



ELECTROCARDIOGRAPHIC INVERSE VALIDATION STUDY: IN-VIVO MAPPING AND ANALYSIS

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We aimed to correlate the electrical signals from a dense sampling of *in-vivo* body surface ECGs (256 recording sites, ca. 15 mm spacing) with electrical activity recorded directly from the ventricles (127 epicardial electrodes, ca. 5-10 mm spacing) and to use these data to assess the accuracy of a new computational inverse approach to electrocardiography, described by Bradley *et al.* ("Electrocardiographic Inverse Validation Study: Model Development and Methodology") in an accompanying abstract. Simultaneous ventricular epicardial and body surface electropotential mapping (2 kHz sampling rate) was performed on anaesthetised pigs during (i) normal sinus rhythm; (ii) epicardial pacing; (iii) regional ischemia and reperfusion, due to a two minute period of left anterior descending artery occlusion; and (iv) global hyperkalaemia (arterial [K⁺] 6-10 mM), due to continuous intravenous potassium chloride infusion (300 mM, 1 ml/kg/min). Torso and epicardial electrode locations (most of which were obtained using a mechanical digitiser) were projected onto 3D anatomico-computational models of the porcine torso and heart, respectively. These were used to visualise the body surface potential field and the epicardial activation sequence. The changes in ventricular activation sequences were clearly reflected in alterations to the body surface potential maps during all interventions. Results are presented from the computational reconstruction of the ventricular epicardial activation sequence during normal sinus rhythm and the various physiological interventions.