Background: Catalytic iron (CI) is free iron not bound to transferrin or ferritin and has the potential to generate reactive oxygen species with further deleterious vascular effects. In acute coronary syndrome high levels of CI were linked to all-cause mortality and in critically ill patients to mortality or need for dialysis. In cardiogenic shock (CS) no data exists about prognostic impact of CI; we hypothesized a correlation between high levels of CI and mortality.

Methods: In IABP-SHOCK II, 600 patients with CS complicating acute myocardial infarction undergoing early revascularization were assigned to therapy with either intraaortic counterpulsation (IABP) or no IABP. In 185 patients, blood samples collected at baseline and after two days were analyzed. Immediately after sample drawing, the blood was centrifuged and the serum frozen (-87° C). CI levels were measured using a modified bleomycin detectable iron assay developed at Muljibhai Institute, Nadiad, India.

Results: Survivors at 30 days had lower CI levels at baseline (0.37 [0.30-0.58] vs. 0.48 [0.35-1.18] µmol/L; p=0.007) and on day 3 (0.35 [0.30-0.41] vs. 0.41 [0.32-0.74] µmol/L; p=0.01). Patients with CI levels in the highest quartile had a worse outcome in Kaplan-Meier-analysis (Day 1: HR 1.91 [1.11-3.31], p=0.005; Day 3: HR 2.15 [1.06-4.34], p=0.01). After multivariable adjustment baseline CI remained an independent predictor of 30-day mortality (HR per 10LOG 1.97 [1.27-3.04], p=0.003) together with serum lactate, age, and TIMI-flow grade after percutaneous coronary intervention. Predictors of CI levels on day 3 were baseline CI, bleeding events or need for blood transfusions, acute kidney injury and baseline troponin T as surrogate for myocardial injury. Patients randomized to IABP had no difference in day 3 CI levels (IABP vs. control 0.37 [0.30-0.42] vs. 0.37 [0.31-0.51] µmol/L; p=0.28).

Conclusion: Increasing CI levels were associated with increased short-term mortality in CS complicating acute myocardial infarction. Rise of CI at day 3 is associated with bleeding, acute kidney injury and myocardial injury.