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Cardiac electrical biomarker retains "memory" of myocardial ischemia not severe enough to cause myocardial necrosis.

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Background: "Cardiac electrical biomarker" (CEB) is a numerical index measured by Vectraplex ECG (vECG) System with a software able to detect changes of the dipolar vectors in the cardiac electrical field to multipolar as an indicator of myocardial ischemic injury. CEB has been validated with ECG traces derived from patients with acute myocardial infarction. Purpose: We set out to examine the effect of repetitive transient myocardial ischemia during coronary angioplasty on CEB and its time-course. Method: Seventy-five consecutive patients with normal surface ECG (with no Q waves, arrhythmia, BBB; sECG) had CEBs measured derived from vECGs recorded before, during balloon occlusion and 1, 2 and 3 hours after elective percutaneous coronary intervention (PCI). HsTnI was measured before and after the procedure. PCI induced ischemia during balloon occlusion was confirmed with TIMI-0 flow on angiogram and/or the presence of ST-T changes on ECG. Multiple vECGs were recorded at each point. Every vECG used to derive CEBs was adjudicated for quality by 2 observers blinded to the results. vECGs with wandering baseline, arrhythmia, Q-waves, BBB were discarded. Highest CEBs derived from the best traces were analyzed. The pre-PCI, during balloon occlusion, and post-PCI CEBs were compared using the Wilcoxon rank and Friedman test.

Results: Fifteen subjects with negative FFR and 2 that withdrew consent were excluded. On average patients underwent 3.5 balloon inflations during the pre-dilatation, stent-deployment, post-dilatation procedures with a median of the total occlusion time of 3 minutes. The CEB increased with balloon inflation (pre-PCI median(IQR) 53.5(74) vs during balloon occlusion 202(224), p<0.0001). There was a gradual recovery of the CEB during PCI,1, 2 and 3 hrs post-PCI (202(224, 74.5(100),66(81) p<0.000) respectively. The 1h (p=0.0011) and 2h (p=0.0352) post-PCICEB remained higher than pre-PCI CEB and returned to the pre-PCIlevel at 3h (p=0.4433). All except 2 patients had normal 3hTnI; both being below the threshold for diagnosis of peri-procedural MI.

Conclusion: CEB increases with short repeated transient coronary artery occlusion not severe enough to cause myocardial necrosis and took 3 hours to return to the pre-procedural level suggesting an "ischemic memory".