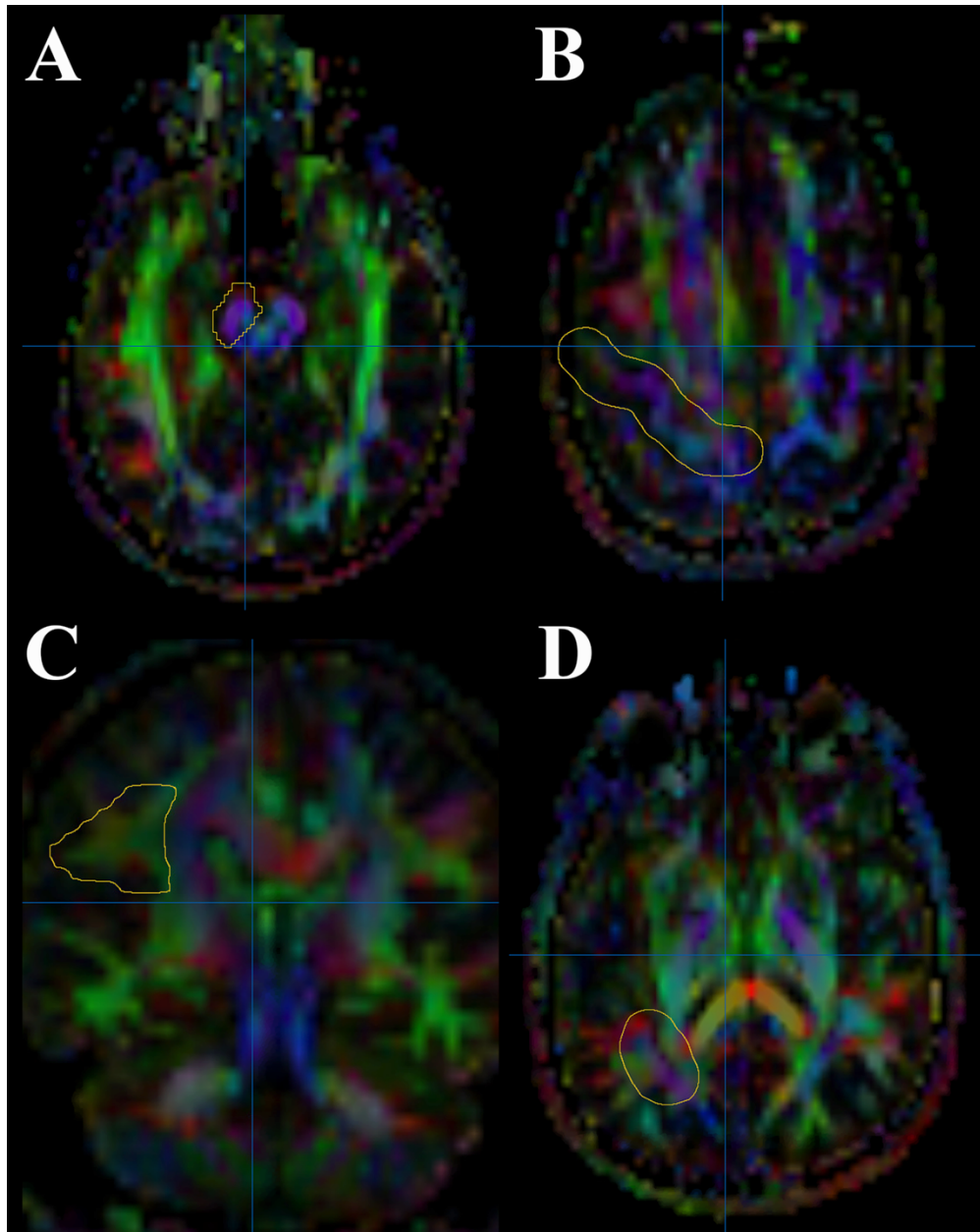
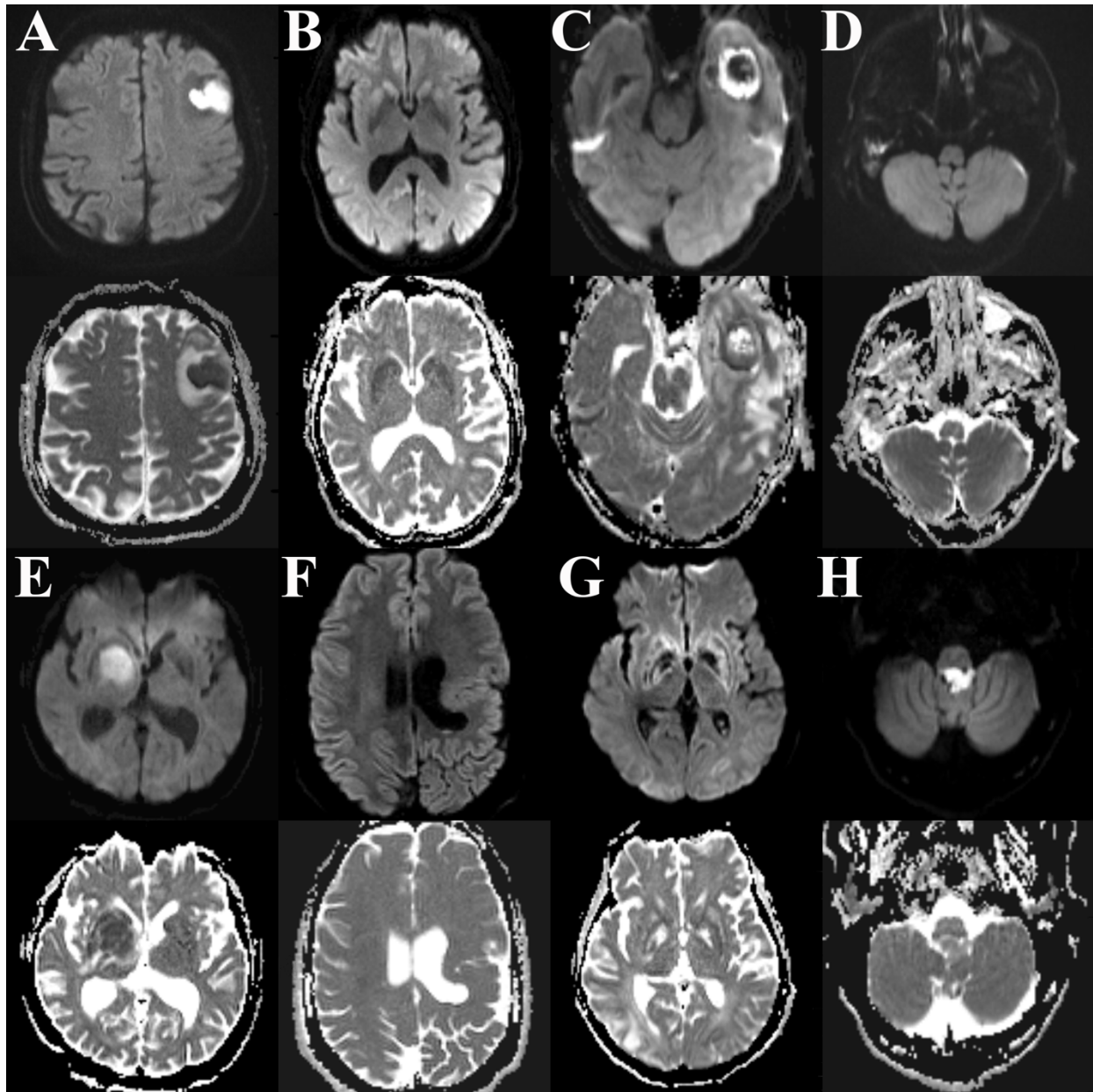


ONLINE TABLE 1 – Key parameters for the diffusion sequence used in 1.5 & 3-T MRI neuroradiology head protocols at a single large academic institution with or without SMS-acceleration.

