

What did you say? A leopard, where?

Text by Jessica Hayes, David Zimmerman & Victor Mokoena
Photos by Melanie de Morney, Untouched Adventures, NSRI, Jessica Hayes

What started off as a typical day ended on an eventful note after the Tsitsikamma management team received news that resulted in an unusual rescue operation. While accustomed to dealing with emergencies, this was no ordinary call, and it left everyone with a sense of disbelief. Kayakers reported a leopard perched precariously on a rock face in the Storms River Gorge - the animal appeared injured and in distress.

Working in unpredictable environments, the management team left nothing to chance and responded promptly by contacting regional ecologist Jessica Hayes to coordinate the necessary assistance. Drs David Zimmerman, SANParks Veterinary Wildlife Services, and Greg Hofmeyr, Bayworld Museum, hastily made the two-hour drive from Gqeberha. Storms River and Oyster Bay NSRI duty crews and Tsitsikamma rangers were mobilised and ready.

Four rescue crafts set out into the rough wintery ocean to access the rugged Storms River mouth. SANParks' "Spirit of Tsitsikamma" rubber duck slowly

approached the area of the reported sighting. The light was fading, rain had settled in and it was almost high tide. Would the leopard still be on the ledge and could it be retrieved safely? With torch and cell phone lights, a young female was spotted clinging to the rocks, her hindquarters submerged by the incoming tide. Rescue teams stood ready while David prepared the capture cocktail and Greg made a makeshift noose using rope and a broomstick. Within a minute the leopard was darted and, as if she knew the team was there to help, swam towards the boat. Greg lifted her onto a kayak with the noose where she rested until she was sedated, lifted into the boat and the rescue craft returned to the slipway to inspect her condition.

Out of the rain and in the light, it became clear that both hindlimb femurs were fractured. The severity of her injuries resulted in a very poor prognosis for this wild leopard. The extensive trauma suggested that she had fallen from a great height while hunting or due to conflict with another leopard. After the immense and extraordinary team effort, the most humane option was to euthanise the young female, another loss to the dwindling leopard numbers in the Eastern and Western Cape.



The severely injured leopard swam towards the rescuers and is lifted onto the kayak while the tranquilliser takes effect.

A thorough examination in the light by SANParks veterinarian, David Zimmerman, revealed serious injuries and a poor prognosis for the young female leopard.



Improving the safety of lion immobilisation

Text by Ashleigh Donaldson, Leith Meyer, Andrea Fuller & Peter Buss
Photos by Andrea Fuller

PHYSIOLOGICAL CHANGES IN LIONS, INDUCED BY IMMOBILISATION, CAN NEGATIVELY IMPACT ANIMALS DESPITE IMMOBILISATIONS APPEARING TO BE HARMLESS ON THE SURFACE. OF THREE DRUG COMBINATIONS TESTED, KETAMINE-BUTORPHANOL-MEDETOMIDINE EMERGED AS PREFERABLE DUE TO SHORTER RECOVERY TIMES



Safe and reliable immobilisation of wildlife is an important tool for conservation around the world. Understanding clinical and physiological effects of different drug combinations is vital to ensuring that immobilisation procedures are safe for both animals and personnel. Free-living African lions (*Panthera leo*) are routinely immobilised in order to conduct research, treat wounds, manage human-wildlife conflict, and investigate disease. Currently, the most commonly used drug combinations for the immobilisation of

lions, which are tiletamine-zolazepam based, result in prolonged recovery times. Despite numerous studies reporting immobilisation with various drug combinations, very little data on associated in-depth physiological effects on respiratory and cardiovascular systems, and risks, are available. Understanding physiological effects of immobilisation allows better treatment plans and responses to complications, which reduces injury or death of animals.

Lion immobilisation cont.

