ISMRM 2021 Trainee Awards

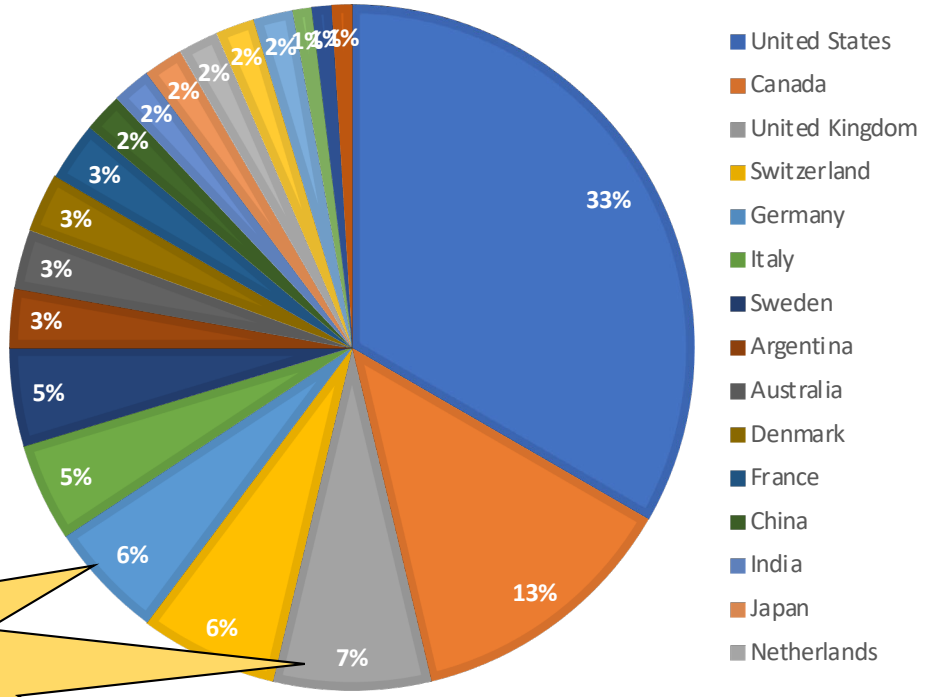
ISMRM 2021 Trainee Awards

- A way to highlight the accomplishments of our trainee members.
- The DSG committee solicited applications from trainees with abstract accepted as 1st author.
- Members of the DSG Committee (#11 in total) judged the abstracts and selected winners for the following categories:
  - Best Methods Abstracts accepted as Oral and Poster presentation
  - Best Neuro Abstracts accepted as Oral and Poster presentation
  - Best Body Abstracts accepted as Oral and Poster presentation

submissions

111 submissions

- 61 poster presentations
- 50 oral presentations
- 36 newcomers
  (first time submission as a first author)



Special feature of 2021:
2 awards per oral category

Best Methods Abstracts

Oral 1

Oral 2

Poster

Best Neuro Abstracts

Oral 1

Oral 2

Poster

Best Body Abstracts

Oral 1

Oral 2

Poster

Diffusion Study Group Award 2021 for

Best Diffusion Methods Abstract (Oral)

Diffusion Study Group Award 2021 for

Best Diffusion Methods Abstract (Oral)

1st Time Submission

Geraline Vis

Dept of Diagnostic Radialogy, Clinical Sciences Lund, Lund University, Lund, Sweden

109: High-resolution visualization of isotropically restricted diffusion in brain by strong spherical dMRI and super-resolution reconstruction.

High-resolution visualization of isotropically diffusion in brain by strong spherical dMRI and super-resolution reconstruction

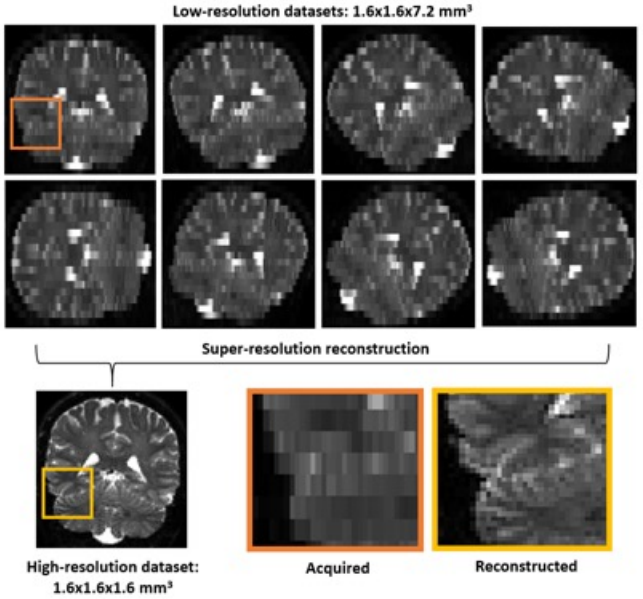
Geraline Vis[1], Markus Nilsson[1], and Filip Szczepankiewicz[1]
[1]*Dept. Of Diagnostic Radiology, Clinical Sciences Lund, Lund University, Lund, Sweden*

Problem

Low SNR limits high-resolution imaging of isotropically restricted diffusion[1]

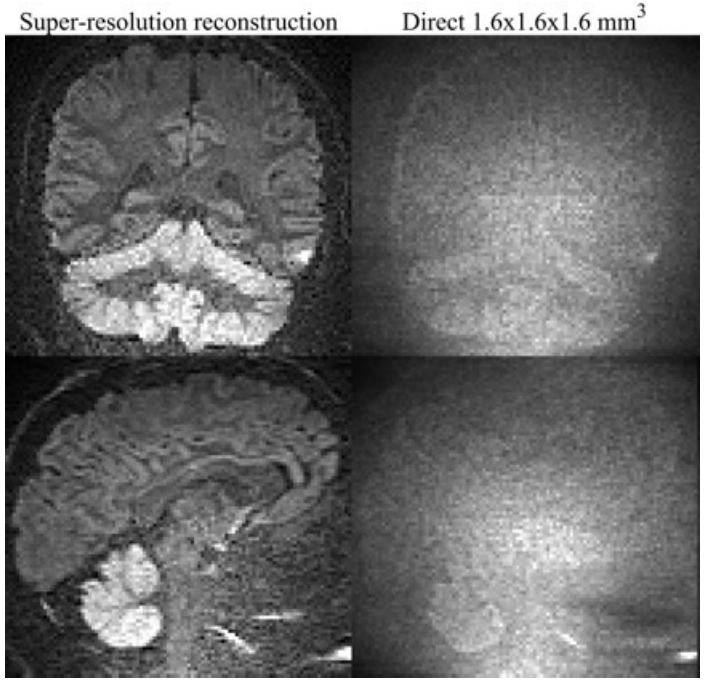
Methods

Super-resolution increases SNR while retaining high-resolution



Clinical 3T scanner
STE at b = 4 ms/µm^2
1.6x1.6x1.6 mm^3

Results



Implications

Novel contrast may be used to study densely packed cells in high-resolution on a clinical scanner

