

# Andy Y. Shih, Ph. D.

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## AT A GLANCE:

- **Research Mission:** To elucidate brain microvascular development, function, dysfunction and repair using high-resolution *in vivo* optical microscopy.
- **Ph.D.** earned at University of British Columbia (mentor: Prof. Timothy H. Murphy).
- **Post-doc training** at University of California, San Diego (mentor: Prof. David Kleinfeld).
- **Honors:** Dana Foundation Neuroimaging Award; Charleston Conference New Vision Awardee; Albert Charitable Trust Award
- **Diverse funding portfolio:** NINDS/NIA R01 (3 grants current), R21 (1 grant current), Alzheimer's Association New Investigator award, American Heart Association, Albert Trust Foundation award.
- **Mentee accolades:** F32, F30, K08 fellowships, American Heart Association post-doctoral fellowship, American Federation on Aging Scholarship.
- **Active NIH service:** BINP (charter member), VCMB, BRAIN initiative review, and Alzheimer's Disease and Related Dementias (ADRD) recommendations committee.
- **>70 speaking invitations** since start of independent research lab in 2012.
- **Productive and well-cited publication record:** 61 peer-reviewed research publications (37 first or senior author); ~7400 total citations; H factor 39

## EDUCATION

**University of British Columbia**, Vancouver, B.C. (2000 – 2006)

*Ph. D. in Neuroscience*, with Dr. Timothy H. Murphy.

*Thesis title:* Activation of the Nrf2-mediated phase 2 enzyme response as a prophylactic strategy for treatment of stroke and neurodegeneration

**University of British Columbia**, Vancouver, B.C. (1996 – 2000)

*B. Sc. in Cell Biology and Genetics*

## EMPLOYMENT

2019-current	Adjunct Associate Professor	Dept. of Bioengineering, U. Washington, Seattle, WA.
2018-current	Associate Professor	Center for Developmental Biology and Regenerative Medicine, Seattle Children's Research Institute.
2018-current	Associate Professor	Dept. of Pediatrics, U. Washington, Seattle, WA.
2014-current	Assistant Professor	Center for Biomedical Imaging, MUSC, Charleston, SC.
2012-current	Assistant Professor	Dept. of Neuroscience, MUSC, Charleston, SC.
2011-2012	Project Scientist	Dept. of Physics, UCSD, La Jolla, CA.
2006-2011	Post-doctoral Fellow	Dept. of Physics, UCSD, La Jolla, CA. <i>UCSD training period with Prof. David Kleinfeld.</i>

## **HONORS/AWARDS**

2001, Rick Hansen Neurotrauma Initiative.  
2001, Michael Smith Foundation for Health Research Graduate Studentship Award.  
2002, 3D Microscopy of Living Cells Course Scholarship (UBC).  
2002, Oxidative Stress in Health and Disease Travel Award (Univ. of Saskatchewan).  
2003, McGeer Award, Psychiatry Research Day (University of British Columbia).  
2003, Chapters Society for Neuroscience Travel Award (SfN, New Orleans).  
2003, Canadian Association for Neuroscience Travel Award.  
2004, Heart and Stroke Foundation of BC and Yukon, Doctoral Award (declined).  
2004, Canadian Institute of Health Research Graduate Scholarship.  
2004, Michael Smith Senior Graduate Studentship Incentive Award.  
2005, Chapters Society for Neuroscience Travel Award (SfN, Washington D.C.).  
2005, Millie and Ralph Drabinsky Graduate Scholarship in Medicine (UBC).  
2006, Canadian Institutes of Health Research Brain Star Award.  
2006, Chan and Peggy Gunn Prize (University of British Columbia).  
2006, Canadian Institute of Health Research Fellowship.  
2008, Gordon Research Conference Travel Award (Proctor Academy).  
2009, American Heart Association Post-doctoral Fellowship (ranked in top 5 %).  
2014, Microcirculation Society Travel Award to NIH Small Blood Vessel Meeting.  
2016, Charleston Conference on Alzheimer's Disease New Vision Awardee.  
2021, American Academy of Neurology, Plenary Symposium Speaker.

## **PROFESSIONAL ACTIVITIES**

2000 – present, Society for Neuroscience, member.  
2002, Mentor for Heart and Stroke Foundation Summer Scholarship Students  
2003 – 2004, Canadian Society for Neuroscience, member  
2003 – 2005, Organizer for Stroke and Neurodegenerative Disease Journal Club (UBC)  
2011-2012, Instructor for CSHL Course on Imaging Structure and Function in the Nervous System.  
2012-present, Editorial Board Member for the Journal of Cerebral Blood Flow and Metabolism.  
2012-present, Appointment to College of Graduate Studies at MUSC.  
2013, Lecturer for Capstone Course in Neuroscience at the College of Charleston.  
2014, Lecturer for Charleston Microscopy Course at MUSC.  
2014, Lecturer for Ashley Hall Summer Neuroscience Program at MUSC.  
2014, Executive member, South Carolina Research Center for Recovery from Stroke (SCRCRS).  
2014, Appointment to Faculty of Center for Biomedical Imaging.  
2014, Undergraduate Coordinated Research Advisor, College of Charleston.  
2015, Murray Endowed Chair selection committee, MUSC.  
2016, Nanosymposium Chair for Society for Neuroscience: Stroke and Injury: Optogenetic and Chemogenetic Approaches.  
2017, Scientific Advisory Committee, World Congress for Microcirculation 2018.  
2017, Department of Neuroscience Neuroimaging faculty recruitment committee, MUSC.  
2018, Advisory Board for Center for Biomedical Imaging, MUSC.  
2018, Symposium Chair, “The Ebb and Flow of Brain Capillaries”, World Congress for Microcirculation 2018. Vancouver, BC.  
2020, Scientific Advisory Committee, International Society for Resistance Arterioles Conference 2019.  
2019, Committee member and Speaker, 2019 Alzheimer's Disease and Related Dementias NIH Summit. VCID section, co-chaired by D. Wilcock and J. Williamson.  
2019, Symposium Co-Chair (with T.P. Davis), “Interrogation of Pericyte Function in CNS Physiology and Pathophysiology” BRAIN2019, Yokohama, Japan  
2020, Editorial Board Member, Intracranial Hemorrhage Journal.  
2021, Center for Integrative Brain Research faculty recruitment committee, SCRI  
2022, Editorial Board Member, Fluids and Barriers of the CNS.  
2022, Editorial Board Member, Neurophotonics.

2022, Guest editor (with V. Coelho-Santos, K. Kilic), Neurophotonics, Imaging Neuroimmune, Neuroglial, and Neurovascular Interfaces  
2022, Committee member, 2022 Alzheimer's Disease and Related Dementias NIH Summit. VCID section, co-chaired by D. Wilcock and R. Peterson.  
2022, Research Facilities Master Plan key stakeholder, SCRI.  
2022, Microscopy Core Workgroup Member, SCRI (prioritize imaging technologies for core facilities).  
2022, Faculty Search committee member, Center for Integrative Brain Research, SCRI.  
2022, Organizer for EMBL Neurovascular Interfaces 2024 conference with Amparo Acker-Palmer, Chenghua Gu, and Ralf Adams

### **NIH GRANT REVIEW**

2016, VCID biomarker Special Emphasis Panel (ZNS1 SRB-T).  
2017, Early Career Reviewer. BINP Study Section.  
2017-2019, *Ad hoc* member. BINP Study Section. June 2017, Feb 2018, Oct 2018, June 2019  
2019-current, Charter member. BINP Study Section.  
2018, The BBB, Neurovascular Systems, CNS Therapeutics, Special Emphasis panel (ZRG1 MDCN-M).  
2018, BRAIN Initiative: Tools to target, identify and characterize non-neuronal cells in the brain.  
2019, *Ad hoc* member, VCMB Study Section, Feb 2019.  
2021, VCID biomarker Special Emphasis Panel (ZNS1 SRB-O).

### **NON-NIH GRANT REVIEW**

2006, Reviewer for Canadian Institute of Health Research.  
2014, Reviewer for Charles and Diane Barmore grants on Parkinson's disease research.  
2015, Reviewer for Louisiana Board of Regents research grants.  
2015, Reviewer for South Carolina Translational Research KL2 Fellowship, MUSC.  
2015-2018, Reviewer for South Carolina Research Center for Recovery Stroke Pilot Grant Program.  
2015, Reviewer for Alzheimer's Association research grants.  
2015, Reviewer for Neuroscience Institute pilot grants at MUSC.  
2016, Reviewer for Swiss National Science Foundation grant.  
2017, Reviewer for Medical Research Council grants (United Kingdom)  
2018, Reviewer for Canadian Foundation for Innovation.  
2018, Reviewer for Flemish Research Council.  
2018, Reviewer for Velux Foundation.  
2018, Reviewer for Alzheimer's Society, UK.  
2019, Fondation pour la Recherche Medicale en France, FA.  
2020, Reviewer for NSERC Discovery Grant.  
2020, Reviewer for Oregon's Alzheimer's Disease Center.  
2021, Reviewer for Israel Science Foundation.

### **GRANT SUPPORT**

#### **Active**

RF1 AG077731                      Shih (PI)                      05/15/22-04/30/25 (extendable to 2027)

NIH/NIA

Brain Drain: In Vivo Optical Interrogation of Venular Function in Gray and White Matter

This preclinical project will use cutting-edge microscopy in live mice to study how age-related impairment in venular drainage contributes to degeneration of cerebral white matter and neighboring gray matter. This work is expected to build a novel experimental foundation for studying the etiology and therapeutic amenability of small vessel pathology in mouse models of dementia.

Role: Principal Investigator

R01 R01AG062738                      Shih (PI)                      10/01/20-09/30/25

NIH/NINDS

Pericyte structural plasticity and cerebrovascular health

This project will characterize the structural plasticity of brain pericytes following vascular insults *in vivo*. It will use *in vivo* two-photon imaging to track pericyte growth and consequence of pericyte loss in cerebral cortex using innovative neuronal calcium imaging and cellular level oxygen imaging.

Role: Principal Investigator

R01 AG081840                      Shih (PI)    04/15/23-01/31/28  
NIH/NIA

Pericyte control of capillary perfusion in the Alzheimer's disease brain

This project will use genetic and pharmacologic approaches to test the role of thromboxane and endothelin-1 signaling in regulation of capillary flow in the normal brain and in mouse models Alzheimer's disease pathology.

Role: PI

R21 DE031942                      Shih (mPI), Yu (mPI)    04/01/23-03/31/25  
NIH/NIA

In vivo two-photon imaging of vascular invasion and stem cell translocation in calvarial bone

This project will use in vivo two-photon imaging to study the development of calvarial vasculature in murine models.

