Maxime **Chamberland**

POST-DOCTORAL RESEARCH FELLOW · NEUROIMAGING

Nijmegen, The Netherlands

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Nationality: Canadian

Interests: *Medical Image Analysis, Microstructural MRI, Data Visualisation, Machine Learning*

Education

PhD. in Radiation Sciences & Biomedical Imaging
Sherbrooke, Canada

UNIVERSITY OF SHERBROOKE - FACULTY OF MEDICINE AND HEALTH SCIENCES
2013-2017
- Diffusion and functional MRI visualisation for neurosurgical planning
- Supervisor: Prof. M. Descoteaux

MSc. in Computer Science & Medical Imaging
Sherbrooke, Canada

UNIVERSITY OF SHERBROOKE - COMPUTER SCIENCE FACULTY
2011-2013
- Real-time fibre tractography using diffusion MRI
- Supervisor: Prof. M. Descoteaux

BSc. in Digital Imaging Science
Sherbrooke, Canada

UNIVERSITY OF SHERBROOKE - COMPUTER SCIENCE FACULTY
2007-2010
- Cooperative program including 3 internships at the Canadian Space Agency (Junior R&D developer)

Experience

Radboud Excellence Initiative Fellowship
Nijmegen, The Netherlands

DONDERS INSTITUTE FOR BRAIN, COGNITION AND BEHAVIOUR
2021-PRESENT
- Computational Neuroimaging & Clinical Applications
- Supervisor: Prof. D.G. Norris

Post-Doctoral Research Fellow
Cardiff, United Kingdom

CARDIFF UNIVERSITY BRAIN RESEARCH IMAGING CENTRE
2017-2021
- Computational Diffusion MRI & Medical Image Analysis
- Supervisor: Prof. D.K. Jones

Sessional Lecturer
Sherbrooke, Canada

UNIVERSITY OF SHERBROOKE
Fall 2013
- Visual and Digital Interactions (IMN638) [Real-time rendering & GPU programming]

Teaching Fellow
Sherbrooke, Canada

UNIVERSITY OF SHERBROOKE
2011-2013
- Digital Medias Acquisition (IMN117) [Image analysis]

Research Funding

Radboud University (eq. to €175,000)
2 years

RADBOUD EXCELLENCE INITIATIVE FELLOWSHIP
2021-2023

Donders Institute for Brain, Cognition and Behavior

Postdoctoral Fellowship ($90,000)
2 years

NATURAL SCIENCES AND ENGINEERING RESEARCH COUNCIL OF CANADA (NSERC)
2017-2019
- Ranked 1st across the Biomedical category.

Alexander-Graham-Bell Post-graduate Scholarship ($105,000)
3 years

NATURAL SCIENCES AND ENGINEERING RESEARCH COUNCIL OF CANADA (NSERC)
2014-2017
- High-caliber biomedical PhD fellowship.

Doctoral Fellowship ($40,000)
2 years

FONDS DE RECHERCHE DU QUÉBEC - NATURE AND TECHNOLOGY (FRQNT)
2014-2016
- Awarded but gratefully declined in favor of the above grant.

Post-graduate scholarship ($19,000) *1 year*
FACULTY OF MEDICINE AND HEALTH SCIENCES, UNIVERSITY OF SHERBROOKE (CANADA) *2013*

Honors & Awards

TRAINING ABROAD GRANTS

2016	**$4000**, Quebec Bio-Imaging Network Research Travel Grant [Cardiff University]	*Cardiff, UK*
2015	**$6000**, Michael Smith Foreign Study Supplement (NSERC) [Harvard Medical School]	*Boston, USA*

