shown in Fig.2 using the limits at which $R_R T_R$ equal $R_C T_C$.

Discussion and Conclusion: Our actualized noise limits provide a useful guide to determine the best appropriated coil technology when addressing SNR improvements. The Q values of HTS coil are known to be strongly dependant on coil design and technological processes. However internal losses derived from highest reported Q values at very different frequencies are coherent with generally assumed ω^2 behavior, corresponding to a linear Q increase as the NMR frequency decreases.

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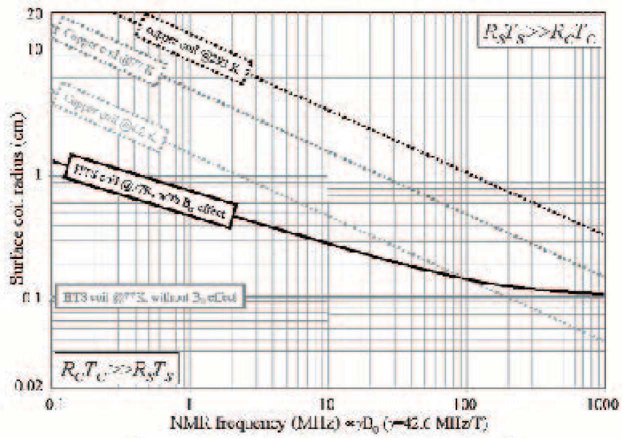

Figure 1: Limits at which $R_C T_C = R_S T_S$

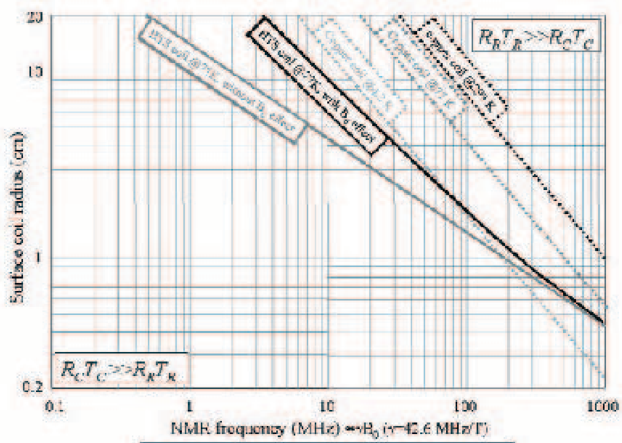

Figure 2: Limits at which $R_C T_C = R_R T_R$

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Comparative study of intravascular RF coil designs

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Introduction: Several studies showed that intravascular single-loop coils could be used to improve the signal-to-noise ratio (SNR) and resolution for evaluation of the vessel wall[1,2,3]. However, SNR in the near field of the dipole, which is the region of interest (ROI) for vessel wall imaging could be improved by innovative coil designs.

The purpose of this work was to study the magnetic field homogeneity improvement by using multi-loop for intravascular coil design.

Methods: In this study, a computer simulation has been applied to evaluate and optimize the magnetic field and the signal drop for multi-loop coils. The magnetic field is calculated from the given current distribution using Biot-Savart law. In our simulation we varied the number of loops (1,2,3 or 4) and the conductor position to search for an optimised coil performance. The diameter of the coils was fixed to 5 mm.

Experimentally, we tested the validity of our simulation by measuring, for each coil, the SNR of a cylindrical phantom containing 1.25g/l $CuSo_4$ solution. All investigations were carried out in a 1 T Magnetom Expert scanner (Siemens, Erlangen, Germany).

Results: Using an optimised conductor position for all coils: the single-loop (SL), double-loop (DL), triple-loop (TL) and quadruple-loops (QL) coils, the calculation of the magnetic field distribution at a distance of 3mm from the surface of each coil, result in magnetic field inhomogeneities of 41%, 30%, 18% and 11%, respectively. The dipole character of the single-loop design lets the magnetic field magnitude decay with distance r as $1/r^2$. Figure 1 shows the magnetic field distribution for each coil, the higher the number of loops the better the field homogeneities. The measured SNR in MRI images of the phantom confirm these results as shown in Figure 2.

Fig. 1

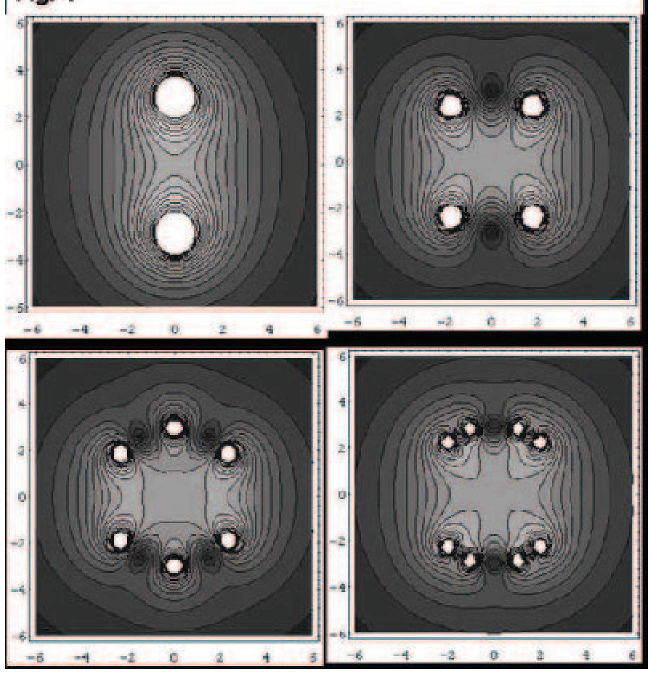

Fig. 2