

### Comparison of the Antiphospholipid Syndrome to Medical Syndromes of Captive Black Rhinos (*Diceros bicornis*)

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Black rhinos in captivity have been plagued by a host of clinical entities. These include superficial necrolytic dermatitis (SND), hemosiderosis, hemolytic and non-hemolytic anemias, and most recently the idiopathic hemorrhagic vasculopathy syndrome (IHVS) has been described in a group of black rhinos. Other conditions affecting black rhinos include encephalomalacia<sup>10</sup> and necrotic laminar disease. Infectious conditions ranging from *Salmonella*, *Aspergillus* pneumonia, and leptospirosis have all been documented. Recurrent embryonic/fetal loss has been seen in one female by the author and in captive Sumatran rhinos (T. Roth, pers.comm.). The antiphospholipid syndrome (APS) is defined as the occurrence of venous and arterial thrombosis, recurrent fetal losses, and frequently a moderate thrombocytopenia in the presence of the phospholipid antibodies (aPL), namely lupus anticoagulant (aLA), anticardiolipin antibodies (aCL), or both. The pathogenesis of APS is quite simply thrombosis regardless of the organ system involved.

Comparisons between APS and black rhino syndromes may not be obvious at first but there may be some parallels (Table 1). Other manifestations and criteria that constitute APS in rhinos have been seen sporadically. Thrombocytopenia is a hallmark of the condition. Coagulation profiles and the development of black rhinoceros specific ELISA for APS related antibodies will be described.

Table 1. Comparisons within organ systems between APS and black rhino syndromes

System	APS	Black Rhino Syndrome
Skin/Digits	Cutaneous necrosis, livedo reticularis	Superficial necrolytic dermatitis, laminar necrosis, IVHS
Pulmonary	Pulmonary embolism	IVHS, hemosiderosis
Cardiovascular	Valvular lesions	Valvular hemosiderosis
Reproductive	Embryonic/fetal loss	Embryonic/fetal loss
Neurological	Cerebral ischemia	Encephalomalacia

### Multiple Isoflurane Anesthesia in a Captive Black Rhinoceros (*Diceros bicornis*)

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Inhalant anesthesia in rhinoceros has been reported on a couple of occasions. In all instances reported, euthanasia was performed or the rhino expired in the perianesthetic period from surgical complications. A four-year male black rhinoceros estimated at 1000kg was anesthetized twice and maintained on isoflurane and ventilated on two separate occasions for diagnostics evaluation of a fractured maxillary sinus. Combinations of detomidine, butorphanol, halperidol, xylazine, ketamine, and etorphine were used for pre-mediations and inductions. A 28mm endotracheal tube was placed with the aid of a 1.7m colonoscope and isoflurane was administered with intermittent positive pressure ventilation. Serial blood gas taken from an auricular artery, non-invasive blood pressure monitoring with the cuff on the base of the tail, oxygen saturation via pulse oximetry, and base apex electrocardiogram (ECG) monitoring were followed during the procedure when feasible. The rhino was maintained in sternal recumbency for the entire procedure. The elapsed time of isoflurane anesthesia for the first anesthesia was 172 minutes and 230 minutes for the second procedure. Recoveries were smooth and uncomplicated with the animal exhibiting normal behaviors within 2 hours of each event.

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