

## **DIRECT MEASUREMENT OF CURRENT PATHWAYS BETWEEN DEFIBRILLATION ELECTRODES IN A PIG**

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**INTRODUCTION** Although defibrillation has been in clinical use for over 50 years, the pathways of electrical current through the chest and heart remain poorly understood. Low frequency current density imaging (LFCDI) is a new technique that uses an ordinary MR imager to non-invasively measure the current density inside a sample. In this study, LFCDI is used to measure the 3-D current density inside a pig torso during an external current application through defibrillation electrodes. **METHODS** LFCDI was performed on 3 post-mortem pigs weighing 3 to 13 kg. Pediatric-sized defibrillation electrodes were applied to either side of the chest approximating an anterior/anterior configuration. A bipolar current pulse (24ms; 150mA~200mA) was applied to the electrodes during the LFCDI imaging sequence. **RESULTS** The majority of current flow was observed in the skin and underlying thoracic muscles (over 60%). Only 20% of the current reached the heart and exhibited a complex pattern inside flowing in the opposite direction in each ventricle. Areas of high current density were observed inside the major vessels. Several points of entry/exit of current to the heart were identified. **CONCLUSION** This study demonstrates that the LFCDI technique can be used to measure the current density inside the thorax to improve our understanding of defibrillation.

