Abstract - In this study, electrical current density in conducting objects, which contain nuclear magnetic resonance (NMR) active nuclei is imaged using a 0.15T Magnetic Resonance Imaging (MRI) system. Current to be imaged is externally applied to the object in synchrony with a standard spin-echo pulse sequence. Applied current pulse creates a measurable magnetic flux density. Measurement of all three components of magnetic flux density makes reconstruction of current density possible with a spatial resolution equal to the half of the MR resolution. Imaging System, at Middle East Technical University, is used. Studies have been carried on a 2T MRI System. In this work, a 0.15T which contain nuclear magnetic resonance (NMR) active nuclei is imaged accurate measurement of current density distribution may lead to high fidelity conductivity imaging [5]. Which could be utilized to improve the efficacy [1, 2, 3]. Determination of electrical current density applied applications. For example, current density distribution on the myocardium between a pair of electrodes can be used to determine lead-sensitivity the body provides vital information in many biomedical engineering applications. For example, current density distribution on the myocardium during cardiac defibrillation is very important to defibrillation efficacy [1, 2, 3]. Determination of electrical current density applied between a pair of electrodes can be used to determine lead-sensitivity maps of biopotential recording set-ups (i.e. ECG, EEG, etc.) [4]. Finally, accurate measurement of current density distribution may lead to high fidelity conductivity imaging [5]. Which could be utilized to improve the accuracy of ECG and EEG volume conductor models.

In this study, current density images are practically realized in a low field (0.15 T) MR system satisfactorily. Accurate measurement of current density distribution may lead to high fidelity conductivity imaging. A study aiming at reconstructing conductivity images using the current density measurement will also be presented at this conference [9].

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REFERENCES