

Rajesh Khanna, PhD, MSc

General Information

Title: Richard and Thelma O.C. Barney Term Professor,
Department of Pharmacology & Therapeutics

Director, Pain Research and Integrated Neuroscience Center (PRINC)
College of Medicine, University of Florida
<https://directory.uflhealth.org/khanna-rajesh>
<https://pharmacology.med.ufl.edu/research-2/the-raj-khanna-lab/>

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Social accounts:



@KhannaLabUF
@khanna.bsky.social

LinkedIn:



EDUCATION

Honors BSc, Toxicology (minor), The University of Toronto, Toronto, Ontario, Canada
1990-1994

MSc, Pharmacology, The University of Toronto, Toronto, Ontario, Canada
1994-1996

Advisor: Patricia Harper, Ph.D.

Dissertation Title: Constitutive embryonic and fetal expression of xenobiotic-metabolizing cytochrome P450s:
CYP1A1, CYP1A2, and CYP1B1

PhD, Physiology, The University of Toronto, Toronto, Ontario, Canada
1996-2000

Advisor: Lyanne C. Schlichter, Ph.D.

Dissertation Title: Expression, roles and regulation of potassium channels in neuroimmune cells

Post-doctoral fellowship, Physiology and Cellular and Molecular Neuroscience, University of California at
Los Angeles, Los Angeles, California
2000-2003

Advisor: Diane M. Papazian, Ph.D.

EMPLOYMENT

Assistant Research Scientist, Toronto Western Research Institute, Toronto, Ontario, Canada (2003 – 2007)
Assistant Professor, tenure track (2007 to 2011) and Associate Professor, with tenure (2011-2013), Department of Pharmacology and Toxicology, Indiana University School of Medicine, Indianapolis, Indiana (2007 – 2013)
Associate Professor, Department of Pharmacology (2014-2015), The University of Arizona College of Medicine, Tucson, AZ
Professor (with tenure), Department of Pharmacology (2015-2021) and Associate Director, Comprehensive Pain and Addiction Center (2019-2021), The University of Arizona College of Medicine, Tucson, AZ (2014 – 2021)
Professor (with tenure), Department of Molecular Pathobiology, College of Dentistry, and Director, New York University Pain Research Center, New York University (2022 – 2023)
Professor (with tenure), Department of Neuroscience and Physiology and Investigator, Neuroscience Institute, NYU Grossman School of Medicine (2022 – 2023)
Richard and Thelma O.C. Barney Term Professor, Department of Pharmacology & Therapeutics and Director, Pain and Addiction Therapeutics (PATH) Collaboratory College of Medicine, University of Florida (2024 – present)

HONORS and AWARDS

Awards

1990-1994 Metropolitan Life Merit Undergraduate Scholarship
Sep. 1999 American Physiological Society Travel Award
Feb. 2000 Biophysical Society Travel Award
Mar. 2000 Keystone Conference Scholarship
2001 Governor General's Gold Medal nominee (for outstanding doctoral dissertation)
2000-2002 Natural Sciences and Engineering Research Council of Canada Postdoctoral Fellowship
2001-2003 American Heart Association Postdoctoral Fellowship
2003-2004 American Heart Association Postdoctoral Fellowship (competitive renewal)
2010 Elwert Award in Medicine, Indiana University
2023 Honorary Professor at Amity Institute of Neuropsychology and Neurosciences, Amity University, Uttar Pradesh, India
2023 Aspen Institute Italia Award for scientific research and collaboration between Italy and the United States ("A light-gated potassium channel for sustained neuronal inhibition")
<https://www.aspeninstitute.it/en/aspen-award-2023-the-winning-entry/>
2024-2025 Mayday Pain & Society Fellowship https://us15.campaign-archive.com/?e=test_email&u=62a0b58d1c685af70a4ffe61d&id=4e50580409

Scientific Review Panels

2017 Reviewer, National Cancer Institute - ZCA1 SRB-A (J1) NCI Provocative Questions Special Emphasis Panel-2
2018 Reviewer, Academic Program Review of the Physiological Sciences Graduate Interdisciplinary Program, University of Arizona
2018 Reviewer, Special Emphasis Panel/Scientific Review Group 2018/08 ZRG1 ETTN-U (81) S; Uniformed Services University (USU) – Pain Research and Management program
2018 Reviewer, Neurotransporters, Receptors, and Calcium (NTRC) Signaling Study Section
2018 Reviewer, R13 Review Panel ZNS1 SRB K13
2018, '20, '21 Reviewer, Czech Science Foundation

2018 Reviewer, Special Emphasis Panel/Scientific Review Group ZRG1 ETTN-U 84; Uniformed Services University (USU) – Transforming Technology for the Warfighter (TTW) Program

2018 Reviewer, ZDA1 SXM-M (09) S; Cutting-Edge Basic Research Awards (CEBRA) (R21-Clinical Trial Optional)

2018 Reviewer, ZNS1 SRB-M (07); Review of R35 Research Program Award

2019 Reviewer, Special Emphasis Panel/Scientific Review Group 2019/05 ZDA1 SXM-M (22) S

2019 Reviewer, PAR Panel: Fogarty Global Brain Disorders 2019/05 ZRG1 BDCN-N (55) R

2019 Reviewer, NINDS R13 review (ZNS1 SRB K17) 2019/03

2019 Reviewer, ZDA1 SXM-M 22 S, Cutting-Edge Basic Research Awards (CEBRA) (R21)

2019 Reviewer, National Science Center, Poland

2019 Reviewer, 2019/08 ZRD1 Neurobiology – B (NURB)-H (01) 1 Merit Review Subcommittee (VA)

2019 Reviewer, Special Emphasis Panel/Scientific Review Group 2019/08 ZRG1 IFCN-N (55)

2019 Reviewer, 2019/08 ZRG1 IFCN-B (07) S - Discovery & Validation of Novel Safe and Effective Pain Treatment

2019 Reviewer, Special Emphasis Panel/Scientific Review Group 2019/08 ZRG1-IDM-C-50

2019 Reviewer, 2020 NIH Director’s New Innovator Award Program

2020 Reviewer, Somatosensory and Pain Systems Study Section (SPS) 2020/05

2020 Reviewer, 2020 CTF's Drug Discovery Initiative Registered Reports (DDIRR) Program

2020 Reviewer, National Council of Science and Technology, Mexico

2020 Member, Abstract Review Committee for 2020 Annual NF Conference, Children’s Tumor Foundation

2020 Reviewer and Acting Chair, 2020/08 ZDA1 TXT-V (01) R – Step Up for Substance Use Disorders (SUD): A Drug Target Initiative for Scientists Engaged in Fundamental Research – U18 Research Demonstration – Cooperative Agreement Study Section (2020/06)

2020 Reviewer and Acting Chair, 2020/08 ZDA1 TXT-V (05) R SEP II: Step Up for Substance Use Disorders (SUD): A Drug Target Initiative for Scientists Engaged in Fundamental Research

2020 Reviewer and Acting Chair, 2020/08 ZDA1 SKM-D (06) R SEP III: Step Up for Substance Use Disorders (SUD): A Drug Target Initiative for Scientists Engaged in Fundamental Research

2020 Ad hoc Reviewer for The University of Rochester Del Monte Institute for Neuroscience

2020 Ad hoc Reviewer for the Department of Pharmaceutical Sciences, College of Pharmacy and Allied Health Professions, South Dakota State University

2020 Reviewer, 2021/01 ZDA1 SKM-D (02) S; NIDA SEP for Career Development and Education (K99/R00 and K12)

2020, 2021 Reviewer, NIH Director’s New Innovator Award Program (DP2), 2021/05 ZRG1 CVRS-A (70) S

2021 Reviewer, Gilbert Family Foundation Gene Therapy Initiative – Peer Review Panel

2021 Reviewer, Special Emphasis Panel/Scientific Review Group 2021/05 ZRG1 MDCN-C (04) M (Molecular, Cellular and Developmental Neurosciences panel)

2021 Member, Scientific Program Committee for the 2022 Annual Society meeting of the Canadian Pain Society

2021 Reviewer, NIH Director New Innovator Award Program (DP2) 2022/05 ZRG1 CVRS-B (70) S

2021-2025 Permanent Member, Neurobiology of Pain and Itch (NPI) Study Section

2021, 2022 Chair, Mechanism and Transition review panel for the FY21 Chronic Pain Management Research Program (CPMRP), Mechanism and Transition (MT)

- 2022 Chair, 2022/05 ZDA1 IXR-Q (09) R - HEAL Initiative: Novel Targets for Opioid Use Disorders and Opioid Overdose
- 2022 ZRG1 MOSS-R (70) R RFA-RM-21-025: NIH Faculty Institutional Recruitment for Sustainable Transformation (FIRST) Program – FIRST Cohort
- 2022 Reviewer, Mitacs Accelerate (Canada’s premiere research internship program)
- 2022 Mentor and Reviewer, The Interstellar Initiative (Japan Agency for Medical Research and Development and the New York Academy of Sciences)
- 2023 Reviewer, Mitacs Elevate (Canada’s premiere research internship program)
- 2022-2025 Executive Committee Member, North American Pain School
(<https://northamericanpainschool.com/about-us/>)
- 2023 Hevolution Foundation Scientific Review Panel, Riyadh, Saudi Arabia
- 2023 Alternate Chair, Neurobiology of Pain and Itch (NPI) Study Section
- 2023 Reviewer, CDMRP FY23 Neurofibromatosis Research Program (NFRP) CET-2 Panel
- 2023 Reviewer, MRC Neurosciences and Mental Health panel, UK Innovation and Research
- 2024 Reviewer, CQDM Consortium de recherche biopharmaceutique (Quebec, Canada)

Editorial/Society Memberships

- 2011-2014 Editor, *Translational Neuroscience*
- 2012- Editorial Board Member, *Journal of Pathobiology and Toxicology*
- 2012- Editorial Board Member, *the International Scholarly Research Network (ISRN)*
- 2015- Review Editor, *Frontiers in Cellular Biochemistry*
- 2015- Review Editor, *Frontiers in Cellular Neuroscience*
- 2017- Associate Editor, *BMC Neuroscience*, ‘Cell and molecular mechanisms’ section
- 2017-2023 Associate Editor, *Neuronal Signaling* (Biochemical Society, Portland Press)
- 2018- Editorial Board, *ASN Neuro*
- 2020- Review Editor, *Frontiers in Pain Research*, Cancer Pain
- 2020- Review Editor, *Frontiers in Pharmacology*, Pharmacology of Ion Channels and Channelopathies
- 2021- Associate Editor for *Frontiers in Cellular Neuroscience* (*Cellular Neurophysiology* section)
- 2021-2023 Editorial Board Member, *Cells*
- 2024 Handling Editor, *PNAS Nexus*
- 2021-2024 US Association for the Study of Pain (USASP), Chair of the Basic Science - Preclinical Special Interest Group (SIG)
- 2022- 2026 Associate Editor, *Journal of Pain* (<https://www.jpain.org/content/edboard>) 2024-2027
Member, USASP’s Communications Committee

Teaching/Mentoring

- 2017 Outstanding Undergraduate Biology Research Program (UBRP) Faculty Mentor 2016
- 2017 Honors College, UA Excellence in Mentoring Award
- 2018 College of Medicine Faculty Mentoring Award, University of Arizona
- 2018 Achievement Award 2018, Outstanding Faculty for Graduate and Professional Students, University of Arizona
- 2021 College of Medicine Faculty Mentoring Award, University of Arizona

Startups

- 2011-2017 Scientific co-founder, Sophia Therapeutics, LLC
2013-2018 Scientific co-founder, Gabriel Therapeutics, LLC
2015- Scientific co-founder and Chief Scientific Officer, Regulonix, LLC (www.regulonix.com)
2020 Scientific co-founder and Chief Scientific Officer, EleutheriaTx (www.eleutheriatx.com)
2021 Luxxon Therapeutics, LLC (Scientific co-founder with Dr. Mohab Ibrahim)

Leadership

- 2017 UA Academic Leadership Institute Fellow (<http://ali.arizona.edu/fellows/2018>)
2020 Senior Member of the National Academy of Inventors <https://uanews.arizona.edu/story/four-uarizona-researchers-named-senior-members-nationalacademy-inventors>
<https://www.wildcat.arizona.edu/article/2020/02/n-professor-inventors>

SERVICE/OUTREACH

NATIONAL/INTERNATIONAL

2009- Reviewer for *125+ journals*:

