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Definition of clinically relevant thresholds of acute kidney injury in patients with ST-elevation myocardial infarctions undergoing primary percutaneous coronary interventions

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**Background:** Although the clinical importance of deteriorating kidney function in patients with ST-elevation-myocardial infarctions (STEMI) on overall prognosis is generally accepted, there is conflicting evidence on the importance of small changes in renal function. Aim of the present study was to calculate clinically relevant thresholds for deterioration of renal function after STEMI.

**Methods:** From a large registry of patients with STEMI renal function was estimated calculating the glomerular filtration rate (GFR in ml/min/1.73 m<sup>2</sup>) with the CKD-EPI-equation. To assess acute kidney injury the ratio GFR (at peak creatinine)/ GFR (at admission) was calculated for each patient (with 1 representing no change). Patients were graded by GFR-reduction and assigned to 11 groups (G1 to G11) each representing 5% intervals.

**Results:** Of 6583 patients admitted with STEMI between 2006–2017 3518 (53%) had no change or a change <5% during hospital stay (G1) while 161 (3%) showed a decrease in GFR of ≥50% (G11). The rest of the patients could be attributed to G2- G10 (table). There was a pronounced correlation between extent of GFR-reduction and peak creatine kinase (indicating size

of STEMI,  $r^2=0.785$ ; G1: 1521±1684 U/l vs. G11: 2885±2943 U/l,  $p<0.01$ ) as well as left-ventricular ejection fraction (LVEF) ( $r^2=0.79$ ; G1: 50.9±9% vs. G11: 41.4±10%,  $p<0.01$ ). However, no such correlation could be detected between GFR-reduction and amount of contrast media (CM) applied ( $r^2=0.05$ , G1: 141±60 ml vs. G11: 139±61 ml,  $p=0.5$ ). Analysis of outcome-data (1-year-mortality and major adverse cardiovascular and cerebrovascular events (MACCE: death, stroke, re-infarction)) revealed, that beneath a threshold of 25% deterioration of renal function did not significantly impact prognosis, while higher degrees of deterioration led to a 7-fold increase in mortality and a 5-fold increase in MACCE-rates (table).

**Conclusions:** These data from a large STEMI-registry show that small changes (less than 25%) in GFR did not significantly impact long-term outcome, while the impact was pronounced for all patients beyond that threshold. The degree of renal deterioration furthermore correlated with size of STEMI as well as reduction of LV-function after STEMI while no correlation to amount of contrast media could be found.

Impact of GFR-reduction on outcome

Group	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11
GFR-reduction (in %)	0–4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	≥50
Patients, n (%)	3518 (53)	881 (13)	717 (11)	492 (7)	327 (5)	196 (3)	119 (2)	88 (1)	48 (1)	36 (1)	161 (3)
1 year mortality (%)	7	4	5	8	7	15	20	22	39	43	50
1-year-MACCE (%)	12	8	8	12	10	19	27	27	49	49	52