Role: mPI

RF1 AG065345                      Yao (PI)    09/01/21-08/31/24  
NIH/NIA

The Roles of Pericyte-Derived laminin in Neurovascular Function and neurodegeneration

This project will determine how expression of laminin by brain pericytes is involved in maintenance of neuronal and microvascular function.

Role: Subcontract PI

R01 NS124627                      Weinstein (PI)    07/15/22-06/30/27  
NIH/NIA

The Roles of Pericyte-Derived laminin in Neurovascular Function and neurodegeneration

This project will determine how expression of laminin by brain pericytes is involved in maintenance of neuronal and microvascular function.

Role: Subcontract PI

R01 NS097775                      Shih (PI)    08/01/17-07/31/22 (NCE)  
NIH/NINDS

Deciphering the Cerebral Microinfarct and its Role in Vascular Cognitive Impairment

This project will use a combination of *in vivo* two-photon imaging, multi-modal MRI of white matter integrity, animal behavior and immunohistology to determine the extent to which a microinfarct burden can induce loss of brain connectivity and cognitive decline in rodents.

Role: Principal Investigator

R21 AG069375                      Shih (mPI), Waters (mPI)    07/01/20-06/30/22 (NCE)  
NIH/NINDS

Optical Interrogation of Venular Function in Cerebral Gray and White matter

This study will use in vivo two-photon and three-photon imaging to delineate pathways that efflux blood from cerebral gray and white matter in the adult and aging brain.

Role: multi-Principal Investigator

### **Completed**

Neuroimaging Grant                      Shih (PI)    10/01/13-09/30/16  
Dana Foundation (\$200K direct)

Novel Strategies to Enhance MRI detection of Ultra-small Brain Lesions in Vascular Dementia

This study will use novel peptide-based contrast agents to increase visibility of cerebral microinfarcts in a rodent model.

Role: Principal Investigator

New Vision Award Lin (PI) 04/01/16-03/31/17

Charleston Conference on Alzheimer's Disease (\$50K direct)

Multi-modal Neuroimaging to Assess Alzheimer's Disease Prevention in an APOE4 Mouse Model

The goal of the project is to identify potential interventions for preventing AD-induced functional decline in mice that are APOE4 carriers. We will identify whether the efficacy of the intervention is associated with inhibited neuroinflammation in pericytes.

Role: Co-Investigator

R21 AA022168 Woodward (PI) 03/15/14-02/29/16

NIH/NIAAA (\$275K direct)

In Vivo Two-Photon Imaging of Cortical Activity in Alcohol-Dependent Mice

This study will examine how chronic alcohol affects neuronal and vascular responses in vivo using two-photon imaging.

Role: Co-Investigator

Fast-Forward Seed Grant Shih (PI) 07/01/13-1/1/14

NIH/SCTR (\$25K direct)

Enhanced detection of cerebral microinfarcts in dementia using MRI

This grant supported MRI studies to define the spatiotemporal features of microinfarcts in mouse brain.

Role: Principal Investigator

R21 NS085402 Shih (PI) 09/01/13-08/31/15

NIH/NINDS (\$275K direct)

Enhanced detection of cerebral microinfarcts in dementia using MRI

This project uses multi-modal imaging to characterize and enhance the visibility of ultra-small cerebral lesions in vascular dementia using MRI.

Role: Principal Investigator

14GRNT20480366 Shih (PI) 07/01/14-06/30/16

American Heart Association (\$70K direct)

In vivo Optogenetic Control of Vascular Contractile Cells

This study will develop and characterize novel mouse lines to enable light-mediated control of arterial smooth muscle and microvascular pericytes.

Role: Principal Investigator

New Vision Award Shih (PI) 04/01/16-03/31/17

Charleston Conference on Alzheimer's Disease (\$50K direct)

Microinfarct-induced Spreading Depression and Synaptic Dysfunction in Dementia

This study will use in vivo two-photon imaging of intracellular calcium to understand the relationship between spreading depression (induced by microscopic ischemic events) and neuronal function.

Role: Principal Investigator

Neuroscience Institute Shih, Riegel, Levy (co-PI) 08/01/16-07/31/17

Gating of Post-stroke Plasticity by Somatostatin Interneurons (\$15K direct)

This study will use chemogenetic approaches to study the role of somatostatin-positive interneurons in post-stroke cortical remapping.

Role: co-Principal Investigator

NIH P20GM103499 DRP Markwald (PI) 10/01/15-09/30/17

Defining the Role of Fibulin-1 in Cerebral Vascular Formation.

This proposal investigates the role of Fibulin 1 in the formation of the vasculature in the brain. Results from these studies are relevant to many different diseases that involve/affect brain blood vessels, from stroke to degenerative diseases.

Role: Co-Investigator

Novel Methodology/Technology Pilot Grants Riegel, Adkins (co-PI) 01/01/17-12/31/17  
Stroke Recovery Research Center (MUSC) (\$25K direct)

Behavioral and neuronal function following a single vs multiple sessions of rTMS in a rat chronic stroke model  
These studies will determine the behavioral and neural outcomes following various modes of transcranial magnetic stimulation in a chronic rat stroke model.

Role: Co-Investigator

Center for Aging Pilot Shih (PI) 07/01/17-06/30/18  
MUSC (\$30K direct)

All Optical Dissection of Small Vessel Disease in the Aged Human Brain

This study will use optical tissue clearing techniques and *ex vivo* two-photon imaging to characterize vascular structure in human brain tissues with and without small vessel disease.

Role: Principal Investigator

P20GM109040 Kautz (PI) 06/02/14-03/31/18

NIH/NIGMS (~\$150K/year direct)

South Carolina Research Center for Recovery from Stroke

Project 5: Microvascular Function and Neuronal Plasticity in Chronic Stroke

This study will examine how chronic changes in peri-infarct blood flow impacts neuronal re-wiring after stroke. It will further investigate how rehabilitative training and direct current cortical stimulation impacts post-stroke neurovascular repair.

Role: Project 5 PI

R21 AG052321 Bhat (PI) 05/01/16-4/30/18  
NIH/NINDS (\$275K direct)

Targeting Neurovascular Dysfunction in AD

This study is to define cerebrovascular dysfunction as a mechanistic link between cardiometabolic disorders such as type 2-diabetes (T2DM) and AD and as a potential target for vasculoprotective strategies in AD treatment.

Role: Co-Investigator

U10 NS086490 Jauch (PI) 09/25/13-07/31/18  
NIH/NINDS

SC Collaborative Alliance for Stroke Trials (SC-CoAST)

The SC-CoAST RCC will provide a large integrated clinical trials network throughout most of South Carolina that will engage and enlist urban and rural/underserved communities and hospitals into the clinical research enterprise and disseminate best clinical and research practices throughout the state where stroke remains a major health hazard. The SC-CoAST RCC represents an effective and efficient mechanism to perform critical clinical research in accordance with the mission of the NINDS Stroke Trials Network.

Role: Co-Investigator

National Science Foundation 1539034 Kara (PI) 08/01/15-07/31/19  
R11 Track-2 FEC: Bridging Cognitive Science and Neuroscience Using Innovative Imaging Technologies.

The major goal of this project is to determine whether there is a universal microcircuit for neurovascular coupling in the neocortex.

Role: Co-Investigator

2016-NIRG-397149 Shih (PI) 07/01/16-10/31/18  
Alzheimer's Association (\$100K direct)

Long-term In Vivo Imaging of the Pericyte Response to Amyloid Beta

This study will use novel imaging methods to track the plasticity of pericytes *in vivo* during to exposure to amyloid beta.

Role: Principal Investigator

R21 NS096997 Shih (PI) 02/01/16-01/30/18

NIH/NINDS (\$275K direct)

Pericytes as Inducers of Blood-Brain Barrier Injury During Stroke

This study will investigate how pericytes respond acutely to ischemic injury and how their response affects the function of the blood-brain barrier.

Role: Principal Investigator

Albert Trust Foundation Shih (co-PI) 6/01/19-05/31/20

(\$75K direct)

Deep In Vivo Two-photon Imaging of White Matter Pericytes During Ischemia

This study will use infrared fluorescent proteins and long-excitation wavelength imaging to study pericytes in cerebral white matter tracts during ischemia.

Role: Co-Principal Investigator

R21 NS106138 Shih (PI) 10/01/18-09/30/20

NIH/NINDS (\$275K direct)

Cytoskeletal Dynamics of Brain Pericytes and Impact on Capillary Flow

This study will use in vivo two-photon optogenetics and imaging to measure the contractile function of capillary pericytes. It will further test the role of F-actin dynamics in slow pericyte contraction/dilation and control of cerebral microcirculation.

Role: Principal Investigator

R21 AG063031 Shih (PI) 4/01/19-03/31/21

NIH/NIA

The Effects of Amyloid Beta on Pericyte Remodeling and Brain Capillary Function In Vivo

This study will examine how amyloid beta burden affects the reparative capacity of brain pericytes. It will also use *in vivo* two-photon imaging of tissue oxygen to examine how pericyte loss affects oxygen delivery.

Role: Principal Investigator

## PEER-REVIEWED JOURNAL ARTICLES

- S. Stamenkovic, Y. Li, J. Waters, and **A.Y. Shih** (2023) Deep Imaging to Dissect Microvascular Contributions to White Matter Degeneration in Rodent Models of Dementia. **Stroke**. In press
- A.A. Berthiaume, F. Schmid, S. Stamenkovic, V. Coelho-Santos, C. Nielson, B. Weber, M. Majesky, and **A.Y. Shih** (2022) Pericyte remodeling is deficient in the aged brain and contributes to impaired capillary flow and structure. **Nature Communications**. 13(1):5912. PMID: 36207315.
- B. Calabrese, S.L. Jones, Y. Shiraishi-Yamaguchi, M. Lingelbach, U. Manor, T. Svitkina, H. Higgs, **A.Y. Shih**, S. Halpain (2022) INF2-mediated actin filament reorganization confers intrinsic resilience to neuronal ischemic injury. **Nature Communications**. 13(1):6037. PMID: 36229429.
- P.J. O'Herron, D.A. Hartmann, K. Xie, P. Kara, **A.Y. Shih** (2022) 3D optogenetic control of arteriole diameter in vivo. **Elife**. 15;11:e72802. 15;11:e72802
- V. Coelho-Santos, T. Tieu, **A.Y. Shih** (2022) Reinforced thinned-skull window for repeated imaging of the neonatal mouse brain. **Neurophotonics**. 9(3):031918. PMID: 35673538.