TRAVEL STIPENDS

2020	**£165**, Guarantors of Brain Conference Travel Grant	*United Kingdom*
2018	**£600**, Guarantors of Brain Conference Travel Grant	*United Kingdom*
2018	**$500**, ISMRM Conference Educational Stipend	*Paris, France*
2016	**$500**, ISMRM Conference Educational Stipend	*Singapore*
2016	**$500**, Sherbrooke Neuroscience Center Travel Award	*Singapore*
2015	**$500**, ISMRM Conference Educational Stipend	*Toronto, Canada*
2015	**$500**, Sherbrooke Neuroscience Center Travel Award	*Honolulu, Hawaii*
2015	**$500**, Québec BioImaging Network Travel Award	*Honolulu, Hawaii*
2014	**$500**, Québec BioImaging Network Travel Award	*Hamburg, Germany*
2012	**$500**, Sherbrooke Neuroscience Center Travel Award	*Beijing, China*
2012	**$750**, University of Sherbrooke – Student Recognition Travel Award	*Beijing, China*

PUBLICATIONS AWARDS

2017	**$500**, Sherbrooke Neuroscience Center Publication Award (also awarded in 2015)	*Canada*
2016	**$1000**, FRQNT Chercheurs Étoiles - Best Paper (Nature & Technology)	*Canada*
2014	**N/A**, Neurotechnix – Best Student Paper Award	*Rome*

OTHERS

2020	**$200**, ISMRM Pediatric Study Group - Oral presentation	*Virtual*
2014	**$500**, Sherbrooke Neuroscience Center Scientific Day - Best Oral Presentation	*Canada*
2013	**$300**, Molecular Imaging Center of Sherbrooke – Best Student Poster	*Canada*
2013	**$1500**, ACFAS – Best Scientific Picture (Jury's and people's choice)	*Canada*
2012	**N/A**, National Science Foundation – Scientific Visualization Challenge (People's choice)	*USA*
2012	**N/A**, NeuroBureau – Best Educational Brain Art Illustration	*-*

Oral Presentations

OHBM 2021 *Virtual*
EDUCATIONAL COURSE: TRACTOMETRY: PEERING INTO THE WHITE MATTER *Summer 2021*
• Single-subject analysis via high-dimensional analysis

Donders Toolkit 2021 *Virtual*
EDUCATIONAL COURSE: BASICS OF DIFFUSION MRI *Summer 2021*
• Basics of Diffusion Imaging and Structural Connectivity

Jena University Hospital seminar series- Germany *Virtual*
INVITED BY DR. DANIEL GULLMAR *May 2021*
• Tract-specific MRI measures explain learning and recall differences in multiple sclerosis.

MICCAI 2020 *Virtual*
ORAL PRESENTATION: COMPUTATIONAL DIFFUSION MRI *Fall 2020*
• Beyond lesion-load: Tractometry-based metrics for characterizing white matter lesions within fibre pathways

ISMRM 28th Annual Meeting *Virtual*
Oral presentation: Pediatric High-End *Fall 2020*
• Highlighting tract-specific microstructural abnormalities in single subjects using autoencoders

ISMRM 27th Annual Meeting *Montreal, Canada*
Oral presentation: Fiber Orientations & Tractography session *Spring 2019*
• Improved statistical power to detect differences in tissue microstructure through dimensionality reduction

Computational Brain Connectivity Mapping Winter School Workshop *Juans-Les-Pins, France*
Invited by Prof. Rachid Deriche *Fall 2017*
• Interactive & Advanced Tractography Visualization

ISMRM Workshop on Breaking the Barriers of Diffusion MRI *Lisbon, Portugal*
Power-pitch: Tractography session *Fall 2016*
• Exploring Geometrical Sheet-Like Structures in Real-Time

Center for Brain Imaging, NYU *New York, USA*
Invited by Prof. Fernando Boada *Fall 2015*
• Invited talk on Tractography and Neurosurgical planning

Department of Mathematics and Computer Science, TU/e *Eindhoven, The Netherlands*
Invited by Prof. Luc Florack *Spring 2015*
• Invited FiberNavigator demonstration

Image Sciences Institute, PROVIDIlab, UMC *Utrecht, The Netherlands*
Invited by Prof. Alexander Leemans *Spring 2015*
• Invited talk on Exploring brain connectivity in real-time

INRIA Research Institute *Sophia-Antipolis, France*
Invited by Prof. Rachid Deriche *Fall 2014*
• Invited talk on Diffusion & Functional MRI visualization

