Spatio-temporal Spread Variation through Myocardium in Supply and Demand Ischemia

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In this paper, we investigate spatio-temporal progression of Myocardial ischemia (MI) and propose a metric for quantifying ischemic manifestation using cardiac activation time. Spatio-temporal spread is separately analyzed and compared for two different types of ischemia, namely 'Demand' and 'Supply' ischemia. This is done for both surface progression, along the epicardial surface as well as volume progression, along the three sub-myocardial layers. Cardiac activation time or depolarization time is computed from cardiac surface potential using a combined spatio-temporal derivative function. Ischemic zones in the cardiac surface is computed using Principal Component Analysis (PCA) and eigen vector projection of the depolarization time. Spatio-temporal ischemic spread analysis revealed different ischemic initiation and manifestation pattern for Demand and Supply ischemia, both in surface and volume progression.