Abstract


Circulating adiponectin concentrations are increased by dietary resistant starch and correlate with serum 25-hydroxycholecalciferol concentrations and kidney function in Zucker diabetic fatty rats.

Koh GY, Derscheid R, Fuller KN, Valentine RJ, Leow SE, Reed L, Wisecup E, Schalinske KL, Rowling MJ.

The Interdepartmental Graduate Program in Nutritional Sciences, Iowa State University, Ames, IA, USA; Department of Food Science and Human Nutrition, Iowa State University, Ames, IA, USA; Veterinary Diagnostic Laboratory, College of Veterinary Medicine, Iowa State University, Ames, IA, USA; The Interdepartmental Graduate Program in Nutritional Sciences, Iowa State University, Ames, IA, USA; Department of Kinesiology, Iowa State University, Ames, IA, USA.

OBJECTIVE: We previously reported that dietary resistant starch (RS) type 2 prevented proteinuria and promoted vitamin D balance in type 2 diabetic (T2D) rats. Here, our primary objective was to identify potential mechanisms that could explain our earlier observations. We hypothesized that RS could promote adiponectin secretion and regulate the renin-angiotensin system activity in the kidney.

METHODS: Lean Zucker rats (n = 5) were fed control diet; Zucker diabetic fatty rats (n = 5/group) were fed either an AIN-93G control diet (DC) or AIN-93G diet containing either 10% RS or 20% RS (HRS) for 6 weeks.

RESULTS: Resistant starch had no impact on blood glucose concentrations and hemoglobin A1c percentage, yet circulating adiponectin was 77% higher in HRS-fed rats, compared to DC rats. Adiponectin concentrations strongly correlated with serum 25-hydroxycholecalciferol (r = 0.815; P < .001) and urinary creatinine concentrations (r = 0.818; P < .001) and inversely correlated with proteinuria (r = -0.583; P = .02). Serum angiotensin II concentrations were 44% lower, and expression of the angiotensin II receptor, type 1, was attenuated in RS-fed rats. Moreover, we observed a 14-fold increase in messenger RNA expression of nephrin, which is required for functioning of the renal filtration barrier, in HRS rats. The HRS, but not 10% RS diet, increased circulating 25-hydroxycholecalciferol concentrations and attenuated urinary loss of vitamin D metabolites in Zucker diabetic fatty rats.

CONCLUSION: Taken together, we provide evidence that vitamin D balance in the presence of hyperglycemia is strongly associated with serum adiponectin levels and reduced renal renin-angiotensin system signaling.

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