Laboratory of Mathematics in Imaging, Harvard Medical School *Boston, USA*
Invited by Prof. Carl-Fredrik Westin *Spring 2013*
• Invited talk on Real-time Fiber Tractography

Computational Radiology Laboratory, Harvard Medical School *Boston, USA*
Invited by Prof. Simon K. Warfield *Spring 2013*
• Invited talk on Real-time Fiber Tractography

Supervision

Master students

| MSc | **2018-2019**, Kate Duffy, Co-supervision | *Cardiff, UK* |
| MSc | **2019-2020**, Peter Murkin, Co-supervision | *Cardiff, UK* |

PhD students

| PhD | **2018-2021**, Dmitri Shastin, Co-supervision | *Cardiff, UK* |

Reviewing and moderator

Committee member

| 2020 | **NSERC**, Natural Sciences and Engineering Research Council of Canada, Biomedical Scholarships (PhD) and Fellowships (Post-doctoral) Selection Committee | *Canada* |

Moderator

| 2019 | **Chair moderator**, Multi-Scale Imaging of the White Matter Neuroanatomy workshop | *Montreal, Canada* |

Reviewer Nature Communications, NeuroImage, Neuromage Clinical, Human Brain Mapping, Medical Image Analysis, Brain Structure and Function, Frontiers, PLOS One, PLOS Computational Biology, MICCAI, computational cdMRI

Publications

Journal Papers

1. **Chamberland, M.**, Genc, S., Tax, C.M.W., Shastin, D., Koller, K., Raven, E., Cunningham, A., Doherty, J., van den Bree, M., Parker, G., Hamandi, K., Gray, WP., Jones, DK., 2020. *Detecting microstructural deviations in individuals with deep diffusion MRI tractometry*. MedRxiv preprint (2021).

2. Tax, CMW., Kleban, E., **Chamberland**, M., Baraković, M., Rudrapatna, U., and Derek K. Jones. "Measuring compartmental T2-orientational dependence in human brain white matter using a tiltable RF coil and diffusion-T2 correlation MRI." NeuroImage 236 (2021): 117967.

3. Winter, M., Tallantyre, C E., Brice, AW T., Robertson, P N., Jones, K D., **Chamberland, M.**, Tract-specific MRI measures explain learning and recall differences in multiple sclerosis, Brain Communications, 2021;, fcab065.

4. Koller, K., Rudrapatna, U., **Chamberland, M.**, Raven, E. P., Parker, G. D., Tax, C. M., ... and Jones, D. K. (2020). MICRA: Microstructural image compilation with repeated acquisitions. NeuroImage, 225, 117406.

5. Barakovic, M., Tax, C.M., Rudrapatna, U.S., **Chamberland, M.**, Rafael-Patino, J., Granziera, C., Thiran, J.P., Daducci, A., Canales-Rodríguez, E.J. and Jones, D.K., 2020. Resolving bundle-specific intra-axonal T2 values within a voxel using diffusion-relaxation tract-based estimation. NeuroImage, p.117617.

6. de Almeida Martins, J.P., Tax, C. M. W., Reymbaut, A., Szczepankiewicz, F., **Chamberland, M.**, Jones, D. K., Topgaard, D., 2020. *Computing and visualising intra-voxel orientation-specific relaxation-diffusion features in the human brain*: Human Brain Mapping.

7. Geeraert, B., **Chamberland, M.**, Lebel, M., Lebel, C., 2020. *Multimodal principal component analysis to identify major features of white matter structure and links to reading*. PloS one (*in press*).

8. Genc, S., Tax, C. M., Raven, E. P., **Chamberland, M.**, Parker, G. D., Jones, D. K., 2020. *Impact of b-value on estimates of apparent fibre density*. Human Brain Mapping.

