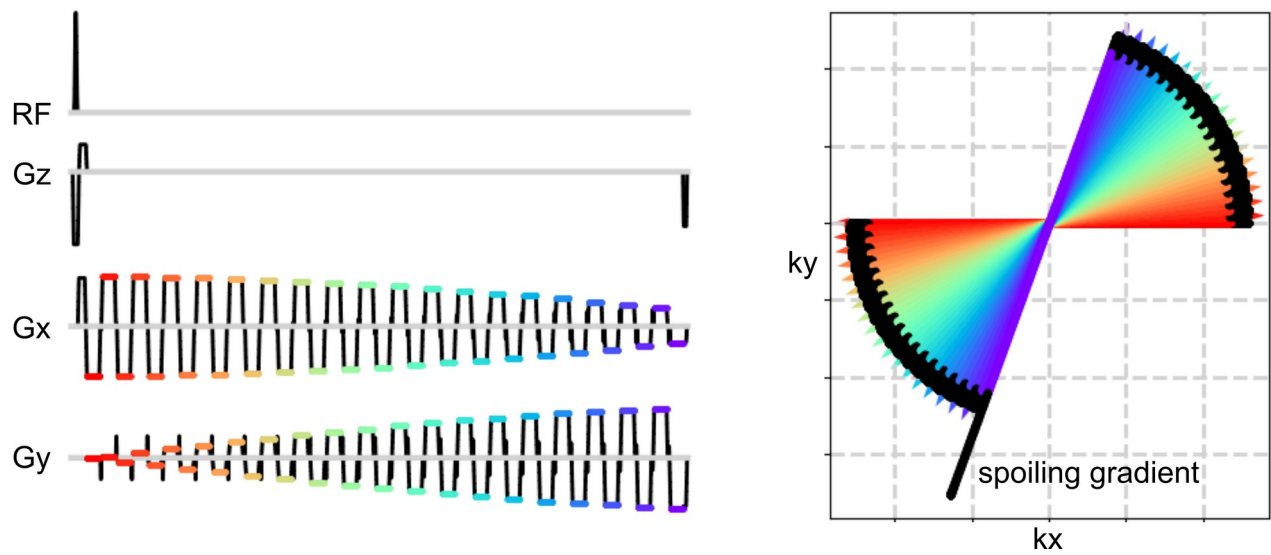
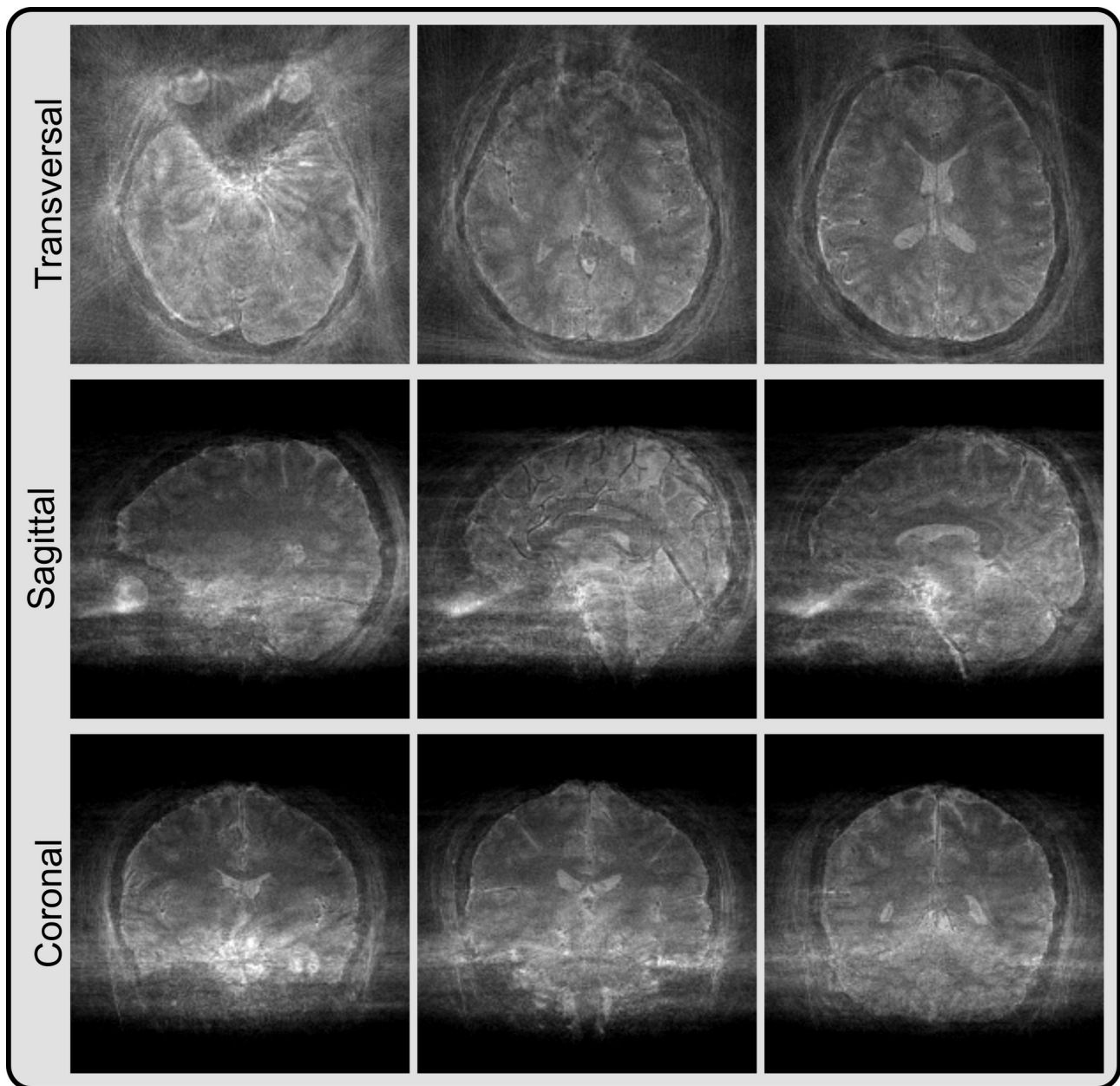


**Figure S1.** (Top) Screenshot of the segmented radial EPI sequence implemented on Siemens pulse sequence programming platform. In this work, one complete k-space consisted of seven excitation (segments). (Bottom) Zoomed-in sequence diagram of the third TR block. Note that this simulation presents the case of 2D acquisition. For 3D acquisition, every TR block is repeated for all  $k_z$  partitions until the next TR block with different segment of radial spokes.



**Figure S2.** Color-coded illustration of the radial EPI sequence from one excitation and its corresponding k-space trajectory. The elongated black line after the readout of the last echo represented the spoiling gradients.



**Figure S3.** Adjoint NUFFT with density compensation reconstruction results of the same slices and orientation views as in Figure 3.