

DETECTION OF HYPERTHERMIA DURING CAPTURE OF WILD ANTELOPE

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ABSTRACT

Capture of wildlife often leads to high animal mortality. In many species, capture is associated with development of a high body temperature. This stress-induced hyperthermia appears to form an integral part of capture-related mortalities, since it occurs before, during and after exposure to capture. I used two wildlife species, impala and blesbok, and exposed them to darting and net capture so as to investigate thermal and haematological changes that occur during capture. We implanted the animals with temperature-sensitive data loggers within the abdominal cavity (for core body temperature) and caudal aspect of the thigh (for muscle temperature). Activity loggers were tethered to the abdominal wall to measure locomotor activity. Blood samples were taken after capture when the animal became recumbent and another sample 10 minutes after the first sample in order to determine haematological changes. Impala had higher abdominal body temperatures during net capture in comparison to darting, whereas blesbok abdominal body temperatures did not differ between capture methods. Different species and individuals of the same species respond differently to various capture procedures. However, I found that irrespective of the capture event or whether impala or blesbok were captured, human presence before capture caused abdominal body temperatures to rise. Similar to thermal responses, there also was high variability between individuals in terms of blood variable concentrations used to quantify physiological responses to capture. Overall, blood variable changes (total protein, sodium, lactate, haematocrit, noradrenaline, adrenaline, potassium, creatine phosphokinase, pH) were similar for impala and blesbok in response to the two capture procedures. Cortisol values in blesbok however showed a greater response during darting whereas impala showed a greater response during net capture. Similarly, osmolality values showed a greater response during net capture whereas impala showed a greater response during darting. Both the species

showed that sodium and lactate correlated positively as well as noradrenaline and adrenaline correlated positively. The correlation between two variables allows us to measure only one of the variables, predicting the change of another. Unpredictable differences in thermal and blood variable measurements of impala and blesbok between different capture procedures did not allow me to correlate the thermal responses after a capture event to stress-related blood variables.

The issue of obtaining a practical and accurate measurement of the hyperthermic response during capture also often arises. Rectal temperature is currently the method of choice to determine body temperature in the field. I aimed to investigate whether muscle temperature measurement can be used as an alternative body temperature measurement in the field. When abdominal core body temperatures were high, muscle temperature measurements were close to and even slightly higher than the abdominal body temperature measurements in both the species. However, low abdominal body temperatures, muscle temperature measurements were at lower and much less accurate in predicting abdominal body temperatures. Muscle temperatures can therefore predict abdominal body temperatures with sufficient accuracy during a capture event, since animals respond to capture with elevated body temperatures thus increasing the similarity between the abdominal and muscle temperature measurements measured. One potential problem with muscle temperature, is that it may reflect exercise-induced temperature increases during capture, independently of a rise in abdominal body temperature. I found that the rise in muscle temperature was not only a result of the increase in activity during a capture event but rather as a result of stress-induced hyperthermia. The increase in activity only contributes to the overall hyperthermia of the animal.

The degree to which stress-induced hyperthermia contributes to mortality during capture is unclear. During my study, five impala died unexpectedly. Four impala died during the first trial while the fifth impala died before the completion of the last trial. I therefore compared the hyperthermic and haematological changes in surviving and non-surviving individuals. Both non-surviving and surviving impala in my study showed a rise in abdominal body temperature during the capture however the highest abdominal body temperatures occurred in individuals in both the surviving and non-surviving group. Very high abdominal body temperatures greater than 41°C and 43°C occurred in individuals of both the non-surviving and surviving animals, respectively. Some animals with an abdominal body temperature of 43°C, therefore survived whereas other individuals died when experiencing abdominal body temperature of less than 41°C. Blood variable responses (Creatine phosphokinase, glucose, potassium, calcium, sodium, lactate, osmolality, noradrenaline, adrenaline, pH) of the non-surviving individuals showed high values in comparison to the blood variable measurements of the surviving group. The blood variable measurements were however sampled late which will affect the measurements but can still be used to predicted mortality in the non-surviving impala.

The blood variable measurements therefore were associated with mortality in the non-surviving impala. In conclusion, whether stress-induced hyperthermia can be used as a sole measure to identify a compromised individual during a capture event and concomitantly enable us to give appropriate treatment is unclear. It is evident from my study that capture induced a hyperthermic response in excitable impala as well as in the much less excitable blesbok. My study is one of few systematic studies on capture stress and shows that body temperature used in conjunction with other parameters may be useful in estimating the degree of stress in captured animals, and thus predicting likelihood of mortality or morbidity. My

study also revealed that muscle temperature, possibly measured in the field by a needle-stab method, may provide an index of core body temperature.