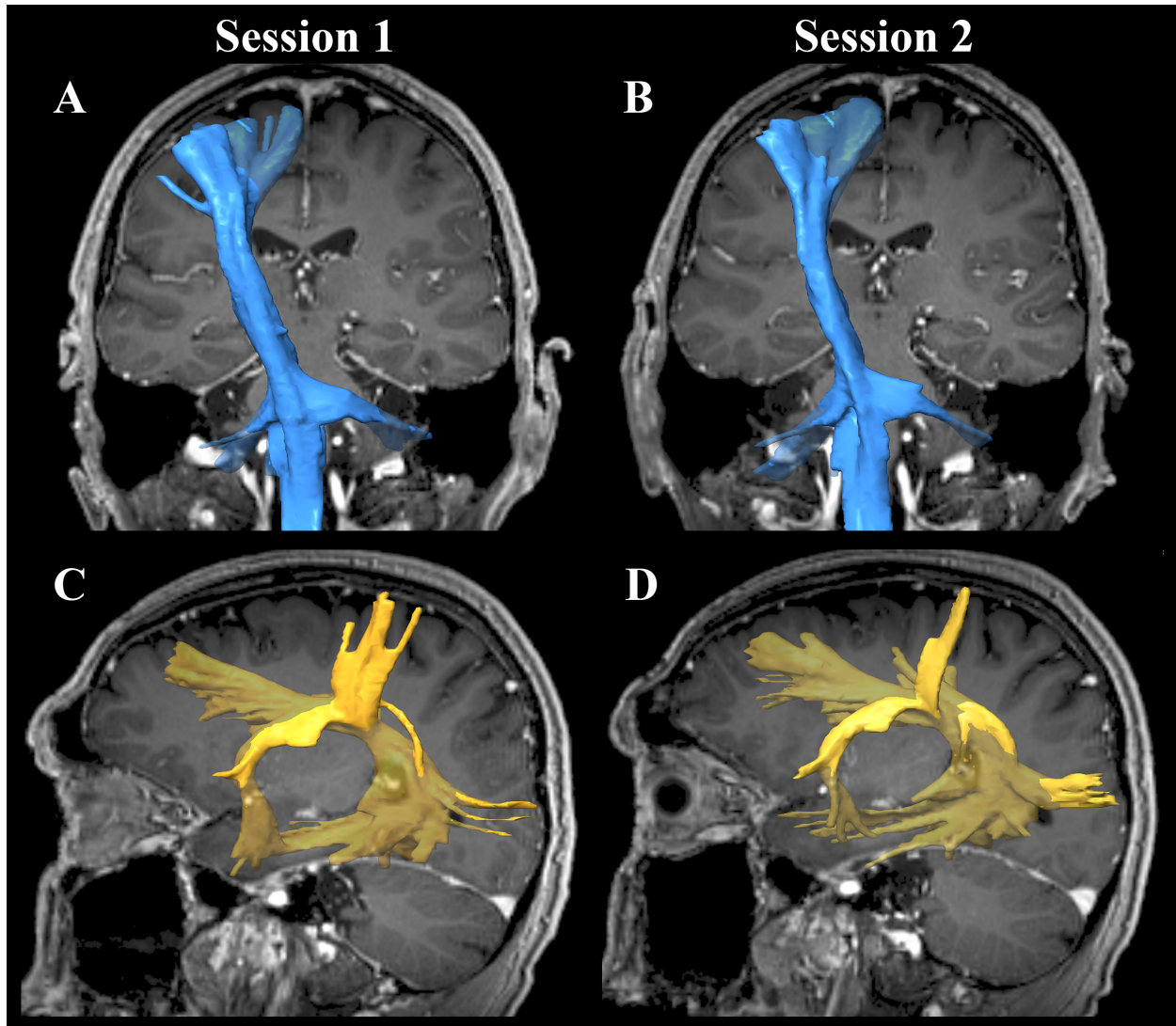
Sequence parameter	3-T MRI		1.5-T MRI	
	Standard	SMS	Standard	SMS
Field-of-view (read)	220 mm	220 mm	220 mm	220 mm
Matrix	150	150	192	150
Partial Fourier	6/8	6/8	6/8	6/8
In-plane resolution	1.5-mm	1.5-mm	1.1-mm	1.5mm
Slice number & thickness	32 x 5-mm	32 x 5-mm	33 x 5-mm	30 x 5-mm
In-plane parallel imaging (iPAT factor)	2x	2x	2x	2x
SMS slice acceleration	NA	2x	NA	2x
b = 0 s/mm ² (averages)	2	2	2	3
b = 500 s/mm ² (directions x averages)	3x2	0	3x2	0
b = 1000 s/mm ² (directions x averages)	3x2	6x1	3x2	6x2
Repetition time (TR)	8.2 sec	3.4 sec	9.6 sec	3.2 sec
Echo time (TE)	82 ms	84 ms	96 ms	80 ms
Bandwidth (Hz/pixel)	1334	1334	1132	1334
Time (min:sec)	2:21	0:45	2:45	1:05



ONLINE FIGURE 1: Illustration of two region of interest (ROI) used for tractography of the corticospinal tract (CST) and superior longitudinal fasciculus (SLF). ROIs are shown in yellow overlaid on direction-encoded color FA maps from the standard DTI acquisition (green = anterior-posterior, red = left-right & blue = superior-inferior anisotropy). Each ROI was drawn on 3 adjacent slices. Diffusion streamlines that passed through both ROIs were segmented (see methods for further algorithm details). CST ROIs included the voxels with superior-inferior anisotropy in the ipsilateral cerebral peduncle (A) and subcortical white matter of the precentral gyrus (B) near the vertex (both in axial plane). SLF ROIs included the proximal frontal projections (triangle of periventricular voxels with anterior-posterior anisotropy in coronal plane through the isthmus of the corpus callosum; C) and the genu (triangle of periventricular voxels with superior-inferior anisotropy in axial plane through the internal capsule; D). Left greater than right hemisphere asymmetry in fractional anisotropy for the SLF ROIs is normal (36).