ACS Chemical Neuroscience; ACS Food Science & Technology; ACS Nano; ACS Omega; ACS Pharmacology & Translational Science; Acta Pharmaceutica Sinica B; Acta Physiologica; Addiction Biology; Advanced Science; Aging; AIMS Neuroscience; Anesthesiology; Annals of Neurology; Antiviral Research; Artificial Cells; Archiv der Pharmazie; ASN Neuro; BBA - Molecular Basis of Disease; BBA Molecular Cell Research; Behavioral Brain Research; Biochemical Journal; Biochemical Pharmacology; Biomedicine & Pharmacotherapy; Bioorganic & Medicinal Chemistry; Blood Substitutes, and Biotechnology; BMC Neuroscience; Brain Behavior and Immunity; Brain Research; FASEB Journal; Cancer Research; Cell Reports; Cell Reports Medicine; Cellular and Molecular Neurobiology; Cellular and Molecular Neuroscience; Cellular Physiology and Biochemistry; Channels; ChemMedChem; Clinical and Translational Medicine; Communications Biology; Communications Medicine; Computational and Structural Biotechnology Journal; Current Biology; Current Molecular Pharmacology; eLife; European Journal of Cell Biology; European Journal of Neurology; European Journal of Pain; European Journal of Pharmacology; European Neuropsychopharmacology; Experimental Biology and Medicine; Experimental Brain Research; Experimental Neurology; Frontiers in Cellular Biochemistry; Frontiers in Cellular Neuroscience; Frontiers in Cellular Neuroscience; Frontiers in Molecular Biosciences; Function; Future Medicinal Chemistry; Future Virology; Heliyon; IBRO Neuroscience Reports; iScience; International Journal of Molecular Sciences; Journal of Alzheimer's Disease; Journal of Autoimmunity; Journal of Clinical Investigation; Journal of Clinical Investigation Insight; Journal of Basic and Clinical Physiology and Pharmacology; Journal of Cell Science; Journal of Investigative Dermatology; Journal of International Medical Research; Journal of Medicinal Chemistry; Journal of Molecular Liquids; Journal of Molecular Neuroscience; Journal of Neuroscience; Journal of Neuroscience Research; Journal of Pain Research; Journal of Pain; Journal of Physiology; Journal of the American Chemical Society; Life Sciences; Marine Drugs; Molecular Medicine; Molecular Neurobiology; Molecular Pain; Molecular Psychiatry; Molecular Therapy; Muscle and Nerve; Nature Chemical Biology; Nature Communications; Neural Plasticity; Neural Regeneration Research; Neurochemistry International; Neuropsychopharmacology; Neuroscience; Neuroscience Letters; Neurotherapeutics; Neurotoxicity Research; Oncogene; Pain; Peptides; Pharmaceutical Nanotechnology; Pharmacological Reports; Physiology; Phytomedicine; Planta Medica; PloS One; Proceedings of the National Academy of Sciences; Psychoneuroendocrinology; Progress in Neuropsychopharmacology & Biological Psychiatry; Protein Expression and Purification; Research in Veterinary Science; Reviews in the Neurosciences Science Advances; Seminars in Cell and

Developmental Biology; Science Advances; Science Signaling; Science Translational Medicine; The International Journal of Biochemistry & Cell Biology; Theranostics; Tissue and Cell; Translational Research; Trends in Pharmacological Sciences.

- 2009 Reviewer, Indiana State Department of Health Spinal Cord and Brain Injury Research Fund competition
- 2011- Member, National Scientific Advisory Council, American Federation of Aging Research
- 2011 Scientist Reviewer, 2011 Neurofibromatosis Research Program (NFRP), Congressionally Directed Medical Research Programs (CDMRP)
- 2012 Reviewer, Medical Research Council, United Kingdom, “Neurosciences and Mental Health” study section
- 2013 Reviewer, Biotechnology and Biological Sciences Research Council, United Kingdom
- 2013 Reviewer, National Institute of Academic Anesthesia (NIAA) e-grants, British Journal of Anesthesia, Great Britain, and Ireland
- 2013 Reviewer, Research Support Funds Grant, IUPUI Office of the Vice Chancellor for Research
- 2013 External reviewer, Promotion and Tenure Committees at Simon Fraser University, Burnaby, British Columbia, Canada; University of California, San Diego, CA; Medical College of Wisconsin, Madison, WI
- 2014 Reviewer, National Research Foundation of Korea - Global Research Network Program
- 2014 Reviewer, Natural Sciences and Engineering Research Council of Canada (NSERC)
- 2016 Reviewer, Neurological Foundation of New Zealand
- 2016 Reviewer, Italian Ministry of Health, Brain Disorders and Clinical Neuroscience Study Section
- 2017 Reviewer, Fondazione Cariplo – private philanthropic organization funding Biomedical Research
- 2017 Reviewer, Italian Medicines Agency (AIFA), Italian Ministry of Health
- 2018 Reviewer, Netherlands Organization for Scientific Research (NWO), Earth and Life sciences division
- 2020 Reviewer, 2020 CTF's Drug Discovery Initiative Registered Reports program
- 2020 Reviewer, Italian Multiple Sclerosis Society
- 2020 Reviewer, Italian Ministry of Health (MOH) Applied Clinical and Biomedical Research Study Section
- 2021 Reviewer, Medical Research Council, United Kingdom
- 2021- External Assessor/Reviewer, Promotion and Tenure Committees for Associate/Full:
- Department of Molecular Biomedical Sciences, NC State Veterinary Medicine
 - Department of Anesthesiology at the University of California, San Diego
 - Pharmacology & Therapeutics, School of Medicine National University of Ireland Galway
 - Department of Pharmacy Practice and Pharmaceutical Sciences, University of Minnesota
 - Department of Neuroscience, Carleton University, Ottawa, Canada
 - Department of Endodontics, School of Dentistry, University of Texas Health Science Center at San Antonio, San Antonio, TX
 - Drug Discovery Biology, Monash University Faculty of Pharmacy and Pharmaceutical Sciences, Australia
 - Department of Anesthesiology, Pain and Perioperative Medicine at the University of Kansas School of Medicine
 - Department of Anesthesia, Division of Pain Management, Cincinnati Children's Hospital Medical Center
- 2022 Reviewer, Medical Research Council, United Kingdom
- 2022 Reviewer, Peer Reviewed Medical Research Program (PRMRP) Pain Management panel (DIS-PM) for the Department of Defense (DOD) Congressionally Directed Medical Research Programs (CDMRP)
- 2022 HEAL Initiative Brainstorming Session (IASP, Toronto, Canada)
- 2023-2026 Member, Scientific Program Committee (SPC) for the U.S. Association for the Study of Pain (USASP)

- 2023 Reviewer, United Arab Emirates University Research Grants, United Arab Emirates
- 2024 Member, Researcher Planning Committee, 5th Annual NIH HEAL Initiative Scientific Meeting (Bethesda, MD)

DEPARTMENTAL

- 2007-2009 Co-chair, Stark Neurosciences Research Institute Seminar Series Committee, Indiana University School of Medicine
- 2009-2013 Chair, Stark Neurosciences Research Institute Seminar Series Committee, Indiana University School of Medicine
- 2009-2013 Member, Stark Neurosciences Research Institute Confocal Users Instruction and Oversight Committee, Indiana University School of Medicine
- 2014-2021 Graduate Student Committees: Razaz Felemban, Yue Wang, Alex Sandweiss, Karissa E. Cottier, Ashley Symons, Erik Dustrude, Sarah Wilson, Joel Brittain, Aubin Moutal, Omotore Eruvwetere, Andrew Piekarz, Weihua Song, Jason Robarge, Melissa Walker, Polina Feldman, Lingxiao Deng, Zifan Pei, Yohance M. Allette, Rania Sulaiman, Kathryn Ibbotson, Rakesh Kumar, Jessica J Pellman, Wazir Ezedine Abdullahi
- 2015 Chair, Department of Pharmacology Search Committee for Tenure-track Professor, College of Medicine, University of Arizona
- 2017-2020 Promotions and Tenure Committee, Department of Pharmacology
- 2018-2020 Space Committee, Department of Pharmacology
- 2019 Faculty Annual Review Committee, Department of Pharmacology
- 2019-2021 Chair, Promotions and Tenure Committee, Department of Pharmacology
- 2021 Member, Pharmacology Graduate Program Committee
- 2022-2023 Chair, NYU Pain Research Center Faculty Search Committee
- 2024-2026 Coach, RO1 Boot Camp, College of Medicine, University of Florida

COLLEGE

- 2014-2019 MD Admissions committee (Chair, Sub-committee E since 2015 and Chair of full committee 2018)
- 2014-2016 University of Arizona College of Medicine Innovative Research Committee for Creating Drug Discovery Team for Neurological Disease
- 2015-2017 Chair, MD/PhD Admissions Committee
- 2015-2017 Chair, Medical Student Research Program (MSRP); Students hosted: Marissa Posada, Edwin Telemi
- 2017 Distinguished Faculty Mentor, New Faculty Mentoring Program
(<https://uatwork.arizona.edu/lqp/new-mentoring-program-supports-junior-faculty>)
- 2018 COM Scholarship Committee - Class of 2023 Recruitment Scholarship Committee
- 2018-2020 Member, College of Medicine Dean's Research Council
- 2019 Advisory Team for UAHS Strategic Plan initiative 2.3 "*Substance Misuse and Addiction*"
- 2020 Member, EMSR (Experimental mouse shared resources) Oversight Committee
- 2020 Member, British Postgraduate Scholarship (Marshall Scholarship, Mitchell Scholarship, and Rhodes Scholarship) Interview Committee
- 2020 Reviewer, Cancer Center Shared Resource renewal grant, University of Arizona Cancer Center
- 2021 Reviewer, Accelerating Innovations into CarE (AICE) - Concepts Program (Alberta, Canada)
- 2021 Reviewer, Arizona Biomedical Research Centre Research Grants
- 2021 Voted Member, 5-Year Administrative Review Member of Chair of Department of Cellular and Molecular Medicine, College of Medicine, Tucson

UNIVERSITY

- 2014 Interviewer, Neuroscience GIDP Admissions Committee
- 2014- Interviewer, Arizona Biological and Biomedical Sciences Program (ABBS) program
- 2015- Graduate Student Committees: Kathryn Ibbotson, Wazir Ezedine Abdullahi
- 2014 Mentor, Undergraduate Biology Research Program
- 2014 Undergraduate Biology Research Program (UBRP) Admissions Committee
- 2015 Grant Reviewer, Arizona Cancer Center review Committee for The Director's Challenge for Therapeutic Development Award
- 2016 Panelist, Idea-to-Asset Seminar, Tech Launch Arizona
- 2016 Member, Molecular and Nanotechnology Imaging Theranostics Committee
- 2016 Reviewer, Brain Research Foundation Scientific Innovation Award Program, Office for Research & Discovery
- 2016 Panel Member, Search Committee for Research Development Associate, Office of Research and Discovery
- 2017 Neuroscience GIDP Seminar Committee
- 2018 UA Global Health Competition Team Mentor
- 2018 Mentoring Facilitator for Mentoring Societies, University of Arizona, College of Medicine
- 2023 Member, Conflicts of Interest Advisory Committee (COIAC), New York University
- 2024- Member, Regulatory Science Working Group, University of Florida

TEACHING

- 2014-2022 PHCL 553; Course Director from 2015-
- 2014-2022 PHCL 601A; Lecturer
- 2014-2019 NRSC 588; Lecturer
- 2014-2018 CBI, Neuro System Block, AZMed Facilitator
- 2023 Lecturer, "How to Make a Drug (PSLG6003)" Columbia University -
Drug development for pain: So, you think you can target NaV1.7?
- 2024 Convergence Science in Pain Research BME6938; Mechanisms of Chronic Pain:
Opportunities for Novel Therapeutics

Individual Student Contact

Advising (High School)

- 2014-2017 Nicole Robles, Michelle Murrieta, Denise Salas Villa, Nicholas Borrea, Paige Nye, Sabrina Hirshorn

Advising/Mentoring (Undergraduate)

- 2014-2015 Anshula Prasad, Yaqi Ran, Hyeonu Oh
- 2014-2015 Isabel Nicole Angeles, Daniel Carlson (Undergraduate Biology Research Program)
- 2014-2016 Denise Salas Villa (Undergraduate Biology Research Program)
- 2015-2016 Seeneen Meroueh, Morgan Postal, Jake Lund Bantlin, Molly Mercedes Ryan, Deziree Coleman
- 2016 Shaely Ann Jackson
- 2014-2018 Lindsey Anne Chew (Undergraduate Biology Research Program)
- 2015-2019 Shreya Bellampalli (Undergraduate Biology Research Program), Ahmed F. Al-Shamari (Summer Institute for Medical Ignorance)