[1]Tax et al. 2020 *NeuroImage*

Diffusion Study Group Award 2021 for

Best Diffusion Methods Abstract (Oral)

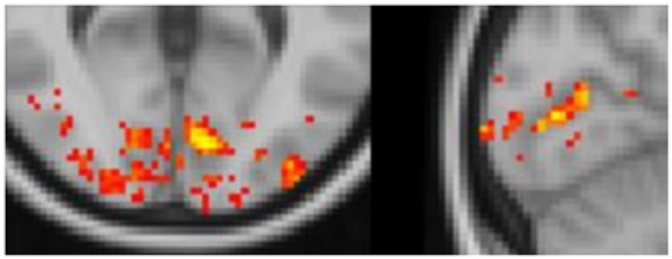
Wiktor Olszowy
Center for Biomedical Imaging, EPFL, Lausanne, Switzerland

459: Beyond BOLD: in search of genuine diffusion fMRI contrast in human brain.

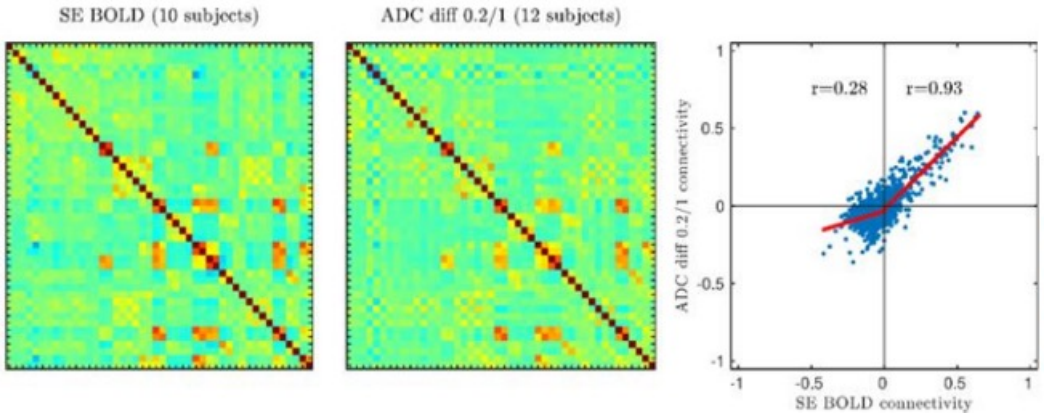
Beyond BOLD: in search of genuine diffusion fMRI contrast in human brain

Wiktor Olszowy[1], Yujian Diao[1,2], Ileana Jelescu[1] [1]*Center for Biomedical Imaging, EPFL* [2]*Laboratoire d'Imagerie Fonctionnelle et Métabolique, EPFL*

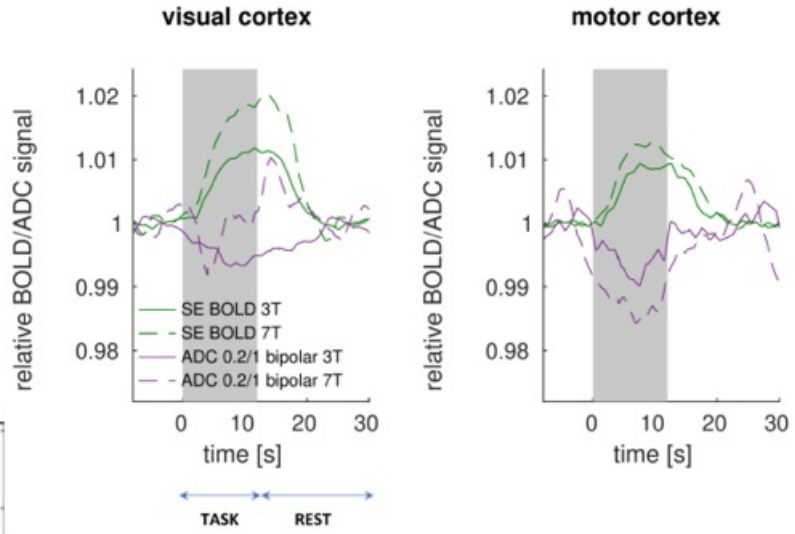
- BOLD fMRI relies on neurovascular coupling -> Diffusion fMRI more specific to neuronal activation
- We minimized BOLD contaminations for Diffusion fMRI
- Task-induced DfMRI activation more spatially specific than BOLD (checkerboard task):



- Resting-state anti-correlations attenuated preferentially in DfMRI:



- Differences between ROIs and 3T/7T
- Task-induced ADC decreases:



- Our DfMRI is largely free of vascular contaminations
- DfMRI valuable alternative to BOLD, part. for low field MRI
- Full study: biorxiv/OpenNeuro/GitHub
- www.biorxiv.org/content/10.1101/2021.05.16.444253v1.full

Diffusion Study Group Award 2021 for

Best Diffusion Methods Abstract (Poster)

Eric Seth Michael
Institute for Biomedical Engineering, ETH Zurich and University of Zurich, Zurich, Switzerland

1324: Multi-shot diffusion MRI of the human brain with motion-compensated oscillating gradients

