

Zaki Ahmed

PhD Candidate - Medical Physics

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Medical Physics Unit, McGill University

Education

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| PhD Physics (Medical Physics) McGill University, Montreal, QC, Canada | Supervisor: Ives R. Levesque Thesis topic: Advancing the reference region model for DCE-MRI [tentative] | 2015–2020 <small>EXPECTED</small> GPA: 4.0 |
| MSc Medical Radiation Physics McGill University, Montreal, QC, Canada | Supervisor: Ives R. Levesque Thesis topic: Quantitative DCE-MRI using a novel reference region-based model | 2013–2015 GPA: 3.9 |
| BSc Physics (Medical Physics) University of Windsor, Windsor, ON, Canada | Supervisors: Jeffrey Sadler, Roman Gr. Maev Research topic: Ultrasound imaging of blood flow through skull | 2009–2013 GPA: 3.7 |

Skills

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| Programming | MATLAB Julia R Javascript LaTeX Python |
| Research | Quantitative MRI Pharmacokinetic Modelling Numerical Optimization Data Wrangling |
| Software | MS Word/Powerpoint Affinity Designer Photoshop Knows how to close vim |
| Tools | Git CI/CD (Travis, Azure, Gitlab) Linux/Bash DICOM HTTP/REST D3.js |
| Clinical | Level 2 MRI safety training MRI quality assurance (ACR protocol) |
| Languages | English French |

Research Projects

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| Reference Region Modeling of DCE-MRI Supervisor: Ives R. Levesque <ul style="list-style-type: none">Reduced number of fitting parameters to improve precision of fitsDerived extended model to make it appropriate for highly vascularized tissue (e.g. tumours)Developed method for converting relative estimates to absolute/quantitative estimatesProject output: 3 journal articles, 9 conference presentations | 2015–Present McGill University |
| Pattern Recognition in DCE-MRI Supervisor: Ives R. Levesque <ul style="list-style-type: none">Adapted and developed pattern recognition methods using either user-defined or data-driven patternsApplied pattern recognition methods to data from liver and breast cancer patientsProject output: 1 journal article (in preparation), 5 conference presentations | 2014–Present McGill University |
| Monitoring Therapy Response in Soft Tissue Sarcoma Supervisor: Ives R. Levesque <ul style="list-style-type: none">Analyzed DCE-MRI data and provided quantitative perfusion estimates to collaboratorsExplored feasibility of texture analysis for predicting metastatic sarcomaProject output: 1 journal article, 4 conference presentations | 2014–Present McGill University |
| Evaluation of Radiation Induced Injury in Small Animals Supervisor: Stephen Brown <ul style="list-style-type: none">Assisted with radiation of small animals, estimation of delivered dose, and post-radiation checkupsCo-registered brain MRI with histology from animal studyProject output: 1 written report and 1 presentation describing co-op internship | Jan–Apr. 2012 Henry Ford Hospital |
| Brain Blood Flow Measurement with Ultrasound Supervisors: Jeffrey Sadler & Roman Gr. Maev <ul style="list-style-type: none">Developed algorithms for visualizing blood flow through the skull with ultrasoundEvaluated algorithm performance on simulated and phantom dataProject output: 2 conference papers | 2010–2013 University of Windsor |

Teaching Experience

Graduate Teaching Assistant

Supervised and assisted students during labs, along with marking reports and assignments for:

2016–2020
McGill University

- MDPH 607 (5 terms)
Medical Imaging
Instructor: Ives R. Levesque
- PHYS 257 (3 terms)
Experimental Methods I
Instructor: Bradley J. Siwick
- PHYS 258 (2 terms)
Experimental Methods II
Instructor: Thomas Brunner
- Phys 241 (1 term)
Signal Processing
Instructor: Matthew A. Dobbs

Supervision & Mentoring

| Supervisee | Project title | Date/Duration |
|---|--|----------------------------|
| Marc-Antoine Fortin* Undergraduate student | Shape recognition in perfusion MRI as an early marker of treatment response in breast cancer | Summer 2019 |
| Marc-Antoine Fortin* Undergraduate student | Développement d'un outil de segmentation du rein par l'imagerie par résonance magnétique | Winter 2019 |
| Hossein Jafarzadeh* Undergraduate student | Arterial input function estimated from total blood volume calculation | Fall 2018 & Winter 2019 |
| Thomas Rosin* Undergraduate student | Automated identification of growth patterns in liver metastases using DCE-MRI and shape analysis | Summer 2016 |