ONLINE FIGURE 2: Simultaneous multi-slice axial diffusion trace and apparent diffusion coefficient maps in 8 different clinical patients after widespread implementation of SMS throughout our protocols. **Top Row:** 1.5-T MRI examples (A; left frontal lobe abscess, B; Creutzfeldt-Jakob disease changes in the basal ganglia, C; left temporal metastasis, D; right otomastoiditis). **Bottom Row:** 3-T MRI examples (E; right basal ganglia lymphoma, F; left frontoparietal polymicrogyria, G; subacute hypoxic ischemic encephalopathy basal ganglia changes, H; fourth ventricle epidermoid cyst). Beyond detection of acute stroke, SMS-accelerated diffusion effectively characterizing other clinical diagnoses common to neuroradiology practice.



ONLINE FIGURE 3: SMS tractography is reproducible in a 66-year-old male with a left frontal anaplastic oligodendroglioma scanned on 2 separate sessions 30 days apart. **Top Row:** (A, B) shows no significant difference in the contralateral right corticospinal tract 3D volumes (blue). The percent difference in tract volume, length and FA was 9.9, 2.5 and 0 % respectively. **Bottom Row:** (C, D) shows no significant difference in the right superior longitudinal fasciculus 3D volumes (yellow). The percent difference in tract volume, length and FA was 7.0, 5.6 and 0 % respectively. Scan-to-scan variation is noted for lateral CST projections, and for SLF projections to the frontoparietal operculum and occipital regions. The Dice similarity coefficients between initial and followup SMS tract volumes for CST and SLF were 0.95 and 0.96 respectively.