



Titre: Diffusion Kurtosis Imaging of Neonatal Spinal Cord in Clinical
Title: Routine. Supplément

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Supplementary Material

1 Supplementary Figures

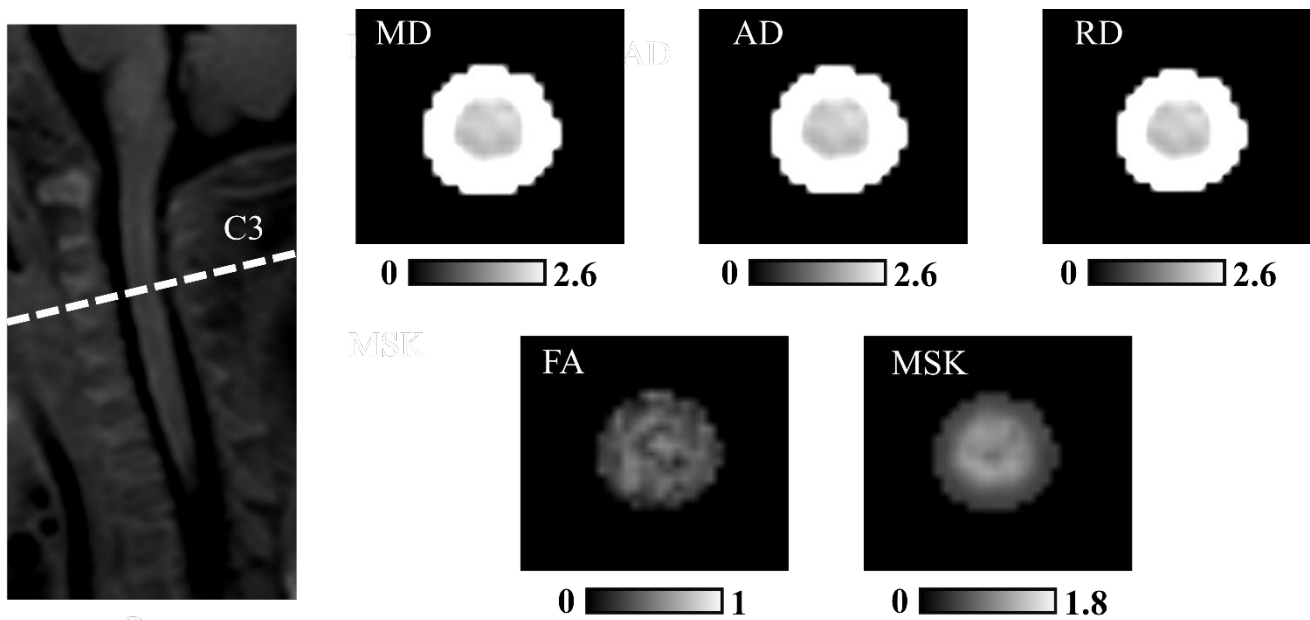


Figure 1S. Diffusion and kurtosis maps at the mid-C3 level for one example subject: Units for MD, AD and RD are $\mu\text{m}^2/\text{s}$, for MSK mm^2/s , while FA is dimensionless.

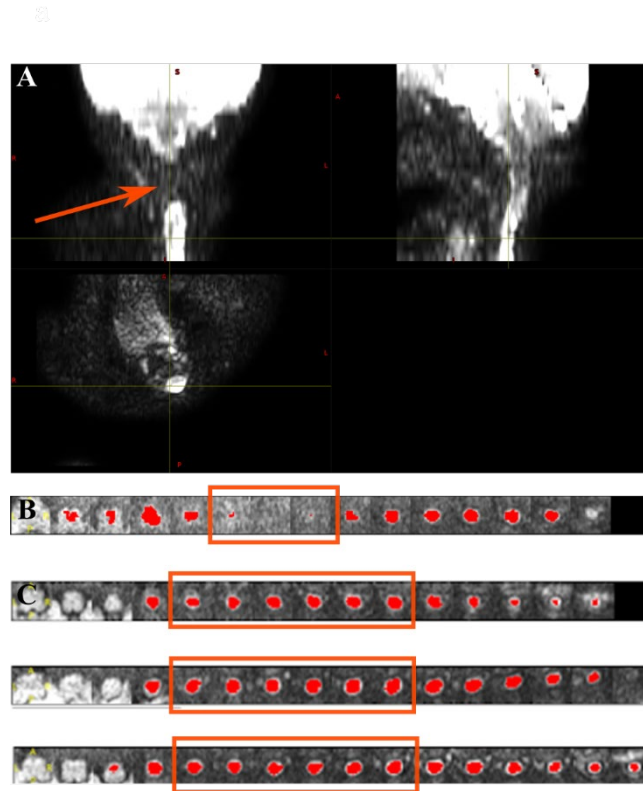


Figure 2S. Quality control: (A) Example of excluded DKI scan and (B) relative SC segmentation show signal loss across multiple slices as the coronal plane is not overlapping with the cord (ie: lordosis); (C) QC of C1-C4 levels: axial slices under analysis correspond to the same cervical levels for all subjects as shown in three example subjects.

