

## 당뇨병성 신병증 환자에서 단백뇨 및 적혈구막 지방산 조성에 미치는 오메가-3 지방산의 효과

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### Effect of Omega-3 Ffatty Acid on Fatty Acid Contents of Erythrocyte Membrane and Proteinuria in Patients with Diabetic Nephropathy

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**Introduction:** Diabetic nephropathy is the leading cause of end-stage renal disease and shows high cardiovascular events. Dietary omega-3 fatty acid (FA) has cardioprotective effect and is associated with a slower deterioration of albumin excretion in patients with diabetic nephropathy. However, there is no report about the effect of omega-3 FA on proteinuria in patients with diabetic nephropathy who are well controlled blood pressure with angiotensin converting enzyme inhibitors (ACEI) or angiotensin II receptor blockers (ARB). We hypothesized that omega-3 FA supplementation decrease proteinuria and change erythrocyte membrane FA contents such as oleic acid which is related with acute coronary syndrome in patients with diabetic nephropathy.

**Methods:** In a double-blind randomized placebo-controlled design, a total of 19 patients treated with ACEI or ARB for at least 6months, was randomized to treatment for 12 weeks with omega-3 FA (Omacor, 3 gram/day) or a control treatment (olive oil, 3 gram/day). We measured proteinuria with random spot urine and urine collected for 24 hours. Urinary liver-type fatty acid binding protein (L-FABP), prostaglandin E2 (PGE2) and neutrophil gelatinase-associated lipocalin (NGAL) were measured by enzyme-linked immunoassay. Erythrocyte membrane fatty acid contents were measured by gas chromatography.

**Results:** The mean age of the enrolled patients was  $60.4 \pm 10.7$  years and mean blood pressure was 121/72 mmHg. Baseline urinary protein to creatinine ratio, 24 hours urine protein and serum creatinine were  $0.74 \pm 0.65$  g/g,  $0.53 \pm 0.53$  g and  $1.23 \pm 0.20$  mg/dL. Blood pressure, proteinuria, albuminuria ( $443.2 \pm 614.6$  mg/g vs.  $348.0 \pm 390.6$  mg/g), serum creatinine, L-FABP, PGE2, NGAL ( $35.1 \pm 57.2$  ng/mL vs.  $25.4 \pm 17.8$  ng/mL) and lipid profile were not significantly changed in omega-3 FA supplemented group after 12 weeks compared to baseline. The erythrocyte membrane contents of eicosapentaenoic acid (EPA) ( $p=0.025$ ) were significantly increased and arachidonic acid to EPA ratio ( $p=0.012$ ) and oleic acid ( $15.8 \pm 2.9\%$  vs.  $13.1 \pm 2.2\%$ ,  $p=0.036$ ) were significantly decreased in omega-3 FA supplemented group after 12 weeks compared to baseline.

**Conclusion:** Although there is no additive effect of omega-3 FA on proteinuria, FA contents of erythrocyte membrane were significantly changed by omega-3 FA treatment for 12 weeks in patients with diabetic nephropathy who are well controlled blood pressure with ACEI or ARB.

**Key Words:** 오메가-3 지방산, 단백뇨, 당뇨병성 신병증

Omega-3 fatty acid, Proteinuria, Diabetic nephropathy