Effects of low-dose hydrocortisone therapy on immune function in neonatal horses

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Background: Low-dose hydrocortisone therapy modulates inflammatory responses in adults and improves outcomes in some septic adults and neonates, but its immunologic effects have not been evaluated in neonates of any species.

Objective: To evaluate effects of low-dose hydrocortisone (LDHC) therapy on ex vivo immune function in neonatal foals. We hypothesized that LDHC treatment would dampen pro-inflammatory responses without impairing neutrophil function.

Animals: 39 healthy 2-to-7-day-old full-term foals

Methods: Hydrocortisone (1.3 mg/kg/day i.v.) was administered to 11 foals in a tapering 3.5 day course. Peripheral blood leukocytes were collected from foals before, during and after hydrocortisone treatment. A separate group of 28 age-matched untreated foals served as controls. Endotoxin-induced peripheral blood mononuclear cell gene expression of inflammatory cytokines was measured by real time quantitative RT-PCR. Neutrophils were incubated with labeled, killed S. aureus or E. coli for assessment of phagocytosis, and with phorbol myristate acetate, zymosan, or endotoxin for measurement of reactive oxygen species (ROS) production. Data were compared between groups with Student’s t tests for parametrically distributed data and Mann Whitney U tests for non-parametric data (significance P<0.05).

Results: No adverse effects were observed in any foals receiving hydrocortisone. Neutrophil phagocytosis and ROS production were similar in both groups. However, foals receiving hydrocortisone had significantly decreased endotoxin-induced production of TNF-α, IL-6, IL-8 and IL-1β during and after hydrocortisone treatment.

Conclusions and Clinical Relevance: These data suggest that this LDHC treatment regimen ameliorates endotoxin-induced pro-inflammatory cytokine expression in neonatal foals without impairing innate immune responses needed to combat bacterial infection.

Portions of these data were presented as a research abstract (oral presentation) at the 2010 ACVIM Forum, June 2010, Anaheim, CA.