

## ABSTRACT

### Magnetocardiography using Superconducting Quantum Interference Devices (SQUIDs)

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Any electrophysiological process in the human body produces an associated magnetic field. The heart is the largest producer of steady magnetic fields in the body resulting from the cardiac depolarization and repolarization cycle as the heart pumps blood throughout the body. The objective of this study was to use a Superconducting Quantum Interference Device (SQUID) magnetometer to measure the magnetic fields of the heart. A suitable grid was first investigated and the magnetic fields of sixteen healthy persons (normal volunteers) and 10 cardiac patients were recorded. The results were used to construct iso-magnetic contour maps for each subject. These maps were then used to calculate the horizontal ( $Q_x$ ) and vertical ( $Q_y$ ) components of the Equivalent Current Dipole (ECD), the software-calculated resultant current vector. The  $Q_x$  and  $Q_y$  values at systole (peak of R wave) were also plotted for all subjects on the same graph. The results clearly show that a standard grid of 36 (4cm X 4cm) squares was the most suitable. There were also significant differences in the iso-magnetic contour maps and ECD plots for the two groups. This may be due to the fact that infarcted myocardium affects the orientation and intensity of the depolarization wavefront across the heart during the heart cycle.

Keywords: Ramadhar Singh, Magnetocardiography, SQUIDs, Superconducting Quantum Interference Devices