*co-supervised with Ives R. Levesque

Honors & Awards

| Value | Name | Awarded by | Date/Duration |
|-----------------------|---|---------------------------------|---------------|
| \$49,000 | Doctoral Training Scholarship | Fonds de Recherche Santé Québec | 2018–2020 |
| \$3,000 | Physics Travel Award | Dept. of Physics, McGill | 2016–2018 |
| 1 st Place | Rising Stars in Medical Physics Symposium | NSERC-CREATE MPRTN | 2017 |
| \$2,100 | MPRTN NSERC CREATE Travel Award | NSERC-CREATE MPRTN | 2015–2017 |
| \$12,000 | George G. Harris Fellowship | Faculty of Medicine, McGill | 2016 |
| \$10,000 | Faculty of Medicine Studentship | Faculty of Medicine, McGill | 2014 |
| \$2,000 | Graduate Excellence Award | Medical Physics Unit, McGill | 2013 |
| \$20,800 | Ron W. Ianni Scholarship | University of Windsor | 2009–2013 |
| \$16,000 | Outstanding Scholars Award | University of Windsor | 2009–2013 |

Memberships

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| International Society for Magnetic Resonance in Medicine (ISMRM) | 2015-2020 |
| Réseau de Bio-imagerie du Québec / Quebec Bio-imaging Network (RBIQ/QBIN) | 2015-2020 |
| Canadian Organization of Medical Physicists (COMP) | 2018-2019 |
| Association Québécoise des Physicien(ne)s Médicaux Cliniques (AQPMC) | 2015-2016 |

Open-Source Projects

Tools & Packages www.github.com/notZaki

Research Code www.github.com/MPUmri

Publications / Presentations

Journal Publications

- [4] Pharmacokinetic modeling of dynamic contrast-enhanced MRI using a reference region & input function tail 2020
Ahmed, Z., Levesque, I. R.
Magnetic Resonance in Medicine, 83(1), 286-298
- [3] An extended reference region model for DCE-MRI that accounts for plasma volume 2018
Ahmed, Z., Levesque, I. R.
NMR in Biomedicine, e3924
- [2] Investigating the role of functional imaging in the management of soft-tissue sarcomas of the extremities 2018
Vallières, M., Serban, M., Benzyane, I., **Ahmed, Z.**, Xing, S., El-Naqa, I., Levesque, I.R., Seuntjens, J., Freeman, C.R.
Physics and Imaging in Radiation Oncology, 6 (May), 53-60
- [1] Increased robustness in reference region model analysis of DCE MRI using two-step constrained approaches 2017
Ahmed, Z., Levesque, I. R.
Magnetic Resonance in Medicine, 78(4), 1547-1557

Conference Papers

- [2] Ultrasonic imaging of foreign inclusions and blood vessels through thick skull bones 2015
Shapoori, K., Sadler, J., **Ahmed, Z.**, Wydra, A., Maeva, E., Malyarenko, E., Maev, R.
Military Medicine, 180(Suppl. 3), 104-108
- [1] Development of a method to image blood flow beneath the skull or tissue using ultrasonic speckle reflections 2013
Sadler, J., **Ahmed, Z.**, Shapoori, K., Wydra, A., Malyarenko, E., Maeva, E., Maev, R.
Medical Imaging 2013: Biomedical Applications in Molecular, Structural, and Functional Imaging. Vol. 8672. 86720G

Invited Talks

- [3] Advances in DCE-MRI analysis for functional tumour assessment 2019
Levesque, I. R.*, **Ahmed, Z.**
MR in RT Symposium. Toronto, Canada
June 24
- [2] Modélisation de l'IRM dynamique de contraste 2017
Levesque, I. R.*, **Ahmed, Z.**
Université de Sherbrooke. Sherbrooke, Canada
October 26
- [1] Visualizing and quantifying blood supply of cancer with MRI 2017
Ahmed, Z.*
CREATE/MPRTN Rising Stars in Medical Physics Symposium. Montreal, Canada
September 8

Conference Presentations/Posters

- [22] Texture features from early enhancement post-contrast MRI are predictive of metastatic sarcoma 2018
Ahmed, Z.*, Freeman, C. R., Goulding, K., Powerll, T., Seuntjens, J., Turcotte, R., Levesque, I. R.
CARO-COMP-CAMRT Joint Scientific Meeting. Montreal, Canada. Oral presentation.
September 15
- [21] Reference region modelling of dynamic contrast enhanced MRI using only signal enhancement 2018
Ahmed, Z.*, Levesque, I. R.
AAPM Annual Meeting. Nashville, USA. Oral presentation.
July 29
- [20] Self-referenced DCE-MRI: reference region modelling without a reference tissue 2018
Ahmed, Z.*, Levesque, I. R.
ISMRM-ESMRM Joint Annual Meeting. Paris, France. E-poster presentation.
June 21
- [19] A reference region version of the two-compartment exchange model for DCE-MRI 2018
Ahmed, Z.*, Levesque, I. R.
ISMRM-ESMRM Joint Annual Meeting. Paris, France. E-poster presentation.
June 21
- [18] Identification of growth patterns in liver metastases using time-course shape analysis of contrast-enhanced MRI 2018
Levesque, I. R.*, **Ahmed, Z.**, Rosin, T., Lazaris, A., Reinhold, C., Metrakos, P.
Meeting of the Liver Metastasis Research Network. Montreal, Canada. Oral presentation.
June 15

* denotes presenting author

Conference Presentations/Posters (Continued...)

