

COMPARISON OF STEROID HORMONE CONCENTRATIONS IN SERUM AND PLASMA OF NON-DOMESTIC SPECIES

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For laboratory tests, using the specified blood sample is critical as analyses using serum or different plasmas (sodium-heparin, lithium heparin, sodium fluoride and EDTA) produce different results. Assays developed for hormone blood analysis specify that serum should be used. However, in practice, serum and plasma are sometimes interchanged when sufficient quantities of serum are unavailable, though it is not known whether steroid hormone concentrations differ between blood samples processed in different ways.

The goal of this study was to investigate whether concentrations of steroid hormones varied between serum and plasma of five non-domestic species: cheetah, okapi, white rhinoceros, black rhinoceros and Mississippi sandhill crane. Specific objectives were to 1) compare the concentrations of estradiol, corticosteroids, testosterone and progestagens in serum and sodium heparinized plasma; and 2) investigate the effects of different anticoagulants on steroid hormone concentrations in plasma samples of white and black rhinoceros.

Serum and sodium-heparinized plasma were collected from cheetah (non-pregnant), okapi and Mississippi sandhill crane, on the same day, as was serum, sodium-heparin, lithium-heparin, sodium-fluoride and EDTA plasma from black and white rhinoceros. Samples were stored frozen (-70°C) until analysis. Hormone concentrations were measured using heterologous enzyme-linked immunoassays (EIA). Assays were validated for each species by serially diluting pooled serum to yield displacement curves parallel to a standard curve, and by determining the recovery of known amounts of hormone added to pools of diluted serum. Parallel curves were not obtained for a) estradiol for any of the species tested; b) corticosteroids in Mississippi Sandhill crane; or c) progestagens in cheetah and Mississippi sandhill crane. Preliminary analysis revealed that sex and age did not influence concentrations of corticosteroids, testosterone or progestagens between serum and plasma, so data were then combined for a stronger analysis. No statistical differences ($P > 0.05$) were found in concentrations of corticosteroids, testosterone, or progestagens between serum and heparinized plasma for the species in which these hormones could be measured. Furthermore, in black and white rhino the concentrations of testosterone, corticosteroids and progestagens were not significantly different ($P > 0.05$) between plasma derived from any of the anticoagulants tested. In summary, it has been determined that 1) using serum or plasma samples for the analysis of testosterone, cortisol or progesterone in the above species will yield comparable results; 2) choice of anticoagulant in plasma samples does not alter steroid hormone concentrations. Lastly, EIA can be used to determine blood concentrations of a) testosterone in male and female cheetah, okapi, white and black rhinoceros and Mississippi sandhill crane, b) corticosteroids in cheetah and okapi, c) progestagens in okapi and white and black rhinoceros.

Key words: EIA; steroid hormones; anticoagulants; serum; plasma.