2016-2019	Angie Dorame (Summer Institute for Medical Ignorance), Meagan Kai-May Yu
2017-2019	Ann Mary Thomas, Grace Ann Montfort, Iori Kanazawa, CJ Shekhinah Ryan, Nancy Yen Ngan Pham, Pooja Gunnala, Yezan Hassan, Maria Fernanda Cruz, Aspen Johnston, Rohan Mittal, Jinette Sun Park, Angie Dorame, Misha Raheel Chaudhary, Tori Danielle Gammel, Bianca Faye Vianson, Alyssa Esther Cordova (TRiO Arizona's Science, Engineering, and Math Scholars program (ASEMS)), Ceci Kimball, Kari Joy Thomas, Sarah Melissa Bedor, Elizabeth Anne Dolbeck
2018-2020	Tissiana Gabriela menna Vallecillo (Flinn Scholar), Laasya Vallabhaeni (Flinn Scholar), Rahul Jayaraman (Flinn Scholar), Diana Meijers (BLAISER), Joseph Baca (BLAISER), Haley Alexander Kenner (UBRP)
2020-2022	Kyleigh Ann Masterson, Kyle Andrew Goveia, Roberto Avila-Valenzuela (BLAISER), Auditi Bhowmick, Veronica Neriah Bausher (BLAISER), Jared Fischer (NIH High School and Undergraduate Student Research Program), Omar Alsbiei
2022-	Margarita Joa (NYU Biology, College of Arts and Sciences) – Dean's Undergraduate Research Fund, Fall 2023 Roger Chavez (REOHS)
2023	Radhika Pai (Rutgers University, New Brunswick, New Jersey)
2024	Momoka Nakashita (2024 ASPET Summer Undergraduate Research Fellow) Caroline Eggers Noami Grabus

Mentoring (Medical School)

2015	Marissa Posada
2015	Edwin Telemi
2017	Alex Urzua

Mentoring (Junior Faculty)

2014-2020	May Khanna (Pharmacology, University of Arizona)
2015-2020	Amol Patwardhan (Anesthesiology, University of Arizona)
2015-2021	Mohab Ibrahim (Anesthesiology, University of Arizona)
2018-2022	Asmaa Abu-Maziad (Assistant Professor of Pediatrics, University of Arizona)
2018-2022	Andreia Zago Chignalia (Anesthesiology, University of Arizona)
2018-2020	Rebecca Vanderpool (Assistant Professor of Medicine, University of Arizona)
2018-2020	Joao Luis Carvalho De Souza (Anesthesiology, University of Arizona)
2019-2021	Arturo Andrade (University of New Hampshire)
2020-2021	Salma Imran Patel (Assistant Professor of Medicine, Associate Program Director, Sleep Medicine Fellowship, Division of Pulmonary, Allergy, Critical Care & Sleep Medicine, University of Arizona)
2022-2023	Aditi Bhattacharya (Assistant Professor, Department of Molecular Pathobiology, College of Dentistry, New York University)

Independent Studies

2014-2015	Isabel Nicole Angeles, Yaqi Ran, Daniel Carlson, Hyeonu Oh
2015-2016	Ahmed F. Al-Shamari, Lindsey Anne Chew
2015	Deziree Coleman
2016-2018	Angie Dorame, Meagan Kai-May Yu, Jinette Sun Park
2017-2019	Yezan Hassan, Rohan Mittal, Nancy Yen Ngan Pham
2022-2023	Margarita Joa

Rotations Directed

2014	Yue Wang, Karissa Cottier, Lusine Gomtsian
2015	Wazir Ezedine Abdullahi, Yuanzhang Yang, Samer Masri
2018	Sarakai Vi
2024	Lewis S. Alexander, Alexander Bartkowiak

Dissertations Directed

2012-2016	Joel M. Brittain (PhD graduate)
2014-2018	Sarah Wilson (PhD graduate)
2015-2018	Erik Dustrude (PhD Graduate)
2015	Yue Wang (MSc Graduate)
2018-2022	Lisa Boinon (PhD graduate)
2019-2022	Harrison Stratton (PhD graduate)
2023	Ana Mara Islas Espinoza (visiting PhD student, Pharmacobiology Department, Cinvestav, Mexico)

Postdoctoral Fellows

2012-2013	Andrew Piekarz
2012-2013	Michael R. Due
2014	Ohannes K. Melemedjian
2014-2016	Yuying Wang
2015	Lian Wang
2016-2017	Wennan Li
2014-2016	Liberty-Francois Moutal
2014-2018	Aubin Moutal
2016-2020	Song Cai
2017-2019	Jie Yu
2017-2021	Samantha Perez-Miller
2018- 2019	Aude Chefdeville
2018-2020	Yuan Zhou
2019-2021	Dongzhi Ran
2020-present	Kimberly Gomez
2020-2021	Qiuyan Wang
2021-2022	Olukiran Olaoluwa Sesan
2021-2023	Paz Duran
2021-present	Santiago I. Loya-Lopez
2021-present	Aida Calderón-Rivera
2020-2022	Cheng Tang
2022-present	Heather Noel Allen
	NINDS F32NS128392 - <i>Neuropeptide Y1 Receptor-Expressing Neurons in the Lateral Parabrachial Nucleus in Neuropathic Pain</i> (\$208,743; 06/09/2023-09/30/2023)
2022-present	Tyler S. Nelson – American Neuromuscular Foundation Development Grant - <i>Analysis of a Novel Primary Periodic Paralysis SCN4A Mutation with Pain as a Major Phenotype</i> (\$100,00; 7/12/2023 to 6/30/2025)

NINDS K00NS124190 - *Dissecting the Parabrachial Nucleus's Role in the Development and Maintenance of Neuropathic Pain* (\$345,512; 1/7/2023 – 1/6/2027)

2022-2023	Hanuma Kumar Karnati
2023-present	Erick J. Rodríguez-Palma
2023	Sara Hestehave Kristensen (currently Assistant Professor in Translational Medicine, University of Copenhagen, Denmark)
2023	Elisa Damo

Research Assistant Professors

2018-2021	Aubin Moutal (currently Assistant Professor, Saint Louis School of Medicine)
2022-	Samantha Perez-Miller

Thesis Committees

2014-2020	Oscar Mendez (UA) Justin LaVigne (UA) Yanxia Chen (UA) Alex Sandweiss (UA) Kathryn Ibbotson (UA) Melissa Walker (IUSM) Zifan Pei (IUSM)
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Dissertation Committees

2014-	Ashley Michele Liguori Melissa Walker (IUSM) Zifan Pei (UA) Alex Sandweiss (UA) Kelsey Nation (UA) Justin LaVigne (UA) Oscar Mendez (UA) Yanxia Chen (UA) Harrison J Stratton (UA) Lisa Boinon (UA) Amelia A Bunnell (UF) Jessica Reinhardt (UF)
2023	Arden Darko-Boateng, External examiner - Ph.D. defense committee, Department of Molecular Pharmacology and Therapeutics, Columbia University, New York, NY, USA

Doctoral Dissertations examined (outside of United States)

- 2012 Rakesh Kumar, A comparative study of the effect of Loperamide and Morphine on nociception and expression of μ -opioid receptor and calcium channels in spinal cord of the rat following surgery (All India Institute of Medical Sciences, India)
- 2019 Arun Kumar Verma, Structural insight of r(CG) motif and small molecule-based therapeutics development for the expanded CG repeats RNA associated neurological disorders (Biosciences & Biomedical Engineering Indian Institute of Technology Indore, India)

2019	Evaluation of the activity of hydrogen sulfide in a rodent model of chemotherapy-induced neuropathic pain (Department of Pharmacology and Therapeutics, Faculty of Pharmacy, Kuwait University)
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- 2020 Gabriella MacDougall, Investigations into the Neuroprotective Mechanisms of Poly-Arginine Peptides (School of Health Sciences, University of Notre Dame, Australia)
- 2021 Zakaria El-Hashim Ahmed, The role of central adenosine A1 receptors in modulating enhanced cough (Department of Pharmacology and Therapeutics, Faculty of Pharmacy, Kuwait University)
- 2023 Alia Kazim Rizvi Syeda, TRPML1 in Autophagy and Neuromuscular Diseases (Department of Physiology and Biophysics, Dalhousie University, Halifax, Nova Scotia, Canada)
- 2024 Theresa Ho Tam (Michael Salter Lab), Sex-Specific Role of Beclin 1 in Pathological Pain Hypersensitivity (Department of Physiology, University of Toronto, Toronto, Ontario, Canada)
- 2024 Kevin Lister (Arkady Khoutorsky and Jeffrey Mogil Labs), Spinal Cell-Type-Specific Translational Control Mechanisms in the Development and Maintenance of Chronic Pain (Department of Anesthesia, McGill University, Montreal, Canada)



PUBLICATIONS (ORCID #: 0000-0002-9066-2969)

Symbols: ^a, based on work as a graduate student; * or #, corresponding author; @, co-first author

1. ^a**Khanna R.**, Chang M.C., Joiner W.J., Kaczmarek L.K., Schlichter L.C. hSK4/hIK1, a calmodulin-binding KCa channel in human T lymphocytes. Roles in proliferation and volume regulation. *J. Biol. Chem.* 1999; 274:14838-14849. PMID: 10329683.
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- **highlighted on the Pain Research Forum:** (<http://www.painresearchforum.org/news/7026-curbing-calcium-channel>) - a joint project of the Harvard NeuroDiscovery Center and MassGeneral Institute for Neurodegenerative Disease Informatics.
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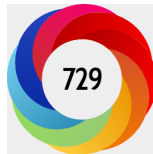
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[Science X, 10/4/20](#)
KNAU Arizona Public Radio: <https://www.kнау.org/post/arizona-study-coronavirus-infection-relieves-painrodents>
<https://www.telemundoarizona.com/noticias/local/uarizona-y-su-combate-al-covid-19/2101856/>
The novel coronavirus may inadvertently function as a pain reliever, study suggests: [FOX NEWS, 10/8/20](#)
[KOLD-TV, 10/8/20](#)
[Daily Mail \(Uk\), 10/9/20](#)
[International Business Times \(Uk\), 10/12/20](#)
[The Times Of India, 10/10/20](#)
[Al Khaleej Today, 10/10/20](#)
[Biospace, 10/9/20](#)
[Corn Nation \(Nebraska Football Blog\), 10/12/20](#) Quirks
and Quarks, CBC Podcast cbc.ca/1.5763913.
<https://m.mid-day.com/articles/indian-doctor-at-the-university-of-arizona-makes-a-link-between-covid-19-andpain-relief/23046285>
<https://briancrombie.com/podcasts-the-brian-crombie-hour/> @sauga960am on the Brian Crombie radio hour from Toronto, Ontario, Canada
<https://www.rediff.com/news/interview/what-you-must-know-about-covid-19/20201201.htm>
[HTTPS://WWW.REDIFF.COM/NEWS/INTERVIEW/CORONAVIRUS-HOW-WE-CAN-DEFEAT-COVID19/20201203.HTM](https://WWW.REDIFF.COM/NEWS/INTERVIEW/CORONAVIRUS-HOW-WE-CAN-DEFEAT-COVID19/20201203.HTM)
- 2020 FLEXcast podcast with host Dr. Allie Min - Mentorship and Faculty Development
<https://facultyaffairs.medicine.arizona.edu/faculty-resources/career-development/flexcast>
<https://podcasts.apple.com/us/podcast/flexcast-the-faculty-learning-exchange/id1512737003>
- 2020 This Week in Virology, episode #674 (podcast): Spike protein induces [analgesia](#) (Pain) 1:05:51
https://hwcdn.libsyn.com/p/2/6/8/2684fcdda32cedc1/TWiV674.mp3?c_id=86574722&cs_id=86574722&expiration=1604601177&hwt=48d4669807230af77a5201b13676570b
- 2020 AZPM National Public Radio: Science Fridays with Leslie Tolbert (How COVID-19 spreads by affecting our sensitivity to pain) <https://radio.azpm.org/p/radio-azscience/2020/11/6/183567-episode-257-how-covid-19spreads-by-affecting-our-sensitivity-to-pain/>
- 2021 Interviewed by Kathy Ritchie, KJZZ-FM for a Nature article (<https://www.nature.com/articles/s41586-021-03553-9>) regarding physicians prescribing opioids to COVID-19 long haulers

