

Magnetic resonance butterfly coils: Design and application for hyperpolarized ¹³C studies - DTU Orbit (08/08/2016)

Magnetic resonance butterfly coils: Design and application for hyperpolarized ¹³C studies

Hyperpolarized ¹³C magnetic resonance spectroscopy in pig models enables cardiac metabolism assessment and provides a powerful tool for heart physiology studies, although the low molar concentration of derivated metabolites gives rise to technological limitations in terms of data quality. The design of dedicated coils capable of providing large field of view with high Signal-to-Noise Ratio (SNR) data is of fundamental importance. This work presents magnetostatic simulations and tests of two butterfly coils with different geometries, both designed for ¹³C hyperpolarized studies of pig heart with a clinical 3T scanner. In particular, the paper provides details of the design, modeling, construction and application of the butterfly style coils. While both coils could be successfully employed in single configuration (linear mode), the second prototype was used to design a quadrature surface coil constituted by the butterfly and a circular loop both in receive (RX) mode while using a birdcage coil as transmitter (TX). The performance of this coils configuration was compared with the single TX/RX birdcage coil, in order to verify the advantage of the proposed configuration over the volume coil throughout the volume of interest for cardiac imaging in pig. Experimental SNR-vs-depth profiles, extracted from the [^{1-¹³C}]acetate phantom chemical shift image (CSI), permitted to highlight the performance of the proposed coils configuration. © 2013 Elsevier Ltd. All rights reserved.

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