

## 일측 요로 폐쇄 마우스의 신장에서 Nrf2 세포 내 이동을 통한 oleanolic acid의 신장 섬유화 억제 효과

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정성진, 윤혜은, 김수정, 김성준, 고은실, 박철휘, 장윤식, 신석준

### Oleanolic Acid Attenuates Renal Interstitial Fibrosis in Unilateral Ureteral Obstructive Nephropathy by Facilitating Nuclear Translocation of Nrf2

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**Background:** Renal interstitial fibrosis is a common final pathological process in the progression of renal disease. This is primarily due to oxidative stress, which contributes to renal inflammation and fibrosis. Nuclear factor-erythroid-2-related factor 2 (Nrf2) is known to coordinate induction of genes that encode antioxidant enzymes. We investigated the effects of oleanolic acid, a known Nrf2 activator, on oxidative stress-induced renal inflammation and fibrosis.

**Methods:** Oleanolic acid treatment was initiated one week before unilateral ureteral obstruction (UUO) in C57BL6/J mice, and was continued until 3, 7, and 14 days after UUO. Renal inflammation and fibrosis, markers of oxidative stress, and changes in Nrf2 expression were subsequently evaluated.

**Results:** In the kidneys of UUO mice, oleanolic acid significantly attenuated UUO-induced collagen deposition and macrophage infiltration on day 14. Additionally, significantly less apoptosis, a lower ratio of Bax to Bcl-2 expression, and fewer apoptotic cells on TUNEL staining were observed in the obstructed kidneys of oleanolic acid-treated mice. Oleanolic acid increased nuclear Nrf2 as well as the expression of HO-1, and decreased lipid peroxidation in the obstructed kidneys. There were no changes in the expression of total Nrf2 and Kelch-like ECH-associated protein 1, indicating that oleanolic acid enhanced nuclear translocation of Nrf2.

**Conclusions:** These results suggest that oleanolic acid may exert beneficial effects in renal fibrosis by increasing nuclear translocation of Nrf2 and subsequently reducing renal oxidative stress.

**Key Words:** 신장 섬유화, 산화 스트레스, 항산화제

Renal fibrosis, Oxidative stress, Oleanolic acid