MAGNETIC RESONANCE INNOVATIONS, INC.
DEDICATED TO THE DEVELOPMENT OF NOVEL IDEAS IN MAGNETIC RESONANCE IMAGING
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SUMMARY REPORT OF FULL TECHNICAL FINDINGS

ID: SAMPLE001, DOS: DAY/MONTH/YEAR, SEX: N/A, AGE: N/A

Overall Impression:

SWI indicates microbleeds, medullar vein damage, and subdural hematoma. Brain perfusion is abnormal in the right hemisphere with pial veins showing abnormal O2 saturation. DTI indicates axonal injury to the right frontal lobe.

Conventional images:

T2 hyper-intensities are shown in the white matter. T1 hypo-intensities are shown in the right temporal and right frontal lobes. A non-uniform signal is shown at the periphery of the left parietal lobe with bright T2 signal anterior to dark T2 signal. On T1, this region appears iso-intense. Dilated VR space noted in right frontal lobe. Hyper-intense signal is noted superficial to the right cerebellar lobe in T1WI.

Diffusion weighted imaging ADC map:

Abnormal signal observed superficial to the left parietal lobe with hyper-intense signal anterior and hypo-intense signal posterior.

SWI analysis:

High iron content is observed in the right pulvinar thalamus and bilaterally in the red nucleus. Multiple hypo-intensities with dipole effect in phase are observed in the: right temporal, right frontal, left occipital and left parietal lobes (microbleeds). Linear hypo-intensities with dipole effect in phase are observed coursing through the white matter of the right temporal and right frontal lobes (medullary vein damage). Irregular hypo-intensity is observed superficial to the right cerebellar lobe (subdural hematoma). Inhomogeneous signal is observed superficial to the left parietal lobe with strong inhomogeneity in the posterior region. SWIM analysis shows a pial vein near the right parietal lobe has abnormal susceptibility/O2 saturation.

Diffusion tensor images:

FA and inverse FA maps are provided. Reduced FA values are observed in the white matter of the right frontal lobe.

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Conventional images:

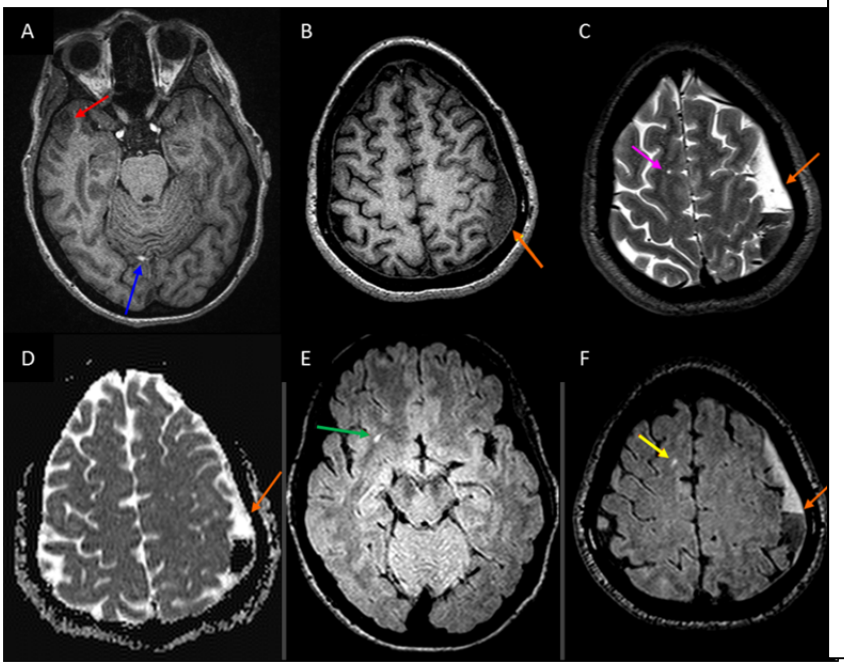

Fig. 1 A-F

A&B: Pre contrast T1WI; Hypo-intensities are observed in the right temporal lobe (red arrow). Hyper-intensity superficial to right cerebellar lobe (blue arrow). Iso-intensity is observed at the periphery of the parietal lobe (orange arrow).

