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# Techniques for Immobilizing and Bleeding Marmots and Woodrats

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ABSTRACT: Blood samples were obtained in the field by femoral vein puncture in bushy-tailed woodrats (*Neotoma cinerea*) and yellow-bellied marmots (*Marmota flaviventris*) that had been injected intramuscularly with ketamine hydrochloride. Dosages ranged from 50 mg/kg for marmots to 30 to 110 mg/kg for woodrats. Sedated animals were handled easily, and a volume of blood sufficient for hematological assays or electrophoresis could be collected.

*Key words:* Bushy-tailed woodrat, *Neotoma cinerea*, yellow-bellied marmot, *Marmota flaviventris*, ketamine hydrochloride, chemical restraint, blood sampling, field study.

Obtaining blood samples from small mammals in the field can involve risk of injury to the animal and investigator. For example, it is difficult to obtain blood from the suborbital sinus of animals much larger than voles, and foot lancing or cardiac puncture can cause trauma or death to the animal. In addition, an animal that is physically restrained and handled may injure itself attempting escape, and the handler may be bitten or scratched.

Ketamine hydrochloride, either alone or in combination with other drugs, has been used to chemically restrain a variety of mammals (Beck, 1976; Ramsden et al., 1976; Lancia et al., 1978; Green et al., 1981; Nielsen et al., 1982; Wright, 1983; Pigozzi, 1987). Ketamine hydrochloride produces "dissociative" anesthesia (Parke, Davis and Company, 1975) in which immobilization occurs but reflex actions are maintained. In this paper we report on the use of ketamine HCl to lightly sedate bushy-tailed woodrats (*Neotoma cinerea*) and yellow-bellied marmots (*Marmota flaviventris*) in the field in Colorado for the purpose of obtaining blood samples for hematological assays and electrophoresis.

The woodrats were live-trapped in Gunnison County, Colorado (38°42′N, 106° 50′W) as part of a demographic study. A captured animal was transferred to a nylon mesh bag for weighing, sexing and ear tagging. These procedures were carried out on non-sedated animals. To chemically immobilize for blood sampling, a hind leg was manipulated through a hole cut in the bag and ketamine HCl (100 mg/ml) (Parke, Davis and Company, Detroit, Michigan 48232, USA) was injected into the thigh muscle. Twenty-three animals were injected, 14 males and 9 females. Body weights ranged from 115 to 340 g ($\bar{x}$ = 198.04, SE = 14.12). Dosage ranged from 32 to 110 mg/kg ($\bar{x}$ = 74.17, SE = 3.79). Efforts were made to keep the dosage to a minimum. With experience, it was found that dosages close to the mean produced optimal results.

Narrow rubber tubing was used as a tourniquet to occlude the femoral vein. This vein was punctured with a 24-ga needle and the blood captured in heparinized microcapillary tubes. Bleeding stopped rapidly, but two or three tubes were easily filled. The woodrat was then returned to the live-trap to recover from sedation.

Seven animals were sedated and bled in the lab, 16 were treated in the field. Three woodrats were sedated twice within 7 days. Although the reaction times varied among individuals, all woodrats were unable to right themselves within 2 min of the injection. In the lab, recovery times ranged from 30 to 40 min ($\bar{x}$ = 35.33, SE = 3.18). In the field, the woodrats were returned to the traps to recover while the remainder of the trap line was checked. These animals were released from 35 to 65 min after immobilization depending upon the length of time necessary to check the other traps. Upon release, the woodrats were able to scramble up the nearly vertical cliff face

and into a crevice without noticeable motor impairment.

With one exception, all animals from which blood was obtained were recaptured. No fearful or aggressive behaviors were observed during recaptures of these woodrats; no animal attempted to bite or resist normal handling.

Yellow-bellied marmots in the vicinity of Gothic, Colorado (38°58′N, 107°00′W) have been continuously studied for more than 20 yr. Marmots are large ground squirrels (adults weigh 2 to 5 kg) that vigorously resist handling and bite readily. For blood sampling, the marmots were live-trapped and transferred to a canvas handling bag. The animals were chemically restrained with an intramuscular injection in the thigh of 50 mg/kg ketamine HCl. A tourniquet was applied to the base of one hind leg, exposing the femoral vein; 1 to 2 ml of blood were drawn from this vein using a 21-ga needle and a 10-ml Vacutainer®. Larger needles were too large for the vein and clots formed in smaller needles. Blood was drawn from 70 marmots, 31 males and 39 females, that averaged 1.95 kg (SE = 0.09). This procedure was used successfully on marmots as small as 650 g.

In marmots, the dosage of ketamine HCl was considerably less than the 100 mg/kg required for complete immobilization but this lesser amount was sufficient to sedate the animals for a 15 min period beginning about 2 min after injection, and rendered them easy and safe to handle. Marmots were sufficiently recovered from sedation to be released about 30 min after injection. Subsequent recapture frequencies and several hundred hours of field observation before and after immobilization indicated no change in the marmots' behavior.

Woodrats required a higher dosage (see above) to achieve approximately the same level of sedation that marmots reached at 50 mg/kg. This species-specific difference is not unexpected. For other rodents, dosages of ketamine HCl necessary for mild sedation ranged from 15 to 20 mg/kg (Beck, 1976) to 80 mg/kg (Green et al., 1981).

Our results indicate that injection of ketamine HCl is an effective method for short-term immobilization of small mammals, and facilitates obtaining blood samples in the field. The risk of injury to and stress on the animal is minimized and the researcher can handle the animal without taking precautions to avoid being bitten.

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## LITERATURE CITED

BECK, C. C. 1976. Vetalar® (ketamine hydrochloride) a unique cataleptoid anesthetic agent for multispecies usage. Journal of Zoo Animal Management 7: 11–30.

GREEN, C. J., J. KNIGHT, S. PRECIOUS, AND S. SIMPKIN. 1981. Ketamine alone and combined with diazepam or xylazine in laboratory animals: A 10-year experience. Laboratory Animals 15: 163–170.

LANCIA, R. A., R. P. BROOKS, AND M. W. FLEMING. 1978. Ketamine hydrochloride as an immobilant and anesthetic for beaver. The Journal of Wildlife Management 42: 946–948.

NIELSEN, L., J. C. HAIGH, AND M. E. FOWLER (editors). 1982. Proceedings of the North American symposium: Chemical immobilization of North American wildlife. Wisconsin Humane Society, Inc., Milwaukee, Wisconsin, 447 pp.

PARKE, DAVIS AND COMPANY. 1975. Vetalar® (ketamine hydrochloride injection, NF). Drug package insert, unnumbered leaflet VET-SG, Detroit, Michigan, 3 pp.

PIGOZZI G. 1987. Immobilization of crested porcupines with xylazine hydrochloride and ketamine hydrochloride. The Journal of Wildlife Management 51: 120–123.

RAMSDEN, R. O., P. F. COPPIN, AND D. H. JOHNSTON. 1976. Clinical observations on the use of ketamine hydrochloride in wild carnivores. Journal of Wildlife Diseases 12: 221–225.

WRIGHT, J. M. 1983. Ketamine hydrochloride as a chemical restraint for selected small mammals. Wildlife Society Bulletin 11: 76–79.

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