9. Rheault, F., De Benedictis, A., Daducci, A., Maffei, C., Tax, C.M.W. et al., 2020. *Tractostorm: The what, why, and how of tractography dissection reproducibility*. Human Brain Mapping

10. St-Jean, S., **Chamberland, M.**, Viergever, M.A. and Leemans, A., 2019. *Reducing variability in along-tract analysis with diffusion profile realignment*. NeuroImage, 199, 663-679.

11. **Chamberland, M.**, Raven, E.P., Genc, S., Duffy, K., Descoteaux, M., Parker, G.D., Tax, C.M. and Jones, D.K., 2019. *Dimensionality reduction of diffusion MRI measures for improved tractometry of the human brain*. NeuroImage, 200, 89-100.

12. Schilling, K.G., Nath, V., Hansen, C., Parvathaneni, P., Blaber, J., Gao, Y., Neher, P., et al., 2019. *Limits to anatomical accuracy of diffusion tractography using modern approaches*. NeuroImage, 185, pp.1-11.

13. Zhang, Z., Descoteaux, M., Zhang, J., Girard, G., **Chamberland, M.**, Dunson, D., Srivastava, A. and Zhu, H., 2018. *Mapping population-based structural connectomes*. NeuroImage, 172, pp.130-145.

14. **Chamberland, M**., Tax, C.M. and Jones, D.K., 2018. *Meyer's loop tractography for image-guided surgery depends on imaging protocol and hardware*. NeuroImage: Clinical, 20, pp.458-465.

15. Maier-Hein, K.H., Neher, P.F., Houde, J.C., Côté, M.A., Garyfallidis, E., Zhong, J., **Chamberland, M.** et al., 2017. *The challenge of mapping the human connectome based on diffusion tractography*. Nature communications, 8(1), p.1349.

16. **Chamberland, M.**, Girard, G., Bernier, M., Fortin, D., Descoteaux, M. and Whittingstall, K., 2017. *On the origin of individual functional connectivity variability: the role of white matter architecture*. Brain connectivity, 7(8), pp.491-503.

17. **Chamberland, M.**, Scherrer, B., Prabhu, S.P., Madsen, J., Fortin, D., Whittingstall, K., Descoteaux, M. and Warfield, S.K., 2017. *Active delineation of Meyer's loop using oriented priors through MAGNEtic tractography (MAGNET)*. Human brain mapping, 38(1), pp.509-527.

18. Kaye, H.L., Peters, J.M., Gersner, R., **Chamberland, M.**, Sansevere, A. and Rotenberg, A., 2017. *Neurophysiological evidence of preserved connectivity in tuber tissue*. Epilepsy & behavior case reports, 7, pp.64-68.

19. Tax, C.M., **Chamberland, M.**, van Stralen, M., Viergever, M.A., Whittingstall, K., Fortin, D., Descoteaux, M. and Leemans, A., 2015. *Seeing more by showing less: orientation-dependent transparency rendering for fiber tractography visualization*. PloS one, 10(10), p.e0139434.

20. **Chamberland, M.**, Bernier, M., Fortin, D., Whittingstall, K. and Descoteaux, M., 2015. *3D interactive tractography-informed resting-state fMRI connectivity*. Frontiers in neuroscience, 9, p.275.

21. **Chamberland, M.**, Bernier, M., Houde, J.C., Descoteaux, M. and Whittingstall, K., 2014. *Using fMRI non-local means denoising to uncover activation in sub-cortical structures at 1.5 T for guided HARDI tractography*. Frontiers in human neuroscience, 8, p.715.

22. **Chamberland, M.**, Whittingstall, K., Fortin, D., Mathieu, D. and Descoteaux, M., 2014. *Real-time multi-peak tractography for instantaneous connectivity display*. Frontiers in neuroinformatics, 8, p.59.

23. Coupé, P., Manjón, J.V., **Chamberland, M.**, Descoteaux, M. and Hiba, B., 2013. *Collaborative patch-based super-resolution for diffusion-weighted images*. NeuroImage, 83, pp.245-261.

