



Supplementary Figure 2. Iron extraction experiment. (A) Two ROIs, corpus callosum and basal ganglia, in the specimen. (B)  $\Delta R_2^*$  changes over 16 days in the corpus callosum (red line) and the basal ganglia (green line). (C)  $R_2^*$  changes in the corpus callosum (red line when the corpus callosum orientation is perpendicular to  $B_0$ , and pink line when it is parallel to  $B_0$ ). (D)  $R_2^*$  changes in the basal ganglia (green line when the corpus callosum orientation was perpendicular to  $B_0$ , and blue line when it was parallel to  $B_0$ ). The single-sided error bar represents a standard deviation. The corpus callosum ROI shows consistently large  $\Delta R_2^*$  over 16 days. No decrease in

$\Delta R_2^*$  was observed over the whole period when  $\Delta R_2^*$  measurements were compared to the pre-extraction result (day 0). This finding suggests that iron is not the source for the contrast. The measurements show a slight increase in  $\Delta R_2^*$  on day 4 and afterward (on average,  $0.9 \pm 0.3$  Hz increase in  $\Delta R_2^*$  compared to day 0; see Discussion for a potential explanation). In the basal ganglia ROI,  $\Delta R_2^*$  was close to zero in all measurements (on average,  $-0.5 \pm 0.2$  Hz). The small negative offset may have been introduced by the field inhomogeneity. The measurements are summarized below.

Iron	Corpus Callosum			Basal Ganglia		
	$R_{2\parallel}^*$	$R_{2\perp}^*$	$\Delta R_2^*$	$R_{2\parallel}^*$	$R_{2\perp}^*$	$\Delta R_2^*$
Day 0	$37.7 \pm 1.5$	$41.2 \pm 1.7$	$3.5 \pm 2.1$	$52.4 \pm 7.0$	$51.5 \pm 8.1$	$-0.9 \pm 10.2$
Day 2	$31.1 \pm 1.4$	$34.6 \pm 1.9$	$3.5 \pm 2.1$	$43.2 \pm 7.1$	$42.7 \pm 8.0$	$-0.5 \pm 10.4$
Day 4	$29.7 \pm 1.4$	$33.9 \pm 1.8$	$4.1 \pm 1.9$	$40.4 \pm 6.7$	$40.0 \pm 6.7$	$-0.4 \pm 8.7$
Day 6	$28.9 \pm 0.9$	$33.5 \pm 1.5$	$4.6 \pm 1.4$	$37.8 \pm 6.0$	$37.3 \pm 6.4$	$-0.5 \pm 9.0$
Day 8	$28.3 \pm 1.0$	$33.2 \pm 1.5$	$4.9 \pm 1.5$	$36.6 \pm 5.8$	$36.3 \pm 6.7$	$-0.3 \pm 9.1$
Day 10	$27.9 \pm 1.1$	$32.1 \pm 1.5$	$4.3 \pm 1.6$	$35.2 \pm 5.5$	$34.7 \pm 6.4$	$-0.5 \pm 7.5$
Day 12	$27.5 \pm 1.1$	$31.7 \pm 1.4$	$4.2 \pm 1.3$	$33.5 \pm 5.2$	$33.4 \pm 6.2$	$-0.1 \pm 7.2$
Day 14	$27.4 \pm 1.2$	$31.7 \pm 1.4$	$4.3 \pm 1.3$	$33.1 \pm 5.3$	$32.5 \pm 6.0$	$-0.6 \pm 8.5$
Day 16	$27.0 \pm 1.1$	$31.2 \pm 1.5$	$4.2 \pm 1.5$	$33.0 \pm 5.6$	$32.3 \pm 5.6$	$-0.7 \pm 8.6$