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Auteurs: Authors:	Rosella Trò, Monica Roascio, Domenico Tortora, Mariasavina Severino, Andrea Rossi, Julien Cohen-Adad, Marco Fato, & Gabriele Arnulfo
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Supplementary Material
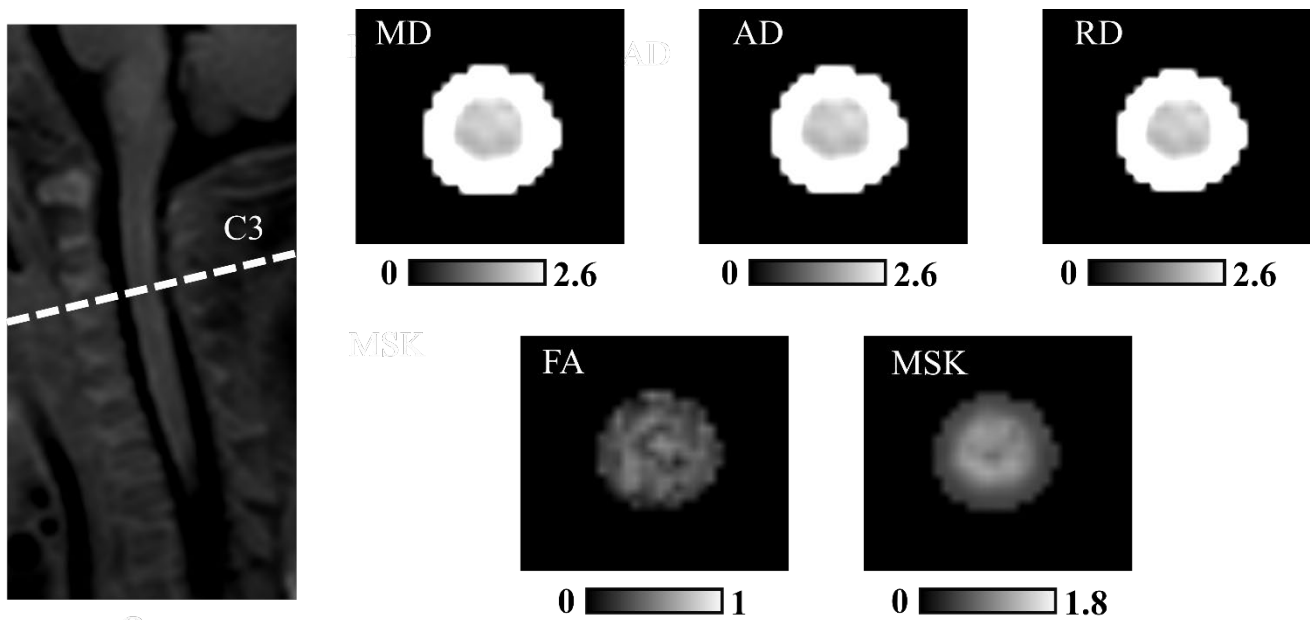
1   Supplementary Figures

Figure 1S. Diffusion and kurtosis maps at the mid-C3 level for one example subject: Units for MD, AD and RD are $\mu m^2/s$, for MSK mm^2/s, while FA is dimensionless.
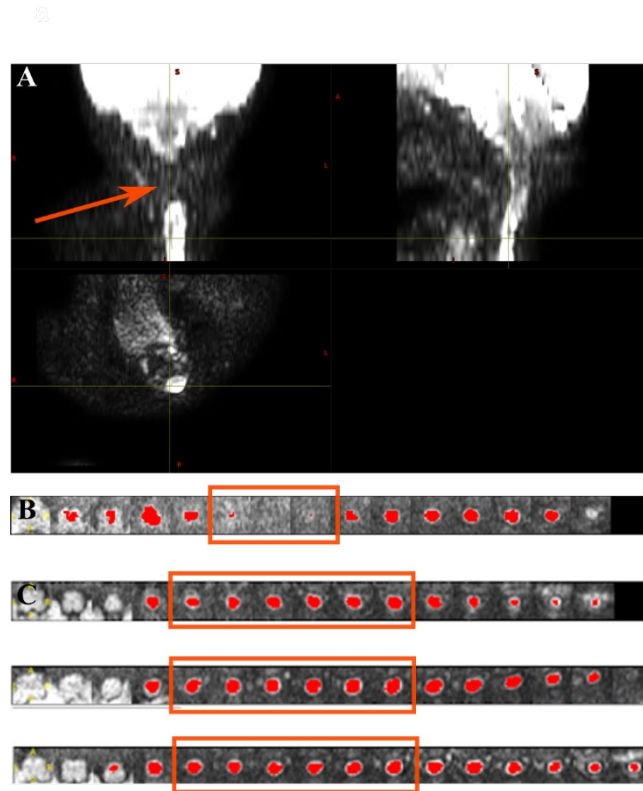
Figure 2S. Quality control: (A) Example of excluded DKI scan and **(B)** relative SC segmentation show signal loss across multiple slices as the coronal plane is not overlapping with the cord (ie: lordosis); **(C)** QC of C1-C4 levels: axial slices under analysis correspond to the same cervical levels for all subjects as shown in three example subjects.
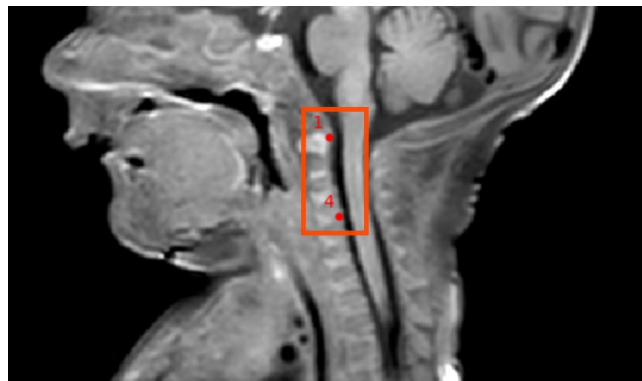