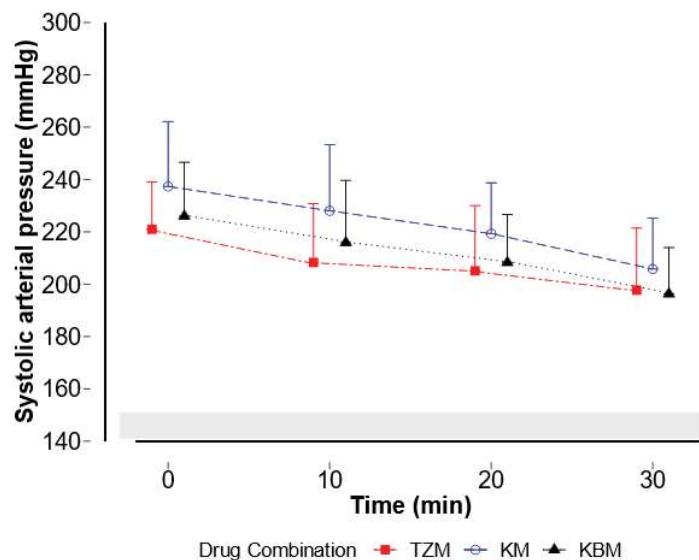


Figure 1. Systolic arterial pressure which is an indication of blood pressure (mean and standard deviation) in African lions immobilised with three drug combinations. All three drug combinations resulted in high blood pressure of immobilised lions. Note: Shaded grey area represents the expected normal range of blood pressures.

We investigated how respiratory and cardiovascular function, as well as immobilisation and recovery quality and time differed in African lions immobilised with tiletamine-zolazepam-medetomidine, ketamine-medetomidine and ketamine-butorphanol-medetomidine. In 2021, 36 lions (12 with each drug combination) were immobilised in the Kruger National Park in the area around Satara Rest Camp. Immobilisation, recovery and physiological data were collected.

We found that all three drug combinations resulted in effective immobilisation of lions, caused minor side-effects for breathing and metabolism, and no single combination gave an advantage in terms of respiration. All lions initially showed a mild decrease in blood oxygen levels, which was not due to breathing problems but was likely a result of hindered oxygen exchange in the lungs caused by drug effects and the stress caused by the immobilisation procedure.

Additionally, all lions immobilised exhibited high blood pressure (Fig. 1), most likely caused by the medetomidine resulting in blood vessels constricting and increasing resistance, and the stress response triggered by immobilisation procedures. Surprisingly, heart rates of lions immobilised with all drug combinations were within normal limits, although lions in all three groups experienced cardiac arrhythmias in the form of skipped heartbeats (Fig. 2). Immobilisation with ketamine-butorphanol-medetomidine resulted in lower blood pressure

than immobilisation with ketamine-medetomidine, and fewer skipped heartbeats than immobilisation with tiletamine-zolazepam-medetomidine. The study revealed that drug combinations commonly used for immobilising lions have negative effects on the heart, which have not previously been reported despite widespread use of the drugs. A key takeaway message is that it is vital to understand physiological changes induced by immobilisation as animals may be negatively impacted despite immobilisations appearing to be uneventful based on visual and basic clinical determination.

Lions immobilised with ketamine-butorphanol-medetomidine recovered three times faster than those immobilised with tiletamine-zolazepam-medetomidine (Fig. 3). Fewer lions immobilised with ketamine-butorphanol-medetomidine experienced difficulties with coordination during the recovery process when compared to those immobilised with the other two drug combinations. Shorter, more coordinated recoveries are advantageous as they reduce the amount of time that lions are vulnerable to attack from other lions and scavengers, such as hyenas, and reduce the chance of injury from stumbling and repeated attempts to stand.

Ketamine-butorphanol-medetomidine emerged as a preferable immobilising drug combination compared to tiletamine-zolazepam-medetomidine and ketamine-medetomidine. Although ketamine-medetomidine results in shorter recovery times than tilet-

amine-zolazepam-medetomidine, it does not provide an advantage over tiletamine-zolazepam-medetomidine with regards to effects on the heart or the number of uncoordinated lions during recovery.