- [17] Texture features from early enhancement post-contrast MRI are predictive of metastatic sarcoma 2018
Ahmed, Z.*, Freeman, C. R., Goulding, K., Powerll, T., Seuntjens, J., Turcotte, R., Levesque, I. R.
 RI-MUHC Cancer Research Program's Annual Research Day. Montreal, Canada. Poster presentation. May 22
- [16] Quantitative DCE-MRI using a reference tissue and AIF tail 2018
Ahmed, Z.*, Levesque, I. R.
 Quebec Bio-imaging Network (QBIN) Scientific Day. Montreal, Canada. Poster presentation. March 9
- [15] Robust mapping of tumour perfusion with the reference region model and DCE-MRI 2017
Ahmed, Z.*, Levesque, I. R.
 Association Québécoise des Physicien(ne)s Médicaux Cliniques (AQPMC) Annual Meeting. Trois-Rivières, Canada. Oral presentation. November 15
- [14] Advancing the reference region model for DCE-MRI 2017
Ahmed, Z.*, Levesque, I. R.
 RI-MUHC Cancer Research Program's Annual Research Day. Montreal, Canada. Poster presentation. May 23
- [13] Robust reference-region DCE-MRI analysis with a vascular component and two-fit analysis 2017
Ahmed, Z.*, Levesque, I. R.
 ISMRM Annual Meeting. Honolulu, USA. Poster presentation. April 25
- [12] Quantitative DCE-MRI analysis using a reference tissue and AIF tail 2017
Ahmed, Z.*, Levesque, I. R.
 ISMRM Annual Meeting. Honolulu, USA. Poster presentation. April 25
- [11] Advancing the reference region model for DCE-MRI 2017
Ahmed, Z.*, Levesque, I. R.
 Quebec Bio-imaging Network (QBIN) Scientific Day. Montreal, Canada. Poster presentation. February 10
- [10] An extended linear reference region model that accounts for plasma volume in DCE-MRI 2016
Ahmed, Z.*, Levesque, I. R.
 ISMRM Annual Meeting. Singapore. E-poster presentation. May 9
- [9] Predicting therapy response using perfusion MRI and pattern recognition 2016
Ahmed, Z.*, Levesque, I. R.
 Quebec Bio-imaging Network (QBIN) Scientific Day. Montreal, Canada. Poster presentation. January 29
- [8] Predicting cancer therapy response with dynamic contrast enhanced (DCE) MRI 2015
Ahmed, Z.*, Levesque, I. R.
 Association Québécoise des Physicien(ne)s Médicaux Cliniques (AQPMC) Annual Meeting. Montreal, Canada. Oral presentation. December 4
- [7] Predicting therapy response using perfusion MRI and pattern recognition 2015
Ahmed, Z.*, Levesque, I. R.
 RI-MUHC Cancer Research Program's Annual Research Day. Montreal, Canada. Poster presentation. November 27
- [6] Early assessment of tumor aggressiveness using joint FDG-PET/MRI textural features: prediction of prospective cohort and potential improvement using hypoxia and perfusion biomarkers 2015
 Vallieres, M.*, Freeman, C., **Ahmed, Z.**, Turcotte, R., Hickeson, M., Skamene, S., Jeyaseelan, K., Hathout, L., Serban, M., Xing, S., Powell, T., Seuntjens, J., Levesque, I., El Naqa, I.
 American Society for Radiation Oncology (ASTRO) Annual Meeting. San Antonio, USA. Oral presentation. October 18-21
- [5] A constrained linear reference region model for DCE-MRI 2015
Ahmed, Z.*, Levesque, I. R.
 AAPM Annual Meeting. Anaheim, USA. Oral presentation. July 16
- [4] DCE-MRI analysis using model-based classification shapes with non-negative least-squares 2015
Ahmed, Z.*, Levesque, I. R.
 ISMRM Annual Meeting. Toronto, Canada. E-poster presentation. June 1
- [3] Quantitative MRI for tissue characterization in health and disease 2014
 Levesque, I. R., **Ahmed, Z.***, Alonso-Ortiz, E., Simard, M., Xing, S.
 Symposium Imaginez l'Imagerie. Sherbrooke, Canada. Poster presentation. September 26
- [2] Ultrasonic imaging of foreign inclusions and blood vessels through thick skull bones 2013
 Sadler, J.*, **Ahmed, Z.**, Shapoori, K., Wydra, A., Maeva, E., Malyarenko, E., Maev, R. Gr.
 Military Health System Research Symposium (MHSRS). Fort Lauderdale, Florida. Poster Presentation. August 12-15
- [1] Development of a method to image blood flow beneath the skull or tissue using ultrasonic speckle reflections 2013
 Sadler, J.*, **Ahmed, Z.**, Shapoori, K., Wydra, A., Malyarenko, E., Maeva, E., Maev, R.
 SPIE Medical Imaging. Orlando, Florida. Oral presentation. February 9-14

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