Short papers

1. **Chamberland, M.**, Genc, S., Raven, E., Parker, G., Tax, C.M.W., Cunningham, A., Doherty, J., van den Bree, M., Jones, DK., 2020. *Tractometry-based Anomaly Detection for Single-subject White Matter Analysis*. Proceedings of The 3rd International Conference on Medical Imaging with Deep Learning (MIDL), Montreal, 2020.

2. Girard, G., **Chamberland, M.**, Houde, J.C., Fortin, D. and Descoteaux, M., 2012. *Neurosurgical tracking at the sherbrooke connectivity imaging lab (SCIL)*. In International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI'12)-DTI Challenge Workshop (pp. 55-73).

Book Chapters

1. **Chamberland, M.**, Winter, M., Brice, T., Jones, D.K., Tallantyre, E., 2020, September. *Beyond lesion-load: Tractometry-based metrics for characterizing white matter lesions within fibre pathways*. MICCAI 2020 - International Workshop on Computational Diffusion MRI

2. **Chamberland, M.**, St-Jean, S., Tax, C.M. and Jones, D.K., 2018, September. *Obtaining representative core streamlines for white matter tractometry of the human brain*. In International Conference on Medical Image Computing and Computer-Assisted Intervention (pp. 359-366). Springer, Cham.

3. **Chamberland, M.**, Gray, W., Descoteaux, M. and Jones, D.K., 2017, September. *Interactive Computation and Visualization of Structural Connectomes in Real-Time*. In International Workshop on Connectomics in Neuroimaging (pp. 35-41). Springer, Cham.

4. Vaillancourt, O., **Chamberland, M.**, Houde, J.C. and Descoteaux, M., 2015. *Visualization of diffusion propagator and multiple parameter diffusion signal*. In Visualization and Processing of Higher Order Descriptors for Multi-Valued Data (pp. 191-212). Springer, Cham.

Conference Abstracts

1. **Chamberland, M.**, Shastin, D., Genc, S., Hamandi, K., Gray, WP., Tax, C.M.W. Jones, DK., 2021. *An n=1 approach to white matter anomaly detection in epilepsy*. International Society for Magnetic Resonance in Medicine (ISMRM), Vancouver, Canada.

2. **Chamberland, M.**, Genc, S., Raven, E., Parker, G., Tax, C.M.W., Cunningham, A., Doherty, J., van den Bree, M., Jones, DK., 2020. *Highlighting tract-specific microstructural abnormalities in single subjects using autoencoders*. International Society for Magnetic Resonance in Medicine (ISMRM), Paris, France.

3. **Chamberland, M.**, Genc, S., Raven, E., Parker, G., Tax, C.M.W., Cunningham, A., Doherty, J., van den Bree, M., Jones, DK., 2020. *Tract-specific microstructural anomaly detection using autoencoders for single subject analysis*. Organization for Human Brain Mapping (OHBM), Montreal, Canada.

4. **Chamberland, M.**, Iqbal, NS., Rudrapatna, SU., Parker, G., Tax, C.M.W., Staffurth, J., Powell, J., Wise, RG., Jones, D.K., 2019. *Characterising tissue heterogeneity in cerebral metastases using multi-shell multi-tissue constrained spherical deconvolution*. International Society for Magnetic Resonance in Medicine (ISMRM), Montreal, Canada.

5. **Chamberland, M.**, Raven, E., Genc, S., Duffy, K., Parker, G., Tax, C.M.W., Descoteaux, M., Jones, DK., 2019. *Metrics that Matter: Improved statistical power to detect differences in tissue microstructure through dimensionality reduction*. International Society for Magnetic Resonance in Medicine (ISMRM), Montreal, Canada.

6. **Chamberland, M.**, and Jones, DK., 2018. *Enhancing bundle topology for tractography visualization using silhouette rendering*. International Society for Magnetic Resonance in Medicine (ISMRM), Paris, France.

7. **Chamberland, M.**, Descoteaux, D., Jones DK., 2018. *Advances in structural and functional connectivity visualization using the FiberNavigator*. International Society for Magnetic Resonance in Medicine (ISMRM), Paris, France.

