High molecular weight adiponectin in horses

Wooldridge AA,1,3 Edwards HG1, Plaisance EP,2,3 Applegate R,1 Taylor DR,1 Taintor J,1 Zhong Q,1 Judd RL2,3

From the Departments of Clinical Sciences1 and Anatomy, Physiology, and Pharmacology2, and the Boshell Diabetes and Metabolic Diseases Research Program3, Auburn University College of Veterinary Medicine, Auburn, Alabama, 36849

Objective: Adiponectin is an adipose-derived protein, circulating as multimers from 90 kDa to 900 kDa in humans. High molecular weight (HMW) adiponectin multimers (360-900 kDa) are primarily responsible for the insulin sensitizing properties of the protein. Serum total adiponectin concentrations have been evaluated in horses, but there is no information regarding multimer distribution. The purpose of this study was to characterize adiponectin protein complexes in normal and obese horses.

Animals: Serum samples from client or university-owned lean (n=26) and obese (n=19) horses.

Procedures: Body condition score (BCS) and insulin were measured for each horse. Denaturing and native western blot analyses were used to evaluate adiponectin complexes in horse serum. A human ELISA kit was validated and used to quantify HMW complexes. Correlations between variables were made using Spearman correlation coefficients, and HMW values were compared between groups using ANOVA with P<0.05.

Results: Adiponectin was present as a multimer consisting of LMW (180 kDa), trimeric (90 kDa), dimeric (60 kDa), and monomeric (30 kDa) complexes under various denaturing and reducing conditions in horse serum. Native gel electrophoresis showed HMW complexes were present and reduced in obese versus lean horses. HMW adiponectin was negatively correlated with serum insulin and BCS, and was lower in obese (3.9 ± 3.8 ng/mL) compared to normal 7.4 ± 3.8 (ng/mL) horses.

Conclusions and clinical relevance: HMW adiponectin is measurable by ELISA and is negatively correlated with BCS and serum insulin. A greater understanding of the role of adiponectin in equine metabolism will provide insight into the pathophysiology of metabolic disease conditions.