- 2022 Interviewed by Shaun Sim, Crain's New York (business publication) for launch of the NYU Pain Research Center
https://www.craigslist.com/health-pulse/providers-say-healthfirst-left-claims-unpaid-then-dropped-themnetwork?utm_source=health-pulse-tuesday&utm_medium=email&utm_campaign=20220114&utm_content=hero-headline
- 2022 Pain Research Forum (PRF) podcast interview with Joe Lesnak, PRF correspondent - Pain Research Forum highlighted - The Last of the "Unplucked" Gems: Targeting Nav1.7 for Chronic Pain
<https://www.painresearchforum.org/news/204620-last-%e2%80%9cunplucked%e2%80%9d-gems-targetingnav17-chronic-pain>
- 2023 NYU Pain Research Center Inaugural Symposium <https://dental.nyu.edu/aboutus/news/articles/420.html>
- 2023 Global health nexus > Nexus 2023: dentistry's leadership landscape
<https://dental.nyu.edu/aboutus/news/nexus/2023/a-conversation-with-rajesh-khanna.html>
- 2023 Causes or Cures Podcast: <https://podcasts.apple.com/us/podcast/gene-therapy-for-chronic-pain-research-onpotential/id1455413855?i=1000631361863>
- 2024 Tech Tuesday – UF Innovate: https://www.youtube.com/watch?V=9ffd1r06srs;HTTPS://WWW.LINKEDIN.COM/POSTS/UF-INNOVATE_TECHTUESDAY-TECHTUESDAYTECHTUESDAY-ACTIVITY-7216803395934842881-9JAB?UTM_SOURCE=SHARE&UTM_MEDIUM=MEMBER_DESKTOP
- 2024 <HTTPS://WWW.SCIENTIFICAMERICAN.COM/ARTICLE/NEW-PAIN-MEDICATION-SUZETRIGINE-PREVENTS-PAIN-SIGNALS-FROM-REACHING-BRAIN/> scientific American 2024
<https://www.sciencenews.org/article/next-gen-drug-chronic-pain-alternative>

PATENTS AWARDED

United States Patent 9,018,1732003

US9018173B2 CA 2802207 EP2580233B1 <https://patents.google.com/patent/us9018173> Materials and methods for suppressing inflammatory and neuropathic pain. Granted 2013-08-15

US9782491B2 <https://patents.google.com/patent/us9782491> Peptide conjugates for treating pain. Granted 2017-10-10

US10287334 <https://patents.google.com/patent/us10287334b2> Non-narcotic CRMP2 peptides targeting sodium channels for chronic pain. Granted 2019-05-23

US10441586 <https://patents.google.com/patent/us10441586b2> CRMP2 SUMOylation inhibitors and uses thereof. Granted 2019-10-15

US10857382B2 Composition and Methods for treating and preventing Chronic Pain. Granted 2020-12-06

US2023/0365544A1 Small molecule inhibitors of calcium channel activity and uses thereof. Granted 2023-11-16

DISCLOSURES/PATENTS SUBMITTED

2006 Disclosure of invention: "Fractional recovery analysis of protein complexes" a method to derive the sequence of proteins in a solubilized multiprotein complex to the technology development and commercialization office, university health network, the University of Toronto, Toronto, Ontario, Canada.

2009 Disclosure of invention: "Transmission Regulatory Peptides (TRAPs) that interfere with CRMP-2:Cav2.2 interactions: tools for studies of synaptic function and potential targets for synaptopathies" (10033) to the office of technology transfer, Indiana University. 61/353,373;61/454,436; PCT/US2011/040100; 9,018,173; 2011279703;2,802,207; 201180038945.7; 2580233; 10895/DELNP/2012; 14/680,880; 2580233; 2580233;2580233

2011 PCT/US11/40100 materials and methods for suppressing inflammation and neuropathic pain.

2012 UA provisional patent application No. 61/588,831. Compounds, composition, and methods for treating neuropathic pain.

- 2012 US provisional patent application 29920-220647: compounds and methods for the prophylactic treatment of epilepsy.
- 2012 Disclosure of invention: Neurological aryl unit (NAU): a structural entity or pharmacophore unit for the control of neuronal hyperexcitability disorders (filed by Rajesh Khanna, IUSM and Harold Kohn, University of North Carolina)
- 2012 Disclosure of invention: functional recovery following traumatic brain injury by sparing motoneuron dendrites from atrophy with a novel peptide therapeutic (12174 IURTC)
- 2012 Peptides conjugates for treating CRMP2-calcium channel mediated pain, U.S. provisional patent application no. 61/655,380
- 2014 Disclosure of invention: CRMP2 SUMOylation motif (CSM) peptide: a novel non-narcotic peptide affecting sodium channel trafficking for chronic pain (Rajesh Khanna and co-inventors May Khanna, Todd W. Vanderah, and Erik T. Dustrude) UA-100; US provisional patent application no. 61/949,456 http://inventions.arizona.edu/technologies/ua14-100_a-non-narcotic-analgesic-peptide-forchronic-pain
- 2015 US Provisional Patent Application no. 62/238,182. SUMOylation inhibitors of Nav1.7 and their uses
- 2016 Disclosure of invention: inhibitors of voltage-gated calcium channel alpha-beta interactions: novel antiallodynic compounds (Rajesh Khanna, Vijay Gokhale, and May Khanna) UA16-139
- 2016 Disclosure of invention: Small molecule allosteric antagonists of Cav2.2 calcium channels and uses thereof (Rajesh Khanna and Vijay Gokhale) UA16-145/US provisional patent application No. 62/314,055
- 2016 Disclosure of invention: Using light to create an animal migraine and pain model (Mohab M. Ibrahim and Rajesh) UA16-212
- 2016 U.S. Provisional Patent Application No. 62/506,303; CRMP2 SUMOylation: a novel biomarker for pain (Rajesh Khanna, May Khanna, and Aubin Moutal) UA17-019
- 2017 Methods and compositions for inhibiting SUMOylation of proteins (Rajesh Khanna, May Khanna, and Vijay Gokhale) UA17-182
- 2017 U.S. Provisional Patent Application No. 62/506,298; Small Molecule Antagonists of SUMO Related Modification of CRMP2 And Uses Thereof (May Khanna, Ph.D.; Rajesh Khanna, Ph.D.; Vijay Gokhale, Ph.D.; and Reena Chawla, Ph.D.) UA17-089
- Top Stories in 2017 at the UA Health Sciences: <https://arizona.us2.list-manage.com/track/click?u=b102b4587403905186d245edb&id=5f1c97b30b&e=edc6bfd5ed>**
- 2017 Allosteric antagonism of calcium channels with small molecules for relief of neuropathic pain (Rajesh Khanna and Vijay Gokhale) UA17-249
- 2017 Discovery of T-type Calcium Channel Antagonists from Multicomponent Reactions and Their Application in Paclitaxel-induced Peripheral Neuropathy (Jun Wang and Rajesh Khanna) UA18-028
- 2017 Peptides that modulate the effect of the CRMP2: neurofibromin complex on synaptic transmission; PCT/US2016/024266 (WO 2016/154559 A1)
- 2017 Patent US 9,782,491 B2 issued Oct 10, 2017 – Peptide conjugates for treating pain (PCT/US2013/043977 filed Jun 4, 2013)
- 2017 U.S. Patent Application No.: 16/306,797; U.S. Nat'l Entry of PCT/US2017/035577 COMPOSITIONS AND METHODS FOR TREATING AND PREVENTING CHRONIC PAIN (Int'l Filing Date: 02-Jun2017) UA16-154
- 2018 Patent 2015226911 Australia (issued June 14, 2018; expires March 6, 2035)
- 2018 16/306,797 (UA16-154): COMPOSITIONS AND METHODS FOR TREATING AND PREVENTING CHRONIC PAIN (Filing date 03-Dec-2018)
- 2019 New Zealand Patent No. 742038; NZ National Entry of PCT/US2016/056051 (Int'l Filing Date: 07-Oct2016)

- 2020 UA Ref. No: UA20-171, UNIA 20.10 Provisional Patent Application: THE T-TYPE CALCIUM CHANNEL ENHANCER SAK3 IMPROVES BEHAVIORAL AND MOTOR DEFECTS ASSOCIATED WITH TAF1 GENE EDITING (filed by Mark Nelson, Rajesh Khanna, Janakiraman Udaiyappan, and Dhanalakshmi Chinnasamy)
- 2020 UAZ-38427.101 Provisional Patent Application: SMALL MOLECULE INHIBITORS OF CaV3.2 ACTIVITY AND USES THEREOF (Jun Wang and Rajesh Khanna)
- 2020 UA21-038: Method of blocking NRP-1 for pain cancer and viral entry (Rajesh Khanna, Aubin Moutal, and Samantha Perez-Miller)
- 2020 UA21-096: Zinc finger protein transcription factors for repression of pain genes (Rajesh Khanna, Aubin Moutal, Casey Case and Manal Mehta) Provisional application 63/134,274 filed January 6, 2021
- 2021 UA-21-165: Inhibitors of CRMP2 phosphorylation for pain relief (Rajesh Khanna, Aubin Moutal, and Samantha Perez-Miller)
- 2021 UA21-167: Treatment of craniofacial pain disorders (Frank Porreca, Edita Navratilova, Aubin Moutal, and Rajesh Khanna) UNIA 21.08 PROV
- 2021 UA18-028 Application Filed - International Patent Application No. PCT/US2021/031964; CJ Ref. No: UAZ-38427.601 SMALL MOLECULE INHIBITORS OF CaV3.2 ACTIVITY AND USES THEREOF (Jun Wang and Rajesh Khanna)
- 2022 A Novel Pan-T-Type Calcium Channel Modulator that alleviates Tonic, Neuropathic and Inflammatory Pain; Disclosure UA22-113 (Jun Wang and Rajesh Khanna)
- 2022 Japanese Patent No. 7092776 SMALL MOLECULE ANTAGONISTS OF SUMO RELATED MODIFICATION OF CRMP2 AND USES THEREOF (May Khanna, Ph.D.; Rajesh Khanna, Ph.D.; Vijay Gokhale, Ph.D.; and Reena Chawla, Ph.D.)
- 2023 Provisional Application No.: 18/186,060 Devices and systems for treating pain based on light therapy (Mohab Ibrahim and Rajesh Khanna; filed on 2023-03-17)
- 2023 Provisional Application No.: 63/495,159 SMALL MOLECULE MODULATORS FOR THE VOLTAGEGATED SODIUM CHANNEL 1.7 (NaV1.7) AND THEIR THERAPEUTIC APPLICATIONS (Rajesh Khanna, Ganesha Rai Bantukallu, Shyh-Ming Yang, Xin Hu, Se In Son, Natalia Martinez, Oscar Cheng, Mathew D Hall, Samantha Perez-Miller and Marcel Patek)
- 2023 Provisional Application No. 63/524,386; SELECTIVE PEPTIDOMIMETIC MODULATORS OF CAV2.2 (N-TYPE) VOLTAGE-GATED CALCIUM CHANNELS AND USES THEREOF (Rajesh Khanna and Carlos J. Camacho; filed on June 30, 2023) TP Ref. 243735.000259; NYU Ref. P.KHA0301PRO
- 2023 Provisional Application NIH Ref. E-246-2023, CC Ref. NIH0163US; Inhibitors of the Surface EXPRESSION OF THE VOLTAGE-GATED SODIUM ION CHANNEL 1.7 (NAV1.7) AND THEIR THERAPEUTIC USES. Ganesha Bantukallu, Shyh-Ming Yang, Xin Hu, Se In Son, Rajesh Khanna, Kwong Tai Cheng, Natalia Martinez, Samantha Perez-Miller, Marcel Patek, Matthew Hall
- 2023 UA 21-038 371; U.S. Patent Application No. 18/253,891 “Compositions and Methods For Blocking Neuropilin Receptor 1 for the Treatment of Pain and Prevention of Viral Entry” (Rajesh Khanna, Aubin Moutal and Samantha Perez-Miller)
- 2024 U.S. Application No. 18/758,804 (Based on Provisional Application No. 63/524,386) SELECTIVE PEPTIDOMIMETIC MODULATORS OF CAV2.2 (N-TYPE) VOLTAGE-GATED CALCIUM CHANNELS AND USES THEREOF (Inventors: Rajesh Khanna and Carlos J. Camacho)
- 2024 U.S. Application No. 63/642,360 New treatment for Pain. (Inventors: Mingji Dai and Rajesh Khanna)