- C.D. Nielson, **A.Y. Shih** (2022) In vivo Single Cell Optical Ablation of Brain Pericytes. **Frontiers in Neuroscience**. 16:900761. PMID: 35720702
- L.D. Faulhaber, O. D'Costa, **A.Y. Shih**, J. Gust (2022) Antibody-based in vivo leukocyte label for two-photon brain imaging in mice. **Neurophotonics**. 9(3):031917. PMID: 35637871
- S.K. Bonney, V. Coelho-Santos, S.F. Huang, M. Takeno, J. Kornfeld, A. Keller, **A.Y. Shih** (2022) Public Volume Electron Microscopy Data: An Essential Resource to Study the Brain Microvasculature. **Front Cell Dev Biol**. 10:849469. PMID: 35450291
- L.D. Faulhaber, A.Q. Phuong, K.J. Hartsuyker, Y. Cho, K.K. Mand, S.D. Harper, A.K. Olson, G.A. Garden, **A.Y. Shih**, J. Gust (2022) Brain capillary obstruction during neurotoxicity in a mouse model of anti-CD19 chimeric antigen receptor T cell therapy. **Brain Communications**. 4(1):fcab309. PMID: 35169706
- S.K. Bonney, L. T. Sullivan, T.J. Cherry, R. Daneman, **A.Y. Shih**. (2021) Distinct features of brain perivascular fibroblasts and mural cells revealed by in vivo two-photon imaging. **Journal of Cerebral Blood Flow and Metabolism**. 42(6):966-978. PMID: 34929105.
- D.A. Hartmann, V.C. Santos, **A.Y. Shih**. (2021) Pericyte Control of Blood Flow across Microvascular Zones in the Central Nervous System. **Annual Review of Physiology**. 10;84:331-354. PMID: 34672718.
- V. Coelho-Santos, A.A. Berthiaume, S. Ornelas, H. Stuhlmann, **A.Y. Shih** (2021) Imaging the construction of capillary networks in the neonatal mouse brain. **Proceedings of the National Academy of Sciences**. 118(26):e2100866118. PMID: 34172585.
- S. Ornelas, A.A. Berthiaume, S.K. Bonney, V. Coelho-Santos, R.G. Underly, A. Kremer, C.J. Guérin, S. Lippens **A.Y. Shih**. (2021) Three-dimensional ultrastructure of the brain pericyte-endothelial interface. **Journal of Cerebral Blood Flow and Metabolism**. 41(9):2185-2200. PMID: 33970018
- F.F. Liao, G. Lin, X. Chen, L. Chen, W. Zheng, R. Raghov, F.M. Zhou, **A.Y. Shih**, X.L. Tan. (2021) Endothelial Nitric Oxide Synthase-Deficient Mice. **American Journal of Pathology**. Online ahead of print. PMID: 33711310
- R. G. Underly and **A.Y. Shih**. (2021) Rapid, Nitric Oxide Synthesis-Dependent Activation of MMP-9 at Pericyte Somata during Capillary Ischemia *In Vivo*. **Frontiers in Physiology**. 11:619230. PMID: 33505320
- D.A. Hartmann, A.A. Berthiaume, R.I. Grant, S.A. Harrill, T. Noonan, T. Tieu, K. McDowell, A. Faino, A. Kelly and **A.Y. Shih**. (2021) Brain capillary pericytes exert a substantial but slow influence on blood flow. **Nature Neuroscience**. 24: 633-645. *Commentary by Institoris and Gordon: "A tense relationship between capillaries and pericytes". New release: "Light and genetic probes untangle the dynamics of brain blood flow"*. PMID: 33603231.
- S.G. Rayner, C.C. Howard, C.J. Mandrycky, S. Stamenkovic, J. Himmelfarb, **A.Y. Shih**, and Y. Zheng. (2021) Multiphoton-Guided Creation of Complex Organ-Specific Microvasculature. **Advanced Healthcare Materials**. Feb 15:e2100031. PMID: 33586357
- K.P. McDowell, A.A. Berthiaume, Taryn Tieu, David. A. Hartmann and **A.Y. Shih**. (2021) Vasometrics: An ImageJ macro for spatiotemporal analysis of vascular diameter in optical imaging data. **Quantitative Imaging in Medicine and Surgery**. 11(3):969-982. PMID: 33654670
- A.N. Watson, A. Berthiaume, A.V. Faino, K.P. McDowell, N.R. Bhat, D.A. Hartmann, and **A.Y. Shih**. (2020). Mild pericyte deficiency is associated with aberrant brain microvascular flow in aged PDGFR $\beta^{+/-}$  mice. **Journal of Cerebral Blood Flow and Metabolism**. 40(12):2387-2400. PMID: 31987006



- F.A. Sorond, S. Whitehead, K. Arai, D. Arnold, S.T. Carmichael, C. De Carli, M. Duering, M. Fornage, R.E. Flores-Obando, J. Graff-Radford, E. Hamel, D.C. Hess, M. Ihara, M.K. Jensen, H.S. Markus, A. Montagne, G. Rosenberg, **A.Y. Shih**, E.E. Smith, A. Thiel, K.H. Tse, D. Wilcock, F. Barone. Proceedings from the Albert Charitable Trust Inaugural Workshop on white matter and cognition in aging. **Geroscience**. 2020, 42(1):81-96. Review. PMID: 31811528
- O'Herron P., Summers P.M., **Shih A.Y.**, Kara P., Woodward J.J. (2019) In Vivo Two-Photon Imaging of Neuronal and Brain Vascular Responses in Mice Chronically Exposed to Ethanol. **Alcohol**. 2019. Dec 16. pii: S0741-8329(19)30280-0. PMID: 31857103
- Coelho-Santos V., **Shih A.Y.** (2019). Postnatal development of cerebrovascular structure and the neuroglial unit. **Wiley Interdiscip Rev Dev Biol**. 2019 Oct 1:e363. PMID: 31576670.
- Berthiaume, A.A., Hartmann, D.A. Majesky, M.W. Bhat, N.R. **Shih, A.Y.** (2018) Pericyte structural remodeling in cerebrovascular health and homeostasis. **Frontiers in Aging Neuroscience**. 10:210. *Review Article*. PMID: 30065645.
- Shih, A.Y.**, Hyacinth, H.I., Hartmann, D.A., van Veluw, S. (2018) Rodent models of cerebral microinfarcts and microhemorrhages. Invited review for **Stroke**. 49(3):803-810. *Review Article*. PMID: 29459393.
- Berthiaume, A.A., Grant, R.I., McDowell, K.P., Underly, R.G., Hartmann, D.A., Levy, M., Bhat, N.R. and **Shih, A.Y.** (2018) Dynamic Remodeling of Brain Pericytes In Vivo Maintains Capillary Coverage in the Adult Mouse Brain. **Cell Reports**. 22(1):8-16. *Research findings featured on front page of EurekAlert! News Release, entitled "Revealing snapshots: Advanced imaging uncovers how the brain responds to vascular injury"*. F1000 recommended. PMID: 29298435.
- Mateo, C., Knutsen, P.M., Tsai, P.S., **Shih, A.Y.**, Kleinfeld, D. (2017) Entrainment of arteriole vasomotor fluctuations by neuronal activity: A basis of blood oxygen level dependent "resting state" connectivity across cortex. **Neuron**. 15;96(4):936-948. *Commentary by Chan and Murphy: Good Vibrations: Resting-State Functional Connectivity Reflects Entrainment of Vasomotion*. PMID: 29107517.
- Hartmann, D.A., Hyacinth, H.I., Liao, F-F, and **Shih, A.Y.** (2017) Does pathology of cerebral venules lead to formation of microinfarcts? *Review Article*. **Journal of Neurochemistry**. 144(5):517-526. PMID: 28950410.
- Hyacinth, H.I. Sugihara, C.I., Spencer, T.L., Archer, D.A. and **Shih, A.Y.** (2017) Higher prevalence of spontaneous cerebral vasculopathy and cerebral infarcts in a mouse model of sickle cell disease. **Journal of Cerebral Blood Flow and Metabolism**. 39(2):342-351. PMID: 28925802
- Grant, R.I., Hartmann, D.A., Underly, R.G. Berthiaume, A.A., Bhat, N.R. and **Shih, A.Y.** (2017) Organizational hierarchy and structural diversity of pericytes in the microvasculature of mouse cerebral cortex. **Journal of Cerebral Blood Flow and Metabolism**. 39(3):411-425. PMID: 28933255. *Selected for Cover Image*.
- van Veluw, S.J., **Shih A.Y.**, Smith, E.E., Chen C., Schneider J.A., Wardlaw J.M., Greenberg S.M., Biessels G.J. (2017) Detection, risk factors, and functional consequences of cerebral microinfarcts. **Lancet Neurology**. *Review Article*. pii: S1474-4422(17)30196-5. PMID: 28716371
- McKinnon, E., Fridriksson, J., George, G. Jensen, J., Rorden, C., Helpert, J., Basilakos, A., **Shih, A.Y.**, Spampinato, M., Bonilha, L (2017). Structural plasticity of the ventral stream and aphasia recovery. **Annals of Neurology**. 82(1):147-151. PMID: 28628946.
- Underly, R.G. and **Shih, A.Y.** (2017). Photothrombotic induction of capillary ischemia in mouse cortex during two-photon microscopy. **Bio-protocol**. <http://www.bio-protocol.org/e2378>

