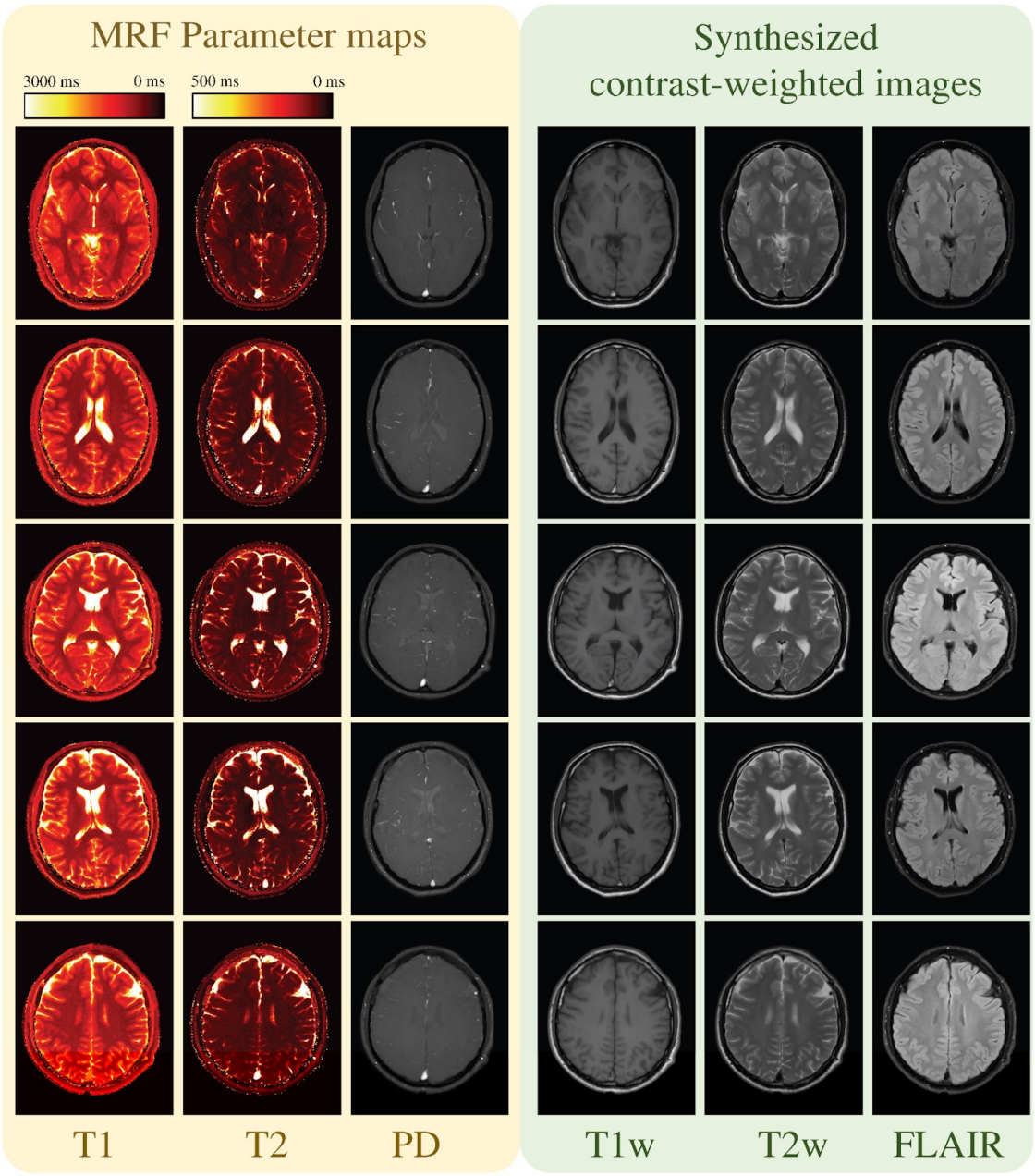


Figure S1: **Gallery of N-DCSNet synthesized contrast-weighted images alongside parameter maps.** N-DCSNet synthesizes high-fidelity contrast-weighted images (right three columns) from MRF data. Concurrently, the parameter maps (*i.e.*, PD, T1, T2) can be obtained through dictionary matching (left three columns). Our approach showcases the feasibility of generating complementary parameter maps and contrast-weighted images from a single scan.