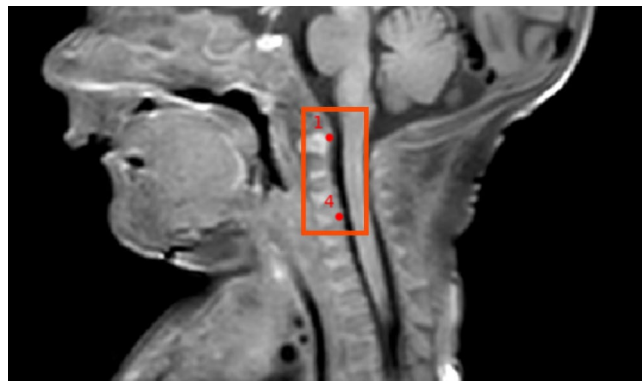


Figure 3S. Vertebral labeling: Manual labeling of top of C1 vertebra and C3-C4 disc from graphical user interface integrated in SCT.

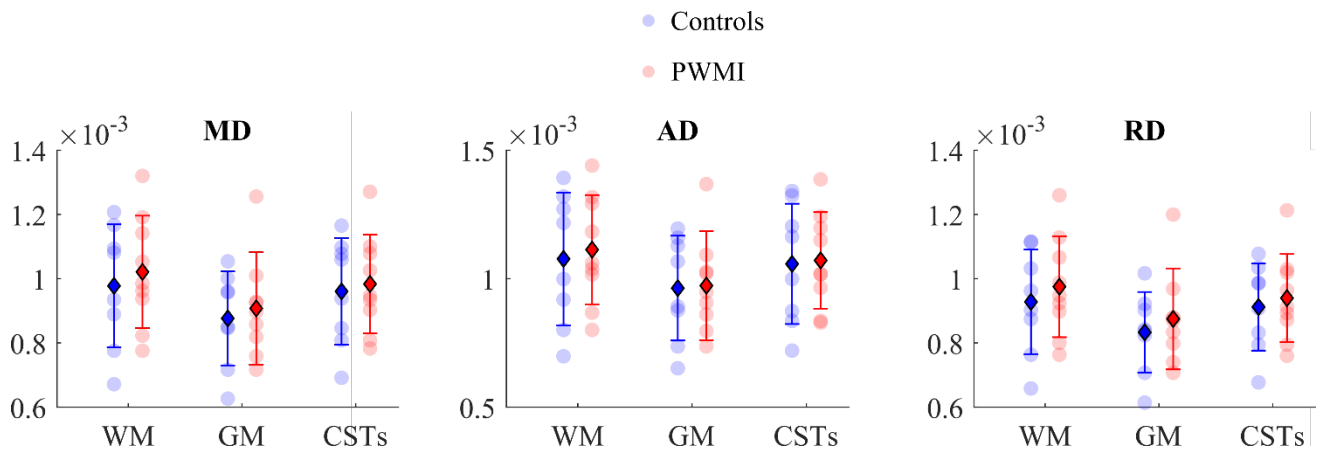


Figure 4S. Extraction of diffusion measures within specific ROIs: Scatter plots of DTI in group subjects across aforementioned ROIs: coloured spots indicate single subject's value for each metric; as reported in the legend, controls' measures are in blue, whereas Periventricular White Matter Injury (PWMI) group's in red. Units for MD, AD, RD are in mm²/s. Error bars displaying mean (diamond) and standard deviation (bars) are overlaid on scatter plots.

