepatic, intrasplenic, or intrarenal injections are acceptable only when performed on anesthetized or unconscious animals.