



Shaping Tomorrow's Nephrology: Insight-Driven Kidney Care

KSN SEOUL, KOREA
2026

The 46th Annual Meeting of the Korean Society of Nephrology



Jun 11 (Thu) – 14 (Sun), 2026

COEX, Seoul, Korea

Abstract Type : Poster exhibition

Abstract Submission No.: A-0420

Abstract Topic : Acute Kidney Injury

Renoprotective Effects of Balcinrenone on Renal Injury and Fibrosis in Acute Kidney Injury and Acute Kidney Disease Models

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Objectives : Acute kidney injury (AKI) often leads to incomplete recovery, transitioning into acute kidney disease (AKD) and eventually chronic kidney disease (CKD). Mineralocorticoid receptor (MR) overactivation drives renal inflammation, glomerular hyperfiltration, and fibrosis, playing a pivotal role in kidney disease progression. While steroidal MR antagonists (MRAs) provide established renoprotection, their clinical utility is limited by the risk of hyperkalemia. Balcinrenone is a novel, tissue-selective, non-steroidal MR modulator (MRM) that may offer potent anti-fibrotic effects with a reduced risk of electrolyte imbalance. This study investigated the potential role of balcinrenone in mitigating renal fibrosis in experimental models of AKI and AKI-to-CKD transition.

Methods : We evaluated the therapeutic effects of balcinrenone in two rodent models: 1) an AKI model involving unilateral nephrectomy with contralateral ischemia-reperfusion (IR) injury, and 2) an AKD model (AKI-to-CKD transition) involving unilateral IR injury followed by contralateral nephrectomy 8 days after IR injury. Mice were orally administered with or without balcinrenone for the duration of the study.

Results : Balcinrenone treatment significantly attenuated urinary albumin excretion and markedly reduced renal fibrosis, as assessed by Masson's trichrome, Sirius Red, and α -SMA staining, in both AKI and AKD models. In the AKI model, serum creatinine levels tended to be lower in the balcinrenone-treated group. In contrast, at day 28 in the AKD model, serum creatinine levels were slightly higher in the balcinrenone-treated group compared with AKD controls. Although a slight increase in serum potassium levels was observed following balcinrenone administration, potassium concentrations remained within the physiological range and did not reach statistical significance.

Conclusions : Balcinrenone provides significant renoprotection by attenuating early kidney in the AKI stage and suppressing the progression to AKD through its potent anti-fibrotic effects. These findings suggest that balcinrenone may represent a promising therapeutic strategy for preventing post-AKI renal fibrotic progression.