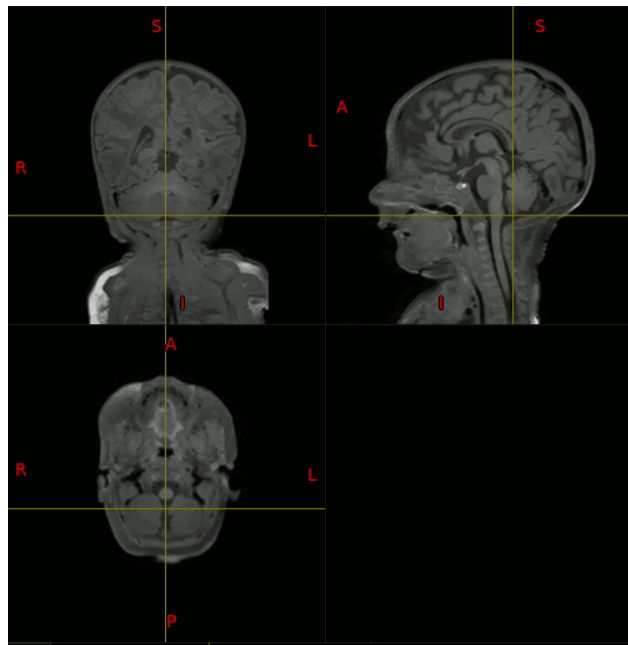


Figure 5S. DKI scan overlaid on structural 3dT1w image in animated picture: while both images are clearly not registered along the antero-posterior direction due to the very strong susceptibility artefact, the z-location is similar: see how the bottom tip of the cerebellum is consistent for the two scans

2 Supplementary Tables

| Test of Between-Subjects Effects | | | | | |
|---|----------------------|-----------|-----------|------------|-----------------|
| | Factor | SS | DF | H | p-value |
| MSK | diagnosis | 1299.6 | 1 | 5.8812 | 0.015303 |
| | ROI | 402.71 | 2 | 1.8224 | 0.40203 |
| | diagnosis*ROI | 46.229 | 2 | 0.20921 | 0.90068 |
| | residuals | 9300 | 45 | NaN | NaN |
| FA | diagnosis | 0.019676 | 1 | 8.9043e-05 | 0.99247 |
| | ROI | 194.94 | 2 | 0.88221 | 0.64333 |
| | diagnosis*ROI | 56.327 | 2 | 0.25491 | 0.88033 |
| | residuals | 10797 | 45 | NaN | NaN |
| MD | diagnosis | 33.075 | 1 | 0.14968 | 0.69884 |
| | ROI | 874.94 | 2 | 3.9595 | 0.1381 |
| | diagnosis*ROI | 19.05 | 2 | 0.086209 | 0.95781 |
| | residuals | 10121 | 45 | NaN | NaN |
| AD | diagnosis | 12.297 | 1 | 0.055652 | 0.8135 |
| | ROI | 627.29 | 2 | 2.8388 | 0.24186 |
| | diagnosis*ROI | 12.197 | 2 | 0.055196 | 0.9728 |
| | residuals | 10397 | 45 | NaN | NaN |
| RD | diagnosis | 68.492 | 1 | 0.30996 | 0.5777 |
| | ROI | 1043.3 | 2 | 4.7214 | 0.094353 |
| | diagnosis*ROI | 16.863 | 2 | 0.076315 | 0.96256 |
| | residuals | 9919.9 | 45 | NaN | NaN |

SS=Sum of Squares; DF=Degrees of Freedom; H= Test Statistics

Supplementary Table 1: two-way non-parametric Scheirer-Ray-Hare output to assess the presence of statistically significant differences in DTI- and MSDKI- derived metrics between patient and control groups.

| Multiple Comparisons of means | | | | | |
|--------------------------------------|-------------|--------------|------------|-----------------|----------------|
| | ROI | U-val | RBC | CLES | p-value |
| MSK | WM | 48.5 | -0.347222 | 0.673611 | 0.247923 |
| | GM | 49.5 | -0.375 | 0.6875 | 0.210682 |
| | CSTs | 55.5 | -0.541667 | 0.770833 | 0.06734 |
| FA | WM | 35.5 | 0.013889 | 0.493056 | 1 |
| | GM | 39.5 | -0.097222 | 0.548611 | 0.772694 |
| | CSTs | 34.5 | 0.041667 | 0.479167 | 0.923295 |

**ROI=Region of Interest; WM=White Matter; GM= Gray Matter; U-val=U-value;
RBC=Rank-Biserial Correlation; CLES= Common Language Effect Size**

Supplementary Table 2: Mann-Whitney U Test (Wilcoxon rank-sum test) as non-parametric version of the independent T-test for pairwise post-hoc comparisons between patient and control group within each ROI, limited to MSK and FA - the two variables of interest for this study.