Alison Xiaoqiao Xie, MS, PhD

PERSONAL INFORMATION

Assistant Professor of Surgery, Division of Urology
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Mail Stop C317, 12700 E 19th Ave, Aurora, CO 80045
Language: Mandarin (native), English (full professional proficiency)

EDUCATION

B. S. in Biophysics, University of Science and Technology of China **2002**
M. S. in Neurobiology and Biophysics, University of Science and Technology of China **2005**
Ph. D. in Neuroscience, University of California, Riverside **2011**

POST-GRADUATE TRAINING

Postdoctoral Research Associate, Department of Pharmacology, School of Medicine, University of North Carolina at Chapel Hill **2011-2016**

- Developed and characterized the first pharmacogenetic mouse model for studying the function of GFAP-expressing glia *in vivo*
- Revealed the role of Gq-GPCR signaling in satellite glial cells in the sympathetic ganglia in regulating cardiovascular functions *in vivo*. This is the first discovery of the function of satellite glial cells in sympathetic ganglia.
- Revealed the analgesic role of satellite glial cells in the lumbar sensory ganglia in inflammatory pain. This is the first discovery of the analgesic role of sensory satellite glial cells *in vivo*.

ACADEMIC APPOINTMENTS

Research Assistant Professor, Department of Pharmacology, School of Medicine, University of North Carolina at Chapel Hill, Chapel Hill, NC **2016-2017**

- Investigated the neuro-modulatory role of satellite glial cells in sympathetic and sensory ganglia.
- Established and validated the first glial-induced cardiovascular disease mouse model.

Instructor, Department of Surgery, School of Medicine, University of Colorado, Anschutz Medical Campus, Aurora, CO **2017-2019**

- Investigated the neurogenic changes underlying vascular endothelial growth factors (VEGF) - induced bladder overactivity and visceral hypersensitivity, an animal model of Urologic Chronic Pelvic Pain Syndrome (UCPPS)
- Investigated the therapeutic potential of activating Gq-GPCR signaling pathways in peripheral glia to alleviate the pain symptoms in UCPPS animal models

Assistant Professor, Department of Surgery, School of Medicine, University of Colorado, Anschutz Medical Campus, Aurora, CO **October 2019 - present**

- Investigating the neural mechanism underlying bladder dysfunction and visceral pain using animal models of lower urinary tract symptoms (LUTS)
- Investigating the neuronal and glial transcriptome changes during the pathogenesis of visceral sensitization and chronic pelvic pain
- Characterizing the age-related changes in bladder contractility and micturition in mice that are genetically lacking mechano-gated potassium channel TREK-1 (TREK-1 KO), and studying the cellular mechanism underlying TREK-1 KO bladder dysfunction using mouse models lacking TREK-1 channels in bladder detrusor muscle and in the sensory nervous system.
- Leading the investigation on the role of major pelvic ganglia (MPG) satellite glia cells in regulating bladder contractions and urinary functions *in vivo*
- Leading the investigation on the mechanism and the sex dimorphism associated with glial-driven blood pressure regulation *in vivo*

OTHER PROFESSIONAL APPOINTMENTS

- Faculty Member, Neuroscience Graduate Program, School of Medicine, University of Colorado, Anschutz Medical Campus
- Faculty Member, Center for NeuroScience (CNS), University of Colorado, Anschutz Medical Campus
- Faculty Member, Colorado Clinical & Translational Sciences Institute (CCTSI), Aurora, CO

PROFESSIONAL ORGANIZATIONS

- Society of Neuroscience (SfN), member
- American Society of Neurochemistry (ASN), member
- South Central Section (SCS) of the American Urological Association (AUA), member
- Society for Basic Urologic Research (SBUR), member

HONORS, AWARDS, AND CERTIFICATE

2011 University Teaching Certificate
University Teaching Program, the Graduate Division, University of California, Riverside

2014 Excellence in Mentoring Undergraduates
Office for Postdoctoral Affairs, University of North Carolina at Chapel Hill

2016 Young Investigator Travel Award
Federation of American Societies for Experimental Biology (FASEB) Maximizing Access to Research Careers (MARC) Program

2023 Young Investigator Award, Society of Basic Urologic Research (SBUR)

LEADERSHIP TRAINING AND EXPERIENCE

2022 **Women's Leadership training**, University of Colorado, School of Medicine

- This training program aims to provide professional development opportunity for selected women Assistant Professors with primary appointments in the School of Medicine.