1st Time Submission

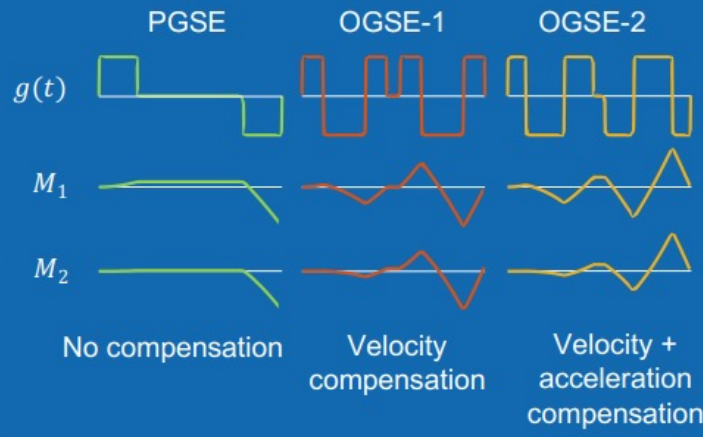
ETH zürich | University of Zurich[UZH]

1324: Multi-shot diffusion MRI of the human brain with motion-compensated oscillating gradients

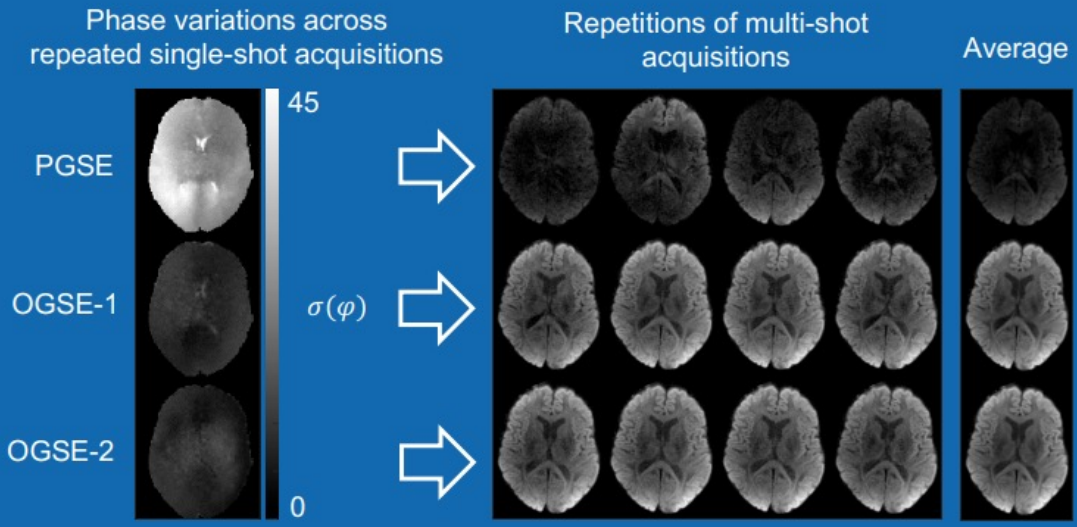
Eric Seth Michael, Franciszek Hennel, Klaas Paul Pruessmann

Motivation: Investigate utility of motion-compensated oscillating gradients for mitigation of phase-induced reconstruction errors in multi-shot DWI

Methods: DW waveforms



Results: Both oscillating gradient variants result in significantly reduced phase variability and artifact-free reconstructed images



- Consistent phase stability eliminates need for advanced reconstruction methods

michael@biomed.ee.ethz.ch

Diffusion Study Group Award 2021 for

Best Diffusion Neuro Abstract (Oral)

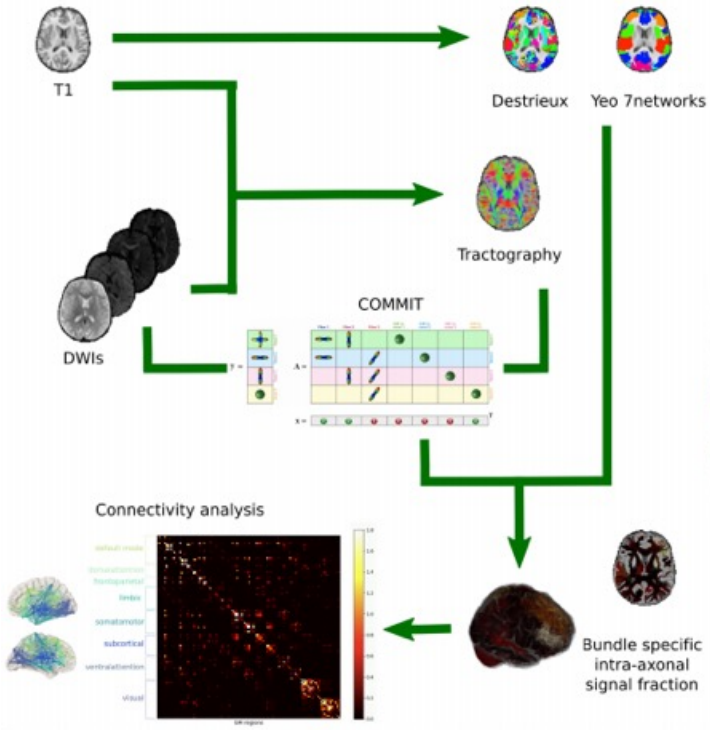
Simona Schiavi
University of Verona, Verona, Italy

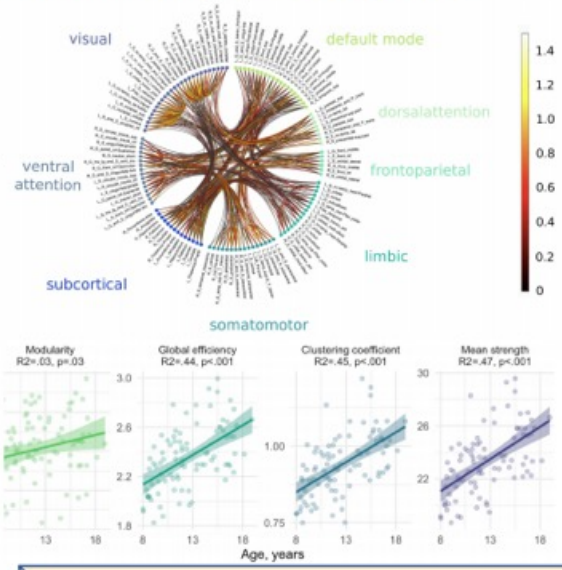
210: Unique insights into visual network development over childhood and adolescence from microstructure informed tractography

