Todd C. Hollon, MD

Assistant Professor (tenure track), University of Michigan
Joseph R. Novello, MD & Alfredo Quiñones-Hinojosa, MD, PhD Endowed Professor
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Academic and Administrative Appointments

2021-present	**Assistant Professor** Department of Neurosurgery, University of Michigan	Ann Arbor, MI
2024-present	**Assistant Professor** Computer Science and Engineering, University of Michigan	Ann Arbor, MI
2023-present	**Assistant Professor** Computational Medicine and Bioinformatics, University of Michigan	Ann Arbor, MI
2021-present	**Principal Investigator** Machine Learning in Neurosurgery Lab, University of Michigan	Ann Arbor, MI
2022-present	**Surgical Director, Comprehensive Pituitary Program** Department of Neurosurgery, University of Michigan	Ann Arbor, MI

Education and Training

2004–2008	**B.A., *magna cum laude*** Honors in Philosophy, University of Michigan	Ann Arbor, MI
2009–2013	**M.D., *magna cum laude*** The Ohio State University	Columbus, OH
2013–2020	**Residency, Neurosurgery** University of Michigan	Ann Arbor, MI
2016–2018	**Postdoctoral Research Fellow** University of Michigan (Mentors: Daniel Orringer, MD; Honglak Lee, PhD)	Ann Arbor, MI
2020	**Clinical Fellow, Skull Base Neurosurgery** University of Utah (Mentor: William Couldwell, MD, PhD)	Salt Lake City, UT

Licensure and Board Certification

2024–2033 **American Board of Neurological Surgery (ABNS)**

Research Narrative

My research focuses on developing digital intelligence that understands human health and disease, especially related to the nervous system. With the digitization of healthcare, I aim to discover better data streams, model architectures, and learning objectives to improve medical AI. My lab has focused on neuroimaging, optical imaging, biomedical computer vision, and neuro-oncology. Our technical contributions include developing better self-supervision, hierarchical feature learning, and medical foundation modeling methods.

Selected Publications by Research Theme ([f]first author; [s]senior author)

Neuroimaging

2026 **Towards Scalable Language-Image Pre-training for 3D Medical Imaging[s]**
Transactions in Machine Learning Research (TMLR)

2026 **Learning neuroimaging models from health system-scale data[s]**
Nature Biomedical Engineering

2024 **Development and validation of an artificial intelligence model to accurately predict spinopelvic parameters[s]**
Journal of Neurosurgery

Optical imaging

2026 **Intelligent histology for tumor neurosurgery[s]**
Neuro-Oncology Advances

2025 **Foundation models for fast, label-free detection of glioma infiltration[s]**
Nature

2023 **Artificial intelligence-based molecular classification of diffuse gliomas using rapid, label-free optical imaging[f]**
Nature Medicine

2021 **Rapid, label-free detection of diffuse glioma recurrence using intraoperative stimulated Raman histology and deep neural networks[f]**
Neuro-Oncology

2020 **Near real-time intraoperative brain tumor diagnosis using stimulated Raman histology and deep neural networks[f]**
Nature Medicine

2018 **Rapid intraoperative diagnosis of pediatric brain tumors using stimulated Raman histology[f]**
Cancer Research

2017 **Rapid intraoperative histology of unprocessed surgical specimens via fiber-laser-based stimulated Raman scattering microscopy**
Nature Biomedical Engineering, Lead by Daniel Orringer

Computer Vision

2026 **CodeV: Code with Images for Faithful Visual Reasoning via Tool-Aware Policy Optimization[s]**
CVPR

2026 **Learning complete and explainable visual representations from itemized text supervision[s]**
CVPR

2025 **An Empirical Study on Unifying JEPA and Language Supervision for Visual Representation Learning[s]**
NeurIPS UniReps Workshop

2025 **Step-Calibrated Diffusion for Biomedical Optical Image Restoration[s]**
AAAI