8. **Chamberland, M.**, Tax, CMW., Gray, W., Jones, DK., 2018. *The neurosurgical implication of scanner, gradient performance and acquisition protocol on Meyer's loop reconstruction*. International Society for Magnetic Resonance in Medicine (ISMRM), Paris, France.

9. **Chamberland, M.**, Tax, C.M.W., Fortin, D., Whittingstall, K., Descoteaux, M., 2016. *Exploring geometrical sheet-like structures in real time*. International Society for Magnetic Resonance in Medicine (ISMRM) – Breaking the barriers of diffusion MRI Workshop, Lisbon, Portugal.

10. **Chamberland, M.**, Scherrer, B., Prabhu, S., Fortin, D., Whittingstall, K., Descoteaux, D. and Warfield, S.K., 2016. *Magnetic ROIs enable improved tractography accuracy through oriented prior*. International Society for Magnetic Resonance in Medicine (ISMRM), Singapore.

11. **Chamberland, M.**, Girard, G., Bernier, M., Fortin, D., Descoteaux, M., and Whittingstall, K., 2016. *Association between structural and functional inter-subject variability of the motor and visual networks*. International Society for Magnetic Resonance in Medicine (ISMRM), Singapore.

12. **Chamberland, M.**, Bernier, M., Fortin, D., Descoteaux, M., and Whittingstall, K., 2015. *Tractography-driven resting-state fMRI for investigating inter-subject variability*. Organization for Human Brain Mapping (OHBM), Honolulu, Hawaii.

13. **Chamberland, M.**, Bernier, M., Fortin, D., Whittingstall, K., and Descoteaux, M., 2015. *Interactively computing and visualizing functional and structural brain connectivity in real time*. International Society for Magnetic Resonance in Medicine (ISMRM), Toronto, Canada.

14. **Chamberland, M.**, Descoteaux, M., Whittingstall, K., and Fortin, D., 2014. *Simultaneously probing functional and structural brain connectivity in real time: Fibernavigator: An interactive tool for brain visualization*. Neurotechnix, Rome, Italy.

15. **Chamberland, M.**, Bernier, M., Fortin, D., Descoteaux, M., and Whittingstall, K., 2014. *Uncovering a visuospatial network at rest*. Organization for Human Brain Mapping (OHBM), Hamburg, Germany.

16. **Chamberland, M.** and Descoteaux, M., 2013. *Explore the brain white matter networks in real-time: multi-sticks fiber tracking*. International Society for Magnetic Resonance in Medicine (ISMRM), Salt-Lake City, USA.

17. **Chamberland, M.**, Fortin, D. and Descoteaux, M., 2012. *Real-time fiber tractography: interactive parameter tuning for neurosurgical interventions*. Organization for Human brain mapping (OHBM), Beijing, China.

Theses

1. **Chamberland, M.**, 2017. Développement d'outils neuroinformatiques spécialisés pour améliorer l'analyse individuelle en médecine personnalisée" (Ph.D thesis, Université de Sherbrooke).

2. **Chamberland, M.**, 2013. Visualisation en imagerie par résonance magnétique de diffusion: tractographie en temps réel des fibres de la matière blanche du cerveau (M.Sc thesis, Université de Sherbrooke).

Active Projects

Lesionometry *Python*
HTTPS://GITHUB.COM/CHAMBERM/LESIONOMETRY *2020-2021*
- Tractometry-based metrics for characterizing white matter lesions within fibre pathways.

Detect *Python*
HTTPS://GITHUB.COM/CHAMBERM/DETECT *2020-2021*
- A browser-based anomaly detection framework for diffusion MRI using Tractometry.

FiberNavigator *C++, OpenGL, GLSL*

Main active developer

- Open-source neuroimaging visualization tool for diffusion MRI data.

Skills

Computer Science	Medical Image Analysis, Data visualisation, Machine Learning
Programming	C/C++, Python, OpenGL, GLSL, R, Matlab, Bash, Git, LaTeX
Tools	FiberNavigator, MRtrix, DIPY, FSL, ExploreDTI, AFNI, TensorFlow, Keras, SKlearn
Languages	French, English