Kellen L. Mulford

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St. Paul, Minnesota

EDUCATION

Ph.D. Medical Physics, University of Minnesota **2022 (Expected)**

- Cumulative GPA: 3.8

B.A. *cum laude*; physics, religion. St. Olaf College **2013-2017**

- Cumulative GPA: 3.7
- Dean's List: Fall 2015, Spring 2016, Spring 2017
- Honor society memberships: Sigma Pi Sigma (physics), Theta Alpha Kappa (religion)
- Graduated with departmental *Distinction* in both majors through research projects and academic excellence

WORK EXPERIENCE

TRACT TL1 Scholar **August 2020 - Present**

Clinical and Translational Science Institute, University of Minnesota, Minneapolis, MN
Advisors: Pierre-Francois Van de Moortele, MD/PhD; Donald Nixdorf DDS/MS; Andrew Grande, MD

- Part of a cohort of pre- and postdoctoral scientists receiving training in training in science communication, grant and manuscript writing, and translational science
- Project is an extension of thesis work with Dr. Van de Moortele. Work within TRACT TL1 program focuses on how research is translated from bench to clinic
- Work with community mentor to understand broad needs of stakeholders in facial pain & imaging research.

Research Assistant **September 2017 - Present**

Center for Magnetic Resonance Research, University of Minnesota, Minneapolis, MN
Advisor: Pierre-Francois Van de Moortele, MD/PhD
Project: **AI-aided diagnosis of Trigeminal Neuralgia with MRI**

- Develop predictive models using deep learning (Tensorflow) and traditional machine learning (Scikit-Learn, R) for the diagnosis and classification of Trigeminal Neuralgia using MRI data
- Construct models of surgical response of Trigeminal Neuralgia using electronic health record data
- Design ultra-high field MR imaging protocols for the cranial nerves
- Process and analyze in-vivo 7.0-Tesla MRI data - including dMRI tractography

Research Assistant **March 2018 - Present**

Department of Radiation Oncology, University of Minnesota, Minneapolis, MN
Advisor: Christopher Wilke, MD/PhD,
Project: **Evaluating Treatment of CNS Malignancies with Radiomics Biomarkers**

- Build predictive models of tumor phenotype and patient prognosis using clustering, regression, & classification
- Assemble databases of medical imaging and clinical data
- Apply -omics style analysis to clinical imaging datasets
- Perform exploratory statistical analyses including survival analysis

Clinical Medical Physics Assistant **December 2017 - Present**

Dept. of Radiology, University of Minnesota, Minneapolis, MN
Advisor: Ngoneh Jallow, PhD

- Perform state and federal specified quality assurance testing on radiation producing clinical imaging equipment
- Responsible for testing radiography, fluoroscopy, dental, and mobile C-arm units of various manufacturers
- Manage equipment and report information database
- Write Python code to automate the testing and logging workflow and manage testing reports

Research Assistant **February 2016 - May 2017**

Department of Physics, St. Olaf College, Northfield, MN
Advisor: James Demas, PhD
Project: **The Role of Intrinsically Photosensitive Retinal Ganglion Cells in Neural Circuits**

- Developed scripts in MATLAB and LabVIEW to run electrophysiological experiments and analyze data
- Performed extracellular recordings of live retinal tissue under various pharmacological conditions and stimuli
- Established lab protocols to insure experimental integrity

TECHNICAL SKILLS

Programming Languages	Python, R, Javascript, BASH, MATLAB, HTML & CSS
Data Science	Data Wrangling (NumPy, Pandas, R-Tidyverse) Deep Learning (Tensorflow, PyTorch) Machine Learning (Scikit-Learn, XGBoost) Image Analysis (Scikit-Image, ITK, FSL) Statistical Modeling (survival analysis, regression modeling, spatial data) Data Visualization (shiny, ggplot, matplotlib)
Software Development	Node.JS, Express, Flask | SQL, Oracle, MongoDB | Git | Spark | React
Medical Imaging	MRI Physics, MRI Protocol Development, Ultrahigh Field MRI, Diffusion-Tensor Imaging, Radiomics

PUBLICATIONS

K. Mulford, C. Chen, K. Dusenbery, J. Yuan, M. Hunt,C.C. Chen, P. Sperduto, Y. Watanabe, C. Wilke, "A radiomics-based model for predicting local control of resected brain metastases receiving adjuvant SRS," Clinical and Translational Radiation Oncology, vol. 29, pp. 27–32, Jul. 2021, doi: LINK.

K. Mulford, Moen S., Grande A.W., Nixdorf D.R., Van de Moortele P.F., "Identifying Symptomatic Trigeminal Nerves From MRI in a Cohort of Trigeminal Neuralgia Patients Using Radiomics," **Accepted for Publication, Neuroradiology*

K. Mulford, M. McMahon, A. Gardeck, M. Hunt, C.C. Chen, D. Odde, C. Wilke, "Predicting Glioblastoma Cellular Motility from in vivo MRI with a radiomics based regression model" **In Revision*

D. Darrow, **K. Mulford**, C. Quinn, A. Spano, A. Grande, A. McKinney, S. Haines, "The use of magnetic resonance imaging to diagnose trigeminal neuralgia," **In Review*

CONFERENCE PRESENTATIONS

Mulford K., Darrow D., Moen S., Ndoro S., Jagadeesan B.D., Grande A.W., Nixdorf D.R., Van de Moortele P.F., "The Feasibility of Radiofrequency Rhizotomy Lesion Visualization in the Trigeminal Ganglion using 7.0-Tesla MRI," International Society for Magnetic Resonance in Medicine 29th Annual Meeting: Toronto, Canada, May 11-16th, 2021.

