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## 당뇨병성 신증 동물 모델에서 AMPK 활성화를 통한 안토시아닌의 신보호 효과

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### Anthocyanin Ameliorates Renal Lipotoxicity and Oxidative Stress via Activation of AMP-Activated Protein Kinase in db/db Mice

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**Background:** Anthocyanins are major constituents of food colors and have been reported to possess antidiabetic, antiangiogenic, and anticarcinogenic activities for potential medicinal use. However, the precise role of anthocyanin for diabetic nephropathy is poorly understood. We investigate whether anthocyanin can potentially prevent oxidative stress, which are the main causes of renal damage in diabetic nephropathy, via activation of AMPK, and the consequent effects on its target molecules.

**Methods:** Four groups of male C57BLKS/J db/m and db/db mice were used in this study. The diabetic and non-diabetic mice were orally administrated drinking water or 10mg/kg body weight anthocyanin daily, starting at 8 weeks of age, for 12 weeks.

**Results:** The db/db mice treated with anthocyanin had decreased albuminuria and urine volume. Anthocyanin ameliorated glomerular matrix expansion and inflammation. Anthocyanin was related to increase in the phosphorylation of AMPK and the activation of peroxisome proliferative-activated receptor (PPAR)- $\alpha$  - PPAR- $\gamma$  coactivator (PGC)-1 $\alpha$  - oestrogen-related receptor (ERR)-1 $\alpha$  pathway, while inhibited the activity of acetyl-CoA carboxylase (ACC). This resulted in a increase in the ratio of Bcl-2/Bax, superoxide dismutase (SOD)1 and SOD2 production. Consequently, anthocyanin reversed the increase in renal apoptotic cells and oxidative stress, as reflected by urinary isoprostane concentrations. Additionally, in cultured human glomerular endothelial cells, anthocyanin prevented high-glucose-induced oxidative stress and apoptosis through the activation of AMPK in the same manner.

**Conclusion:** The results revealed that anthocyanin ameliorate diabetic nephropathy in db/db mice by the phosphorylation of AMPK, the major energy sensing enzyme and the consequent effects on its target molecules, which appear to prevent lipotoxicity-related apoptosis and oxidative stress in the kidney.

**Key Words:** 안토시아닌, AMPK, 당뇨병성 신증

Anthocyanin, AMPK, Diabetic nephropathy