AbstractID: 4715 Title: Evaluation of the Turn Variation of Spiral RF Surface Coils for MR Microscopic Imaging and Spectroscopy

Purpose: The purpose of this study was to enhance the technical improvement which can develop the advanced sensitive RF surface coil to investigate the sensitivities of the multi-spiral surface coils and eventually achieve the high resolution of microscopic MR images and MR spectra.

Method and Materials: The simulation of a coil's magnetic field was processed in MATLAB. Biot-Savart law provides information about the relation between the amplitude and the position.

The experiment was processed in the Oxford magnet (1.5T), Copley gradient (25mT/m) coil and Analogic RF amplitude system. The diameter of a coil was fixed at 4cm, and the turn of a coil was increased with a spiral turning method.

Results: 1. Simulation of magnetic field

The magnetic field strength was increased close to the wire because of a ring-shape wire coil. This simulation was performed assuming no obstruction in the current and domain. Thus, the shape and the field distribution of a RF surface coil were able to be visually analyzed.

2. Coils' performance

The ROI with approximately 3cm was identified by a water phantom in 1.5T. The three and five turned spiral coils were developed and their Q-factor and bandwidth were estimated.

Conclusion: The present study showed that the sensitivity of RF surface coil was improved by the increasing the number of a spiral coil's turn, and also the SNR of RF surface coil was dependent upon the number of a spiral coil's turn. However, the sensitivity was not proportional to the number of a spiral RF coil's turn. There is an optimal vale in a spiral RF coil turn and sensitivity. In order to obtain a high sensitivity as varying the spiral RF coil's performance, it is important to find the optimal number of turn. This study provides an efficient approach to designing high-field RF coils.