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Effect of Adiponectin on Kidney Crystal Formation in Metabolic Syndrome Model Mice via Inhibition of Inflammation and Apoptosis

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Abstract

Recently, kidney stone formation has been recognized as a MetS-related disease [1-4]. The aims of the present study were to elucidate a possible mechanism of kidney crystal formation by using a metabolic syndrome (MetS) mouse model and to assess the effectiveness of adiponectin treatment for the prevention of kidney crystals. Further, we performed genome-wide expression analyses for investigating novel genetic environmental changes. Wild-type (+/+) mice showed no kidney crystal formation, whereas ob/ob mice showed crystal depositions in their renal tubules. However, this deposition was remarkably reduced by adiponectin. Expression analysis of genes associated with MetS-related kidney crystal formation identified 259 genes that were >2.0-fold up-regulated and 243 genes that were <0.5-fold down-regulated. Gene Ontology (GO) analyses revealed that the up-regulated genes belonged to the categories of immunoreaction, inflammation, and adhesion molecules and that the down-regulated genes belonged to the categories of oxidative stress and lipid metabolism. Expression analysis of adiponectin-induced genes related to crystal prevention revealed that the numbers of up- and down-regulated genes were 154 and 190, respectively. GO analyses indicated that the up-regulated genes belonged to the categories of cellular and mitochondrial repair, whereas the down-regulated genes belonged to the categories of immune and inflammatory reactions and apoptosis. The results of this study provide compelling evidence that the mechanism of kidney crystal formation in the MetS environment involves the progression of an inflammation and immunoresponse, including oxidative stress and adhesion reactions in renal tissues. This is the first report to prove the preventive effect of adiponectin treatment for kidney

crystal formation by renoprotective activities and inhibition of inflammation and apoptosis.

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