C: T2IW; Hyper-intensity in the right frontal lobe (pink arrow, dilated VR space). Anterior hyper-intensity and posterior hypo-intensity is observed at the periphery of the parietal lobe (orange arrow).

D: ADC; Anterior hyper-intensity and posterior hypo-intensity (orange arrow).

E&F: T2 FLAIR; Hyper-intensity near the right insular cortex (green arrow) and right frontal lobe (pink arrow). Anterior hyper-intensity and posterior hypo-intensity (orange arrow).

SWI analysis:

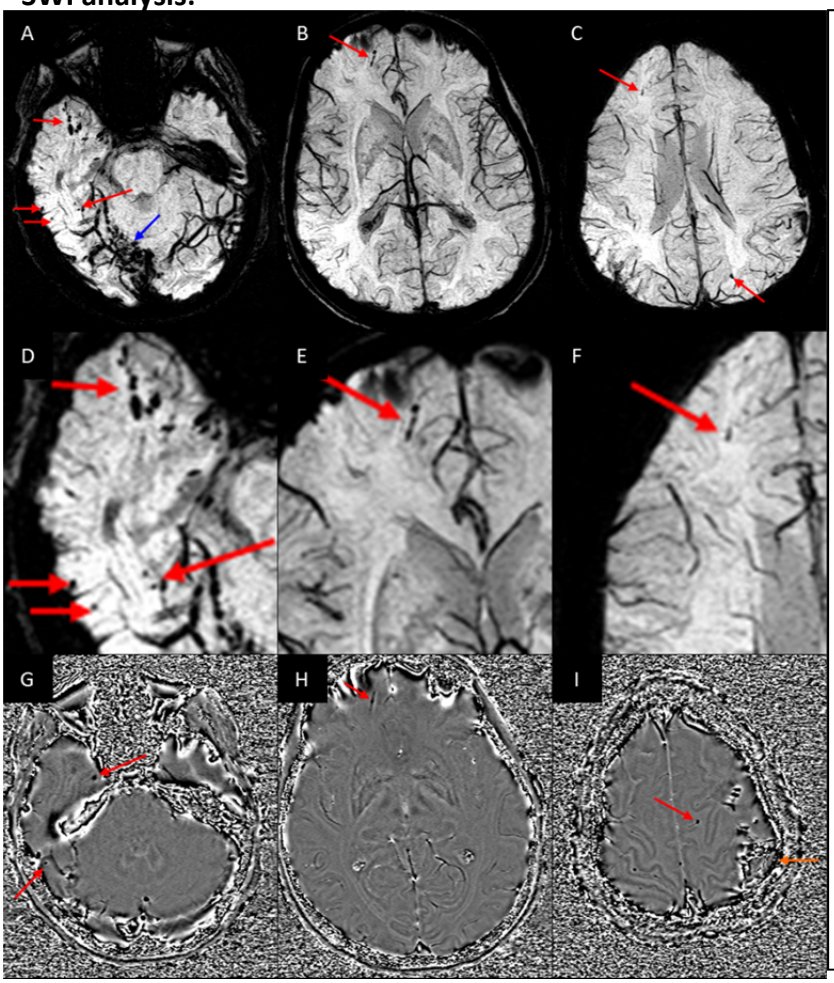

Fig. 2 A-I

A-C: SWI MIP; hypo-intense signals are shown in the white matter (red arrows) indicating high susceptibility of microbleeds and medullary vein damage. Irregular hypo-intense signal is shown above the right cerebellar lobe (blue arrow in A, subdural hematoma).

D-F: zoomed SWI MIP A-C.