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- Underly, R.G., Levy, M., Hartmann, D.A., Grant, R.I., Watson, A.N., and **Shih, A.Y.** (2017). Pericytes as inducers of rapid, matrix metalloproteinase-9 dependent capillary damage during ischemia. **Journal of Neuroscience**. 37(1):129-140 (Selected as Feature Article)(*Research findings featured as EurekAlert! News Release, entitled “Advanced imaging of intact brains during ischemic stroke reveals a new role for pericytes”*). Altmetrics Score of 31. PMID: 28053036.
- Z.J. Taylor, E. S. Hui, A.N. Watson, X. Nie, R.L. Deardorff, J.H. Jensen, J.A. Helpert and **A.Y. Shih** (2015). Microvascular basis for growth of small infarcts following occlusion of single penetrating arterioles in mouse cortex. **Journal of Cerebral Blood Flow and Metabolism**. 36(8):1357-73 (Selected for Journal Cover). F1000 recommended. PMID: 26661182.
- D.A. Hartmann, R.G. Underly, R.I. Grant, A.N. Watson, V. Lindner and **A.Y. Shih** (2015). Pericyte structure and distribution in the cerebral cortex revealed by high-resolution imaging of transgenic mice. **Neurophotonics**. 2(4), 041402. *Top ten most downloaded*. PMID: 26158016.
- A.Y. Shih**, C. Rühlmann, P. Blinder, A. Devor, P.J. Drew, B. Friedman, P.M. Knutsen, P.D. Lyden, C. Mateo, L. Mellander, N. Nishimura, C.B. Schaffer, P.S. Tsai and D. Kleinfeld (2015). Robust and fragile aspects of cortical blood flow in relation to the underlying angioarchitecture. **Microcirculation**. *Review Article*. 22(3):204-18. PMID: 25705966.
- D. Hartmann, R. Underly, A. Watson, **A. Y. Shih** (2015). A murine toolbox for imaging the neurovascular unit. **Microcirculation**. *Review Article*. 22(3):168-82. PMID: 25352367
- Z. J. Taylor and **A.Y. Shih** (2013). Targeted occlusion of individual pial vessels of mouse cortex. **Bio-protocol**. <http://www.bio-protocol.org/wenzhang.aspx?id=897>
- A.Y. Shih**, P. Blinder, B. Friedman, P.S. Tsai, G.M. Stanley, P.D. Lyden, D. Kleinfeld (2013). The smallest stroke: Occlusion of one penetrating vessel leads to infarction and a cognitive deficit. **Nature Neuroscience**. 16(1):55-63. (*Research findings featured as a Media Release in UCSD News and New Scientist*). PMID: 23242312.
- A. Y. Shih**, C. Mateo, P. J. Drew, P.S.Tsai, D. Kleinfeld (2012). A polished and reinforced thinned skull window for long-term imaging of the mouse brain. **Journal of Visualized Experiments**. Mar 7: (61). PMID: 22433225
- A. Y. Shih**, J. D. Driscoll, P. J. Drew, N. Nishimura, C. Schaffer, D. Kleinfeld (2012). Two-photon microscopy as a tool to study blood flow and neurovascular coupling in the rodent brain. **Journal of Cerebral Blood Flow and Metabolism**. 32: 1277-1309. *Review Article. (Top Ten Most Downloaded in Journal of Cerebral Blood Flow and Metabolism)*. PMID: 23370483.
- P.J. Drew, **A.Y. Shih**, D. Kleinfeld (2011). Fluctuating and sensory-induced vasodynamics in rodent cortex extend arteriole capacity. **Proceedings of the National Academy of Sciences**. 108(20): 8473-98. PMID: 21536897.
- D. Kleinfeld, P. Blinder, P. J. Drew, J.D. Driscoll, A. Muller, P.S. Tsai, **A.Y. Shih**. A guide to delineate the logic of neurovascular signaling in the brain. **Frontiers in Neuroenergetics**. 2011. 3:1.

- J. D. Driscoll, **A.Y. Shih**, G.A. White, Q.-T. Nguyen, P.S. Tsai, J.A. Squier, G. Cauwenberghs, D. Kleinfeld (2011). Photon counting, censor corrections, and lifetime imaging for improved detection in two-photon microscopy. **Journal of Neurophysiology**. 105(6): 3106-13.
- I. Valmianski, **A. Y. Shih**, J. D. Driscoll, D. M. Matthews, Y. Freund and D. Kleinfeld (2010). Automatic identification of fluorescently labeled brain cells for rapid functional imaging. **Journal of Neurophysiology**. 104(3): 1803-11. PMID: 20610792.
- P. Blinder\*, **A.Y. Shih**\*, C.A. Rafie, and D. Kleinfeld (2010). Topological basis for the robust distribution of blood to rodent neocortex. **Proceedings of the National Academy of Sciences**. 107(28): 12670-5. (\* equal co-first authors). PMID: 20616030.
- P.J. Drew, **A.Y. Shih**, P.S. Tsai, P. Knutsen, D. Davalos, P. Blinder, K. Akassoglou, and D. Kleinfeld (2010). Chronic optical access through a polished and reinforced thinned skull. **Nature Methods**. 7(12): 981-4. (Selected for journal cover image). PMID: 20966916.
- A. Weidemann, K. X. Knaup, C. A. Rafie, A. T. Boutin, C. Stockmann, N. Takeda, M. Scadeng, **A. Y. Shih**, V. H. Haase, M. C. Simon, D. Kleinfeld, and R. S. Johnson (2009). Glial response is an essential component of hypoxia-induced erythropoiesis. **Journal of Clinical Investigation**. 119(11):3373-83.
- B. Friedman, C. Schachtrup, P.S. Tsai, **A.Y. Shih**, K. Akassoglou, D. Kleinfeld, and P.D. Lyden (2009). Acute vascular disruption and Aquaporin 4 loss after stroke. **Stroke**. 40: 2182-2190. PMID: 19372455.
- P.J. Drew, P. Blinder, G. Cauwenberghs, **A.Y. Shih**, and D. Kleinfeld (2009). Rapid determination of particle velocity from space-time images using the Radon transform. **Journal of Computational Neuroscience**. 29(1-2):5-11. PMID: 19459038.
- A. Y. Shih**, B. Friedman, P. J. Drew, P. S. Tsai, P. D. Lyden and D. Kleinfeld (2009). Active dilation of penetrating arterioles restores red blood cell flux to penumbral neocortex after focal stroke. **Journal of Cerebral Blood Flow and Metabolism**. 29: 738-751. (Research findings featured as UCSD News Release, entitled "Mesh-like Network of Arteries Adjusts to Restore Blood Flow to Stroke-injured Brain".) PMID: 19174826.
- A.Y. Shih**, H. Erb, T.H. Murphy (2007). Dopamine activates Nrf2-regulated neuroprotective pathways in astrocytes and meningeal cells. **Journal of Neurochemistry**. 101(1):109-19. PMID: 17394461.
- A.M. Pacchioni, J. Vallone, R.I. Melendez, **A.Y. Shih**, T.H. Murphy, P.W. Kalivas (2007). Nrf2 gene deletion fails to alter psychostimulant-induced behavior or neurotoxicity. **Brain Research**. 1127(1):26-35.
- A.Y. Shih**, H. Erb, X. Sun, X. Toda, P.W. Kalivas, T.H. Murphy (2006). Cystine/glutamate exchange modulates glutathione supply for cell proliferation and neuroprotection from oxidative stress. **Journal of Neuroscience**. 26(41):10514-23. PMID: 17035536.
- A.Y. Shih**, H.B. Fernandes, F.Y. Choi, M.G. Kozoriz, Y. Liu, P. Li. C.M. Cowan, A. Klegeris (2006). Policing the police: astrocytes modulate microglial activation. **Journal of Neuroscience**. 26(15): 3887-3888. Journal of Neuroscience, 26(6):1880-1887.
- X. Sun, **A.Y. Shih**, H.C. Johannssen, H. Erb, P. Li, T.H. Murphy (2006) Two-photon imaging of glutathione levels in intact brain indicates enhanced redox buffering in developing neurons and cells at the cerebrospinal fluid and blood-brain interface. **Journal of Biological Chemistry**. 281(25):17420-17431.
- A.Y. Shih**, P. Li and T.H. Murphy (2005). A small molecule inducible Nrf2-mediated antioxidant response provides effective prophylaxis against cerebral ischemia *in vivo*. **Journal of Neuroscience**. 25(44):10321-10335. (Featured in "This Week in the Journal" for The Journal of Neuroscience; Top 50 most-read in Journal of Neuroscience, March 2014). PMID: 16267240.

**A.Y. Shih\***, S. Imbeault\*, V. Barakauskas, H. Erb, L. Jiang, P. Li, T.H. Murphy (2005). Induction of the Nrf2-driven antioxidant response confers neuroprotection during mitochondrial stress *in vivo*. **Journal of Biological Chemistry**. 280(24): 22925-22936. (\* equal co-first authors). PMID: 15840590.

**A.Y. Shih**, D.A. Johnson, G. Wong, A.D. Kraft, L. Jiang, H. Erb, J.A. Johnson and T.H. Murphy (2003). Coordinate regulation of glutathione biosynthesis and release by Nrf2 expressing glia potently protects neurons from oxidative stress. **The Journal of Neuroscience**. 23 (8):3394-406. PMID: 12716947.

J.M. Lee, **A.Y. Shih**, T.H. Murphy, J.A. Johnson (2003). NF-E2-related factor 2 mediates neuroprotection against mitochondrial complex I inhibitors and increased concentrations of intracellular calcium in primary cortical neurons. **Journal of Biological Chemistry**. 278(39):37948-56.

**A.Y. Shih** and T.H. Murphy (2001). xCT cystine transporter expression in HEK293 cells: pharmacology and localization. *Biochem. and Biophys. Res. Comm.* 282(5):1132-7.

## COMMENTARIES, NEWS & VIEWS

Berthiaume, A.A. and **Shih, A.Y.** 2019. Sharpening the tools for pericyte research. **Nature Neuroscience**. News and Views article for "Pericyte loss leads to circulatory failure and pleiotrophin depletion causing neuron loss" by Nikolakopoulou ... Zlokovic.

## BOOK CHAPTERS

A.A. Berthiaume, V.C. Coelho-Santos, D.A. Hartmann, and **Andy Y. Shih**. In vivo optical imaging and manipulation of brain pericytes. Volume: "Biology of Pericytes – Recent Advances" Springer Nature series: "Stem Cell Biology and Regenerative Medicine (ISSN:2196-8985)".

C.J. Guérin, A. Kremer, P. Borghgraef, **A.Y. Shih**, S. Lippens. Combining serial block face and focused ion beam scanning electron microscopy for 3D studies of rare events. *Methods Cell Biol.* 2019;152:87-101.

P.M. Summers, Z.J. Taylor and **A.Y. Shih**. Two-photon imaging of cerebral vasodynamics in awake mice during health and disease. In "Intravital Microscopy". Editor Roberto Weigert, 2013. Springer Science + Business Media.

**A.Y. Shih**, P.J. Drew, D. Kleinfeld. Imaging vasodynamics in awake mice with two-photon microscopy. In *Neuromethods Coupling Methods in NeuroMethods*. Editor Wolfgang Walz, 2013. Springer Science + Business Media.

**A. Y. Shih**, J. D. Driscoll, M.J. Pesavento, D. Kleinfeld (2012). Two-photon microscopy to measure blood flow and concurrent brain cell activity. B. Weber and F. Helmchen, eds., 2012, Elsevier, NY, Chapter 3.3 (In press).

J. D. Driscoll, **A. Y. Shih**, P. J. Drew, P.J. Drew, I. Valmianski, and D. Kleinfeld. Quantitative two-photon imaging of blood flow in cortex. In *Imaging in Neuroscience: A Laboratory Manual (Book 2)*, F. Helmchen and A. Konnerth, editors, R. Yuste, series editor, 2011, Cold Spring Harbor Laboratory Press, NY, Chapter 84, 927-938.

**A. Y. Shih**, N. Nishimura, J. Nguyen, B. Friedman, P. D. Lyden, C. B. Schaffer, and D. Kleinfeld. Optical-based models of single vessel occlusion in rodent neocortex. In *Imaging in Neuroscience: A Laboratory Manual (Book 2)*, F. Helmchen and A. Konnerth, editors, R. Yuste, series editor, 2011, Cold Spring Harbor Laboratory Press, NY, Chapter 85, 939-948.