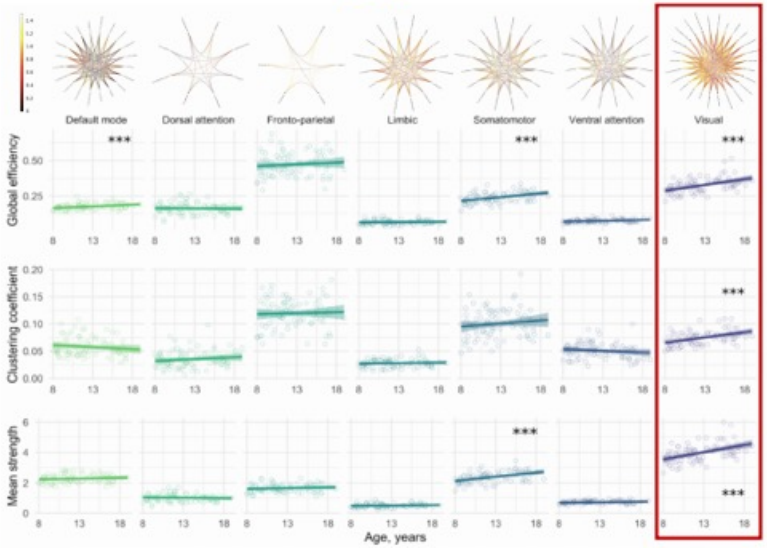
Program Number: 0210

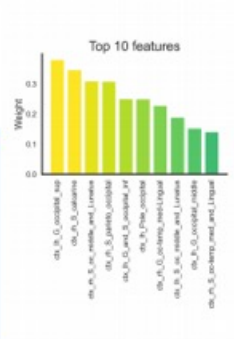
Unique insights into visual network development over childhood and adolescence from microstructure informed tractography

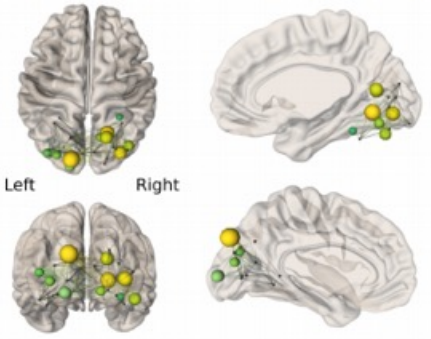
For the first time we applied **COMMIT to investigate structural connectivity over age-related development** with more **biologically informative graph global measure**







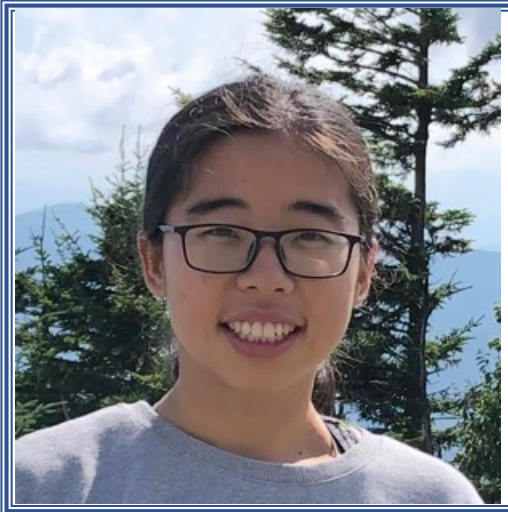




we **confirmed** previous observations on **maturational pattern of posterior regions** and found **unique visual network characteristics**

Diffusion Study Group Award 2021 for

Best Diffusion Neuro Abstract (Oral)



Yixin Ma

Brain Imaging and Analysis Center, Duke University, Durham, NC, United States

299: Column-based cortical depth analysis of the diffusion anisotropy in submillimeter whole-brain DTI of the human gray matter

Column-based cortical depth analysis of the diffusion anisotropy in submillimeter whole-brain DTI of the human gray matter

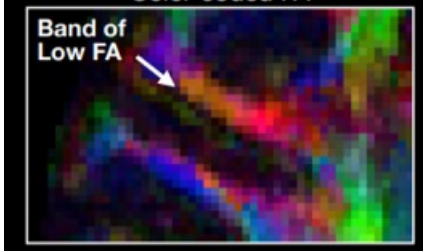
Yixin Ma, Trong-Kha Truong, Iain P. Bruce, Chun-Hung Yeh, Jeffrey R. Petrella, and Allen W. Song

Duke University

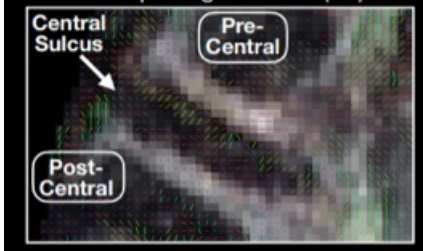
biac

DTI metrics maps

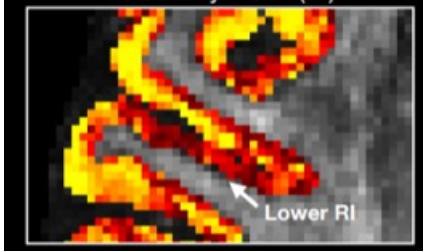
Color-coded FA



Principal eigenvector (V1)

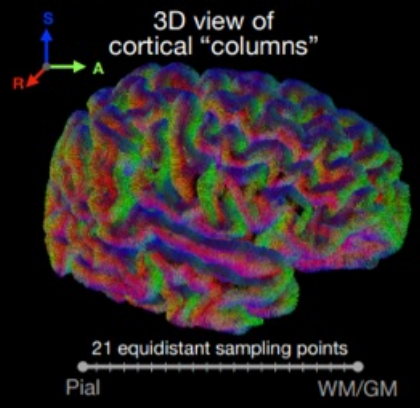


Radiality index (RI)

