

## Chemical immobilization of brown bears – a Croatian experience

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### Abstract

#### Background

Capture of brown bears for scientific purposes in Croatia dates back to 1981 when the first bear was equipped with a VHF radio collar. In 2003, the first GPS/GSM collar was employed on bears as a novel technique. In addition to collecting location data of the collared bears, we used the capture events to collect data on body morphometry, blood parameters (cellular composition and biochemistry), DNA (blood), age (premolar tooth) and various other values such as stress level, heavy metals, fatty acids (hair, blood).

#### Methods

The first bear in 1981 was chemically immobilized with ketamine (K, Ketalar) and xylazine (X, Rompun) in combination with only ketamine to prolong immobilization. Since 2015, we have used the combination of tiletamine and zolazepam (TZ, Zoletil) with medetomidine (M, Domitor, Sedastart) and adding only medetomidine for prolongation of immobilization. During sleep, the bears' heart and respiratory rates, body temperature were monitored and later blood oxygen levels with an oximeter.

#### Results

The absolute range of doses administered to a total of 53 bears for the ketamine + xylazine combination was between 4.0 and 30.3 mg/kg ketamine and between 0.42 and 12.5 mg/kg xylazine. The ranges of doses given to 21 bears immobilized with the tiletamine and zolazepam + medetomidine combination were 1.78 to 6.40 mg/kg and 0.011 to 0.050 mg/kg, respectively. The KX combination resulted in a slower onset of sleep with a shorter duration and sometimes a rapid recovery with full movements of the animal. with TZM induced faster onset but with slow and gradual recovery, sometimes for hours, when doses were higher. In cases where higher doses of TZM were administered, respiratory depression with lower values of blood oxygenation was also noted.

#### Conclusion

The wide range of dosages administered, for both the KX and TZM combinations, was related to various field conditions (e.g., stress level, thickness of subcutaneous fat), but suggests that the use of these chemical agents for immobilization is relatively safe in cases where it is difficult to estimate the actual body mass of captured animals. Because oxygenation of the blood is lower when the TZM combination is used, oxygen flow devices should be used throughout the procedure.

**Keywords:** immobilization; brown bear; *Ursus arctos*; free-ranging wildlife; Croatia