- A. Devor, **A. Y. Shih**, P. S. Tsai, P. Blinder, P. Tian, and D. Kleinfeld. Statics and dynamics of the angiome probed by two-photon laser scanning microscopy under normal conditions and following experimental stroke. In *Imaging the Brain with Optical Methods*, A. Roe, editor, 2008, Springer Press.
- D. Kleinfeld, B. Friedman, P. D. Lyden, and **A. Y. Shih**. Targeted occlusion to surface and deep vessels in neocortex via linear and nonlinear optical absorption. In *Animal Models of Acute Neurological Injuries*, J. Chen, Z. Xu, X.-M. Xu and J. Zhang, editors, 2008, Contemporary Neuroscience Series, The Humana Press.

## CONFERENCE PAPERS

D.A. Hartmann and **A.Y. Shih** (2017). In vivo Optical Imaging and Manipulation of Pericytes in the Mouse Brain. *OSA Technical Digest* (online) (Optical Society of America, 2017), paper BrW3B.1. <https://doi.org/10.1364/BRAIN.2017.BrW3B.1>

## INVITED TALKS/SEMINARS

- 2001, Frontiers in Cardiovasc. Research, Hope Heart Institute. Bell Harbor Conf. Center, Seattle, Washington.
- 2002, Oxidative Stress in Health and Disease. University of Saskatchewan, Saskatoon, Saskatchewan.
- 2003, Summer Program in Neuroscience. Memorial University, St. John's, Newfoundland.
- 2005, Pacific Northwest Neuroscience Meeting. Seattle, Washington.
- 2006, Salk Institute, Laboratory of Dr. David Schubert. Salk Institute, La Jolla.
- 2007, Collaborative Research on Computational Neuroscience. University of Southern California, Los Angeles.
- 2008, Gordon Research Conference on Blood Flow and Brain Metabolism. Proctor Academy, New Hampshire.
- 2010, Hotchkiss Brain Institute. University of Calgary, Alberta, Canada.
- 2010, Kavli Institute for Theoretical Physics. University of California, Santa Barbara.
- 2011, Brain 2011, ISCBFM, Barcelona, Spain.
- 2011, Medical University of South Carolina. Charleston, South Carolina.
- 2011, Imaging Structure and Function Course, Cold Spring Harbor Laboratories, New York.
- 2012, UBC Stroke Symposium, Vancouver, British Columbia.
- 2013, Capstone Course Lecture, College of Charleston, Charleston, South Carolina.
- 2014, Cognitive Neuroscience Seminar Series, MUSC, Charleston, South Carolina. (host G. Aston-Jones)
- 2014, Smooth Muscle Underground Microcirculation Meeting, San Diego, California. (host D. Welsh)
- 2014, Center for Biomedical Imaging Seminar Series, Charleston, South Carolina. (J. Helpert)
- 2015, Georgia Regents University, Augusta, Georgia. (host J. Filosa)
- 2015, Bioengineering Program Seminar, MUSC, Charleston, South Carolina. (host T. Ye)
- 2015, Frontiers in Neuroscience, Charleston, South Carolina. (host S. Kautz)
- 2015, Department of Regenerative Medicine Seminar, MUSC, Charleston, South Carolina. (host M. Cooley)
- 2015, Department of Neurology Seminar, Charleston, MUSC, South Carolina.
- 2015, Department of Pharmacology Seminar, Memphis, UTHSC, Tennessee. (host F. Liao)
- 2016, Pre-clinical Imaging Lecture Series, MUSC, Charleston, South Carolina. (host A. Broome)
- 2016, Department of Psychiatry Seminar, Charleston, MUSC, South Carolina. (host C. Blanco Centurion)
- 2016, Canadian Association of Neuroscience Symposium Presenter, Toronto, Canada. (host C. Brown).
- 2016, FASEB Smooth Muscle Conference Speaker, Lisbon, Portugal. (host S. Early).
- 2016, Neurology Grand Rounds, Charleston, MUSC, South Carolina (host J. Kurent).
- 2016, International CAA Association Conference, Boston, MA. (host S. Greenberg).
- 2016, Society for Neuroscience Nanosymposium Speaker and Organizer, San Diego.
- 2016, Department of Physiology Seminar, Lexington, University of Kentucky, Kentucky (host J. Abisambra).
- 2016, Center for Biomedical Imaging Seminar Series, Charleston, South Carolina. (host C. Gregory).
- 2017, Department of Pharmacology Seminar, Burlington, University of Vermont (host Benedek Erdos).
- 2017, Department of Pharmacology Seminar, New Orleans, Tulane University, Louisiana (host R. Mostany).
- 2017, Invited Speaker at European Stroke Organization Conference, Prague, Czech Republic.
- 2017, Institute of Pharmacology and Toxicology, University of Zurich, Zurich, Switzerland (host B. Weber).
- 2017, Invited Speaker, Optics in the Life Science, OSA Biophotonics Congress, San Diego (host D. Hod).

2017, Center for Developmental Biol. and Regen. Med., Seattle Children's Research Institute, Seattle.

2018, Invited Speaker, World Congress for Microcirculation, Vancouver, Canada (host F. Dabertrand).

2018, Lecture on Multi-photon imaging and the microcirculation, WCM2018, Vancouver, Canada.

2018, Neuroscience Student Seminar, University of Rochester, New York (host K. Gates).

2018, Invited Speaker, ISN&N, Non-neuronal mechanisms of VCID, Dresden, Germany (host. D. Wilcock)

2018, Vollum Institute Seminar, Oregon Health & Science University, Oregon (host. A. Mishra)

2018, Djavad Mowafaghian Centre for Brain Health, Colloquium speaker, U. British Columbia (host T. Murphy)

2018, Center for Neuroscience Seminar, Loma Linda University, California (host J. Zhang).

2019, Invited Speaker, The 3rd VCID Translational Workshop, Carlsbad, California (host F. Barone)

2019, Invited Speaker, International Stroke Conference, Honolulu, Hawaii (host, Richard Daneman, Hua Su)  
Symposiums: "Pericytes: New Kids on the Block", "Chronic Disorders and Cerebrovasc. Regulation"

2019, Invited Speaker, Blood-brain barrier consortium meeting, Portland, Oregon (host E. Neuwelt)

2019, Invited Speaker, Neurovascular Unit Symposium, Columbia University, NY (host E. Miller, D. Agalliu)

2019, Invited Speaker, Cold Spring Harbor Laboratory Blood-brain barrier course, CSHL, NY (host. C. Gu)

2019, Breakfast Club Seminar Speaker, University of Washington, Seattle (host. K. Stevens)

2019, Bioscience Seminar, University of South Florida, Tampa Bay, Florida (host. J. Breslin)

2019, Dept. of Pharmacology and Toxicology Seminar, University of Mississippi, Mississippi (host F. Fan)

2019, Duke Advanced Light Imaging and Spectroscopy, Duke University, Raleigh, North Carolina  
(host. E. Raba from Coherent)

2019, Dept. Physiology and Cell Biology, University of Nevada, Reno, (host. C.H. Tran)

2020, Dept. of Pharmacology, University of Georgia, Athens, GA (host Y. Yao)

2020, Invited Speaker and Symposium Moderator, International Stroke conference, Los Angeles, CA.

2020, Dept. of Neuroscience, University of Alberta, Edmonton, AB (host I. Winship)

2020, Dept. of Anesthesiology, University of Colorado, Denver (host F. Dabertrand)

2020, Invited Speaker, Neurophotonics Mini-symposium, online (host A. Devor)

2020, Invited Speaker, International Cerebral Amyloid Angiopathy Assoc. meeting, online (host E.E. Smith)

2020, Invited Speaker, Neurology Grand Rounds, Northwestern University, online. (R. Sobota)

2020, Dept. of Cell Biology and Physiology, University of North Carolina, Chapel Hill, NC (host J. Faber)

2021, Invited Speaker, "Emerging Topics in Microcirculation". Experimental Biology 2021. (host J. Breslin)

2021, Invited Speaker, "Developmental Dynamics of Adult Microvasculature". NAVBO 2021. (host J. Breslin)

2021, Invited Speaker, "Albert Charitable Trust White Matter Workshop" (host S. Brogan)

2021, Dept. of Pharmaceutics Seminar Series. University of Minnesota. (host K. Kandimalla)

2021, Dept. of Medicine Research Seminar. University of Missouri. (host Z. Liu)

2021, Dept. of Neuroscience Seminar Series, University of Florida, online (host J. Abisambra)

2021, Zilkha Neurological Institute, University of Southern California, online (host P. Lyden)

2021, Stanford University, Neuroimmunology conference, online (host D. Hartmann)

2021, Carnegie Mellon University/U. Pittsburgh, Neurovascular coupling cluster, online (host. A. Rakymzhan)

2021, University of Illinois, Champaign-Urbana, Environmental Toxicology seminar, online (host F. Tehrani)

2021, University of Edinburgh, Neuroscience seminar, online (host A. Montagne)

2021, Invited Speaker, Neurovascular Unit Meeting, Goethe University Frankfurt, online (host J. Hefendehl)

2022, Ohio State University, Neurological Institute Seminar Series, online (host A. Tedeschi)

2022, University of Vermont, Pharmacology Center Seminar Series, (host O. Harraz)

2022, University of Washington, Neurology Grand Rounds, (host M. Davis)

2022, Invited Plenary Symposium Speaker, Canadian Assoc. for Neurosci., Toronto, Canada (host A. Di Polo)

2022, Hacettepe University, Neuroscience Seminar Series, online (T. Dalkara)

2022, American Society for Neurochemistry meeting, Roanoke, VA, (R. Daneman, D. Davalos)

2022, Cornell University. Feil Family Mind and Brain Institute Seminar, (host C. Iadecola)

2022, Massachusetts General Hospital, Center for Engineering in Medicine and Surgery, (host L. Fan)

2022, Invited Speaker, "Pericytes in Disease". BRAIN 2022, Glasgow, Scotland (host C. Hall)

2022, Invited Speaker, Intl. Cerebral Amyloid Angiopathy conference, Perth, Australia (host H. Sohrabi)

2022, Invited Speaker, Neurovascular Unit Interface Symposium, Frankfurt (host R. Adams, C. Gu)

