A fast and simple method for calibrating the flip angle in hyperpolarized 13C MRS experiments - DTU Orbit (08/11/2017)

A fast and simple method for calibrating the flip angle in hyperpolarized 13C MRS experiments

Hyperpolarized 13C Magnetic resonance represents a promising modality for in vivo studies of intermediary metabolism of bio-molecules and new biomarkers. Although it represents a powerful tool for metabolites spatial localization and for the assessment of their kinetics in vivo, a number of technological problems still limits this technology and needs innovative solutions. In particular, the optimization of the signalto-noise ratio during the acquisitions requires the use of pulse sequences with accurate flip angle calibration, which is performed by adjusting the transmit power in the prescan step. This is even more critical in the case of hyperpolarized studies, because the fast decay of the hyperpolarized signal requires precise determination of the flip angle for the acquisition. This work describes a fast and efficient procedure for transmit power calibration of magnetic resonance acquisitions employing selective pulses, starting from the calibration of acquisitions performed with non-selective (hard) pulses. The proposed procedure employs a simple theoretical analysis of radiofrequency pulses by assuming a linear response and can be performed directly during in vivo studies. Experimental MR data validate the theoretical calculation by providing good agreement.

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