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**ELECTROENCEPHALOGRAM-BASED INDICES FOR DEPTH-OF-ANAESTHESIA
MONITORING IN WHITE RHINOCEROSES (*CERATOTHERIUM SIMUM*)
IMMOBILISED WITH DIFFERENT ETORPHINE-BASED COMBINATIONS**

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Short Abstract

White rhinoceroses are routinely immobilised with the potent opioid etorphine combined with a sedative. While these drugs usually induce satisfactory immobilisation, their effect on the depth of anaesthesia is poorly understood.

In this randomised-crossover-trial, eight boma-housed sub-adult rhinoceros bulls were immobilised with etorphine (2µg/kg, E; Wildlife Pharmaceuticals, South Africa), etorphine-azaperone (2µg/kg+10µg/kg, EAza; Janssen, South Africa), etorphine-midazolam (2µg/kg+10µg/kg, EMid; Wildlife Pharmaceuticals), and etorphine-medetomidine (2µg/kg+5µg/kg, EMed; Wildlife Pharmaceuticals) with a two week wash-out period in-between. Butorphanol (20µg/kg, Wildlife Pharmaceuticals) was administered intravenously at 12-minutes and oxygen supplemented intra-nasally at 42-minutes after recumbency. The Root patient-monitor with Sedline (Masimo, USA) electroencephalogram (EEG) was used to record Patient-State-Index (PSI), Spectral-Edge-Frequency (SEF), electromyography (EMG), and burst-suppression-ratio (SR). The effects of immobilisation protocol and time were tested using a generalized-linear-mixed-model with rhinoceros as random factor.

Ear movement and reflex correlated with EEG indices. PSI and EMG decreased and SR increased over time reflecting the peak effects of the administered drugs. PSI was highest for E and EMid (76±23 and 75±24), followed by EAza (70±29, p<0.001), and then EMed (44±34, p<0.001). SEF and EMG revealed similar results indicating that addition of midazolam to etorphine had little to no effect on depth of immobilisation and that only EMed appeared to induce surgical anaesthesia. However, the frequent occurrence of burst suppression (SR 23±32%) indicated anaesthesia might have been too deep with EMed at this dose. E alone showed high EEG activity, indicating a light plane of anaesthesia and the need to add sedatives.