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쥐에서 파라콰트유발 신독성에 대한 키토산올리고당의 신보호 효과

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Protective Effects of Chitosan Oligosaccharide on Paraquat-Induced Nephrotoxicity in Rats

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Background: Since generation of reactive oxygen species obviously contributes to the development of paraquat (PQ) toxicity, apoptosis may be considered to play a role in PQ induced nephrotoxicity. Increased evidences suggest that anti-oxidants may prevent PQ-induced apoptosis. In this study we attempted to investigate the apoptotic pathway in the PQ-induced nephrotoxicity as well as renoprotective effects of chitosan oligosaccharide (COS) in the male Sprague-Dawley rats.

Materials and Methods: Adult male Sprague-Dawley rats were treated with PQ (60 mg/kg, ip), COS (500 mg/kg, po, 3 days before PQ injection) or both PQ and COS, and then divided into two groups, PQ group and COS-PQ group. Experimental animals were sacrificed before PQ administration (n=5/each group) and 4, 12, and 24 hours after PQ administration (n=7/each group). PQ concentration, kidney functions, histological findings, expressions of PUMA, caspase-3 and APE were compared for the different groups.

Results: Compared with the vehicle-treated rats, rats given PQ showed an increase in serum PQ concentration, blood urea nitrogen and creatinine levels with time dependent manner ($p<0.05$/each). All the above parameters were significantly reversed with COS pretreatment ($p<0.05$/each). After PQ injection, there were cell deaths in proximal renal tubules with increased expression of PUMA and caspase-3, while there was little change in APE expression. COS prevented the degenerative changes with decreased expression of PUMA and caspase-3 and increased expression of APE.

Conclusion: Taken together, the present results showed that PQ activates apoptotic gene and caspase cascade in rat kidney, which might contribute to clinical manifestations of PQ-induced nephrotoxicity. COS proved to protect kidneys from PQ-induced toxicity in association with a decrease of apoptosis.

Key Words: 세포자멸사, 파라콰트, 키토산올리고당
Apoptosis, Paraquat, Chitosan oligosaccharide