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Background: Among the acute phase proteins, α_1-acid glycoprotein (AGP) stands out by being regulated in adipose tissue, modulating inflammation and metabolism. Therefore, AGP may have a functional role in obesity and a potential as biomarker for obesity and obesity related metabolic perturbations. In swine, AGP behaves as a negative acute phase protein, in contrast to other mammals, with decreased hepatic gene (ORM1) expression and serum concentration during bacterial infection and aseptic inflammation. However, in obesity, AGP was previously found to be upregulated in the Ossabaw pig.

Aims: To investigate the regulation of AGP in diet induced obese Ossabaw pigs, compared to the AGP response during acute aseptic inflammation induced by lipopolysaccharide (LPS).

Results: A short term, 11-week, obesity feeding of Ossabaw pigs with a high fat (54% of energy), 0.5% cholesterol diet resulted in a significant weight increase (58%) accompanied by a significant decrease in AGP serum concentration, both compared to lean controls. Additionally, in the obese group a significant decrease in subcutaneous and visceral adipose tissue expression of the ORM1 gene was observed, while hepatic expression was not affected. Acute aseptic inflammation induced by LPS did not lead to changes in AGP serum concentrations.

Discussion: Previous results indicate that long term (40 weeks) obese dieting with a 2% cholesterol and high fat (43% of energy) diet resulted in a significantly increased AGP serum concentration in obese Ossabaw pigs (66% weight increase). In contrast, the short-term dieting period investigated here resulted in a significantly decreased AGP serum concentration, accompanied by a significant downregulation of ORM expression in obese adipose tissue. Acute aseptic inflammation induced by LPS did not affect AGP serum concentrations, in contrast to what was previously observed with alternative aseptic inflammatory stimulators in other pig breeds. We conclude that circulating AGP concentrations in the Ossabaw pig reflect the fattening diet type and the duration of the feeding period rather than the weight increase *per se*. Given the potential association of AGP with energy homeostasis, AGP may prove useful as a discriminating biomarker for specific types of responses to obesity.