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복막투석환자에서 감소된 Klotho 레벨과 산화스트레스 및 염증과의 연관성

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Decreased Circulating Klotho Levels in Patients Undergoing Dialysis and Relationship to Oxidative Stress and Inflammation

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Background: Klotho is known as an anti-aging gene, which is predominantly expressed in the distal convoluted tubules of the kidney. Previous studies have shown that, in experimental kidney disease models, circulating klotho levels are decreased and act like a hormone that exerts anti-oxidative stress and anti-inflammatory effects. Patients with end-stage renal disease (ESRD) are particularly characterized by increased inflammation and oxidative stress. However, little is unknown about the relationship between such two factors and klotho in these patients.
Methods: We conducted a cross-sectional single-center study in 78 ESRD patients receiving peritoneal dialysis (PD). Serum concentrations of klotho, high-sensitivity C-reactive protein (hsCRP), interleukin-6 (IL-6), and 8-isoprostane were measured by enzyme-linked immunosorbent assay. To define independent factors associated with klotho, Spearman's correlation coefficients were determined between co-variates and multiple linear regression analyses were conducted.
Results: When patients were classified according to the median value, serum 8-isoprostane and IL-6 levels were significantly higher in patients with klotho levels <329.6 pg/ml than in those with klotho levels >329.6 pg/ml. In correlation analyses, log 8-isoprostane (χ=-0.310, p=0.006) and log IL-6 (χ=-0.343, p=0.002) were inversely correlated with log klotho, whereas log hsCRP was not. After adjustment for age, gender, MAP, log iPTH, and inflammatory markers, log 8-isoprostane was independently associated with log klotho (β=-0.158, p=0.040). However, significant relationship between klotho and IL-6 disappeared in the adjusted model.
Conclusions: This study showed that circulating klotho levels were significantly associated with 8-isoprostane levels in ESRD patients undergoing PD, suggesting a potential link between klotho deficiency and enhanced oxidative stress in ESRD patients. However, our findings are hypothesis generating based on many previous experimental data, thus further studies with larger sample size are required to clarify relationship between klotho, oxidative stress, and inflammation in ESRD patients.

Key Words: 클로토, 산화 스트레스, 말기 신부전
Klotho, oxidative stress, ESRD