S-E9

# Effects of Spironolactone in Combination with ACE Inhibitor or Angiotensin Receptor Blockers in Aldosterone Escape and Non-escape Group of Patients with Proteinuria

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**Background:** Conventional blockade of the renin-angiotensin-aldosterone system with angiotensin-converting enzyme (ACE) inhibitors or angiotensin receptor blockers (ARB) does not adequately protect against target organ damage. Thus, add-on aldosterone blockade therapy may constitute a therapeutic strategy for progressive kidney disease. The present study was aimed to investigate whether add-on aldosterone blockade therapy has beneficial antiproteinuric effects in aldosterone escape and non-escape group in association with changes of vitamin D level.

**Methods:** In this prospective intervention trial, we studied the effects of spironolactone (25 mg/day) in 211 patients who showed persistent proteinuria after ACE inhibitor or ARB medications for more than 3 months. Plasma aldosterone, renin, potassium, estimated GFR (eGFR) and urine protein to creatinine ratio were determined at baseline and 6 months after spironolactone add-on treatment. Patients were divided according to their aldoterone level during ACE inhibitor or ARB treatment in an escape group (plasma aldosterone >80 pg/ml, n=68, 32.2%) and a non-escape group (n=143, 67.8%).

**Results:** Plasma aldosterone level was increased by 86.3% (77.90 to 145.19 pg/ml) and plasma renin activity also increased by 18.9% (6.18 to 7.35 ng/ml/hr) in both escape and non-escape group after spironolactone treatment. By using paried T-test, there was a tendency toward a decrease in urine protein to creatinine ratio in both groups (1.148±1.080 to 1.073±1.211, p=0.703 in aldosterone escape group, 1.86±2.508 to 1.41±1.251, p=0.175 in non-escape group). There was significant increase of plasma 25 OH vitamin D level after spironolactone treatment (12.27±5.883 to 14.69±4.361, p=0.006 in aldosterone escape group, 12.02±5.435 to 14.79±6.452, p<0.001 in non-escape group). Serum potassium has increased significantly (4.571±0.498 to 4.962±0.704, p<0.001 in aldosterone escape group, 4.51±0.606 to 4.82±0.844, p<0.001 in non-escape group) and hyperkalemia (K >5.5mEq/L) was developed in 29 of the 130 patient (13.6%). Furthermore, it seems like that antiproteinuria effect was different according to eGFR (1.489±1.053 to 1.567±1.360, p=0.681 in group with eGFR <60 mL/min/1,73m$^2$, 1.353±1.457 to 0.959±1.102, p= 0.277 in group with eGFR >60 mL/min/1,73m$^2$).

**Conclusions:** Adding spironolactone treatment seems to decrease the proteinuria in both aldosterone escape and non-escape group in association with the increase of vitamin D level .

**Key Words:** Spironolactone, 단백뇨
Spironolactone, Aldosterone escape, Proteinuria