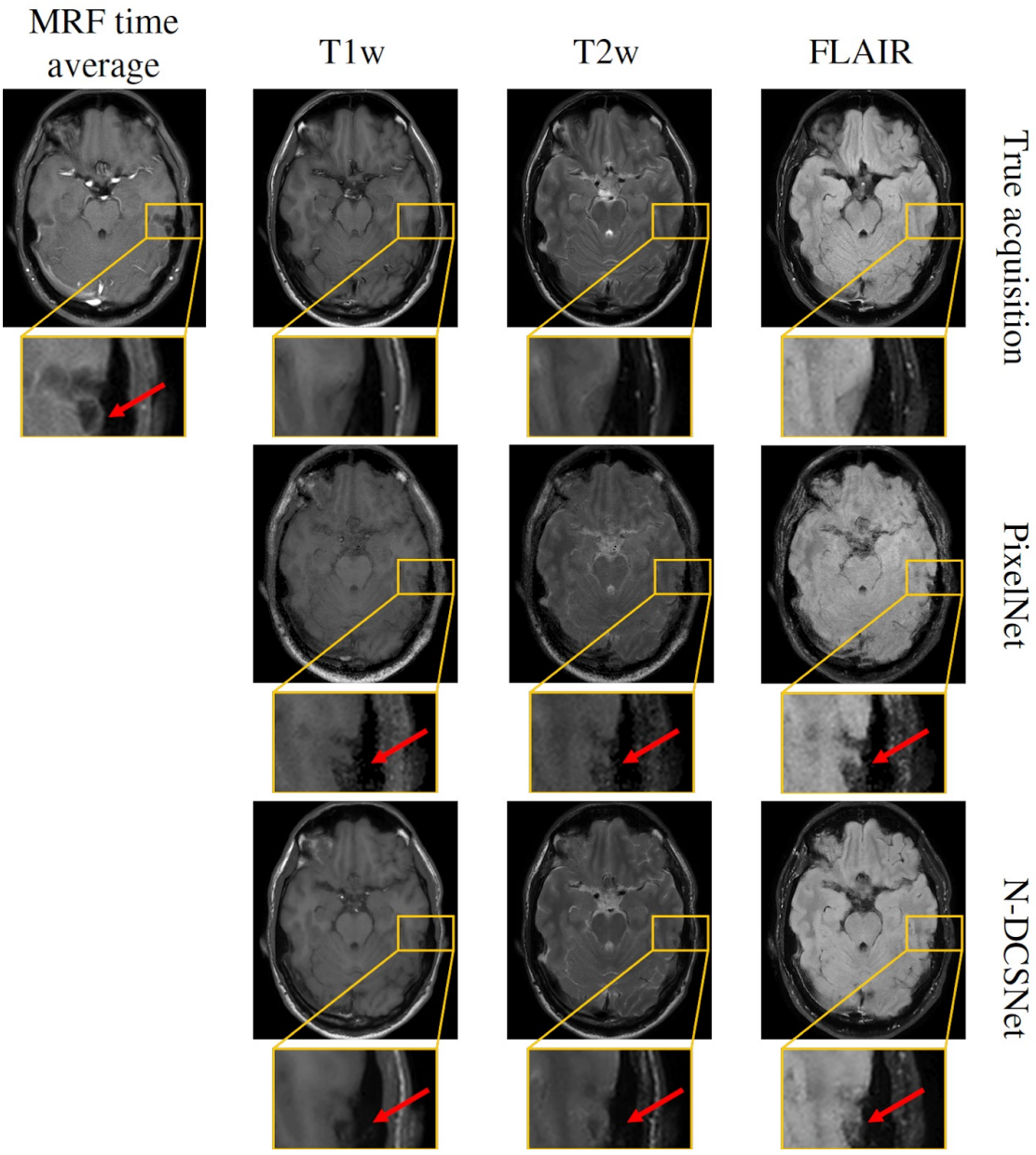


Figure S2: **Representative N-DCSNet results in mitigating spiral off-resonance artifacts in an MRF time series near the skull region.** The MRF time-averaged image and PixelNet results exhibit spiral off-resonance artifacts near the skull region (zoomed-in images) because of B0 inhomogeneity and the long readout time. **N-DCSNet** recovers the structure and produces contrast-weighted images with few residual artifacts. True acquisitions are displayed as references. Red arrows point to the regions with residual artifacts.