2022 **Leadership, Empower & Engage, Authenticity & Awareness, Diversity (LEAD) training**, University of Colorado, Department of Surgery

- This training program helps DOS members to develop their leadership identity.

RESEARCH

THESES/DEGREES

Bachelor of Science, Biophysics

"Effects of different stimulation modes on short-term synaptic plasticity of visual cortex in adult rats"

Master of Science, Neurobiology and Biophysics

"The function of visual cortex neurons of different age rats"

Doctor of Philosophy, Neuroscience

"Bidirectional scaling of astrocytic metabotropic glutamate receptor signaling following long-term changes in neuronal synaptic transmission"

PEER-REVIEWED PUBLICATIONS

PI-led and Collaborative Research

2023 Yesupatham SK, Malykhina AP, **Xie AX***. "Transcriptome Analysis in Lumbosacral Dorsal Root Ganglia Reveals Molecular Changes in Animal Models of Urological Chronic Pelvic Pain Syndrome (UCPPS)". *In review.*

2023 **Xie AX**†, Iguchi N†, Malykhina AP*. "Long-term follow-up of TREK-1 KO mice reveals the development of bladder hypertrophy and impaired bladder smooth muscle contractility with age". *In review*.

2022 Clarkson TC, Iguchi N, **Xie AX**, Malykhina AP. Differential transcriptomic changes in the central nervous system and urinary bladders of mice infected with a coronavirus. ***PLoS ONE***. doi: 10.1371/journal.pone.0278918

2022 **Xie AX**, Iguchi N, Clarkson TC, Malykhina AP. "Pharmacogenetic inhibition of lumbosacral sensory neurons alleviates visceral hypersensitivity in a mouse model of chronic pelvic pain". ***PLoS ONE***. doi: 10.1371/journal.pone.0262769

2021 Iguchi N, Carrasco A Jr, **Xie AX**, Pineda RH, Malykhina AP, Wilcox DT. (2021) Functional constipation induces bladder overactivity associated with upregulations of Htr2 and Trpv2 pathways. ***Sci Rep***. doi: 10.1038/s41598-020-80794-0.

2021 **Xie AX**†*, Taves S†, McCarthy KD. "Nuclear factor Kappa B-COX2 pathway activation in non-myelinating Schwann cells is necessary for the maintenance of neuropathic pain in mice". *Corresponding author. ***Front. Cell. Neurosci***. doi: 10.3389/fncel.2021.782275

2020 **Xie AX***, Madayag A, Minton SK, McCarthy KD, Malykhina AP. "Sensory Satellite Glial Gq-GPCR Activation Alleviates Inflammatory Pain via Peripheral Adenosine 1 Receptor Activation". *Corresponding author. ***Scientific Reports.*** Sci Rep. 2020 Aug 25;10(1):14181. doi: 10.1038/s41598-020-71073-z

2019 **Xie AX**†, Pan XQ†, Meacham RB, Malykhina AP. "The Expression of Transcription Factors Mecp2 and CREB Is Modulated in Inflammatory Pelvic Pain", ***Frontiers in Systems Neuroscience***. doi: 10.3389/fnsys.2018.00069.

Postdoctoral Research

2017 **Xie AX*,** Lee JJ, McCarthy KD. "Ganglionic GFAP$^+$ Glial Gq-GPCR Signaling Enhances Heart Functions *in vivo*". ***Corresponding author. ***Journal of Clinical Investigation Insight***.