- 2022, Invited Speaker, Excellence Center for Systems Neurology (SyNergy), Munich (host M. Dichgans)
- 2022, University of Kentucky, College of Pharmacy Seminar Series (host B. Bauer)
- 2023, University of Victoria, Dept. of Medical Sciences Seminar (host. C. Brown)
- 2023, Washington University at St. Louis, Hope Center Neurovascular Injury & Repair Group (host J.M. Lee)
- 2023, Pennsylvania State University, Center for Neural Engineering (host. Y. Kim)
- 2023, Medical University of South Carolina, Dept. of Pathology and Lab Medicine (host H. Fan)
- 2023, University of Washington, Breakfast Club seminar, Seattle, WA (host. Y. Zheng)
- 2023, Cajal Advanced Neuroscience Training Program, Univ. of Bordeaux, France (host. C. Hall, N. Plesnila)
- 2023, University of Arizona, Dept. of Pharmacology Seminar Series, Tucson, AZ (P. Ronaldson)
- 2023, University of Washington, Biology of Aging Course, Seattle, WA (host. J. Young)
- 2023, Invited Speaker, BRAIN conference, Symposium: Cell-cell and cell-boundary communication during cerebral tissue responses to injury in the neurovascular unit, Brisbane, Australia (host. G. Del Zoppo)
- 2023, University of Virginia, Cardiovascular Research Center, Charlottesville, VA (host U. Eyo)

## MEDIA/COVERAGE

- 2001, Interview in B.C. Business Magazine Profile
- 2001, Featured in Rick Hansen Institute Newsletter
- 2004, Featured in Canadian Stroke Network Newsletter
- 2004, Michael Smith Foundation Trainee Event Speaker
- 2004, Featured in Brain Research Center Newsletter (UBC)
- 2005, Heart and Stroke Foundation of B.C. and Yukon, Telephone Thank You Volunteer
- 2009, Shih et al. JCBFM article featured as UCSD News Release, entitled "Mesh-like Network of Arteries Adjusts to Restore Blood Flow to Stroke-injured Brain". Additional coverage on: Science Direct, United Press International, Post Chronicle, St. Louis Star, e! Science News, ScienceBlog, BioMedicine, PhysOrg.com, Science Codex, Big News Network, Machines Like Us, Lab Spaces, ScienceMode; Genetic Engineering and Biotechnology News, RxPG NEWS, NewsGuide.US, Science Centric, ZAMP Bionews, Eureka! Science News (Canada), KopalniaWiedzy (Poland), Insciences Organisation (Switzerland), Science Centric (Bulgaria), Medical News Today (UK), Newpost Online (India), Smash Hits (India), Hindu News (India), Fresh News (India), Frontline (India), Howrah News (India), Yahid News (India), SINDH TODAY (Pakistan), Thaindian.com (Thailand), NewsX (Asia)
- 2009, Two-photon image featured in Discover Magazine, focus on Brain function
- 2012, Shih et al. Nature Neuroscience article featured as UCSD press release "Even the smallest possible stroke can damage brain tissue and impair cognitive function, appeared in Science 2.0, Preettext, Doctor Tipster, Science Daily, redOrbit, Medical Daily, Medical Xpress, EurekaAlert, Health.India, Hindustantimes, IANS live, and Barchester Healthcare. Commentary in The Neuroscientist: "How small is the smallest stroke?"
- 2012, The Research Brief "Mini-stroke does mega-damage - Can Memantine help?" appeared in the AlzForum
- 2013, "Even the tiniest stroke can damage the brain" appeared in the NewScientist.
- 2014, Featured in MUSC Research Inklings.
- 2014, Featured in Center for Biomedical Imaging Quarterly.
- 2014, Featured in Microcirculation Society Newsletter.
- 2015, Alzheimer's Forum commentary for "Smooth Muscle Cells, Not Pericytes, Control Brain Blood Flow".  
["http://www.alzforum.org/news/research-news/smooth-muscle-cells-not-pericytes-control-brain-blood-flow"](http://www.alzforum.org/news/research-news/smooth-muscle-cells-not-pericytes-control-brain-blood-flow)
- 2016, Taylor et al. JCBFM article **Altmetrics score of 10**. Featured on Alzforum. **F1000** review by Anne Dorrance and Paulo Pires.
- 2017, Underly et al. J. Neuroscience article featured as MUSC News Release, entitled "Advanced imaging of intact brains during ischemic stroke reveals a new role for pericytes". **Altmetrics score of 32**. Additional coverage on: EurekaAlert!, News Medical, Health Medicine Network, Medical Xpress, DOTmed, Labroots.com, Scienmag.com, New-Medical (Dutch).
- 2017, Summers et al. JCBFM article featured as News Release, entitled "Lasting effects of mini-strokes may lead to dementia". JCBFM Most Read List. Trended on Science Twitter Feed. **Altmetrics score of 69**. Additional coverage on: EurekaAlert!, Dementia today. Science daily. Medical News Today. Janos (spanish).

- Hindustan times. The Health Site. Dementia today. Counsel Heal. PsychCentral. Medical Xpress. CyberMedCorp. IamActive
- 2017, Mateo et al. Neuron articles based on the UCSD press release "UC San Diego researchers solve mystery of oxygenation connections in the brain" appeared in DeathRattleSports, EcoDiario, EurekAlert! Science News, homeAI, MedicalXpress, NSF "News From the Field", Neuroscience News and Research, NewswiseScience Daily, ScienceNewslite, and Topix.
- 2018, Berthiaume et al. Cell Reports articles based on MUSC press release "Revealing snapshots: advanced imaging uncovers how the brain responds to vascular injury." Additional coverage on: EurekAlert!, Medical Xpress, NeuroscienceNews, Phys.org, Reliawire, New-medical.met, Healthinformative. Biobeat Blog article (<https://biobeat.nigms.nih.gov/2018/05/pericytes-capillary-guardians-in-the-brain/>).  
**F1000 review** by Stephen Schwartz. **Altmetrics score of 54.**
- 2021, Hartmann et al. Nature Neuroscience article. SCRI press release "Light and Genetic Probes Untangle Dynamics of Blood Flow Through the Brain's Vast Capillary Network."  
<https://pulse.seattlechildrens.org/untangling-the-dynamics-of-brain-blood-flow/>  
 Additional coverage by: Science Daily, Medical Xpress, ScienMag, NeuroscienceNews.  
 Coverage also by Neurology Today:  
[https://journals.lww.com/neurotodayonline/fulltext/2021/08050/debate\\_on\\_the\\_role\\_of\\_pericytes\\_in\\_blood\\_flow\\_in.3.aspx](https://journals.lww.com/neurotodayonline/fulltext/2021/08050/debate_on_the_role_of_pericytes_in_blood_flow_in.3.aspx). **Altmetrics score of 105**
- 2021, Coelho-Santos et al. PNAS article. Trends in Neurosciences Spotlight: "Not just a 'drain': venules sprout brain capillaries, but Como, Jones and Seigenthaler. **Altmetrics score of 85**

### **AlzForum Contributions.**

- 2015, Comment for "Smooth Muscle Cells, Not Pericytes, Control Brain Blood Flow"  
 Hill *et al.* Neuron. 2015 Jul 1;87(1):95-110.  
<http://www.alzforum.org/news/research-news/smooth-muscle-cells-not-pericytes-control-brain-blood-flow>
- 2017, Comment for "Pericytes Don't Go With the Flow—They Change It"  
 Kisler *et al.* Nat Neurosci. 2017 Mar;20(3):406-416.  
<http://www.alzforum.org/news/research-news/pericytes-dont-go-flow-they-change-it>
- 2017, Interviewed for "Mini Strokes Cause Mega Problems for Brain Cleansing"  
 Wang *et al.* J. Neurosci. 37(11):2870-2877, 2017.  
<http://www.alzforum.org/news/research-news/mini-strokes-cause-mega-problems-brain-cleansing>.
- 2017, Comment for "Finally, a Dye to Visualize Pericyte Function"  
 Damisah *et al.* Nature Neuroscience. 2017 May 15.  
<http://www.alzforum.org/news/research-news/finally-dye-visualize-pericyte-function>

### **AD HOC REVIEW**

Nature, Science, Nature Communications, Nature Methods, Nature Neuroscience, PNAS, Science Advances, Journal of Cerebral Blood Flow and Metabolism, Nature Protocols, Neurophotonics, Neuroscience, PLOS One, Journal of Neurotrauma, Diabetes, Cerebral Cortex, Journal of Visualized Experiments, Microcirculation, Stroke, Neurochemical Research, Acta Neuropathologica, Arteriosclerosis, Thrombosis and Vascular Biology, Journal of Clinical Investigation, Journal of Neuroinflammation, Journal of Neuroscience, Frontiers in Aging Neuroscience, Frontiers in Physiology, Journal of Neuroscience Research, Journal of Neural Engineering, Journal of Translational Stroke Research, EMBO Reports, eLife, Cell reports, DevelopmentNeuropathology and Applied Neurobiology, Communications Biology.

### **TEACHING AND SUPERVISORY ACTIVITIES**

#### **Undergraduate/Graduate courses**

##### **MUSC**

- 2016 (Spring), NRSC730 – Neuroscience Graduate Core Curriculum – Introductory lecture. ~20 students.  
 2016 (Spring), Journal Club – Neuroscience Program Requirement ~ 50 students.  
 2016 (Spring), CoM 1<sup>st</sup> year – Introductory lecture on functional neuroimaging ~50 students.  
 2016 (Fall), Neuroscience Elective – Stroke and Brain Injury ~8 students



2016 (Fall), NRSC730 – Neuroscience Graduate Core Curriculum – 2 lectures on neurovasculature and stroke models ~20 students  
2017 (Winter), NRSC730 – Neuroscience Graduate Core Curriculum – Introductory lecture. ~5 students.  
2017 (Spring), CoM 1<sup>st</sup> year – Introductory lecture on functional neuroimaging ~50 students.  
2017 (Fall), Neuroscience Elective – Advanced Optical Imaging Methods in Neuroscience, ~10 students  
2017 (Fall), NRSC730 – The neurovasculature.  
2017 (Fall), NRSC730 – Animal models of stroke and cerebrovascular disease.  
2018 (Spring), NRSC730 – Neuroscience Graduate Core Curriculum – Introductory lecture. ~20 students.  
2018 (Spring), CoM 1<sup>st</sup> year – Introductory lecture on functional neuroimaging ~50 students.

## **UW**

2019 (Fall). Guest lecture. BioEngineering 325. Biotransport ~75 students.  
2021 (Spring), Guest lecture. Vascular biology and engineering. BIOEN483/583.  
2022 (Spring), Guest lecture. Vascular biology and engineering. BIOEN483/583  
2023 (Spring), Guest lecture. Vascular biology and engineering. BIOEN483/583

### Thesis advisor

2012 – 2015, Philipp M. Summers, M.Sc. candidate, primary mentor.  
*Currently mechanical engineer at South Carolina Stroke Recovery Center*  
2013 – 2018, Robert G. Underly, Ph.D. candidate, primary mentor.  
*Current Research Associate at RJ Reynolds*  
2014 – 2018, David A. Hartmann, Ph.D. candidate, primary mentor.  
*Currently Medical Student at MUSC*  
2016 – 2020, Andree-Anne Berthiaume, Ph.D. candidate, primary mentor.  
2021 – current, Cara Nielson, Ph.D. candidate, primary mentor.