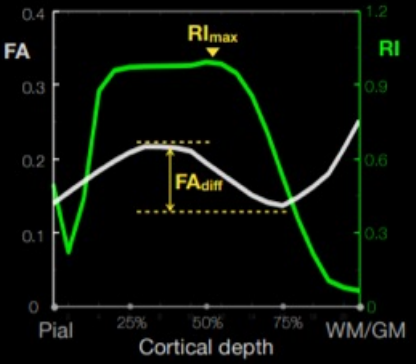


0.9mm isotropic resolution

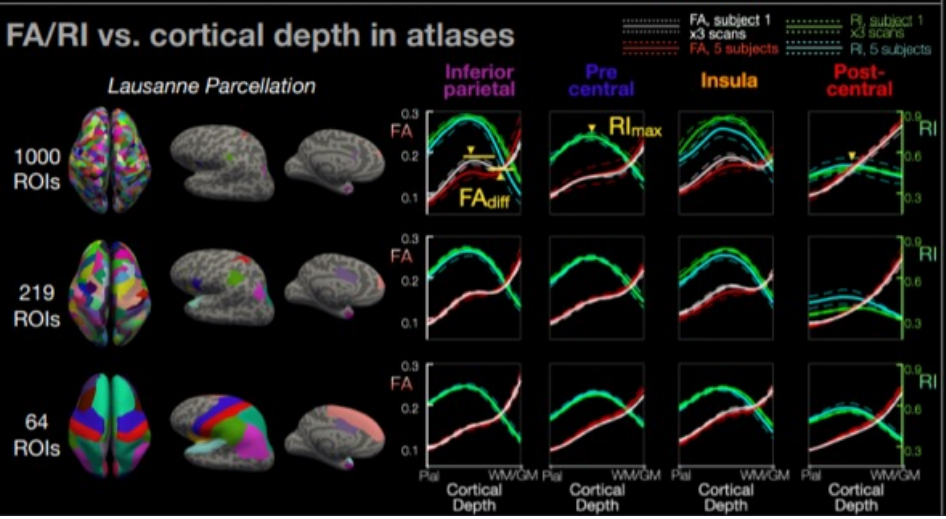
Column-based analysis



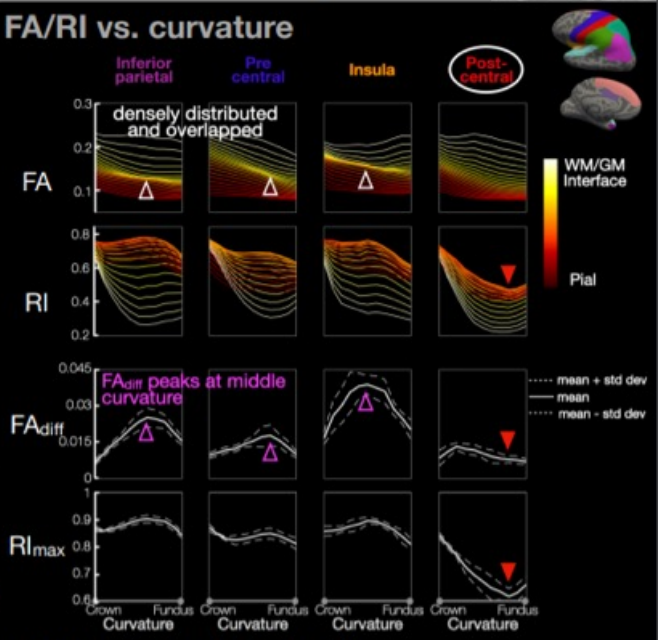
Single column
FA/RI vs. Cortical depth



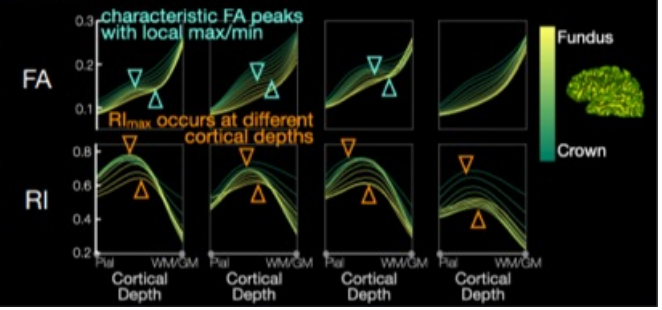
FA/RI vs. cortical depth in atlases



FA/RI vs. curvature



FA/RI vs. cortical depth



Diffusion Study Group Award 2021 for

Best Diffusion Neuro Abstract (Poster)

Ethan Danielli

Imaging Research Centre, St. Joseph's Healthcare; McMaster University, Hamilton, ON, Canada

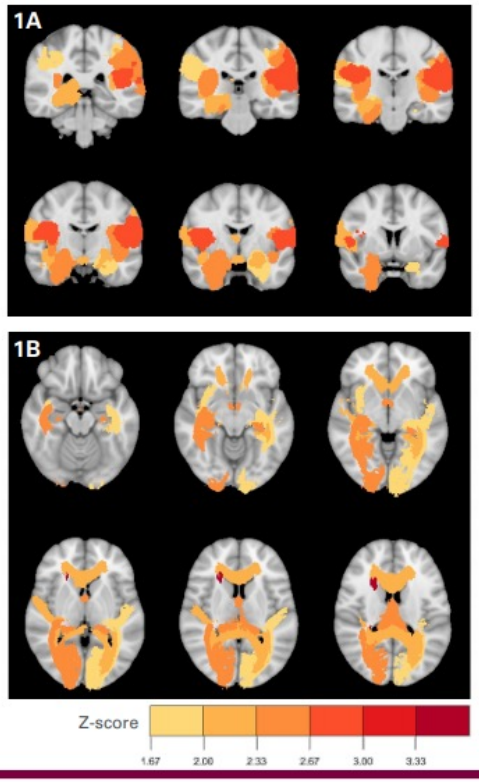
1st Time Submission

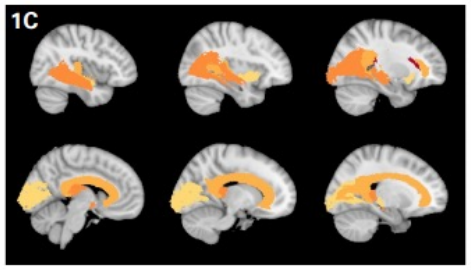
1301: Correlating Concussion-Related Symptoms to the Personalized MRI Assessment of Brain Abnormalities in Children.