2017;2(2):e90565. doi: 10.1172/jci.insight.90565.

2017 **Xie AX*,** Chaia A, McCarthy KD. "Targeting sympathetic glia for treating cardiovascular diseases". ***Corresponding author.** ***Receptors and Clinical Investigation***. 2017;4:e1572. doi: 10.14800/rci.1572.

2016 Annis RP, Swahari V, Nakamura A, **Xie AX**, Hammond SM, Deshmukh M. "Mature Neurons Dynamically Restrict Apoptosis via Redundant Pre-Mitochondrial Brakes". ***the FEBS Journal***. dio: 10.1111/febs.13944

2015 **Xie AX**, Petravicz, J, McCarthy KD*. "Molecular approaches for manipulating astrocytic signaling *in vivo*". ***Frontier in Cellular Neuroscience.*** doi: 10.3389/fncel.2015.00144

2013 Agulhon C, Boyt KM, **Xie AX**, Friocourt F, Roth BL, McCarthy KD. "Modulation of the autonomic nervous system and behaviour by acute glial cell Gq protein-coupled receptor activation *in vivo*". ***Journal of Physiology.*** doi: 10.1113/jphysiol.2013.261289

Graduate/Undergraduate Research

2014 **Xie AX**, Lauderdale K, Murphy T, Myers TL, Fiacco TA. "Inducing plasticity of astrocytic receptors by manipulation of neuronal firing rates". ***Journal of Visualized Experiments.*** doi: 10.3791/51458

2013 Sun MY, Devaraju P, **Xie AX**, Holman I, Samones E, Murphy TR, Fiacco TA. "Astrocyte calcium microdomains are inhibited by bafilomycin A1 and cannot be replicated by low-level Schaffer collateral stimulation *in situ*". ***Cell Calcium.*** doi: 10.1016/j.ceca.2013.10.004

2012 **Xie AX**, Sun MY, Murphy T, Lauderdale K, Tiglao E, Fiacco TA. "Bidirectional scaling of astrocytic metabotropic glutamate receptor signaling following long-term changes in neuronal firing rates". ***PLoS One.*** doi: 10.1371/journal.pone.0049637

2009 Carson MJ, Crane J, **Xie AX**. "Modeling CNS microglia: the quest to identify predictive models". ***Drug Discovery Today: Disease Models.*** Doi: 10.1016/j.ddmod.2008.07.006

2006 Wang H, **Xie X**, Li X, Chen B, Zhou Y. "Functional degradation of visual cortical cells in aged rats". ***Brain Research.*** doi: 10.1016/j.brainres.2006.09.010

2006 Jia F, Wei H, Li X, **Xie X**, Zhou Y. "Short-term synaptic plasticity in the rat geniculo-cortical pathway during development *in vivo*". ***Neuroscience Letters.*** doi: 10.1016/j.neulet.2005.12.054

2005 **Xie X**, Wang H, Chen B, Zhou Y. "Neural response characteristic of neuron to flashing stimulus in visual cortex of young rats". ***Progress in Biochemistry and Biophysics.*** 2005,32(11):1088-1092

2004 Jia F, **Xie X**, Zhou Y. "Short-term depression of synaptic transmission from rat lateral geniculate nucleus to primary visual cortex *in vivo*". ***Brain Research.*** doi: 10.1016/j.brainres.2004.01.001

MEETINGS/INVITED SEMINARS

Invited Seminars

2023 Department of Biology, Johns Hopkins University. Baltimore, MD. "Probing the roles of satellite glial signaling *in vivo* and in physiology"

2022 Neuroscience Graduate Program, University of Colorado, Anschutz Medical Campus. Aurora, CO. "Peripheral glia modulation of autonomic control: from heart to bladder"

2021 Department of Anesthesiology, University of Colorado, Anschutz Medical Campus.

Aurora, CO. "The analgesic role of peripheral GFAP$^+$ glia *in vivo*"

