

Appendix A Supplementary Materials

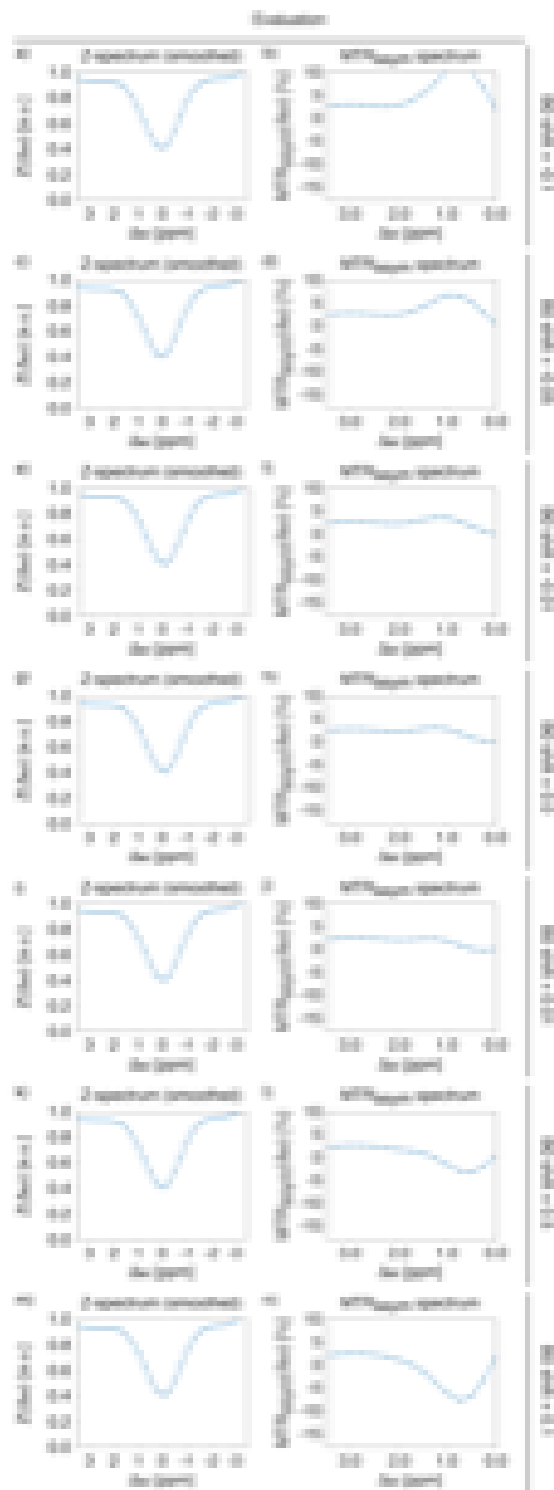


Fig. S1 Illustration of B0 artifacts demonstrated through successive B0 shifts in an L-arginine phantom. The environment is L-arginine (3T, 20mM, pH4, $T_1 = 1500\text{ms}$, $T_2 = 1000\text{ms}$). Plots demonstrate Z-spectra and MTRasym spectra across B0 shifts of 0.1 (a,b), 0.05 (c,d), 0.01 (e,f), 0.0 (g,h), -0.01 (i,j), -0.5 (k,l), and -0.1 (m,n). As a result, the B0 artifact induced peak at $\sim +0.7\text{ppm}$ changes in both magnitude and direction, but the L-arginine peak at $\sim +3\text{ppm}$ does not change.

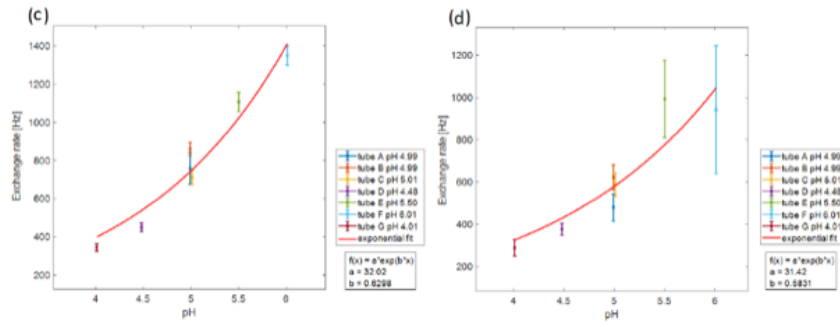


Fig. S2 Exchange rate estimation over variations in pH level. Regression plots indicate mean values inside a region-of-interest (ROI) for different concentrations of L-Arginine [A=25mM,B=100mM,C-G =50mM] acquired at different pH levels [A=4.99, B=4.99,C=5.01,D=4.48,E=5.50,F=6.01,G=4.01]. L-Arginine was dissolved in a pH 4.0 buffer at the specified concentrations and adapted with NaOH to reach pH levels of 4.0 , 4.5, 4.0, 5.5, 6.0. 6g of salt were added in the water for better shimming. The temperature of the solution was measured to be 25°C. Data were acquired with a standard MRF-protocol with a) an EPI and b) with a GRE readout [26].