SCHOLARLY PRESENTATIONS

Seminars

- 2002 Trafficking of voltage-gated K⁺ channels, Universidad de Metropolitana, San Juan, Puerto Rico (Invited)
- 2003 Quality control of potassium channel biogenesis, Institut de Pharmacologie et de Toxicologie, Universite de Lausanne, Lausanne, Switzerland (Invited ; host Dr. Olivier Staub)
- 2007 Ion channel trafficking: from molecule to malady, Brock University, St. Catharines, Ontario, Canada (Invited)
- 2007 Ion channel trafficking: from molecule to malady, Medical College of Wisconsin, Wisconsin, Madison (Invited)
- 2008 The calcium channel interactome: a new tree emerges in the woods, Neuroscience Retreat at Bradford Woods — Martinsville, Indiana, IUPUI/IUB (Invited)
- 2009 The calcium channel acquires a new synaptic partner in the transmitter release chronicles, Institute of Psychiatric Research, Department of Psychiatry, Indiana University School of Medicine, Indianapolis, Indiana (Invited)
- 2009 The presynaptic calcium channel interactome, Indiana University Purdue University Fort Wayne (IPFW), Department of Chemistry Fort Wayne, Indiana (Invited)
- 2009 Exploiting Ca²⁺ channel protein-protein interactions for development of therapeutics for pain and neuroprotection, Department of Biochemistry and Molecular Biology, Indiana University School of Medicine, Indianapolis, Indiana (Invited)
- 2009 An Atypical Role for CRMP-2 in Trafficking and Transmitter Release Via Interaction with Presynaptic Voltage-gated Calcium Channels, Loyola University College Stritch School of Medicine, Department of Pharmacology, Loyola University, Chicago, IL (Invited)
- 2009 Nervous System Ion channels: a glimpse of functions, trafficking, targeting and diseases, Goshen College, Department of Chemistry and Mathematics, Goshen, IN (Invited)
- 2010 Roles of ion channels in physiology and pathophysiology, Department of Pharmaceutical Sciences, College of Pharmacy and Health Sciences, Butler University, Indianapolis, IN (Invited)
- 2011 CRMP2, a novel target for pain, Departments of Neurology and Neurosurgery, McGill University and the Montreal Neurological Institute, Montréal, Québec, Canada (Invited)
- 2011 CRMP2, a novel biological target for pain, AstraZeneca R&D Montreal, Ville Saint-Laurent (Montréal), Québec, Canada (Invited)
- 2011 CRMPs curb calcium channels: implications for pain relief, Brain Research Institute, Department of Neurology, University of California at Los Angeles, Los Angeles, CA (Invited)
- 2011 CRMPs Curb Calcium Channels: Implications for Relief of Chronic Neuropathic Pain, Department of Neurosciences and Pathology, University of Toledo Medical Center, Toledo, Ohio (Invited)
- 2011 CRMP2, a novel target for pain, Department of Anatomy and Cell Biology, University of Kansas Medical Center, Kansas City, Kansas (Invited)
- 2012 CRMPs curb calcium channels: implications for pain relief, Department of Biological Sciences, Simon Fraser University, Vancouver, British Columbia, Canada (Invited)
- 2012 CRMP2, a novel target for nociception and neuroprotection, Department of Pharmaceutical Sciences, University of British Columbia, Vancouver, British Columbia, Canada (Invited)
- 2012 CRMP2, a novel target for pain, Departments of Neuro-Oncologie and Neuro-Inflammation, Faculty of Medicine Laennec, Lyon, France (Invited)
- 2012 CRMP2 and Lacosamide: Strange Bedfellows or Complete Strangers?, CNS Research, UCB Pharma, Chemin du Foriest, R9 1420-Braine l'Alleud, Belgium (Invited)
- 2012 Targeting calcium channel interactions for the development of therapeutics for chronic pain, Department of Pharmacology, University of Arizona (Invited)
- 2013 CRMPing chronic pain with peptide aptamers, 2013 Indy SfN, Indianapolis Chapter of the Society for Neuroscience (Invited)
- 2013 Targeting calcium channel interactions for the development of therapeutics for chronic pain, Center for

- Pain Research, and Department of Neurobiology, Pittsburgh, PA (Invited)
- 2013 CRMP2 peptides for pain management: preclinical studies, Phi-Zeta research Day, Purdue University, Purdue, IN (Invited)
- 2014 CRMPing Pain, Children’s Health Research Center at Sanford Research, Sioux Falls SD Sanford Research (Invited)
- 2016 ‘Painful’ ménage à trois: CRMP2 wrestles with SUMO to curb Nav1.7, Neuroscience Data Blitz, Neuroscience Department, University of Arizona (Invited)
- 2016 CRMPing Pain, Department of Anesthesiology Bioengineering; Cell Biology and Anatomy; Biopharmaceutical Science, University of Illinois College of Medicine, Chicago, Illinois (Invited)
- 2017 ChIRPMAP – a novel method for identifying regulators channels inhibitor, Cumming School of Medicine, University of Calgary, Calgary, Alberta, Canada (Invited)
- 2017 Crosstalk between CRMP2 SUMOylation and phosphorylation modulates NaV1.7 channel trafficking and neuropathic pain, Centre for Biomedical Research, University of Victoria, British Columbia, Canada (Invited)
- 2017 ChIRPMAP – a novel method for identification of channel regulators, Department of Pharmacology & Pathology, Columbia University, New York (Invited)
- 2017 New Therapeutic Horizons in Chronic Pain, Department of Anesthesiology & Critical Care Medicine, University of New Mexico (Invited)
- 2018 Research Funding and Visibility, New Faculty Mentoring Program, Office of Diversity and Inclusion, University of Arizona Health Sciences (Invited)
- 2018 SUMO on CRMPs - wrestling for pain?, Chemistry and Biochemistry and Biological Chemistry Program Journal Club, University of Arizona (Invited)
- 2018 Conquering Pain, Science Café at the 2018 - Tucson Festival of Books (Invited)
- 2018 Made It Happen: From Research to Invention to Impact
(<https://techlaunch.arizona.edu/event/regulonixcommercializing-non-opioid-drugs-chronic-pain>)
- 2019 CRMP2, NaV1.7 channels, Chronic Pain – a novel method for identification of channel regulators, Department of Pharmacology & Toxicology, Indiana University Purdue University Indianapolis (Invited)
- 2019 Unlocking NaV1.7’s pain potential, University of Pittsburgh, Department of Neurobiology, Pittsburgh, PA, USA (June 28, 2019, Pittsburgh, Invited)
- 2019 Unlocking NaV1.7’s pain potential, Università Degli Studi di Milano, Department of Bioscience, Milano, Italy (Invited)
- 2019 Biologics, Small Molecules, and Natural Products Targeting Voltage-gated Calcium Channels for Pain Relief, Pharmacology and Toxicology, Institute of Pharmacy, University of Innsbruck, Innsbruck, Austria (Invited; host Joerg Striessnig)
- 2019 Unlocking NaV1.7’s pain potential, University College London, London, United Kingdom (Invited; hosts Drs. Annette Dolphin and John Wood)
- 2019 Unlocking NaV1.7’s pain potential, Grünenthal GmbH, Aachen, Germany (Invited; host Drs. Stefan Schunck, Paul Ratcliffe, and Torsten Rodolf Dunkern)
- 2020 Unlocking NaV1.7’s pain potential, Cognition and Neuroscience, School of Behavioral and Brain Sciences, The University of Texas at Dallas, Texas (Invited)
- 2020 Unlocking NaV1.7’s pain potential, Henry and Amelia Nasrallah Center for Neuroscience, Saint Louis University School of Medicine, St. Louis, Missouri (Invited, Dr. Daniela Salvemini)
- 2020 Two Scientists – a conversation on the scientific journey, work-life balance, COVID-19 and analgesia; University of Arizona (Invited)
- 2021 SARS-CoV-2 Spike protein highlights a role for VEGF-A/Neuropilin-1 receptor signaling in nociceptive processing, Dept. of Molecular Pathobiology, New York University College of Dentistry (Invited; host Dr. Nigel W. Bunnett)
- 2021 From the COVID-19 fog a new pain target emerges in “Academic Innovation in the Drug Discovery Ecosystem” – Arizona Center for Drug Discovery Spring Summit (Invited; host Dr. Wei Wang)

- 2021 Opportunities for Therapeutics for Chronic Pain -Targeting Ion channels and their Regulators, MD Anderson Pain Research Consortium; Dept. of Symptom Research and Anesthesiology, Critical Care and Pain Medicine, Houston, Texas, USA (Invited; hosts Drs. Cobi Heijnen and Carin Hagberg)
- 2021 Opportunities for Therapeutics for Chronic Pain -Targeting Ion channels and their Regulators, Department of Pharmacology and Physiology and the Henry and Amelia Nasrallah Center for Neuroscience, Saint Louis University School of Medicine, St. Louis, MO USA (Invited; host Dr. Daniela Salvemini)
- 2021 Opportunities for Therapeutics for Chronic Pain -Targeting Ion channels and their Regulators, MD Anderson Pain Research Consortium; The Division of Anesthesiology, Critical Care and Pain Medicine, Houston, Texas, USA (Invited; host Dr. Patrick Dougherty)
- 2021 Selective targeting of NaV1.7 via inhibition of the CRMP2-Ubc9 interaction reduces pain in rodents, Department of Neuroscience and Pharmacology, Carver College of Medicine, The University of Iowa (Invited; Host Dr. Kathleen Sluka)
- 2022 Navigating a new path to NaV1.7 for pain; NYU Neuroscience Institute (Invited; Host Dr. Richard Tsien)
- 2022 Can SARS-CoV2 blunt pain?; Interdisciplinary Pain Research Program's (IPRP) Seminar NYU Langone Health (Invited; Host Dr. Jing Wang)
- 2022 Navigating a new path to NaV1.7 for pain; Department of Pharmacology, Northwestern Medicine, Feinberg School of Medicine (Invited; Host Dr. Al George)
- 2022 Navigating a new path to NaV1.7 for pain; Trans Cure Lecture Series, Institute of Biochemistry and Molecular Medicine, University of Bern, Switzerland (Invited; Host Dr. Hugues Abriel)
- 2022 Can SARS-CoV2 blunt pain?; Department of Immunobiology, University of Arizona (Invited; Host Dr. Felicia Goodrum)
- 2022 Therapeutic Opportunities for Chronic Pain -Targeting Ion channels and their Regulators; Kansas University Medical Center (Hosts: Drs. Talal Khan and Doug Wright)
- 2022 A unique binding domain in NaV1.7 accounts for its selective regulation by CRMP2; University of Texas Health Science Center at San Antonio (Invited; host Dr. Shivani Ruparel)
- 2022 Targeting NaV1.7 for chronic pain: the path not (yet) taken; Rutgers – New Jersey Medical School (Invited; host Dr. Huijuan Hu)
- 2022 Can SARS-CoV-2 blunt pain? Hacettepe University Faculty of Medicine, Institute of Neurological Sciences and Psychiatry, Sıhhiye Ankara; Turkey (Virtual Host: Dr. Bengisu Solgun)
- 2023 Opportunities for therapeutics for chronic pain – targeting ion channels and their regulators, Department of Biochemistry, All India Institute of Medical Sciences (AIIMS), Delhi, India (Invited; hosts: Dr. Pragyan Acharya and Dr. S. A. Raju Bagadi)
- 2023 Opportunities for therapeutics for chronic pain – targeting ion channels and their regulators, Department of Biochemistry, Amity University, Noida, India (Invited; host: Dr. A. K. Singh)
- 2023 Opportunities for therapeutics for chronic pain – targeting ion channels and their regulators, Department of Biochemistry, University Institute of Pharmaceutical Sciences, Panjab University, Chandigarh, India (Invited; host: Dr. Indu Pal Kaur)
- 2023 Dialing down neuropathic pain with antagonists of Nav1.7 channels, Pain Medicine Group, Postgraduate Institute of Medical Education and Research (*PGIMER*), Chandigarh (Invited; host: Dr. Babita Ghai)
- 2023 Responses to NaV1.7 analgesic failures: post-translational targeting of pain; Alan Edwards Centre for Research on Pain (Invited, host: Dr. Arkady Khoutorsky, McGill Pain Center)
- 2023 The last of the unplucked gems: targeting NaV1.7 for chronic pain: the path not (yet) taken, Department of Pharmacology and Toxicology, University at Buffalo (Invited; host Dr. Arindam Bhattacharjee)
- 2023 Allosteric modulation of voltage-gated sodium channels: opportunities for neuropathic pain drug discoveries, Department of Chemical & Biomolecular Engineering, NYU Tandon School of Engineering (Invited; host: Dr. Nathalie M. Pinkerton)