Mulford K., Moen S., Grande A.W., Nixdorf D.R., Van de Moortele P.F., "Using MRI and Radiomics to Predict Pain in a Cohort of Trigeminal Neuralgia Patients Treated with Radiosurgery," International Society for Magnetic Resonance in Medicine 29th Annual Meeting: Toronto, Canada, May 11-16th, 2021.

Mulford K., Moen S., Ndoro S., Watanabe Y., Van de Moortele, P.F., "Automatic segmentation of the trigeminal nerve using deep learning," American Association for Physicists in Medicine 2020 Annual Meeting: Vancouver BC, Canada, July 12-16th, 2020.

Mulford K., McMahon M., Odde D., Wilke C., "Predicting Glioblastoma cell motility with radiomics," American Association for Physicists in Medicine 2020 Annual Meeting: Vancouver BC, Canada, July 12-16th, 2020. *Blue Ribbon Abstract Award*.

Mulford K., Lenglet C., Pisharady P., Moen S., Nixdorf D.R., Jagadeesan B.D., Grande A.W., Van de Moortele P.F., "Toward identifying individual branches of the trigeminal nerve with dMRI-based tractography at 7 Tesla: methodological considerations," International Society for Magnetic Resonance in Medicine 27th Annual Meeting: Montreal, QC, Canada, May 11-16th, 2019.

Mulford K., Chen C., Dusenbery K., Yuan J., Hunt M., Chen C.C., Sperduto P., Watanabe Y., Wilke C., "Tumor cavity shape characteristics do not predict local control in patients with resected brain metastases receiving adjuvant SRS" American Radium Society 101st Annual Meeting: Dana Point, CA, April 6-9th, 2019.

Mulford K., Larson, C., Demas, J., "A Vocal Minority: Ganglion Cell Photo-receptors Exert Widespread Influence via Gap Junctions," Society for Neuroscience 46th Annual Meeting, San Diego, CA, November 12-16th, 2016.

FELLOWSHIPS AND AWARDS

Finalist, Interdisciplinary Health Data Competition, Carlson School of Management **2021**
Project: Modeling Rates of COVID-19 Vaccination in Minnesota Counties

University of Minnesota CTSI TL1 TRACT Fellowship **2020-2022**

- *The CTSI TL1 TRACT Fellowship is a two-year competitive fellowship that includes a full NIH predoctoral stipend with tuition and professional benefits. The program is characterized by its focus on developing researchers for careers in translational science.*

ISMRM Trainee Educational Award **2019, 2021**

St. Olaf CURI Research Fellowship and Travel Award – 2016 **2016**

GRANTS AND FUNDING

NIH / NCATS UL1TR002494 Blazar (PI) & TL1R002493 Fulkerson (PI) **03/30/2018 - 02/28/2020**
Funding Agency: National Center for Advancing Translational Sciences
Major goals: The goal of the TL1 Program is to improve human health by catalyzing and accelerating the translation of research findings to the community. It provides comprehensive, flexible training for a diverse cohort of predoctoral and postdoctoral trainees committed to a substantive and impactful career in translational research and team science
Role: TL1-TRACT Scholar 08/01/2020 - 08/01/2022
Project Title: MRI-based biomarkers of treatment outcomes in trigeminal neuralgia

University of Minnesota Grant-in-Aid #416184 Wilke, C. (PI) **07/01/2020 - 01/15/2022**
Funding Agency: University of Minnesota Office of the Vice-President for Research (OVPR)
Major Goals: The Grant-in-Aid of Research, Artistry, and Scholarship program (GIA) promotes the research, scholarly, and artistic activities of faculty and supports academic excellence throughout the University
Role: Contributor to grant writing process, research assistant (declined in favor of TL1-Award)
Project Title: Development of a predictive model of glioblastoma for patient-specific prognosis and therapeutic intervention

PROFESSIONAL MEMBERSHIPS AND SERVICE

Memberships

American Association of Physicists in Medicine (AAPM)	**2017 - Present**
Radiological Society of North America (RSNA)	**2017 - Present**
International Society for Magnetic Resonance in Medicine (ISMRM)	**2018 - Present**
Society for Neuro-Oncology (SNO)	**2020 - Present**

Service

Article Reviewer - PLOS One	**2019**
Article Reviewer - American Journal of Roentgenology	**2021**

RELEVANT COURSEWORK

- CSCI 4131: Internet Programming
- CSCI 5521: Machine Learning
- CSCI 5523: Data Mining
- CSCI 5707: Principles of Database Systems
- CSCI 5715: Spatial Data Science
- CSCI 5541: Natural Language Processing
- CSCI 5751: Big Data Engineering
- STAT 5101: Theory of Statistics I
- STAT 5102: Theory of Statistics II
- MPHY 5178: Physical Principles of MRI
- MPHY 8147: Advanced Physics of MRI
- MPHY 5160: Radiation Physics and Dosimetry
- MPHY 5172: Radiation Biology
- Siemens IDEA MRI Pulse Sequence Programming training, Raleigh, NC - August 2019
- NURS 8361: Communicating Your Science
- NURS 8361: Translational Case Studies