2017 Integrative Physiology Program, University of Colorado, Boulder. Boulder, CO. "DREADD the Glia: Pharmacogenetic Approaches for Studying the Role of GFAP$^+$ Glia in Physiology and Disease"

2016 Department of Pharmacology, University of North Carolina at Chapel Hill. Chapel Hill, NC. "Targeting sympathetic satellite glial cells for treating cardiovascular diseases"

Conferences

2024 American Physiological Society Summit. Serves as a speaker and the co-chair for the Foundational Science Session titled "Peripheral glia take center stage in autonomic functions", Long Beach, CA. "Satellite glial regulation of bladder function and pain". *upcoming*

2024 ASN 2024 Annual Meeting. Serve as a speaker and the chair for scientific symposium titled "the roles of satellite glial cells during development and diseases". Portland, OR. "The analgesic role of satellite glial signaling in bladder sensory ganglia and chronic pelvic pain", *upcoming*

2023 AUA 2023 Annual Meeting, Basic Science Symposium. Chicago, IL. "Manipulating peripheral glial signaling to treat pelvic pain"

2022 SCS of the AUA Annual Meeting, "Modulation of Sensory Glia Gq-GPCR Signaling *in vivo* Affects Spontaneous Voiding and Bladder Function in an Animal Model of Chronic Pelvic Pain"

2021 AUA annual meeting, "Sensory glial Gq-GPCR signaling alleviates visceral pain and improves micturition function in an animal model of urological chronic pelvic pain syndrome"

2020 SCS of the AUA Annual Meeting, "Lumbar-sacral neuromodulation alleviates visceral pain and improves lower urinary tract symptoms in animal model of urological chronic pelvic pain syndrome"

2018 AUA Annual Meeting, "VEGF-induced bladder nerve remodeling and visceral hyperalgesia in bladder pain"

2016 Duke Neuroimmunology and Glia Group Annual Retreat, "Gq-GPCR Signaling in Sympathetic Satellite Glial Cells Regulate Cardiovascular Functions *in vivo*"

Department of Pharmacology Retreat, University of North Carolina at Chapel Hill, "Gq-GPCR Signaling in Sympathetic Satellite Glial Cells Regulate Cardiovascular Functions *in vivo*"

The ASN 47th Annual Meeting, "Gq-GPCR Signaling in Sympathetic Satellite Glial Cells Regulate Cardiovascular Functions *in vivo*"

2014 Cold Spring Harbor Laboratory, Glia in Health & Disease meeting, "Ganglionic GFAP$^+$ glia regulate cardiovascular function via Gq-GPCR activation"

FUNDING

ONGOING RESEARCH SUPPORT

Ludman Center Early Career Faculty Research Development Awards

Sex differences in sympathetic glial regulation of blood pressure

Role: Principal Investigator

The Ludeman Family Center for Women's Health Research

09/01/2023-08/30/2024

Direct cost: $25,000/year

This proposal studies the sexual dimorphism in sympathetic glial regulation of blood pressure.

NIH/NIDDK R01 DK129260

Activating Peripheral Glia to Relieve Visceral Pain in Animal Models of Urological Chronic Pelvic Pain Syndrome (UCPPS)

Role: Principal Investigator

08/05/2021-08/04/2026

Direct cost: $220,000/year

This proposal is the first proposal on the roles of peripheral GFAP$^+$ glia in bladder function and disease.

RECENTLY COMPLETED RESEARCH SUPPORT

The role of mechanosensitive TREK-1 channels in detrusor overactivity and voiding dysfunction in patients with overactive bladder (OAB)

Department of Surgery, School of Medicine, AEF Seed grant

Role: Principal Investigator

09/01/2020-08/30/2021

Direct cost: $40,000

This project aims to investigate the cellular and molecular mechanisms of aberrant mechano-sensitivity in idiopathic detrusor overactivity and identify molecular targets and signaling pathways associated with increased sensory activity in overactive LUTS.

