The CORONA (Controlled Rosuvastatin Multinational Trial in Heart Failure) study included a prespecified subgroup analysis comparing outcomes in the two-thirds of patients at lower risk versus the one-third at higher risk (1). This showed a trend toward greater benefit in patients with lower plasma N-terminal pro-B-type natriuretic peptide (NT-proBNP). Further analysis showed that this was driven by a substantial reduction in events in patients with systolic heart failure. The CORONA (Controlled Rosuvastatin Multinational Trial in Heart Failure) study included a prespecified subgroup analysis comparing outcomes in the two-thirds of patients at lower risk versus the one-third at higher risk (1). This showed a trend toward greater benefit in patients with lower plasma N-terminal pro-B-type natriuretic peptide (NT-proBNP). Further analysis showed that this was driven by a substantial reduction in events in patients with systolic heart failure.

ST-Segment Resolution and Outcome in Myocardial Infarction

Sejersten et al. (1) explore the relationship between ST-segment recovery and outcome among patients enrolled in the DANAMI (DANish trial in Acute Myocardial Infarction)-2 study (1). In general, their report joins a chorus of others establishing the validity of ST-segment recovery as a correlate of myocardial reperfusion and predictor of outcomes among early ST-segment elevation myocardial infarction survivors. A key finding emphasized as “provocative,” however, was the absence of a relationship linking ST-segment recovery to 30-day mortality among the subset of 602 patients assigned to primary percutaneous coronary intervention (PCI) in contrast to their fibrinolytic–treated patients.

Before accepting their call for further study, we suggest that they first reflect on previous work. A 2004 report of 700 patients enrolled in the CADILLAC (Controlled Abciximad and Device Investigation to Lower Late Angioplasty Complications) trial revealed a significant relationship between ST-segment recovery on electrocardiograms acquired within 4 h of PCI (average 1.77 h) and both 30-day and 1-year mortality (2). We reported the relationship between early ST-segment recovery (mean 32 min post-primary PCI) and 90-day mortality in 4,866 primary PCI patients enrolled in the APEX-AMI (Assessment of the PEXilizumab in Acute Myocardial Infarction) trial (3). Six previously published methods for describing ST-segment recovery were tested, including ∆ST elevation recovery, all provided robust prognostic information that persisted after adjustment for baseline variables and exclusion of
those with unsuccessful PCI or suboptimal post-PCI epicardial flow (Thrombolysis In Myocardial Infarction flow grade <3). Why the apparent discord? Our larger cohort provided more end-point events (144 vs. 27 deaths at 30 days). Moreover, Sejersten et al. (1) found a relationship between ST-segment recovery and mortality when both reperfusion strategies were aggregated; hence, we believe that this is the key finding to emphasize rather than diverse associations within each strategy (the interaction between ST-segment resolution, death, and treatment assignment in their study was not significant [p = 0.40]).

A substantial portion of ST-segment elevation myocardial infarction patients have suboptimal outcomes despite primary PCI. In our study using a simple worst-lead residual ST-segment elevation method, we found that 32% of such patients had excess mortality and morbidity.

The universally available, inexpensive, noninvasive ST-segment recovery metric provides a powerful tool for early prognostication. This remains true regardless of the reperfusion strategy and can be readily incorporated into routine clinical practice and guidelines.

Christopher E. Buller, MD
Cynthia M. Westerhout, PhD
*Paul W. Armstrong, MD

*University of Alberta
2-51 Medical Sciences Building
Edmonton, Alberta T6G 2H7
Canada
E-mail: paul.armstrong@ualberta.ca

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Reply

Dr. Buller and colleagues in a comment to our previously published paper (1) call for some more reflection based on their previous work in this field. ST-segment resolution turned out to be such a powerful prognosticator after fibrinolysis and became so recognized that it constitutes a paradigm. ST-segment resolution has even been used as surrogate end point in several subsequent trials. Our substudy from the DANAMI 2 trial (1) provided a unique opportunity to explore the prognostic value of ST-segment recovery within the context of a randomized clinical trial comparing fibrinolysis and primary percutaneous coronary intervention (PCI). Admittedly to our surprise, ST-segment recovery did not predict 30-day mortality in the subset of 602 patients assigned to primary PCI. Dr. Buller and colleagues point to some of the important differences between our study and their larger cohort from the APEX-AMI (Assessment of PEXelizumab in Acute Myocardial Infarction) trial (2) in which all patients were treated with primary PCI. It is possible that the earlier measure of ST-segment recovery after primary PCI (mean 32 min) provides a stronger signal. We have subsequently calculated the earliest available electrocardiogram in DANAMI-2 to be performed at mean of 101 min post-PCI. Also, as pointed out in their larger study, more end points occurred but still did not include a comparably sized group treated with fibrinolysis for comparison.

The apparent discord with previous reports could also be publication bias. We are confident that there will be more publications in this field in the near future with further insight into the background of our findings. Until then, ST-segment recovery provides a powerful tool for early recognition of failed reperfusion after fibrinolysis and thus prognostication. Furthermore, in this context, the lack of ST-segment recovery has real clinical relevance because rescue angioplasty can be offered, whereas the lack of ST-segment recovery after optimal primary PCI in the otherwise optimally medically managed patient is of little clinical consequence.

*Maria Sejersten, MD
Peter Clemmensen, MD, PhD

*Department of Cardiology B, 2142
Rigshospitalet
Copenhagen University Hospital
Blegdamsvej 9
Copenhagen Ø, Østerbro 2100
Denmark
E-mail: msejersten@hotmail.com

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