Somatotropic axis and growth hormone resistance in critically ill foals

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While our understanding of endocrine factors involved with metabolic functions in healthy and critically ill foals is improving, information on other systems linking the hypothalamus with the pituitary gland and other body systems is minimal. A good example is the somatotropic axis (growth hormone-GH axis), which in addition to promote growth, cell differentiation and energy expenditure, also modulates reproductive functions. The somatotropic axis consists of GH-releasing hormone, GH, and insulin-like growth factor-1 (IGF-1). Ghrelin is an extra-hypothalamic (gastrointestinal) component of this axis that stimulates hunger and GH secretion.

The goal of this project was to determine whether components of the somatotropic axis (GH, IGF-1, ghrelin) and energy metabolites (glucose, triglycerides) were associated with severity of disease in newborn foals. We hypothesized that GH and ghrelin will be higher and IGF-1 lower in septic foals, and associated with severity of sepsis and mortality. Blood samples were collected from 40 septic (sepsis score ≥12), 60 sick non-septic (score <11), and 20 healthy neonatal foals (<3 days old). Hormones were measured by RIA (ghrelin, GH) and ELISA (IGF-1). Data was analyzed by non-parametric statistics.

GH, ghrelin and triglyceride concentrations were higher while IGF-1 and glucose concentrations were lower in septic foals compared to sick non-septic and healthy foals. Sick non-septic foals had higher ghrelin, GH and lower IGF-1 concentrations than healthy foals. Hormones were not associated with survival. High ghrelin likely resulted from inflammatory mediators and/or an empty stomach. Low IGF-1 in the presence of high ghrelin and GH concentrations indicates “GH Resistance”, which in septic foals could be affecting several metabolic functions. Somatotropic axis failure was recently associated with sepsis and mortality in critically ill children.