Figure 3S. Vertebral labeling: Manual labeling of top of C1 vertebra and C3-C4 disc from graphical user interface integrated in SCT.
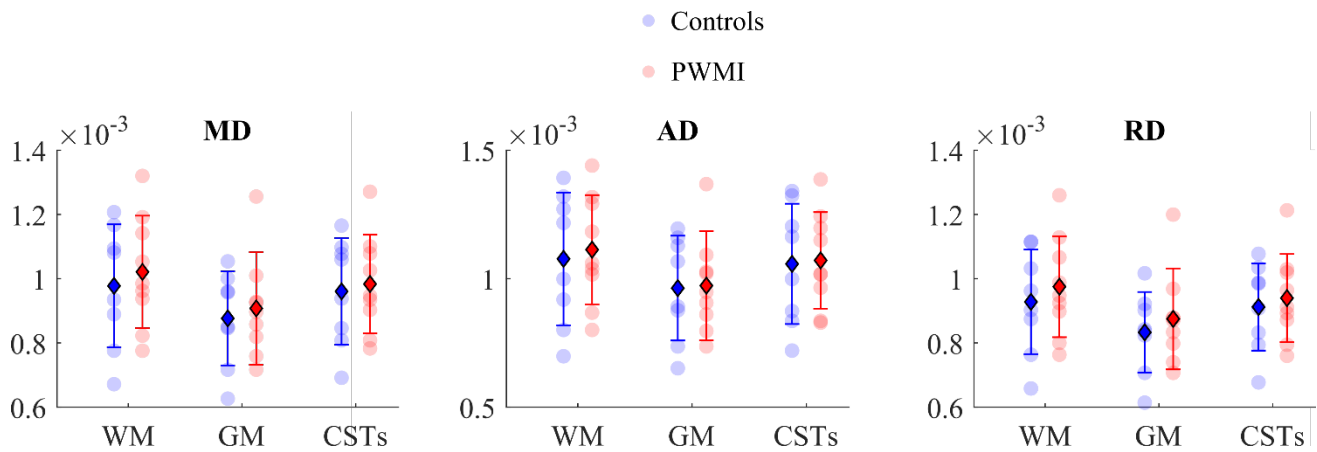
Figure 4S. Extraction of diffusion measures within specific ROIs: Scatter plots of DTI in group subjects across aforementioned ROIs: coloured spots indicate single subject's value for each metric; as reported in the legend, controls' measures are in blue, whereas Periventricular White Matter Injury (PWMI) group's in red. Units for MD, AD, RD are in mm^2/s. Error bars displaying mean (diamond) and standard deviation (bars) are overlaid on scatter plots.
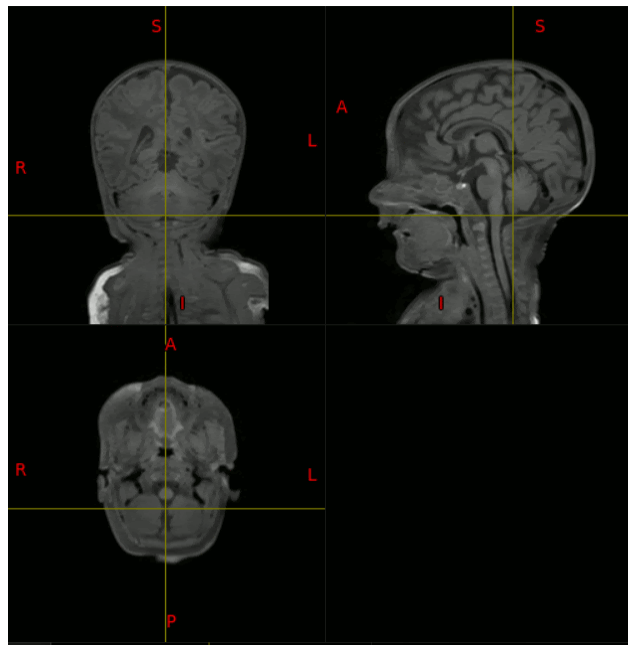

Figure 5S. DKI scan overlaid on structural 3dT1w image in animated picture: while both images are clearly not registered along the antero-posterior direction due to the very strong susceptibility artefact, the z-location is similar: see how the bottom tip of the cerebellum is consistent for the two scans

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.