Our results have brought us one step closer to improving our understanding of the physiological effects of immobilising drug combinations used to immobilise free-living lions, as well as understanding the potential mechanisms that result in low blood oxygen levels, high blood pressure, and cardiac arrhythmias. Although a better drug combination for immobilising lions has been identified, there is still work to be done to further improve immobilising protocols and address the remaining negative side effects. Improving immobilising protocols will not only improve the welfare of individual lions but have direct conservation consequences for the species.

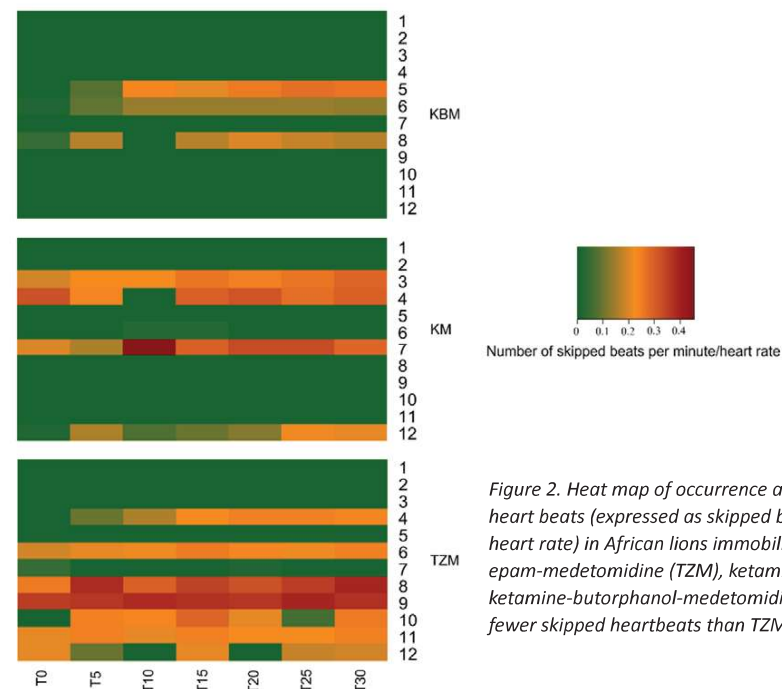


Figure 2. Heat map of occurrence and severity of skipped heartbeats (expressed as skipped beats per minute relative to heart rate) in African lions immobilised with tiletamine-zolazepam-medetomidine (TZM), ketamine-medetomidine (KM) or ketamine-butorphanol-medetomidine (KBM). KBM resulted in fewer skipped heartbeats than TZM.

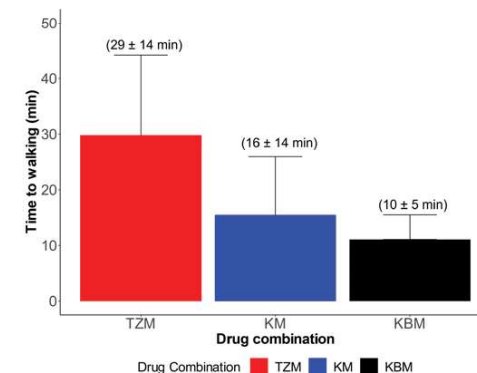


Figure 3. Time from administration of antagonist to walking in African lions that were immobilised with the three drug combinations. KBM offered the fastest recovery times.

Donaldson AC, Meyer LCR, Fuller A & Buss PE. 2023. Comparison of the cardiovascular effects of immobilisation with three different drug combinations in free-ranging African lions. Conservation Physiology 11: coac077.

Donaldson AC, Fuller A, Meyer LCR & Buss PE. 2023. Chemical immobilisation of lions: weighing up drug effectiveness versus clinical effects. Journal of The South African Veterinary Association 94: 23-34. <https://journals.co.za/doi/abs/10.36303/JSAVA.544>