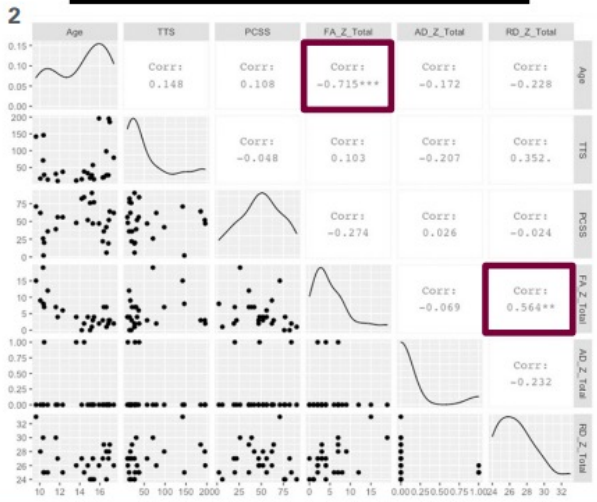
Correlating Concussion-Related Symptoms to the Personalized MRI Assessment of Brain Abnormalities in Children

Ethan Danielli,[1,2] David Stillo,[1,2] Rachelle A Ho,[3,7] Carol DeMatteo,[3,8] Geoffrey B Hall,[7] Nicholas A Bock,[7] John F Connolly,[2,4,7,8] Michael D Noseworthy[1,2,5,6,8]

1. Imaging Research Centre, St. Joseph's Healthcare, Hamilton, ON, Canada; McMaster University, Hamilton, ON, Canada: 2. School of Biomedical Engineering, 3. School of Rehabilitation Sciences, 4. Department of Linguistics, 5. Department of Electrical and Computer Engineering, 6. Department of Radiology, 7. Department of Psychology, Neuroscience & Behaviour, 8. ARiEAL Research Centre







Key findings:

- Subject-wise Z-scoring and injury burden (IB) approach successfully identified and quantified personal concussion severity
- Younger subjects had greater FA IB (r=-0.715)
- Significant variance was found between FA IB & age, FA IB & PCSS, RD IB & age, and RD IB & TTS:PCSS
- Age and ongoing neurodevelopment influence concussion severity
- FA, RD and AD all provided useful IB results

Figure 1: A sample of injured FA brain ROIs with colours corresponding to injury severity calculated by Z-scores relative to normative, healthy values from a coronal (1A), axial (1B) and sagittal (1C) perspective.

Figure 2: A paired matrix plot indicating the distribution of each metric and the correlation between metrics, with significant correlations marked with an asterisk.

Diffusion Study Group Award 2021 for

Best Diffusion Body Abstract (Oral)

Linda Heskamp

Newcastle University Translational and Clinical Research Institute (NUTCRI), Newcastle University, Newcastle upon Tyne, UK

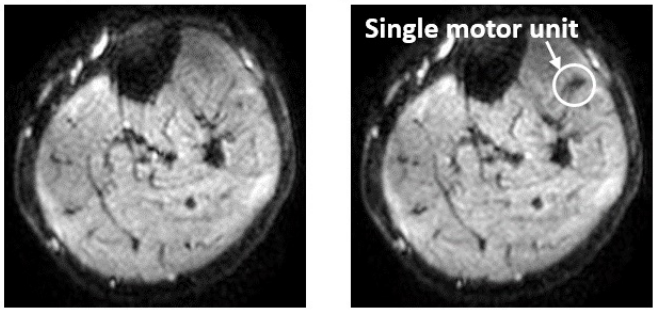
587: The muscle twitch profile assessed with Motor Unit Magnetic Resonance Imaging (MUMRI)

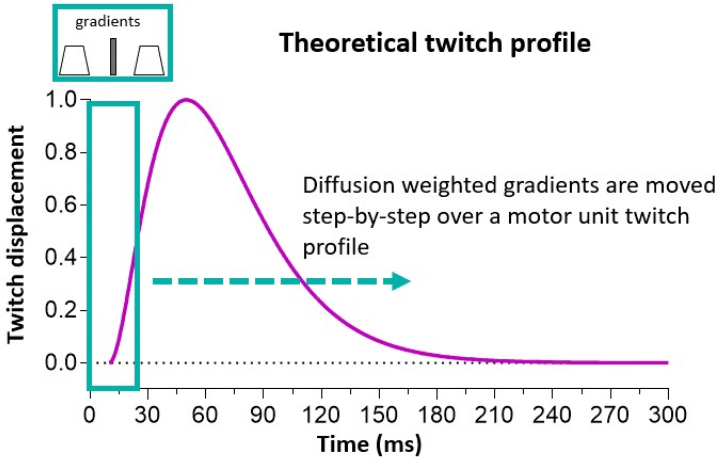
The muscle twitch profile assessed with Motor Unit MRI (MUMRI)

Linda Heskamp[1], Matthew Birkbeck[1,2,3], Roger Whittaker[1], Ian Schofield[1], Andrew Blamire[1]

Methods

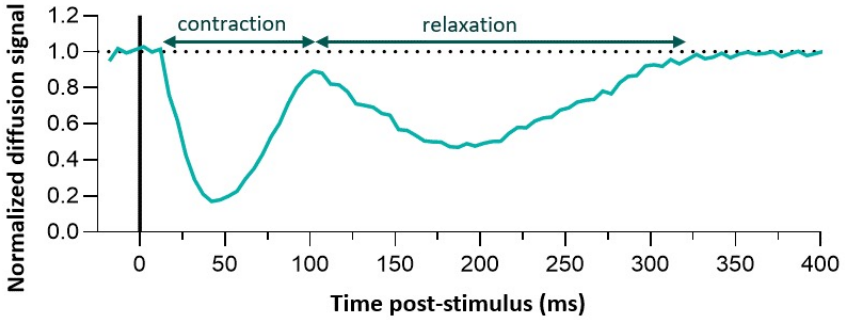
Motor units activated via electrical nerve stimulation show as signal voids on diffusion weighted images