2024 **Super-resolution of biomedical volumes with 2D supervision[s]**
CVPR Workshop

2023 **Hierarchical discriminative learning improves visual representations of biomedical microscopy**[s]
CVPR, ***Highlight Paper***

2022 **OpenSRH: optmizing brain tumor surgery using intraoperative stimulated Raman histology**[s]
NeurIPS

Neuro-oncology

2022 **Spatiotemporal analysis of glioma heterogeneity reveals COL1A1 as an actionable target to disrupt tumor progression**
Nature Communications, collaboration with Pedro Lowenstein

2018 **A machine learning approach to predict early outcomes after pituitary adenoma surgery**[f]
Neurosurgical Focus

2016 **Supratentorial hemispheric ependymomas: an analysis of 109 adults for survival and prognostic factors**[f]
Journal of Neurosurgery

2013 **Cytomegalovirus contributes to glioblastoma in the context of tumor suppressor mutations**
Cancer Research, Lead by E. Antionio Chiocca

Selected Preprints ([f]first author; [s]senior author)

2025 **Health system learning achieves generalist neuroimaging models**[s]
arXiv, In Review at *Nature Medicine*

Selected Research Funding

Government Sponsored

2025–2029 **NIH R01CA292529: DeepSRH: Transforming Molecular Cancer Screening with Stimulated Raman Histology and Deep Neural Networks**
Role: PI, Total $2,284,054

2025–2029 **NIH R37NS144573: Neuro-immune mechanisms in mutant IDH1 gliomas**
Role: Co-I (PI: Castro), Total $2,578,231

2022–2027 **NIH R01CA226527: Clinical Translation of Stimulated Raman Histology**
Role: Site PI (PI: Orringer), Total $300,326

2022–2025 **NIH K12NS080223: AI-based Molecular Classification of Diffuse Gliomas**
Role: PI, Total $310,089

Foundation Sponsored

2023–2027 **Chan Zuckerberg Initiative: Molecular diagnosis of brain tumors using stimulated Raman histology**
Role: PI, Total $349,485

2022–present **Ian's Friends Foundation: UM-IFF Neuroimaging Consortium**
Role: PI, Total $350,000

Selected Honors and Awards

2025 **Best Data Science Abstract Award**
Congress of Neurological Surgeons

2025 **Joseph R. Novello, MD and Alfredo Quiñones-Hinojosa, MD, PhD Research Professorship**
University of Michigan

2023 **Scouts Award**
University of Michigan

2022 **Oldfield Lecture**
American Academy of Neurological Surgeons

2022 **Best Data Science Abstract Award**
Congress of Neurological Surgeons

2022 **Getch Scholar Award**
National Institute for Neurological Diseases and Stroke/Congress of Neurological Surgeons

2018 **Ronald L. Bittner Award for Brain Tumor Research**
AANS/CNS Section on Tumors

Students and Teaching

Postdoctoral Fellows

2024–present **Soumyanil Banerjee**
University of Michigan

PhD Students

2021–present **Cheng Jiang**
NIH F31 Fellow, Computational Medicine and Bioinformatics, University of Michigan

2021–present **Renly Hou**
MICDE fellow, Computational Medicine and Bioinformatics, University of Michigan

2022–present **Yiwei Lyu**
Co-mentor with Honglak Lee, Computer Science and Engineering, University of Michigan

2024–present **Chenhui Zhao**
Computer Science and Engineering, University of Michigan

MD/PhD Students

2024–present **Akhil Kondepudi**
NIH T32 Trainee, Computational Medicine and Bioinformatics, University of Michigan

2024–present **Akshay Rao**
Biomedical Engineering, University of Michigan

Resident

2025–present **Rushikesh Joshi, MD**
NIH T32 Trainee, University of Michigan

Medical Student

2023–present **Samir Harake**
NIH T32 Pre-doctoral award, University of Michigan