### Graduate rotation student

2014 fall, Spencer Bell, Ph.D. candidate  
2017 summer, Dimitri Arhontoulis, M.D./Ph.D. candidate  
2017 summer, Gray Evans, M.D./Ph.D. candidate  
2017 fall, Luke Watson, Ph.D. candidate  
2017 fall, Kareem Heslop, Ph.D. candidate  
2022 fall, Sheridan Sargent, Ph.D. candidate

### Postdoctoral fellows

2014 – 2018, Manuel Levy, Ph.D. Centre National de la Recherche Scientifique.  
*Promoted to Research Assistant Professor at MUSC in 2017.*  
*Currently Research Assistant Professor at Duke University*  
2018 – current, Vanessa Coelho-Santos, Ph.D. University of Coimbra, Portugal.  
2019 – current, Stefan Stamenkovic, Ph.D. University of Serbia.  
2019 – current, Stephanie Bonney, Ph.D. University of Colorado, Anschutz Campus  
2022 – current, Yuandong (Jenny) Li, Ph.D. University of Washington, Seattle, USA

### Research assistants/Technicians

2012 – 2015, Zachary Taylor, B.A., College of Charleston.  
2014 – 2017, Ashley Watson, B.Sc. candidate, College of Charleston.  
2015 – 2018, Ian Grant, B.Sc. candidate, College of Charleston.  
2016 – 2017, Chase Burton, B.Sc. candidate, College of Charleston.  
2017 – 2018, Jordan Costello, B.Sc., College of Charleston.  
2018 – 2019, Sydney Seerden, B.Sc., Virginia Tech University.  
2019, Taryn Tieu, B.Sc., Holyoke College.  
2019 – 2021, Sharon Gonzalez-Ornelas, B.Sc. University of Washington.  
2019 – 2021, Madeline Kilby, B.Sc. University of Wisconsin.  
2020 – current, Lila Faulhaber, B.Sc. University of Washington.  
2021 – current, Liam Sullivan, B.Sc. University of Washington.  
2021 – current, Maria Sosa, B.Sc. University of Texas, Dallas.

2021 – current, Anne-Jolene Cruz, B.Sc. Seattle Pacific University.  
2021 – current, Bonnierose Dietrich, University of Washington  
2022 – current, Nicholas Weiteman, St. Olaf College

#### Volunteers

2014, Molly Sekar, B.Sc. candidate, College of Charleston.  
2014, Allie Harrill, B.Sc. candidate, College of Charleston.  
2014, Samantha Manucy, B.Sc. candidate, College of Charleston.  
2014 – 2015, Tegan Noonan, B.Sc. candidate, College of Charleston.  
2015 – 2016, Amber Dorn, B.Sc. candidate, College of Charleston.  
2017 – 2020, Konnor McDowell, B. Eng. candidate, Clemson University.  
2018, Sydney Seerdan, B.Sc. candidate, Virginia Tech University.  
2022 – current, Khushi Tawde, B.Sc. candidate. University of Washington

#### Visiting fellows

2016, 2017, Hyacinth I. Hyacinth, M.D./Ph.D., Assistant Professor, Emory University.  
2017, Vanessa Coehlo-Santos, Ph.D., Pre-doctoral fellow, University of Coimbra, Portugal.  
*Luso-American Development Foundation travel award to study in the Shih lab.*  
2022, Michael Pizzi, M.D., Assistant Professor, University of Florida.  
*4-week intramural travel award to learn two-photon imaging in the Shih lab*  
2022, Dr. Fan Fan, Ph.D., Associate Professor, University of Mississippi.  
*1-week travel award to learn two-photon imaging in the Shih lab (supported by American Physiological Society Research Career Enhancement Award)*

#### Thesis committees

2015 – 2017, Rachel Weber, Ph.D. candidate, Neuroscience, Med.Univ. of South Carolina  
2016 – 2018, Daniel Lench, Ph.D. candidate, Neuroscience, Med.Univ. of South Carolina  
2016 – 2018, Serena Kinley-Cooper, Ph.D. candidate, Neuroscience, Med.Univ. of South Carolina  
2017 – 2019, Emilie McKinnon, M.D./Ph.D. candidate, Neuroscience, Med.Univ. of South Carolina  
2017 – 2019, Jessica Breedlove, Ph.D. candidate, Neuroscience, Med.Univ. of South Carolina  
2019 – current, Caitlin Howard, Ph.D. candidate, Bioengineering, University of Washington  
2019 – current, Peijun Tang, Ph.D. candidate, Bioengineering, University of Washington  
2021, Signe Fruekilde, Ph.D. candidate, Aarhus University Denmark (external thesis defense committee)  
2021 – current, Yu Jung Shin, Ph.D. candidate, Bioengineering, University of Washington

#### Scientific Advisor

2020 – current, Juliane Gust, Assistant Professor, K08 Mentored Clinical-scientist career award

#### External committee advisors

2018 – current, Heather McConnell, Post-doctoral fellow (Anusha Mishra lab), T32 trainee.

#### Seminars

2019, Career panel, Office of Teaching and Educational Resources, Seattle Children's.  
2021, CARE talk to OAC staff, Office of Animal Care, Seattle Children's.

### **MENTEE FELLOWSHIPS/ACHIEVEMENTS**

2015, Robert Underly receives First Prize poster at Frontiers in Neuroscience, Charleston, South Carolina  
2015, Ian Grant nominated for "Best in Biology" at *College of Charleston 27<sup>th</sup> Annual Poster Session*.  
2015, David Hartmann receives TL1 fellowship from South Carolina Clinical and Translational Institute.  
2015, David Hartmann receives First Prize poster at Perry Halushka MUSC Research Day.  
2016, David Hartmann receives Ph.D. Fellowship from American Heart Association.  
**2016, David Hartmann receives F30 Fellowship from the NIH/NINDS (F30 NS096868).**  
2016, David Hartmann receives Hot Topic Selection for Society for Neuroscience 2016.  
2017, Robert Underly featured in Society for Neuroscience, Neuronline Article.  
2017, Ashley Watson nominated for "Best in Biology" at *College of Charleston 29<sup>th</sup> Annual Poster Session*.

2017, Roger Ian Grant receives R25 PREP scholarship from NIH.  
 2017, Manuel Levy receives Mentored Pilot Award from MUSC's Stroke Recovery COBRE.  
 2018, David Hartmann receives travel award and platform presentation at Experimental Biology, San Diego.  
 2018, David Hartmann wins first prize for Lasker Foundation Essay Competition. \$10K award.  
 2018, Vanessa Coelho-Santos receives speaker invitation at EMBO Workshop on Developmental Biology.  
**2018, Andree-Anne Berthiaume receives AFAR Scholarship for Research in the Biology of Aging.**  
 2019, Vanessa Coelho-Santos receives travel award to International BBB Consortium conference (Portland).  
**2019, Vanessa Coelho-Santos receives Post-doctoral Fellowship from the American Heart Association (Top score of 0.1%, 1.15 impact).**  
 2020, Stephanie Bonney receives T32 training fellowship from UW Cardiovascular Diseases Research.  
**2020, Stephanie Bonney receives NIH F32 fellowship from NINDS.**  
 2020, David Hartmann receives MUSC Distinguished Graduate Student Award.  
 2020, Vanessa Coelho-Santos receives NAVBO Meeting best post award.  
**2022, Vanessa Coelho-Santos receives Marie-Curie career transition award.**  
 2022, Taryn Tieu receives Hershey Conference on Developmental Brain injury best poster award.

## PUBLISHED ABSTRACTS

T.H. Murphy, J. Yu , and **A.Y. Shih** (2000). Cystine/glutamate antiport transporter (xCT) in rat brain: tissue distribution and cellular localization. *Soc. for Neuroscience Abs. Prog # 625.10.*

**A.Y. Shih** and T.H. Murphy (2001). xCT cystine transporter expression in HEK293 cells: pharmacology, 4F2hc dependence, and localization. *Soc. for Neuroscience Abs. Prog # 867.15.*

**A.Y. Shih**, G. Wong, D.A. Johnson, L. Jiang, J.A. Johnson and T.H. Murphy (2002). Engineering an enhanced glial antioxidant response protects neurons from oxidative stress. *Soc. for Neuroscience Abs. Prog # 625.3. Platform presentation.*

D.A. Johnson, **A.Y. Shih**, T.H. Murphy and J.A. Johnson (2002). Induction of ARE-driven genes in rat cortical cultures over-expressing the transcription factor Nrf2. *Soc. for Neuroscience Abs. Prog # 113.8.*

S. Imbeault, **A.Y. Shih**, H.E. Erb, L. Jiang, S. Toda, P.W. Kalivas and T.H. Murphy (2003). Ectopic expression of the cystine/glutamate antiporter xCT confers protection against oxidative glutamate toxicity. *Soc. for Neuroscience Abs. Prog # 951.5.*

**A.Y. Shih**, P. Li, H. Erb, S. Imbeault, T.H. Murphy (2003). Nrf2 activation protects neurons from experimental stroke by inducing a multi-faceted antioxidant defense. *Soc. for Neuroscience Abs. Prog # 740.15.*

**A.Y. Shih**, P. Li, N. Earl, S. Imbeault, M.N. Cheng, R. Gilbert, G.S. Robertson, T.H. Murphy (2004). A coordinated Nrf2-mediated antioxidant response promotes neuronal survival following cerebral ischemia *in vivo*. *Soc. for Neuroscience Abs. Prog # 456.13.*

S. Imbeault, **A.Y. Shih**, T.H. Murphy (2004). Role of coordinated anti-oxidant enzyme induction mediated by Nrf2 over-expression in protection against a mitochondrial complex II inhibitor *in vivo*. *Soc. for Neuroscience Abs. Prog # 1016.4.*

S. Zhang, X. Sun, **A.Y. Shih**, J.D. Boyd, P. Li, K.R. Delaney, T.H. Murphy (2004). High resolution 2-photon imaging of acute and chronic effects of ischemia in mouse *in vivo*. *Soc. for Neuroscience Abs. Prog # 429.16.*

X. Sun, H. Johnnassen, **A.Y. Shih**, S. Imbeault, H. Erb, T.H. Murphy (2004). *In vivo* and *in vivo* 2-photon imaging of glutathione indicates that meningeal and ependymal cells are the major antioxidant buffer in mammalian brain. *Soc. for Neuroscience Abs. Prog # 431.15.* (authorship added later)

**A.Y. Shih**, P. Li, N. Earl, S. Imbeault, M.N. Cheng, R. Gilbert, G.S. Robertson, T.H. Murphy (2004). A coordinated Nrf2-mediated antioxidant response promotes neuronal survival following cerebral ischemia *in vivo*. *Soc. for Neuroscience Abs. Prog # 456.13*

