Impact of worsening renal function (WRF) and baseline chronic kidney disease (CKD) on clinical outcomes in patients with chronic coronary syndromes (CCS); insights from the REAL-CAD study

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On behalf of REAL CAD

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Background: The impact of worsening renal function (WRF) and baseline chronic kidney disease (CKD) on clinical outcomes in patients with chronic coronary syndromes (CCS) in the era of modern PCI and optimal medical therapy is still unknown.

Methods: The REAL-CAD study is a prospective, multicenter, randomized trial either high-dose (pitavastatin 4 mg/day) or low-dose (pitavastatin 1 mg/day) statin therapy in 12,118 patients with CCS. The primary endpoint was composite of cardiovascular-death, nonfatal myocardial infarction and stroke, or unstable angina requiring emergency hospitalization (MACCE). CKD was defined as estimated glomerular filtration rate [eGFR]<60mL/min/1.73m². WRF was defined as an annual decrease in eGFR >20% in the first year and Pre-WRF was defined as decrease in eGFR <20%. After excluding 1,247 patients who had MACCE, censored or missing eGFR within 1-year, 10,871 patients were examined. P < 0.05 was considered as statistically significant.

Results: Of the 12,118 baseline-patients, 4,340 had baseline-CKD (estimated glomerular filtration rate [eGFR]<60mL/min/1.73m²) and the remaining 7,778 had baseline-non-CKD (eGFR≥60mL/min/1.73m²). Five-year MACCE significantly deteriorated from 5.5% in non-CKD to 9.5% in CKD (p<0.0001). Of the 10,871 patients, 577 patients had WRF, 6014 patients showed Pre-WRF and the remaining 4280 patients maintained Non-WRF. In CKD patients, WRF was independent predictor for 4-year MACCE as compared to Non-WRF (hazard ratio [HR] 1.67; 95% confidence interval [CI], 1.03 to 2.73; P=0.039). In Non-CKD patients, Pre-WRF was significant predictor for 4-year MACCE as compared to Non-WRF (HR,1.40; 95%-CI,1.03-to-1.91; P=0.032).

Conclusions: Baseline-CKD was independent predictor for 5-year MACCE in patients with CCS. While WRF was independent predictor for 4-year MACCE in CKD patients, Pre-WRF was also predictor for 4-year MACCE in Non-CKD patients (NCT01042730).
Five-Year Cumulative Incidence of MACE in Patients With and Without CKD

![Graph showing the five-year cumulative incidence of MACE in patients with and without CKD. The graph compares the incidence of MACE between Non-CKD and CKD groups over a 5-year follow-up period. The graph indicates a statistically significant difference with P<0.0001.]
Four-Year Cumulative Incidence of MACE
According to the Degree of Worsen Renal Function (WRF)
in CKD patients

P = 0.018

Follow-up period (years)

<table>
<thead>
<tr>
<th>Degree of Worsen Renal Function</th>
<th>Incidence of MACE</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;0% decrease in eGFR (Non-WRF)</td>
<td>13.1%</td>
</tr>
<tr>
<td>0-20% decrease in eGFR (Pre-WRF)</td>
<td>8.3%</td>
</tr>
<tr>
<td>&gt;20% decrease in eGFR (WRF)</td>
<td>7.0%</td>
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