

## 겐타마이신으로 유발된 급성신부전에서 홍삼의 신보호 효과

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### Reno-protective Effects of Korean Red Ginseng in Gentamicin-induced Acute Kidney Injury (AKI)

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**Introduction :** Gentamicin-induced nephrotoxicity is one of the prevalent causes of AKI, in which oxidative stress-mediated apoptosis of renal tubular cells has been known to be the main mechanism. Although Korean Red Ginseng (KRG), one of the most widely used health food in Korea, has been reported to show anti-oxidant and immune-modulatory activities, it has not been welcomed due to possible nephrotoxicity of KRG. In order to investigate the reno-trophic effect of KRG, we evaluated the renal function in gentamicin-induced AKI treated with KRG with an assessment of markers of oxidative stress.

**Methods :** Forty male Sprague-Dawley rats were divided into four groups: Control (C), Gentamicin (GM, 100 mg/kg/day, ip for 10 days), GM+KRG (100 mg/kg of KRG for 30 days before the 1st GM injection) and only KRG group. Measurement of BUN, creatinine, proteinuria with histologic analysis including TUNEL staining for assessing cell apoptosis was performed on day 0, 1, 3 and 10 days of GM injection. For evaluation of oxidative stress in the kidney, tissue glutathione (GSH) levels and urine 8-OHdG were measured. Effect of KRG extract (KRGE, 500 µg/mL) on cell proliferation, cytotoxicity and generation of reactive oxygen species (ROS) were also investigated in GM (3 mM/L)-treated HK-2 cells by MTT assay, LDH assay and DCF-DA staining with FACScan analysis.

**Results :** KRG pre-treatment for 30 days significantly attenuated renal dysfunction, cell apoptosis and tubular damage in GM-induced AKI rats at day 3 and day 10. KRG only groups showed no effect on parameters of renal function and histology. KRG significantly decreased ROS production at day 10 (GSH  $1.5 \pm 0.1$  vs.  $5.0 \pm 2.5$  µmol/g kidney wt,  $p < 0.05$ ; 8-OHdG in urine  $3.0 \pm 1.5$  vs.  $2.0 \pm 0.5$  ng/mg creatinine,  $p < 0.05$ ). KRGE significantly protected HK-2 cells from GM-induced cytotoxicity with a reduction of ROS generation.

**Conclusion :** Our results suggest that KRG may protect the kidney from aminoglycoside-induced AKI, possibly via the mechanism of modulation of oxidative stress. Further studies will be necessary to verify therapeutic potential of KRG with an investigation of reno-protective mechanisms in various spectrum of renal disease.

**Key Words :** 겐타마이신, 급성신부전, 고려홍삼

Gentamicin, Acute Kidney injury, Korean Red Ginseng