Beyond the neurons: the role of peripheral glia in neurogenic bladder dysfunction

Colorado Pilot Program Mentored Award, Colorado Clinical and Translational Sciences Institute

Role: Principal Investigator

03/01/2019-02/29/2020

Direct cost: $30,000

This project supported our investigation on whether satellite glial Gq-GPCR activation modulates visceral afferent sensitivity *in vivo*.

NIH/NIDDK R01 DK116648-01A1

Mechanisms of neurogenic voiding dysfunction in a viral murine model of multiple sclerosis

PI: Anna P. Malykhina

Role: Key Personnel

09/08/2020-8/30/2023

Direct cost: $200,000/year

The project will investigate the neural mechanisms of lower urinary tract symptoms in multiple sclerosis.

Regulation of pelvic pain and micturition reflex by VEGF in urological chronic pelvic pain syndrome

NIH/NIDDK R01 (DK121506-01)

PI: Anna P. Malykhina

Role: Key Personnel

08/01/2019-07/30/2022

Direct cost: $200,000/year

This application evaluates the role of VEGF pathways in neurogenesis and neural plasticity of the

neural pathways innervating the lower urinary tract.

TEACHING AND MENTORING

CLASSROOM TEACHING

Zoology Experiments	**2004**
Introduction to Cell and Molecular Biology Lab	**2008-2009**
Genetics	**2010**
Introduction to Neuroscience	**2010**
Neuroscience Laboratory	**2009-2011**
Cellular Neuroscience: Membrane and Synaptic Phenomena	**2010-2011**
Human Reproduction and Sexual Behavior	**2009, 2011**

MENTORSHIP

UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL

Shailja Admin, Biology	**2013**
Jakovin J. Lee, Biology, Carolina Summer Fellowship Program	**2013**
Jakovin J. Lee, Biology	**2014**
Brook Teffera, Biochemistry	**2014**
Miles Herr, Biology, Music, Computer science	**2014**
David Reich, Biochemistry and Molecular Biology, Brown University, Carolina Summer Fellowship Program	**2015**
Stephanie K. Yu, Computer science, Biology, Physics	**2015**
Esther Y. Lee, Biology	**2016**
Dante N. Duncan, Chemistry	**2016**
Tanya Qureshi, Biology	**2016**
Angelo Chaia, Chemistry	**2016**

UNIVERSITY OF COLORADO, ANSCHUTZ MEDICAL CAMPUS - LABORATORY

Kelly P. Smith, Bioengineering	**2018-2019**
Sathish Kumar Yesupatham, Postdoctoral Research Associate, Full-time	**2022-present**
Jin Cha, Professional Research Assistant, Full-time	**2022-present**

UNIVERSITY OF COLORADO, ANSCHUTZ MEDICAL CAMPUS – DEPARTMENT OF SURGERY

Urology resident research Program, Research advisor	**2022-present**

UNIVERSITY OF COLORADO, ANSCHUTZ MEDICAL CAMPUS - OTHERS

Women in STEM (WiSTEM) Mentorship Program, Mentor **2022-present**

2022-2023

Kayla Janevski, PA-II. CU Anschutz.

Ester Oh, Postdoctoral Fellow, Division of Renal Diseases and Hypertension, CU Anschutz.

2023-2024

Aubrianna Gholar, Graduate Student, MS Modern Human Anatomy. CU Anschutz.

Aurélie Ledreux, Early Career Faculty, Neurosurgery. CU Anschutz.