- 2023 Dialing down neuropathic pain with through allosteric modulation of Nav1.7 channels, Department of Molecular Biomedical Sciences, North Carolina State University, College of Veterinary Medicine (Invited; host: Dr. E. Javier Lopez Soto)
- 2023 Food for Thought Series: Mechanisms of Chronic Pain: Opportunities for Novel Therapeutics, Amicus Therapeutics (Invited; hosts: Drs. Jill Weimer and Tyler Johnson)
- 2023 A peptidomimetic modulator of the CaV2.2 N-type calcium channel for chronic pain, Department of Anesthesiology, Medical College of Wisconsin (Invited; host: Dr. Quinn Hogan)
- 2023 Allosteric modulation of voltage-gated channels: opportunities for neuropathic pain drug discoveries, Department of Pharmacology & Therapeutics, College of Medicine, University of Florida (Invited; host: Drs. Dan Wesson and Joe GN “Skip” Garcia)
- 2023 The Power Within: Allosteric Modulation of Voltage-Gated Channels Opens Doors to Innovative Neuropathic Pain Drug Discoveries, REOHS: Research Education in Oral Health Sciences Program, College of Dentistry, New York University (Invited; host: Drs. Lorel Burns and Rodrigo Lacruz)
- 2023 Dialing down neuropathic pain with through allosteric modulation of Nav1.7 channels, Department of Biomedical Sciences, Texas A&M University School of Dentistry, Dallas, Texas (Invited; host Dr. Feng Tao)
- 2023 From SARS-CoV-2 to analgesia: harnessing the VEGF-A/NRP-1 axis for pain therapy, Center for Translational Neuroscience, Division of Glial Disease and Therapeutics, University of Copenhagen (Invited; host: Dr. Maiken Nedergaard)
- 2023 From SARS-CoV-2 to analgesia: harnessing the VEGF-A/NRP-1 axis for pain therapy, Department of Pathophysiology - Third Faculty of Medicine, Charles University, Prague, Czech Republic (Invited; host: Dr. Norbert Weiss)
- 2023 Discovery and characterization of bioinspired, peptidomimetic, and computationally-identified small molecule analgesics for chronic pain, Institute of Organic Chemistry and Biochemistry of the Czech Academy of Sciences, Prague, Czech Republic (Invited; host: Dr. Emanuela Jahn and Ullrich Jahn)
- 2023 Discovery and characterization of bioinspired, peptidomimetic, and computationally-identified small molecule analgesics for chronic pain, Department of Chemistry, New York University (Invited; host: Dr. Mark Tuckerman)
- 2023 A peptidomimetic modulator of the Ca_v2.2 N-type calcium channel for chronic pain, Department of Physiology, Michigan State University (Invited; host: Dr. Geoffroy Laumet)
- 2024 A peptidomimetic modulator of the Ca_v2.2 N-type calcium channel for chronic pain, Department of Physiology, University of Toronto, Toronto, Canada (Invited; host: Dr. Michael Salter)
- 2024 A peptidomimetic modulator of the CaV2.2 N-type calcium channel for chronic pain, Department of Neuroscience and the McKnight Brain Institute (Invited, hosts: Drs. Setlow and Martín-Peña)
- 2024 A peptidomimetic modulator of the CaV2.2 N-type calcium channel for chronic pain, Burke Neurological Institute, Weill Cornell Medicine, White Plains, New York (Invited; host: Dr. Rajiv Ratan)
- 2024 A peptidomimetic modulator of the CaV2.2 N-type calcium channel for chronic pain, Department of Anesthesiology, University of Minnesota Pain Interest Group (Invited; host: Dr. Ratan Banik)
- 2025 Deciphering the CRMP2 molecular QR code for pain signaling, Department of Physiology and Membrane Biology, UC Davis, Davis, California (Invited; host: Drs. Theanne Griffith and Jorge Contreras)

Symposia/Conferences

- 2009 Drug Discovery in Academia: CRMP2, a novel target for pain suppression, Indiana University and Lilly Labs Joint Pain Forum, Indianapolis, Indiana (Invited)
- 2009 Regulation of neurite outgrowth and synaptic efficacy by calcium channel-CRMP-2 interactions, 2009 Gill Symposium, Indiana University Bloomington, Bloomington, IN (Invited)
- 2009 Regulation of Synaptic Efficacy by Calcium channel-CRMP-2 Interactions, FASEB Summer Research

- Conference on Ion Channel Regulation June 7-12, 2009, Snowmass Village, Colorado (Invited)
- 2011 Suppression of inflammatory and neuropathic pain by uncoupling CRMP-2 from the presynaptic Ca²⁺ channel complex, Ion Channel Symposium 2011 (Danish Arrhythmia Research Centre) May 26-27, 2011 Copenhagen, Denmark (Invited)
- 2011 Suppression of inflammatory and neuropathic pain by uncoupling CRMP-2 from the presynaptic Ca²⁺ channel complex, FASEB Summer Research Conference on Ion Channel Regulation, June 12-17, 2011, Steamboat Springs, Colorado (Invited)
- 2011 CRMP2, a novel biological target in pain research, Pain Interest Group Annual Meeting, Chicago, IL (Invited)
- 2011 CRMP2: A Novel Biological Target in Pain Research, 5th Annual Pain Therapeutic Summit: New Drug Discovery Targets, Clinical Development and Commercialization Strategies, September 20-21, 2011, San Francisco, CA (Invited)
- 2012 Suppression of inflammatory and neuropathic pain by uncoupling CRMP-2 from the presynaptic Ca²⁺ channel complex, 43rd Annual Meeting of the American Society of Neurochemistry, Baltimore, MD Colloquium on Collapsin Response Mediator Proteins (CRMPs) in Neurological Disease (Session Chairs, Invited)
- 2012 Pain Sensitization in the Periphery: Should We Mine New Pain-Transducing Ion Channels or Focus on Specific Properties of Known Ion Channel Targets, APS 31st Annual Scientific Meeting, Honolulu, HI (Invited)
- 2012 Neuroprotective effects of CRMP2 following TBI, 2012 Mini-symposium: CNS Injury and Repair, Joint symposia between Indiana University School of Medicine, Indianapolis, Indiana and Center for Translational Neuroscience, University of Missouri-Columbia School of Medicine (Invited)
- 2013 Curbing calcium channels for relief of chronic pain, 4th International Congress on Neuropathic Pain: the path to relief starts with understanding, Toronto, Ontario, Canada (Session Chair; Invited)
- 2013 Voltage-gated calcium channels: novel roles, International Union of Physiological Sciences (IUPS) Congress, The Physiological Society, Birmingham, United Kingdom (Invited)
- 2015 Voltage-gated channels in Pain, Spring Pain meeting, May 11-13, 2015, Palm Springs, CA (Session Chair; Invited)
- 2016 Teaching an old dog new tricks: constellation pharmacology unravels nociceptive targets and mechanisms, Spring Brain meeting, Topic: Pain Mechanisms (April 7-11, 2016, Sedona, AZ) (Invited)
- 2017 Going in circles with opioids for treatment of pain, Spring Brain meeting, Topic: Pain Mechanisms (March 16-19, 2017, Sedona, AZ) (Invited)
- 2017 Regulonix: Non-opioid compounds for chronic pain (April 18, 2017, University of Arizona, I²A Expo and Awards: Invention to Impact)
- 2017 Regulonix: Non-opioid drugs for chronic pain (May 3, 2017, TechCode, Mountain View, CA)
- 2017 Regulonix: Non-opioid drugs for chronic pain (Oct 25, 2017, First San Diego Annual Regional Innovation Showcase, Torrey Pines, CA)
- 2017 First Annual NF1 Synodos meeting, Oct 2 – 4, 2017, Palm Beach, FL (Invited)
- 2018 Targeting Sodium Channels for Non-Opioid-Based Pain Relief, Drug Discovery and Development Symposium, College of Pharmacy, University of Arizona
- 2018 “CRMPing Pain”, Brain to Nanodomain Symposium honoring Dr. Elise F. Stanley (October 17, 2018, Toronto, Ontario, Canada)
- 2019 Neurobiology and Chemistry of Pain and Addiction in honor of Dr. Rao Rapaka (April 29, 2019, Tucson, AZ; Chair Session 3)
- 2019 FASEB Science Research Conference (July, 2019; co-chairs Rajesh Khanna and Henry Colecraft, Lisbon, Portugal)
- 2019 Unlocking Nav1.7's Pain Potential: Preclinical Studies on a First-in-Class, Non-Opioid, Selective Nav1.7 Regulator, 4th Annual Chemistry and Drug Abuse Conference, Boston, MA (Invited)

- 2019 New Approaches for Pain Assessment and Treatment Nanosymposium (Chair, Session number 543, Society for Neuroscience, McCormick Place, Chicago, IL)
- 2019 Dissecting pain in NF1 (Session #5: Pain and Itch) 2019 NF Conference, San Francisco, CA
- 2019 Sex-dependent differences in pain and sleep in a porcine model of neurofibromatosis 1 (Session #8: Targeted Gene Editing and Gene Therapy for Neurofibromatosis, co-chair) 2019 NF Conference, San Francisco, CA Session #5: Pain and Itch
- 2019 Unlocking Nav1.7's pain potential: Discovery and initial characterization of a novel class of compounds selectively targeting Nav1.7 through inhibition of a protein-protein interaction (Session number 543, Society for Neuroscience, McCormick Place, Chicago, IL)
- 2019 Unlocking Nav1.7's pain potential (Translational Research Initiative for Pain and Neuropathy Annual Symposium at Virginia Commonwealth University; Richmond, VA, November 5, 2019)
- 2020 Discovery of T-type Calcium Channel Antagonists from Multicomponent Reactions and Their Application in Paclitaxel-induced Peripheral Neuropathy (Inaugural NIH HEAL InitiativeSM Investigator Meeting, Bethesda, Maryland)
- 2020 Defining the Cav2.2-CRMP2 molecular interaction identifies a first-in-class small molecule antinociceptive (Session C-03: CRMPs in the CNS: Novel Roles in Health and Disease, Co-chair) American Society of Neurochemistry 2020 Annual Meeting, St. Charles, MO [postponed due to the Covid-19 pandemic]
- 2020 Unlocking Nav1.7's pain potential (Session S6: Novel Non-narcotic Strategies for Pain Management) American Society of Neurochemistry 2020 Annual Meeting, St. Charles, MO [postponed due to the Covid-19 pandemic]
- 2020 Biochemistry Focus webinar series: Neurobiology of chronic pain – mechanisms, management, and in-between (Biochemical Society and Portland Press, chaired by Dr Eilís Dowd); podcast attendees were from UK, USA, India, Nigeria, Iran, Canada, Philippines, Ireland, Mexico, Ghana, Scotland, Iraq, Indonesia, Germany, and Belgium
- 2021 SARS-CoV-2 Spike protein co-opts VEGF-A/Neuropilin-1 receptor signaling to induce analgesia (Symposium: COVID-19, human nociceptors, and pain (Chair of session)) Canadian Pain Society Annual Meeting April 27-31 [virtual meeting]
- 2021 Second NIH Helping to End Addiction Long-term (HEAL) Initiative Investigators Meeting; HEAL Innovation Research – Panelist and Speaker (Nav1.7 revisited)
- 2021 Novel COVID-19 Pain Syndromes - Evidence from Translational Basic and Clinical Research (International Association for the Study of Pain's "COVID-19: Elevating Healthcare Professionals and Available Resources - The Latest on COVID-19 and Pain" Virtual Education series) May 20, 2021
- 2022 Navigating a new path to Nav1.7 for pain (New York Academy of Sciences – Advances in Pain) May 3-4 New York City
- 2022 Allosteric Modulation of Cav2.2 (4th European Calcium Channel Conference, Alpbach, Austria (May 24-28, 2022))
- 2022 Unlocking Cav2.2's pain potential (Calcium Channels Session) May 29- June 4; Pain Mechanisms and Therapeutics meeting, Verona, Italy)
- 2022 Visiting Faculty, North American Pain School - "Controversies in Pain Research" - The last of the unplucked gems: targeting Nav1.7 for chronic pain (June 19-24, 2022 at the Fairmont Le Chateau Montebello, in Montebello, Quebec)
- 2022 NYU Center for Skeletal & Craniofacial Biology annual Symposium, Keynote speaker: 'Answers to Nav1.7 Analgesic Failures: Posttranslational Targeting for Pain Reduction'
- 2022 Answers to Nav1.7 Analgesic Failures: Post Translational Targeting for Pain Reduction (Ion Channel Modulation Symposium 2022, co-organizers: Stefan Feske, William Coetzee, and Rajesh Khanna) NYU Grossman School of Medicine
- 2023 Chair, Basic Sciences session – The Indian Society for Study of Pain 37th Annual Conference, Amritsar, Punjab, India