A.M. Pacchioni, J. Vallone, **A.Y. Shih**, T.H. Murphy, P.W. Kalivas (2005). Nrf2 deletion gene sensitizes mice to acute and repeated cocaine. *Soc. for Neuroscience Abs. Prog # 799.18.*

X. Sun, **A.Y. Shih**, H. Erb, P. Li, T.H. Murphy (2005). Meningeal cells efficiently protect neurons against oxidative stress by GSH dependent mechanisms. *Soc. for Neuroscience Abs. Prog # 221.14.*

**A.Y. Shih**, S. Imbeault, V. Barakauskas, H. Erb, L. Jiang, P. Li, T.H. Murphy. (2005). Induction of the Nrf2-driven antioxidant response confers neuroprotection during mitochondrial stress *in vivo*. *Soc. for Neuroscience Abs. Prog # 215.8.*

- P. Blinder, P. S. Tsai, J. P. Kaufhold, **A.Y. Shih**, B. Friedman, P. D. Lyden, A. I. Ifarraguerri and D. Kleinfeld (2007) Toward the complete reconstruction of cell location and vasculature connectivity in mouse vibrissa cortex. *Soc. for Neuroscience Abs. Prog # 87.10* (authorship added later)
- B. Friedman, J. Nordberg, B. Chen, **A.Y. Shih**, D. Kleinfeld, P. D. Lyden (2007) Ischemic vasogenic edema is temporally and spatially coupled to the loss of astrocytic Aquaporin IV after stroke. *Soc. for Neuroscience Abs. Prog # 87.13* (authorship added later)
- J.D. Driscoll, **A. Y. Shih**, P. J. Drew, and D. Kleinfeld (2009). Arbitrary line-scan paths with in vivo two-photon laser scanning microscopy reveals that the dynamics of cortical blood vessel diameter and red blood cell velocity can dissociate. *Soc. for Neuroscience Abs. Selected for SfN Press Release.*
- P.J. Drew, J.D. Driscoll, P. Tsai, **A. Y. Shih**, and D. Kleinfeld (2009). Two-photon imaging of spontaneous and sensory evoked cortical microvascular dynamics in the awake mouse. *Soc. for Neuroscience Abs.*
- I. Valmianski, **A. Y. Shih**, J.D. Driscoll, D.W. Matthews, Y. Freund, and D. Kleinfeld (2009). Automated detection of neurons and astrocytes from in vivo two-photon laser-scanning microscopy using boosted classifiers. *Soc. for Neuroscience Abs.*
- A. Y. Shih**, J.D. Driscoll, P.J. Drew, B. Friedman, P. D. Lyden, and D. Kleinfeld (2009). Occlusion of a single penetrating arteriole is sufficient to generate multiple features of stroke pathology in cerebral cortex. *Soc. for Neuroscience Abs.*
- A. Y. Shih**, P. Blinder, J. D. Driscoll, P. J. Drew, B. Friedman, P. D. Lyden, and D. Kleinfeld (2010). One Venule, One Stroke: Optical occlusion of a single cortical penetrating venule is more severe than a Penetrating Arteriole Occlusion. *Soc. for Neuroscience Abs. and Barrels*
- P.S. Tsai, P. J. Drew, **A.Y. Shih**, P. Knutsen, D. Davalos, P. Blinder, K. Akassoglou, and D. Kleinfeld (2010). Large-scale chronic imaging and optical manipulation of cortical cells through a polished and reinforced thinned-skull. *Soc. for Neuroscience Abs.*
- D. Jeong, P.S. Tsai, **A.Y. Shih**, D. Schafer, J. Squier, Y. Neev, and D. Kleinfeld (2010). All optical cranial surgery: Ablation of hard but not soft tissue by amplified femtosecond laser pulses and feedback from atomic emission spectra. *Soc. for Neuroscience Abs.* (authorship added later).
- A. Y. Shih**, P. Blinder, P.S. Tsai, G.M. Stanley, B. Friedman, P. D. Lyden, and D. Kleinfeld (2011). The smallest stroke: Occlusion of a single penetrating vessel in cortex leads to local pathology and sensory impairment. *Soc. for Neuroscience Abs. and Barrels*
- A. Y. Shih**, Z. Taylor, J.A. Helpen and S.K. Hui (2013). The smallest stroke revealed through in vivo two-photon microscopy and 7T magnetic resonance imaging. *Soc. for Neuroscience Abs*
- C.E. Mateo, P.S. Tsai, **A.Y. Shih** and D. Kleinfeld (2013). Probing neurovascular coupling via natural and driven vasomotion in the awake mouse. *Soc. for Neuroscience Abs*
- A. Y. Shih**, E.S. Hui, Z. Taylor, X. Nie, R. Deardorff, J. Jensen, J. A. Helpen (2014). Deciphering the cerebral microinfarct using rodent models and multi-modal MRI. *Soc. for Neuroscience Abs. and World Stroke Congress Abs.*
- P. M. Summers, Z.J. Taylor and **A.Y. Shih** (2014). Persistent and extensive disruption of neurovascular coupling by a single cerebral microinfarct. *Soc. for Neuroscience Abs.*
- Z.J. Taylor, A.N. Watson and **A.Y. Shih** (2014). Early capillary constriction impedes collateral blood flow to the acute stroke penumbra. *Soc. for Neuroscience Abs.*
- R.G. Underly and **A.Y. Shih** (2014). Pericyte response to ischemic injury in vivo. *Soc. for Neuroscience Abs.*
- E.S. Hui and **A.Y. Shih** (2014). A novel mouse model of vascular cognitive impairment: A diffusional kurtosis imaging study. *International Society for Magnetic Resonance in Medicine Abs.*
- D.A. Hartmann, N.R. Bhat and **A.Y. Shih** (2015). The influence of type 2 diabetes on the cerebral microvasculature in Alzheimer's transgenic mice. *American Neurochemistry Society Meeting.*
- I. Grant, D. A. Hartmann, R. G. Underly, A. N. Watson, V. Lindner, and **A. Y. Shih** (2015). Pericyte Distribution in the Cerebral Cortex Revealed by High-Resolution Imaging of Transgenic Mice. *College of Charleston 27<sup>th</sup> Annual Poster Session: Year of Light.*
- A.Y. Shih** (2016). The Double Life of a Cerebral Pericyte. *Canadian Association of Neuroscience.*
- A.Y. Shih** (2016). The Double Life of a Cerebral Pericyte. *Faseb Smooth Muscle Meeting, Lisbon Portugal.*
- R.G. Underly, M. Levy, D.A. Hartmann, R.I. Grant, A.N. Watson, and **A.Y. Shih** (2016). Capillary ischemia produces MMP-9 dependent blood-brain barrier degeneration localized to cerebral pericyte somata. *Soc. for Neuroscience Abs.*
- D.A. Hartmann, R. I. Grant, and **A.Y. Shih** (2016). Probing the contractility of cerebral pericytes in vivo with optogenetics. *Soc. for Neuroscience Abs.*

- R.I. Grant, D.A. Hartmann, R.G. Underly, and **A.Y. Shih** (2016). The cerebrovascular mural cell continuum: A structural and biochemical characterization of smooth muscle cells, pericytes and intermediary hybrids. Soc. for Neuroscience Abs.
- M. Levy, R.I. Grant, C. Burton, and **A.Y. Shih** (2016). Toward a murine model to image the remapping of synaptic inputs after stroke. Soc. for Neuroscience Abs.
- A.Y. Shih**, P.M. Summers, D.A. Hartmann, R. Deardorff, X. Nie, E.S. Hui, J.A. Helpern, and J.H. Jensen (2016). Microinfarcts induce widespread functional deficits in perilesional tissues. Soc. for Neuroscience Abs.
- A. Berthiaume and **A.Y. Shih** (2017). Structural plasticity of brain microvascular pericytes revealed by long-term *in vivo* imaging. Dementia and Cognition: A Vascular Perspective Meeting. Montreal.
- E. McKinnon, L. Bonhila, J. Helpern, **A.Y. Shih**, and J. Jensen (2017). Exploring Cortical Fiber Crossings in Mice using Diffusional Kurtosis Imaging. ISMRM.
- S. Halpain, B. Calabrese, and **A.Y. Shih** (2017). Actin Reorganization is a Rapid and Reversible Adaptive Response by Neurons Exposed to Ischemic and Excitotoxic Injury in Vitro and in Vivo. International Stroke Conference. Abstract #4977
- S. Halpain, B. Calabrese, and **A.Y. Shih** (2018). Actin cytoskeleton and pro-survival responses during acute neurological injury and stroke. American Society for Neurochemistry. AC07-X
- A.Y. Shih**, D. Hartmann, A. Berthiaume (2018). Pericyte structural plasticity in the adult mouse brain. Soc. for Neuroscience Abs.
- M. Levy, C. Burton, R.I. Grant, **A.Y. Shih** (2018). Multi-scale imaging of the plasticity of sensory representations in somatosensory cortex. Soc. for Neuroscience Abs.
- M.J. Sosa, S.K. Bonney, **A.Y. Shih** (2022). Characterization of mural cells and perivascular fibroblasts in the Tg-SwDI mouse model of cerebral amyloid angiopathy. Soc. for Neuroscience Abs. San Diego
- T. Tieu, A.J. Cruz, **A.Y. Shih**, V. Coelho-Santos. (2022). Live imaging of microglial behavior across the lifespan. Soc. for Neuroscience Abs. San Diego
- C.P. Profaci, V. Coelho-Santos, K. Bajc, **A.Y. Shih**, F. Dabertrand, R. Daneman. (2022). Neuronal activity regulates brain endothelial cholesterol metabolism as a feedback mechanism for neurovascular coupling. Soc. for Neuroscience Abs. San Diego
- L.T. Sullivan, S.K. Bonney, Z. Zhao, **A.Y. Shih**. (2022). Characterization of brain capillary pericyte-specific targeting using the Atp13a5-2A-CreERT2-IRES-tdTomato mouse line. Soc. for Neuroscience Abs. San Diego
- C.D. Nielson, A.A. Berthiaume, V. Coelho-Santos, **A.Y. Shih**. (2022). In vivo single cell optical ablation to study brain pericyte function in health and disease. Soc. for Neuroscience Abs. San Diego
- A.Y. Shih**, S.K. Bonney, V. Coelho-Santos, S.F. Huang, M. Takeno, J. Kornfeld, A. Keller. (2022). Public volume electron microscopy resources to study the brain microvasculature. Soc. for Neuroscience Abs. San Diego
- B. Calabrese, R. Mortazavi, L.S. Cotsirilos, C.E. Andolina, S. Ravipati, **A.Y. Shih**, S. Halpain. (2022). Novel ATP-independent F-actin polymerization in neuronal dendrites undergoing ischemic stress. Soc. for Neuroscience Abs. San Diego