SERVICE

SCIENTIFIC REVIEWER – FUNDING AGENCIES

CCTSI Pilot Grant Program, reviewer **2019-present**

NIH/CSR Renal/Urological Sciences Small Business Activities Special Emphasis Panel, ad hoc reviewer **2022**

NIH/NIDDK Kidney and Urological Systems Function and Dysfunction study section, ad hoc reviewer **2023**

PEER REVIEWER - PUBLICATIONS

Journal of Visualized Experiments (JoVE), Reviewer **2020-Present**

Frontiers in Systems Neuroscience, Review Editor **2022-Present**

Frontiers in Pain Research, Review Editor **2022-Present**

Frontiers in Molecular Neuroscience, Reviewer **2022-Present**

DEPARTMENT SERVICE

The Uro Social Media Workgroup, Department of Surgery, Member **2022-present**

COMMUNITY SERVICE

Denver Metro Regional Science and Engineering Fair (DMRSEF), Judge **2018-present**

FACULTY MENTORS AND REFERENCES

Dr. Anna Malykhina, PhD (University of Colorado, Anschutz Medical Campus)
Professor of Surgery, Division of Urology
University of Colorado, Anschutz Medical Campus, School of Medicine
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Fax: 1-303-724-6330
E-mail: anna.malykhina@cuanschutz.edu

Dr. Fernando J. Kim, MD, MBA, FACS (Denver Health)
Chief Emeritus of Urology, Denver Health
Professor of Surgery, Division of Urology
University of Colorado, Anschutz Medical Campus, School of Medicine
660 N. Bannock St., Pavilion L, Floor 5, Denver, CO 80204
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E-mail: fernando.kim@dhha.org

Dr. Rejji Kuruvilla, PhD (Johns Hopkins University)
Professor of Biology
Johns Hopkins University

3400 N. Charles St, Mudd 227, Baltimore, MD 21218
Tel. (office): 1-410-516-2366
E-mail: rkuruvilla@jhu.edu

ADDITIONAL REFERENCES

Dr. Ken D. McCarthy, PhD (University of North Carolina at Chapel Hill)
Emeritus Professor, Pharmacology
4044 Genetic Medicine Building, 120 Mason Farm Road
University of North Carolina at Chapel Hill, Chapel Hill, NC 27599-7365
Tel. (cell): 1-919-602-6859
Email: kdmccarthy46@gmail.com

Dr. Todd A. Fiacco, PhD (University of California, Riverside)
Associate Professor, Molecular, Cell & System Biology, Neuroscience Program
1109 Biological Sciences Building, University of California, Riverside, Riverside, CA 92521
Tel: 1-951-827-7865
Fax: 1-951-827-3087
E-mail: todd.fiacco@ucr.edu

Dr. Bryan Roth, MD, PhD (University of North Carolina at Chapel Hill)
Michael Hooker Distinguished Professor, Pharmacology, Division of Medicinal Chemistry & Natural Products
Director, NIMH psychoactive drug screening program, Eshelman School of Pharmacy
Fellow of the American Academy of Arts and Sciences
Member of the National Academy of Medicine of the National Academy of Sciences
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Tel: 1-919-966-7535
Fax: 1-919-966-5640
E-mail: bryan_roth@med.unc.edu

Dr. Brian Cooley, PhD (University of North Carolina at Chapel Hill)
Associate Professor, Department of Pathology and Laboratory Medicine
Faculty Director, Rodent Advanced Surgical Models Core Lab
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Tel: 1-919-962-4912
Fax: 1-919-966-6012
E-mail: brian_cooley@med.unc.edu

Dr. Mohanish P. Deshmukh, PhD (University of North Carolina at Chapel Hill)
Professor, Department of Cell Biology and Physiology
7129E Neuroscience Research Building, 115 Mason Farm Road
University of North Carolina at Chapel Hill, Chapel Hill, NC, 27599-7250
Tel: 1-919-843-6004

Fax: 1-919-966-9605
E-mail: mohanish@med.unc.edu.

Dr. Juan Song, PhD (University of North Carolina at Chapel Hill)
Associate Professor, Department of Pharmacology
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University of North Carolina at Chapel Hill, Chapel Hill, NC 27599-7365
Tel: 1-919-966-7535
Fax: 1-919-966-5640
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