- 2023 Navigating a New Path to Nav1.7 for (Anabios's Translational Research Conference, Torrey Pines, San Diego, California)
- 2023 Navigating a New Path to Nav1.7 for Pain (FASEB Ion Channel Regulation Conference, Halifax, Nova Scotia, Canada)
- 2023 Allosteric modulation of voltage-gated sodium channels: opportunities for neuropathic pain drug discoveries; Keynote Speaker for Department of Physiology and Biophysics Research Day, Dalhousie University, Halifax, Nova Scotia, Canada (Invited; host: Dr. Yassine El Hiani)
- 2023 Navigating Pain Relief: Exploring Indirect Approaches to Target Nav1.7 without Autonomic Side Effects AnaBios Webinar (Host: Gary Watkins) <https://www.youtube.com/watch?v=2Z3hFKgduf0>
- 2023 Navigating a New Path to Nav1.7 for Pain (Mapping the Pain Landscape: From Molecules to Medicine, Woods Hole, Massachusetts)
- 2023 Charting a New Path: The Drive to Develop the Next Gabapentin; Keynote Speaker for the 6th Annual Center to Advance Chronic Pain Research Symposium - "Holistic and traditional approaches to treat chronic pain, University of Maryland, Baltimore, MD (Invited; host: Dr. Joyce T. Da Silva and Ian Kleckner)
- 2024 Charting a New Path to Pain Therapy: The Drive to Develop the Next Gabapentin; 23rd Missing Link in Translational Science Seminar, Department of Anesthesiology and Intensive Care Medicine, University Hospital Cologne, Germany (Invited; host Dr. Tim Hucho)
- 2024 Validation of Neuropilin-1 receptor signaling in nociceptive processing; New Targets and Mechanisms for Pain and Addiction Symposium; 5th Annual HEAL Initiative Scientific Meeting, Bethesda, MD (Moderator: DP Mohapatra, NINDS)
- 2024 Forecasting the Future in Pain Research: Editors' Picks for 2024; USASP Annual Meeting (Seattle, USA)
- 2024 Allosteric regulation of Nav1.7 in neurons and chondrocytes (Session #14: The Nav1.7 Dilemma; To Target or Not to Target, That is the Question; Chair: Rajesh Khanna); May 19-24; Pain Mechanisms and Therapeutics Meeting (Verona, Italy)
- 2024 The path to drugging Nav1.7: why aren't we there yet?; Worldwide Sodium Channel Seminars (Invited; hosts: Drs. Angelika Lampert & Prof. Hugues Abriel) [Rajesh Khanna, PhD - The path to drugging Nav1.7: Why aren't we there yet? \(youtube.com\)](#)

Peer reviewed abstracts (only selected abstracts listed)

- 2011 Brittain JM, Chen L, Brustovetsky T, Gao X, Wilson SM, Ashpole NM, Molosh AI, You H, Hudmon A, Brustovetsky N, Chen J, **Khanna R**. Neuroprotection against Traumatic Brain Injury by a Peptide Derived from the Collapsin Response Mediator Protein 2 (CRMP2). Session 426. Nov 14, 2011. Society for Neuroscience Meeting, Washington D.C.
- 2011 Wilson SM, Xiong W, Head J, Brittain JM, Gagare P, Ramachandran P, Jin X, **Khanna R**. The anticonvulsant Lacosamide inhibits CRMP2-mediated neurite outgrowth in vitro and prevents enhanced excitatory connectivity in an animal model of posttraumatic epileptogenesis. Session 250. Nov 13, 2011. Society for Neuroscience Meeting, Washington D.C.
- 2011 Brittain JM, Duarte DB, Wilson SM, Ballard C, Johnson PL, Liu N, Xiong W, Ripsch MS, Wang Y, Fehrenbacher JC, Fitz JD, Khanna M, Park CK, Ashpole NM, Hudmon A, Meroueh SO, Ji RR, Hurley JH, Jin X, Shekhar A, Xu XM, Oxford GS, Vasko MR, White FA, **Khanna R**. Session 275. Nov 13, 2011. Society for Neuroscience Meeting, Washington D.C
- 2012 White FA, Due MR, Piekarz AD, Feldman P, Chavez S, Yin H, **Khanna R**. Neuroexcitatory effects of morphine-3-glucuronide are dependent on Toll-like receptor 4 signaling. Society for Neuroscience 2012 New Orleans.
- 2012 T. Verhovshek, J. Brennia, S.M. Wilson, J. Gao, X. Jin, **R. Khanna** and X-M. Xu. A novel peptide targeting the collapsin response mediator protein 3 (CRMP3) is neuroprotective in multiple models of dendritic atrophy. Society for Neuroscience 2012 New Orleans.

- 2013 Wilson NM, **Khanna R**, and Wright DE. A peptide uncoupling Collapsin Response Mediator Protein-2 (CRMP2) from the Voltage-gated Ca²⁺ channel attenuates mechanical allodynia in a rodent model of diabetic neuropathy. Annual Meeting of the Diabetic Neuropathy Study Group, September 27-30 in Dresden, Germany.
- 2013 Shimomura A, Patel D, Wilson SM, **Khanna R**, Hashino E. Essential role for CBP in Tlx3-mediated neuronal differentiation from embryonic stem cells. Feb 16-20, 2013 Baltimore, MD. American Research in Otolaryngology MidWinter Conference.
- 2014 Melissa Walker, Lingxiao Deng, Chandler L. Walker, Wenjie Wu, Xiangbing Wu, Qingbo Lu, Sarah M. Wilson, **Rajesh Khanna**, Naikui Liu, Xuejun Wen, Ning Zhang, and Xiao-Ming Xu. Novel Bioengineered Hydrogel Combinational Therapy for Traumatic Spinal Cord Injury. 6th Annual Wings for Life Annual Meeting, Salzburg, Austria, May 21-22, 2014.
- 2014 **Khanna R**. Challenging the catechism of therapeutics for chronic neuropathic pain: targeting CaV2.2 interactions with CRMP2 peptides. June 15, 2014 - June 20, 2014 - Keystone Resort - Keystone, Colorado, USA. The Brain: Adaptation and Maladaptation in Chronic Pain.
- 2014 **Khanna R**. CRMP2 protein SUMOylation modulates NaV1.7 channel trafficking. July 6, 2014 – July 11, 2014, Mount Holyoke College in South Hadley MA, USA. Gordon Research Conference on Ion Channels.
- 2015 Wang Y, Francois-Moutal L, Moutal A, Cotter KE, Melemedjian OK, Khanna M, Vanderah TW, and **Khanna R**. A membrane-delimited N-myristoylated CRMP2 peptide aptamer inhibits CaV2.2 trafficking and reverses post-operative pain behaviors. American Pain Society, May 13-16, 2015 at the Palm Springs Convention Center, Palm Springs, CA.
- 2015 Moutal A, Dustrude E, Yang XF, Wang Y, Khanna M, **Khanna R**. Interplay between CRMP2 phosphorylation and SUMOylation determines NaV1.7 trafficking Session 35. Oct. 17, 2015. Society for Neuroscience Meeting, Chicago, IL (abstract #17492).
- 2016 Chung-Yang Yeh, Ashlyn M. Bulas, Karen A. Hartnett, **Rajesh Khanna**, Dandan Sun, Elias Aizenman. Ameliorating Kv2.1-mediated Neurodegeneration in Ischemic Stroke. Keystone Symposium on Neurodegenerative Mechanisms. June, 2016.
- 2016 Alexander J. Sandweiss, Mary I. McIntosh, Aubin Moutal, Aswini K. Giri, Victor J. Hruby, **Rajesh Khanna**, Tally M. Largent-Milnes and Todd W. Vanderah. Pulling the brakes on midbrain dopamine cells: inhibiting substance p prevents opiate reward. International Narcotics Research Conference 2016, July 10-14, 2016 Bath, England.
- 2016 Aubin Moutal, Nathan Eyde, Edwin Telemi, Jennifer Y. Xie, Frank Porreca, and **Rajesh Khanna**. Relief of cephalic pain by (S)-Lacosamide in an experimental model of headache. 2016 NF Conference, June 18-21, 2016 Austin, Texas.
- 2016 Xiaofang Yang, Aubin Moutal, and **Rajesh Khanna**. CRISPR/Cas9-based gene editing of *Nf1*: a new rat model of Neurofibromatosis type 1 (NF1)? 2016 NF Conference, June 18-21, 2016 Austin, Texas.
- 2016 Chung-Yang Yeh, Ashlyn M. Bulas, Karen A. Hartnett, Charles T. Anderson, Roberto Di Maio, Thanos Tzounopoulos, Dandan Sun, **Rajesh Khanna**, Elias Aizenman. A peptide disrupting Kv2.1/syntaxin interaction is neuroprotective in cerebral ischemia. Society for Neuroscience Meeting, San Diego, CA.
- 2016 Priyodarshan Goswamee, Jeffrey Parrilla-Carrero, William Buchta, Peter W Kalivas, Aubin Moutal, **Rajesh Khanna** and Arthur C Riegel. Chronic Cocaine Self-Administration Impairs the Ability of Dopamine to Enhance Neuronal Excitability by Inhibition of Kv7/KCNQ Channels. Medical University of South Carolina Research Day, SC.
- 2017 David Meyerholz, Georgina K Ofori-Amanfo, Mariah R. Leiding, Dawn Quelle, Benjamin Darbro, Karin Panzer, Jessica C. Sieren, **Rajesh Khanna**, Chris Rogers, Katherine White, Jill Weimer. Evaluation of Immunohistochemical Markers for Application in a Novel Neurofibromatosis-1 Porcine Model. Experimental Biology Meeting, April 2017, Chicago, IL.
- 2017 Mohab M. Ibrahim, Amol Patwardhan, Kerry Gilbraith1, Jessica Hanson, Aubin Moutal, Wennan Li, Song Cai, Lindsey A. Chew, Xiaofang Yang, T. Philip Malan, Todd W. Vanderah, Frank Porreca, and **Rajesh Khanna**. Long-lasting antinociceptive effects of green light in rats and humans. Society for Neuroscience Meeting, Washington, DC.