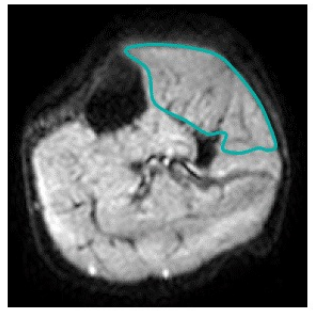




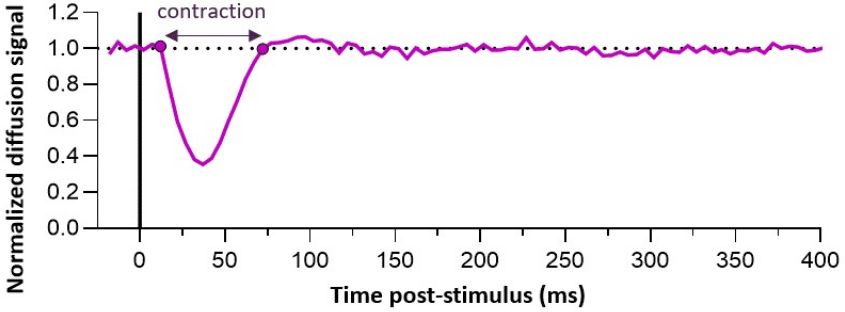
Results

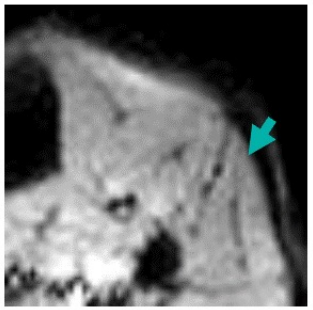
DW signal reflecting the twitch profile of a whole muscle





DW signal reflecting the twitch profile of a single motor unit





Diffusion Study Group Award 2021 for

Best Diffusion Body Abstract (Oral)

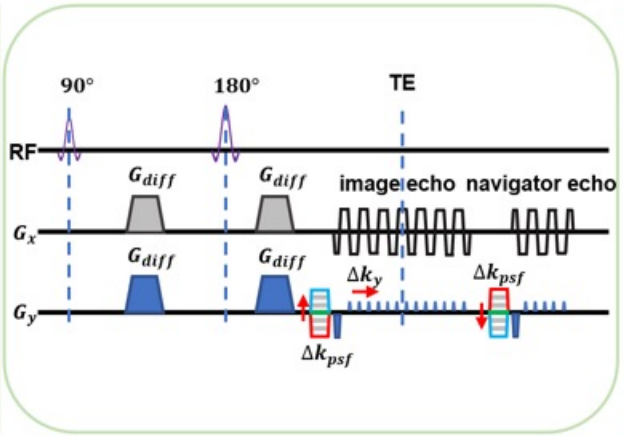
Sisi Li

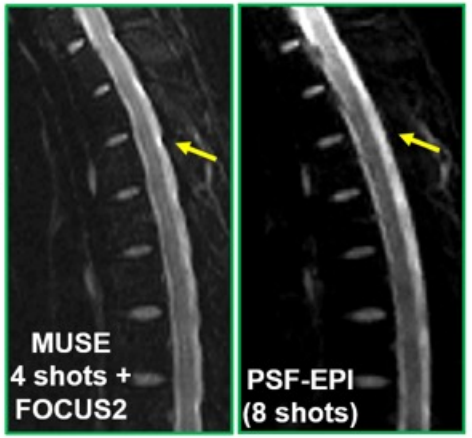
Center for Biomedical Imaging Research, Department of Biomedical Engineering, Tsinghua University, Beijing, China

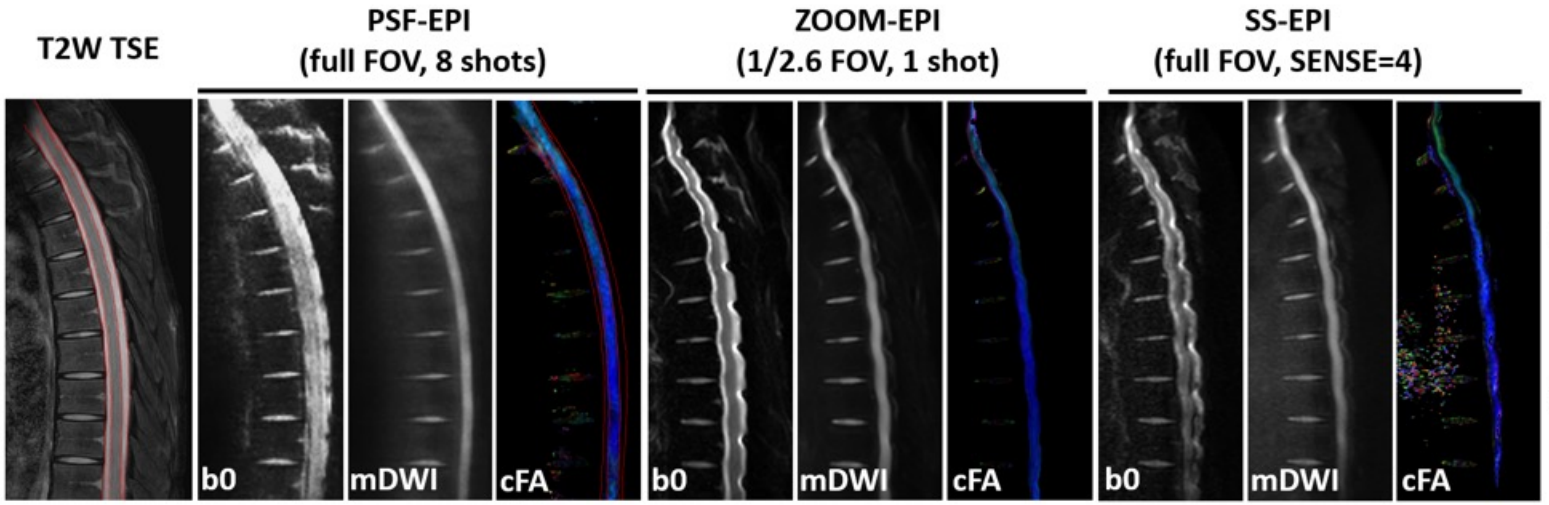
104: High-Fidelity Diffusion Tensor Imaging of the Thoracic Spinal Cord Using Point-Spread-Function Encoded EPI (PSF-EPI).

