



Literature Review on the Welfare Implications of Electroimmobilization

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Electroimmobilization is the use of electrical current to restrain conscious animals by causing paralysis. The direct action of electrical current on animal's muscle and/or nervous systems is used to prevent animals from moving. There is concern that electroimmobilization is a source of distress because animals are believed to be conscious and aware of their surroundings and experiences, but unable to respond. In addition, physical discomfort may result due to loss of bodily control, sustained overstraining of muscles and labored¹ or suspended respiration.^{2,3}

ELECTRO-IMMOBILIZATION OF LIVESTOCK

Commercial electroimmobilization devices have been developed to restrain livestock such as sheep,^{4,5} swine and cattle.² Electroimmobilization usually involves placing electrodes at distal ends of an animal's spine, excluding the brain, and produces a conscious rigid paralysis for the length of a procedure. These devices are mainly for use with large, potentially dangerous, free-ranging livestock to prevent injury to handlers and to the animal during infrequent handling.⁶ Electroimmobilization is anecdotally reported to produce unpleasant sensations when applied to humans.^{7,8c,f,9} Livestock have been shown to avoid the electroimmobilization^{5,10,11} and show physiological stress reactions when it is applied^{12,13} or in anticipation of its use.²

ELECTROIMMOBILIZATION OF OTHER TERRESTRIAL ANIMALS

Electroimmobilization has also been used to hold small animals such as insects still for purposes of photography and other imaging.¹⁴

ELECTROIMMOBILIZATION IS NOT AN ANESTHETIC OR ANALGESIC

Speculation that electro-immobilization might produce some analgesic or anesthetic effects is not clearly supported anecdotally⁷ or experimentally.^{1,15,16} Nevertheless electroimmobilization along the spine has sometimes been discussed as if it produces "*surgical anesthesia*"¹⁷ or causes "*pain to be blocked out*"¹⁸ for procedures on animals such as turtles. These uses are not supported by any research at this time and electroimmobilization should *not* be considered a form of anesthesia or analgesia,¹ nor should electroimmobilization equipment ever be employed as an electric goad.¹⁹

DISAMBIGUATION

The following procedures are *not* considered to be electroimmobilization as a method of conscious paralysis because they are 1) not a method of restraint, 2) produce immediate unconsciousness or death, 3) are applied to animals that are already unconscious or dead, or 4) they do not act by causing paralysis.

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Electrofishing—Electrofishing is use of transient applications of electrical current for the purpose of collecting fish samples as part of fish population surveys.^{20,21} Voltage, current, and wave forms are varied depending on water chemistry and target species and are designed to produce temporary immobility or involuntary swimming toward the anode. Electrofishing is a method of fish capture, not a method of restraint. It is unclear whether electrofishing produces paralysis by acting on the muscles (electroimmobilization) or by producing an epileptic state²² (stunning).

Electroanesthesia and stunning—Electricity applied to the brain may be used as a form of anesthesia—producing near instantaneous unconsciousness. Stunning^{23,24} is a form of electroanesthesia used immediately prior to²⁵ or simultaneous with slaughter (e.g. by cardiac arrest).²⁶

Post-stunning restraint—Electrification may also be used to suppress seizure movements of animals of stunned animals but so long as the animal is effectively stunned they will remain unconscious during this procedure.

Electrical devices and TENS—Electrical devices such as fences, goads and training collars, while applied to conscious animals, should not cause paralysis. A device providing transcutaneous electrical stimulation (TENS) should not, even at the highest settings, produce paralysis. TENS has been proposed as a method for controlling pain, however its effectiveness is often not supported by controlled studies.^{27e.g.28} Therefore TENS devices should not be used for analgesia or anesthesia in animal unless convincing supporting data is available for that application. It has also been suggested that TENS delivered by rectal probe prevents cows from kicking and calms them, but this has not been objectively demonstrated.^{29,30}

SUMMARY

Electroimmobilization, the use of electrical current to restrain conscious animals by causing paralysis, is likely to be disturbing to animals and detrimental to their welfare. Procedures that are *not* considered to be electroimmobilization include: electrofishing, electroanesthesia, stunning, electrical restraint of stunned animals, electrical devices such as fences and transcutaneous electrical stimulation (TENS).

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