NEGATIVE EFFECTS OF ANALGESIC AND ANESTHETIC DRUGS ON SPERM MOTILITY: IMPLICATIONS FOR ASSISTED BREEDING IN MANAGED RHINOCEROS

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Abstract

Drugs utilized for immobilization for assisted breeding may have negative effects on sperm motility. Opioid receptors have been detected on the head, neck, and tail of sperm cells of humans, horses, and boar.[1,2,4] The mu and delta opioid receptors modulate sperm motility; however, interspecies variation exists.[3] Butorphanol stopped sperm motility in human in vitro studies, while other opioids, such as fentanyl, had partial inhibitory activity.[5] Domestic horses and cattle were used to develop an in vitro model evaluating drugs utilized for semen collection in rhinoceros. Semen was collected from stallions with an artificial vagina and from bulls using electro-ejaculation. Semen concentrations were standardized to a minimum 60 million sperm cells/ml. Butorphanol (μ and κ opioid partial agonist/antagonist), naloxone (opioid antagonist), xylazine (alpha-2 agonist) and detomidine (alpha-2 agonist) were added to aliquots of sperm at concentrations from 0.01 μg/ml to 400 μg/ml and incubated for 240 min. Computer-assisted sperm analysis (CASA) was used to determine sperm motility as the percent of progressive motility at drug exposure and specific time intervals thereafter. Butorphanol, detomidine, and xylazine had significant negative effects on sperm motility with increasing drug concentrations. Naloxone had no effects on progressive sperm motility at all drug concentrations evaluated. Opioid drugs (butorphanol and etorphine) were detected in stored seminal plasma from immobilized black (*Diceros bicornis*), southern white (*Ceratotherium simum simum*), and greater one-horned (*Rhinoceros unicornis*) rhinoceros, indicating the potential for negative effects of these drugs on sperm motility. Comparison of drug concentrations from additional serum and seminal plasma samples are pending.

Key words: Artificial insemination, opioids, rhinoceros, sperm motility

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