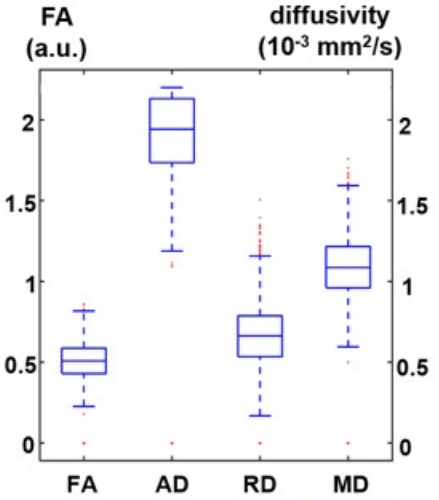
High-Fidelity Diffusion Tensor Imaging of the Thoracic Spinal Cord Using Point-Spread-Function Encoded EPI (PSF-EPI)

- ✓ **feasibility of DTI for Tspine**
  - tilted-CAIPI accelerated PSF-EPI[1-3] (8 shots)
- ✓ **efficacy in distortion correction:**
  - PSF-EPI v.s. MS-EPI, rFOV+MS-EPI, SS-EPI
  - similar performance on Philips and GE scanners
- ✓ **reliability of performance:**
  - high anatomical fidelity + reasonable SNR levels
  - practical scan time: ~ 6 min (2 NEX, 6 directions)
- ✓ **quantitative evaluation of DTI metrics:**
  - agree with reported values[4-6] + reproducibility









[1] Zaitev M., et al. MRM, 2004. [2] In M. H., et al. NeuroImage, 2017. [3] Dong Z., et al. MRM, 2018. [4] Zaharchuk G., et al. AJNR 2011. [5] Jeong EK., et al. MRM 2005. [6] Kim T., et al. AJNR 2010.

Diffusion Study Group Award 2021 for

Best Diffusion Body Abstract (Poster)

1st Time Submission

Moses Philip Cook

Sunnybrook Research Institute, University of Toronto, Canada

982: Diffusion Tensor Imaging Reveals Myocardial Structure after Stem Cell-derived Cardiomyocyte Therapy in Myocardial Infarction

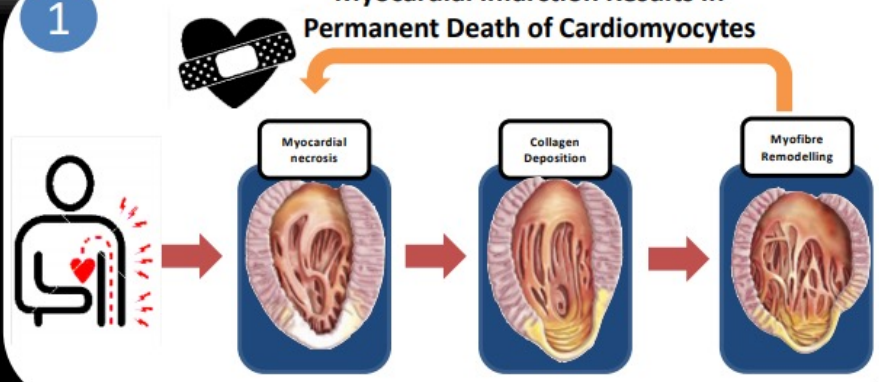
Medical Biophysics
UNIVERSITY OF TORONTO

Diffusion Tensor Imaging Reveals Myocardial Structure after Stem Cell-derived Cardiomyocyte Therapy in Myocardial Infarction

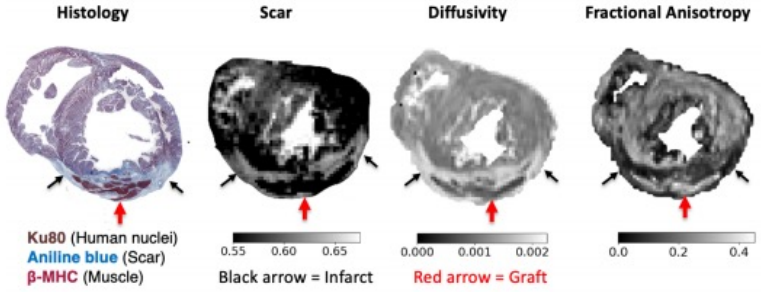
Sunnybrook
RESEARCH INSTITUTE

Moses P. Cook, Wahiba Dhahri, Graham A. Wright, Michael A. Laflamme, Nilesh R. Ghugre

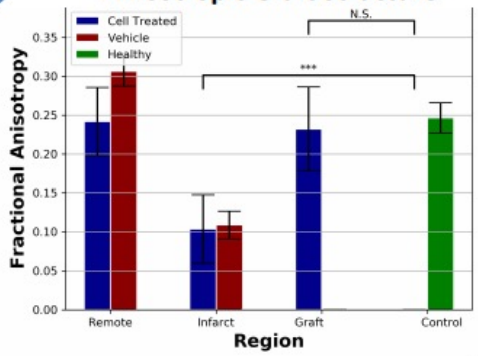
1 Myocardial Infarction Results in Permanent Death of Cardiomyocytes



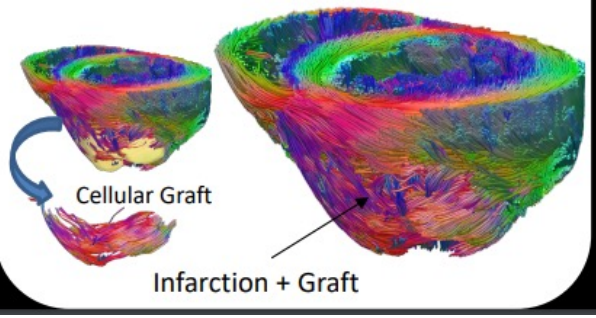
2 DTI Parameter Maps Demonstrate Stem Cell Derived Cardiomyocyte Repopulation



3 Results - FA Demonstrated Anisotropic Graft Structure



4 DTI Tractography Showcases Helical Graft Orientation



Congratulations!!