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Physiological response to chemical immobilization: a case study of etorphine-azaperone in free-ranging plains zebra (*Equus quagga*) in Kenya.

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Predictable immobilization of wild zebras is challenging and there is massive variation in opiate response within different species. Etorphine-azaperone combination is considered the protocol of choice, but no studies have investigated the physiological response to this procedure of immobilization in plains zebras. Eleven free-ranging plains zebras (*Equus quagga*) were immobilized for snares removal and translocations in Kenya using a combination of etorphine 0.019 ± 0.003 mg/kg and azaperone 0.27 ± 0.05 mg/kg administered intramuscularly with a projectile dart. After recumbency, arterial blood was taken for gas analyses and physiological parameters were recorded for the duration of immobilizations (19 ± 6 minutes). Ad hoc descriptive scores were given to the exertion resulting from high-speed chasing (Table 1) and to quality of induction, immobilization and recovery. Diprenorphine or naltrexone were used for opioid antagonism. The combination induced quick inductions within 3.5 ± 0.8 minutes and provided reliable recumbencies without attempts to stand for the duration of the immobilization.

The average heart rates, respiratory rates and mean arterial blood pressure recorded were 102 ± 42 beats/minute, 18 ± 4 breaths/minute and 145 ± 28 mmHg respectively. Arterial gas analyses demonstrated mild to severe and partially compensated metabolic acidosis and hypoxia, while electrolytes were within equids range. Higher exertion levels during the chasing were significantly correlated to worse immobilization scores (p=0.008) and hyperthermia occurrence (p=0.0012) and non-significantly to severe acidosis. Recoveries from anaesthesia were smooth, on average 121 ± 38 seconds after reversal. Etorphine-azaperone combination

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produced physiological alterations in free-ranging plains zebra such as tachycardia, hypertension, metabolic acidosis and hypoxemia. However, these preliminary results indicate that high-speed chase might be responsible for physiological imbalance and that this drug combination does not suppress the compensatory response. Regardless of the metabolic status, recover from immobilization was uneventful and all zebras went back to normal behavior thereafter.

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Table 1: Description of the scoring system used to categorise the amount of exertion resulting from high-speed chasing during vehicle-darting procedures in free-ranging plains zebra

Exertion score	Description
1	No reaction when approached by the darting vehicle or slow walking away (less than 30 seconds). No running.
2	Suspicion over the darting vehicle. Fast walking away (less than 60 seconds) or high-speed sprinting (less 10 seconds gallop).
3	Running away within the herd when vehicle approach, no clearly individual chasing. Medium/high-speed gallop up to 30 seconds.
4	Jumpy reaction to approaching vehicle. Individual high-speed chasing for 30 – 90 seconds.
5	Extremely jumpy reaction to approaching vehicle. Individual high-speed chasing for 90 – 180 seconds.

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