Purple corn compound may aid in developing future treatments for Type 2 diabetes, kidney disease

September 18 2012

Diabetic nephropathy is one of the most serious complications related to diabetes, often leading to end-stage kidney disease. Purple corn grown in Peru and Chile is a relative of blue corn, which is readily available in the U.S. The maize is rich in anthocyanins (also known as flavonoids), which are reported to have anti-diabetic properties. Scientists from the Department of Food and Nutrition and Department of Biochemistry at Hallym University in Korea investigated the cellular and molecular activity of purple corn anthocyanins (PCA) to determine whether and how it affects the development of diabetic nephropathy (DN). Their findings suggest that PCA inhibits multiple pathways involved in the development of DN, which may help in developing therapies aimed at type 2 diabetes and kidney disease.

The study is entitled "Purple corn anthocyanins inhibit diabetes-associated glomerular monocyte activation and macrophage infiltration" bit.ly/SlrkRY. It appears in the online edition of the American Journal of Physiology – *Renal Physiology*, published by the American Physiological Society (APS).

Methodology

Researcher Min-Kyung Kang and colleagues performed a two-part study, an in vitro experiment investigating the effects of PCA on human endothelial cells cultured under hyperglycemic kidney conditions and an

in vivo study that investigated the effects of PCA on kidney tissue in diabetic mice. In the in vitro experiment, cultured cells were exposed to 1-20 µg/ml of PCA for six hours (control cells were not exposed), then assessed for level of monocyte-endothelial cell adhesion, a major factor in the development of diabetic glomerulosclerosis. In the in vivo experiment, diabetic and control mice were dosed with PCA for eight weeks, then changes in kidney tissue were assessed and immunohistological analyses were performed. Kidney tissue was further analyzed for levels of inflammatory chemokines, which are key components in DN.

Results

Researchers found that in human endothelial cells cultured in hyperglycemic kidney conditions, induction of endothelial cell adhesion molecules decreased in a dose-dependent manner with PCA exposure, meaning that the PCA likely interfered with cell-cell adhesion in glomeruli. PCA also appeared to interfere with leukocyte recruitment and adhesion to glomerular endothelial cells. In diabetic mice, PCA exposure slowed mesangial expansion and interrupted the cellular signaling pathway that may instigate glomerular adhesion and infiltration of inflammatory cells responsible for diabetic glomerulosclerosis. Finally, PCA inhibited levels of macrophage inflammatory protein-2 and monocyte chemotactic protein-1 in kidney tissue, demonstrating that it may inhibit macrophage infiltration, which is closely related to renal inflammation.

Importance of the Findings

The research suggests that anthocyanins may be the main biofunctional compound in purple corn and could protect against mesangial activation of monocytes and infiltration of macrophages in glomeruli—the two

major contributors to DN. The research further suggests that renoprotection by PCA against mesangial activation may be specific therapies targeting diabetes-associated diabetic glomerulosclerosis and renal inflammation. Finally, PCA supplementation may be an important strategy in preventing renal vascular disease in type 2 diabetes.

"PCA may be a potential renoprotective agent treating diabetes-associated glomerulosclerosis," wrote the researchers.

More information: ajprenal.physiology.org/conten … 6.2012.full.pdf+html

Provided by American Physiological Society