G-I: SWI phase images; hypo-intensities with dipole are shown in the white matter (red arrows in G&I, microbleeds). Linear hypo-intensity with dipole is shown in the right frontal lobe (red arrow in H, medullary vein damage). Inhomogeneous signal is shown superficial to the left parietal lobe with increasing inhomogeneity in the posterior region (orange arrow in I).

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DTI analysis:

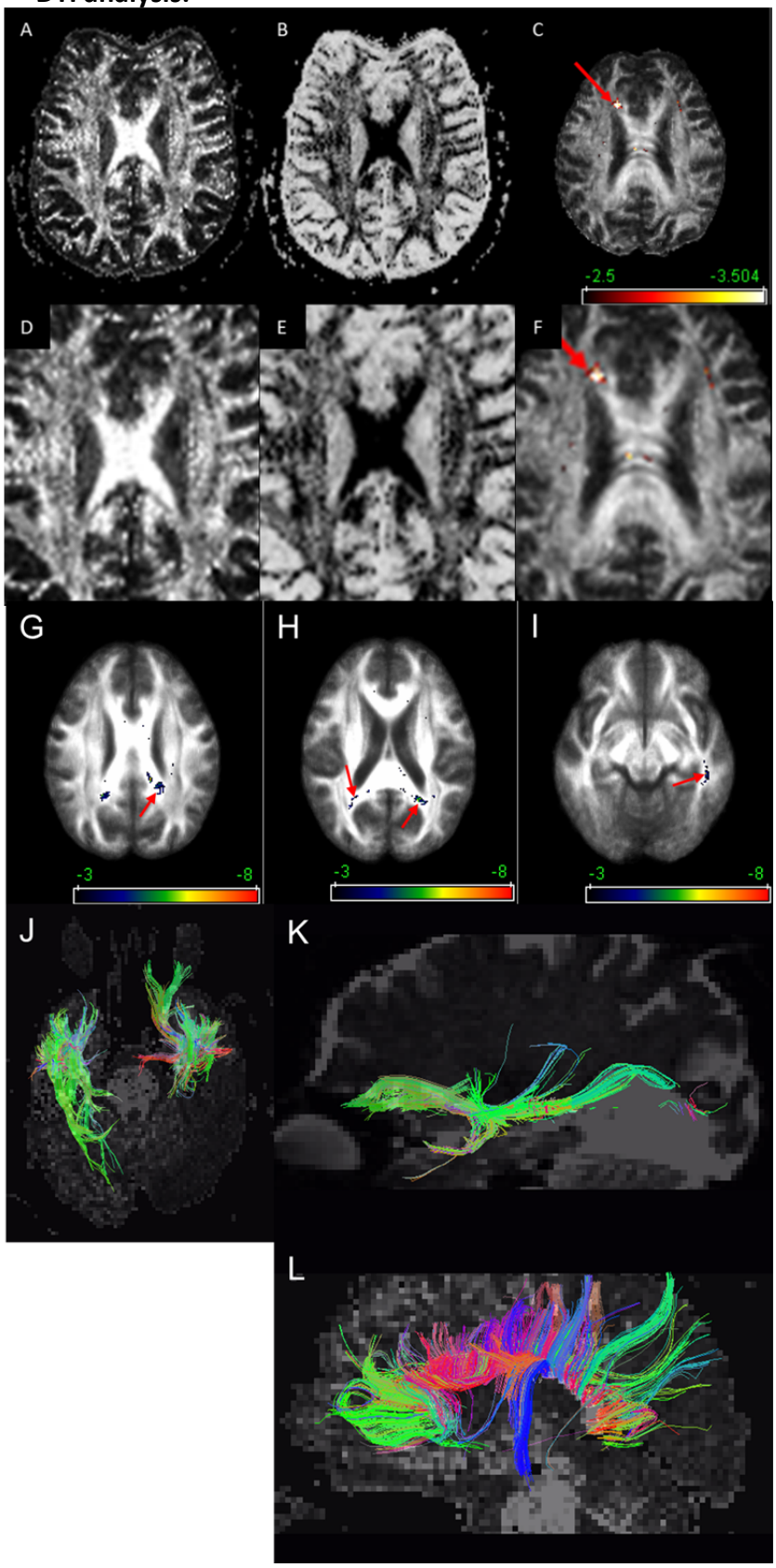

Fig. 5 A-I

A: FA map

B: Inverse FA map

C: FA map fitted to normal control template. Regions with values lower than 2.5 standard deviations from the mean are highlighted. Scale provided.

D-F: Respective zoomed images of A-C. DTI maps show reduced FA values and increase inverse FA values in in the white matter of the right frontal lobe near the corpus callosum (red arrow).

G-I: Mean FA image with Z-score analysis; abnormal FA values are observed in the vertical occipital fasciculus (G), splenium (H), and inferior longitudinal fasciculus (I) as indicated by the red arrows.

J: Tractography; the left hemisphere shows fewer fibers from the inferior longitudinal fasciculus seed region.

K: Left hemisphere Tractography; the left hemisphere shows fewer fibers from the inferior fronto occipital seed region.

L: Left hemisphere Tractography; the left hemisphere shows truncated and fewer fibers from the corpus callosum.

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Traumatic Brain Injury Technical Report Guide

Overall Impression: A summary of results noted in the images of the comprehensive MRI scan will be provided highlighting the TBI related findings included in both the full and short technical TBI reports. Additional anatomic and physiological findings may also be provided in the extended reports which are not reflected in this opening statement.

Conventional: This section includes analysis of standard brain scan images including T2WI, T2 FLAIR, as well as pre and post contrast T1WI. Lesions may be identified in the parenchyma including: edema, intracerebral/intraventricular hemorrhage, vascular dissection, disruption of the blood brain barrier, and inflammation or brain swelling. Other TBI related findings which may be identified on these images include: skull fracture, mid-line shift, 4th ventricle shift or effacement, ischemia, infarctions, and contusion. The technical report may also provide a lesion volume for T2 FLAIR data.

Diffusion weighted imaging/ADC scan: DWI and ADC maps are evaluated for the presence of lesions in the parenchyma. Although these lesions may also appear on other modalities, their presence or absence may provide further support for the timeline of the TBI and parenchymal characteristics.

SWI analysis: This section includes MRV and MRA of the brain to identify any potential abnormalities resulting from the TBI. SWI provides an excellent opportunity to observe any blood products in the parenchyma such as: traumatic aneurysm, microbleeds, subdural/epidural hematoma, and hemorrhage. Venous vascular damage has also been shown to occur in the medullary veins in mild to severe TBI and is virtually undetectable in other modalities. Iron quantification of the deep gray matter structures is provided. Susceptibility weighted imaging mapping (SWIM) is also performed to reconstruct potential TBI related phenomena from the surrounding local magnetic field changes. This analysis provides a quantitative map of vascular susceptibility which is proportional to oxygen saturation. A threshold mask of these images has the potential to provide regions of interest where veins show abnormal oxygen saturation/susceptibility.

Diffusion tensor imaging: Fractional anisotropy maps are provided in both standard and inverted images. The white matter including: the genu, splenium, body of the corpus callosum, corticospinal tracts, and radiata of the white matter are visualized for any abnormal change in these values. When observed, these are compared with a normal control template. Those regions which are greater than 2.5 standard deviations away from the normal control population are considered abnormal. DTI is considered a method to observe diffuse and traumatic axonal injury.

DTI based Tractography: Fiber tracking, or tractography, is performed with seed regions in the: inferior fronto occipital fibers, inferior longitudinal fasciculus fibers, corpus callosum, cortico spinal tract, internal capsule, and brain stem. These images may provide indications where lesions have disrupted the connection of white matter fibers.