- 2017 **Rajesh Khanna**, Amol Patwardhan, Kerry Gilbraith¹, Jessica Hanson, Aubin Moutal, Wennan Li, Lindsey A. Chew, Shreya S. Bellampalli, Angie Dorame, Xiaofang Yang, T. Philip Malan, Todd W. Vanderah, Frank Porreca, and Mohab M. Ibrahim. Development and characterization of an injury-free rodent model of hyperalgesia relevant to fibromyalgia syndrome. Society for Neuroscience Meeting, Washington, DC.
- 2017 Angie Dorame, Zunaira Shuja, Vijay Gokhale, Xiaofang Yang, Yingshi Ji, Yue Wang, Aubin Moutal, Lindsey A. Chew, Shreya S. Bellampalli, Todd W. Vanderah, May Khanna, Henry M. Colecraft, and **Rajesh Khanna**. High-throughput chemical screening identifies SGM-45 as a selective inhibitor of Ntype voltage-gated (Cav2.2) channel. Society for Neuroscience Meeting, Washington, DC.
- 2017 Erin Romero, Brian Hallmark, Amanda Willis, Saurabh Sharma, Christopher Le, Aubin Moutal, **Rajesh Khanna**, Cassandra Deering-Rice, Christopher Reilly, Eugene Chang. Loss of function TRPV1 SNP (rs8065080) is associated with chronic rhinosinusitis. American Rhinologic Society meeting Chicago, IL.
- 2018 Hongwei Yu, Hongfei Xiang, Seung Min Shin, Hao Xu, Brandon Itson-Zoske, **Rajesh Khanna**, and Quinn H. Hogan. Enhanced analgesic effect of AAV-encoded mutant CBD3 peptide (CBD3A6K) for primary sensory neuron-targeted treatment of neuropathic pain in rat. American Society of Gene & Cell Therapy, 21st annual meeting in Chicago, IL, May 16-19, 2018.
- 2018 Katherine A. White, Vicki J. Swier¹, Jordan L. Kohlmeyer, David K. Meyerholz, Munir R. Tanas, Johanna Uthoff, Emily Hammond, Frank A. Rohret, J. Adam Goeken, Chun-Hung Chan¹, Mariah R. Leiding, Shaikamjad Umesalma, Margaret R. Wallace, Rebecca D. Dodd, Karin Panzer, Benjamin W. Darbro, Aubin Moutal, Song Cai, Wennan Li, Shreya S. Bellampalli, **Rajesh Khanna**, Christopher S. Rogers, Jessica C. Sieren, Dawn E. Quelle, and Jill M. Weimer. A novel porcine model of Neurofibromatosis Type 1 (NF1) that mimics the human disease. 8th Annual Rare Disease Symposium, Sanford, Sioux Falls, South Dakota, Feb. 23, 2018.
- 2018 Lindsey A. Chew and **Rajesh Khanna**. A novel therapeutic strategy for chronic pain. 22nd annual Posters on the Hill, Washington, D.C. April 18, 2018
- Featured in the Daily Wildcat: UA Research travels to Capitol Hill**
<http://www.wildcat.arizona.edu/article/2018/03/n-posters-on-the-hill>
- 2018 Chung-Yang Yeh, Zhaofeng Ye, Shivani Gaur, Aubin Moutal, Amanda M Henton, Stylianos Kouvaros, Jami L Saloman, Karen A Hartnett-Scott, Kai He, Thanos Tzounopoulos, **Rajesh Khanna**, Carlos J Camacho and Elias Aizenman. Small molecule inhibition of Kv2.1-syntaxin interaction protects against neuronal cell death. Society for Neuroscience Meeting, San Diego, CA.
- 2018 Laura Alberio, Andrea Saponaro, Alessandro Porro, Matteo Pisoni, Shizhen Luo, Aubin Moutal, Yingshi Ji, **Rajesh Khanna**, Gerhard Thiel and Anna Moroni. Engineering synthetic tools for the inhibition of cell excitability. Janelia Farms - Conference on genetic manipulation of neuronal activity. Sep. 2018
- 2023 Caroline Sawicki, Paz Duran, Sara Hestehave, **Rajesh Khanna**, Spencer Wade. Green Light Exposure in Pediatric Dental Patients with Autism. The International Association for Dental, Oral, and Craniofacial Research (IADR), New Orleans, Louisiana.
- 2024 Andrea Saponaro, Santiago Loya Lopez, Kimberly Gomez, Alessandro Porro, Gerhard Thiel, **Rajesh Khanna**, Anna Moroni. Targeting the facilitatory effect of cAMP on HCN2 channel opening promotes analgesic actions. Biophysical Society, Philadelphia, Pennsylvania, USA.
- 2024 Paz Duran, Cheng Tang, Santiago Loya-Lopez, Aida Calderon-Rivera, Kimberly Gomez, Samantha Perez-Miller, Afroze Chimthanawala, Saumya Saurabh and **Rajesh Khanna**. S-Palmitoylation of NaV1.7 voltage-gated sodium channels regulates channel's activity and voltage sensitivity. Biophysical Society, Philadelphia, Pennsylvania, USA.
- 2024 Tyler S. Nelson, Heather N. Allen, and Rajesh Khanna. Neuromedin U Receptor Type 2-expressing Spinal Cord Interneurons Drive Neuropathic Pain. Society for Neuroscience Meeting (Chicago, IL).
- 2024 Heather N. Allen, Tyler S. Nelson, and Rajesh Khanna. A parabrachial subpopulation responsible for modulating inflammatory pain in mice. Society for Neuroscience Meeting (Chicago, IL).
- 2024 Shailee Patel, Leticia Arbex, Niloofar Ghadirian, Aida Calderon-Rivera, Kimberly Gomez, Malvin Janal, May Khanna, **Rajesh Khanna**, Aditi Bhattacharya. Fibronectin Expression Is Associated with Patient Reported Pain In Oral Cancer. IASP World Congress on Pain (Amsterdam, Netherlands; August 5-9).

- 2024 Shilan Xiao, Heather Allen, Stephanie A. Fulton, Olivia L. Babyok, **Rajesh Khanna**, and Jami Saloman. Validation of peptidergic sensory neuron Neuropilin-1 receptor as a regulator of nociception. IASP World Congress on Pain (Amsterdam, Netherlands; August 5-9).

GRANTS AND CONTRACTS

Funded

Federal

- 2011-2014 CRMP-2, a novel target for excitotoxicity, American Heart Association, 15% effort, \$308,000, PI
- 2011-2015 Neurofibromin-CRMP2-Ca²⁺ channels: a new network for therapeutic intervention in neurofibromatosis, Department of Defense Congressionally Directed Military Medical Research and Development Program – Neurofibromatosis New Investigator Award FY2010, \$616,000, 10% effort, PI
- 2012-2013 Characterization and elucidation of the cellular pharmacological pathways of Extended NeuroAmides (ENAs) for the treatment of epileptic disorders, NIH R41, \$80,000, sub-contractor
- 2012-2016 Liberation of Intracellular Zinc and Neuronal Cell Death, NIH R01, 5% effort, \$27,985, Subcontractor
- 2014-2015 The role of DAMPS in painful bladder syndrome, NIH R01, 5% effort, \$390,000, multi-PI
- 2016-2019 Targeting the CRMP2/Ca²⁺ channel complex for abortive treatment of migraine and posttraumatic headache, CDMRP, 20% effort, \$2,281,087, PI
- 2017-2018 Regulators of NaV1.7 channels: Novel Anti-allodynic Drug candidates, NIH R41, 10% effort, \$299,999, PI
- 2017-2022 CRMP2, mitochondria, and Huntington disease, NIH R01, 10% effort, \$2,818,710, multi-PI
- 2017-2022 CRMP2, Nav1.7 sodium channel, and chronic pain, NIH R01, 15% effort, \$1,918,584, PI
- 2018-2022 Mechanism of intrathecal Contulakin-G induced analgesia without motor block, NIH K08 K08NS104272, \$196,560; Co-mentor (PI: Patwardhan)
<http://memo.ahsc.arizona.edu/index.cfm/memos/view/33649/0494a059b98295f6>
- 2018-2023 Green Light Therapy for Chronic Pain, NIH R01, 12.5% effort, \$1,716,875, co-I
<http://anesth.medicine.arizona.edu/news/2018/university-anesthesiology-faculty-garner-nihfunding>
- 2019-2020 Optimization of Betulinic Acid analogs for T-type calcium channel inhibition for nonaddictive relief of chronic pain, NIDA 1R41DA050364, 10% effort, \$224,696, PI
- 2019-2020 Discovery of T-type Calcium Channel Antagonists from Multicomponent Reactions and Their Application in Paclitaxel-induced Peripheral Neuropathy, NINDS 1R41NS116784, 10% effort, \$341,527, PI
- 2019-2020 FASEB SRC on Ion Channel Regulation, NINDS 1R13NS111788-01 (conference grant), Henry Colecraft and Rajesh Khanna (Multi-PIs)
- 2019-2020 Evaluation of Drug Efficacy in a Rat Model of Neuropathic Pain, NINDS, 3% effort, \$275,676, PI of subcontract (Prime: Lovelace Biomedical & Environmental Research Institute)
- 2019-2020 Disease Model Characterization and Development of Assays to Evaluate and Measure Pain in a Porcine Model for Sick Cell Disease (SCD), NIDA, 3% effort, \$139,298, PI of subcontract (Prime: Lovelace Biomedical & Environmental Research Institute)
- 2020-2025 Genetic and Pharmacological Validation of CRMP2 Phosphorylation as a Novel therapeutic Target for Neuropathic Pain, NINDS R01NS120663, 10% effort, \$2,060,449, PI
- 2020-2022 Green Light Therapy for Improving Dementia in Mice Models of Alzheimer's Disease, Administrative Supplement for NIHR01 AT009716, 4% effort, Co-Investigator (PI: Ibrahim)

2020-2024 Validation of Spinal Neurotensin Receptor 2 as an Analgesic Target NINDS R01, 7.5% effort, Co-Investigator (PI: Patwardhan)

2021-2023 Anti-CV2 autoantibodies unmask a CRMP5/GluN2B pain signaling hub, NINDS R01NS119263, 5% effort, \$368,934, Co-Investigator (PI: Moutal, UA)

2021-2026 Sentrin proteases, CRMP2 deSUMOylation, and Chronic Pain; 3R01NS120663-01A1S1 NINDS Diversity Supplement, 1% effort, PI (Trainee – Kimberly Gomez)

2021 (NCE) Inhibition of CaV α - β interaction with orally available small organic molecules for chronic pain, NIH R41, 10% effort, PI (Wei Wang, Pharmacy, PI of UA subcontract); \$400,000

2021-2024 CRMP2 phosphorylation: a novel target for Alzheimer’s disease; 3R01NS120663-01A1S2 NINDS, 10% effort, PI

2021 (NCE) Targeting the neuropilin-1 receptor (NRP-1)/VEGF-A axis for neuropathic pain, NINDS 1R41NS122545, 10% effort, \$419,470, PI

2022-2024 Antagonists of CRMP2 phosphorylation for chemotherapy-induced peripheral neuropathy, 1R61NS126026-01A1, 20% effort, PI (co-Is: Dr. Andrea Hohmann, IU Bloomington; and Dr. Gerald Zamponi, Univ. of Calgary, Canada) \$1,394,887

2023-2028 Endosomal mechanisms signaling oral cancer pain NIHRM1 20% effort, MPI (Lead PI: Brian Schmidt) RM1 DE033491-01 \$8,024,185

2023-2026 Validation of Neuropilin-1 receptor signaling in nociceptive processing NIHR01 10% effort, PI: Rajesh Khanna (PI) and Jami L. Saloman (co-I) \$2,091,838

2024-2028 Validation of a non-opioid analgesic pathway in human sensory ganglia and spinal cord, Chronic Pain Management Research Program (CPMRP) Department of Defense (DoD), 5% effort (Partnering PI: Rajesh Khanna, Amol Patwardhan (contact PI)) \$386,400

2024-2029 Dissection of NTSR2/calcium channel signaling as a non-opioid spinal analgesic mechanism for the treatment of high impact chronic pain 1R01NS139492-01, 10% effort, (Multi-PIs: Rajesh Khanna and Amol Patwardhan (contact PI)) \$4,007,054.00

2024 Targeting Schwann cell dysfunction and repair signaling in chemotherapy induced painful peripheral neuropathy, NIHR01 1R01 DE033674-01 10% effort, PI: Yi Ye, Rajesh Khanna (co-I)

2024 Optimization of Peptidomimetic Modulators of the CaV2.2 N-type Calcium Channel for Chronic Pain), Helping End Addiction Long-Term (HEAL) Initiative collaboration with the NCATS Early Translation Branch; Rajesh Khanna (PI)

State

2012-2014 CRMP2, a novel therapeutic target of neuroprotection and neuroinflammation in an open-head concussive model of traumatic brain injury, Indiana Spinal Cord and Brain Injury Research Board, Indiana State Department of Health Indiana – Individual Research Grant, \$120,000, PI

2013-2014 Preclinical evaluation of CRMP2-directed peptides for neuroprotection, Indiana Spinal Cord and Brain Injury Research Board, Indiana State Department of Health Indiana – Individual Research Grant, \$120,000, PI

2013-2014 Functional recovery following traumatic brain injury by sparing motoneuron dendrites from atrophy with a novel peptide therapeutic, Indiana State Department of Health Indiana – Individual Research Grant, \$120,000, co-PI

Industry

2012 ENA (Extendend NeuroAmides), cellular and whole animal pharmacological evaluation, Neurogate LLC, KickStart grant, \$22,000, sub-contractor (PI: Kohn)

2016-2017 TEV-48125 in brain injury and bladder, TEVA Pharmaceutical Industries, LTD, 5% effort, \$176,390, Sub-contractor (PI: Porreca)

2018-2019 Development of NaV1.7 allosteric modulators (Seed investment of \$2,000,000 from UAVenture

Capital Fund; CEO of Regulonix Holding Inc., CSO: Khanna)

https://tucson.com/business/tucsonan-launches-venture-capital-fund-to-support-u-techstart/article_cb5b442a-488e-5dd2-95e4-fadb40818a05.html

https://tucson.com/business/tucson-tech-ua-cites-impact-of-tech-startups-asnumbers/article_d699d94a-53ae-542b-a045-0b4f8904eeec.html

<https://www.azbio.org/non-opioid-pain-therapeutics-company-regulonix-raises-2-million-inseed-funding-led-by-uaventure-capital-fund>

<http://memo.ahsc.arizona.edu/index.cfm/memos/view/33548/3e537a409c18e92d>

<https://www.facebook.com/UACOM.Tucson/videos/1464773500320168/>

Private Foundations

- 2010-2011 Preclinical studies of a small peptide-based disruptor of calcium channel complexes as a novel therapeutic for chronic pain and migraine, Ralph W. and Grace M. Showalter Research Trust Fund, \$60,000, PI
- 2010-2011 Screening and validation of peptide-based disruptors of the neurofibromin and CRMP-2 interaction as novel therapeutic tools for NF1, Children's Tumor Foundation, \$15,000, PI
- 2012-2013 Assessment of peptide-based disruptors of the neurofibromin and CRMP-2 interaction as novel analgesics for neurofibromatosis type 1 (NF1), Drug Discovery Award Initiative, Children's Tumor Foundation, \$50,000, PI
- 2012-2013 A Cure for Epilepsy: Prevention of Post-traumatic Epilepsy by Targeting CRMP2-mediated Axon Sprouting, Ralph W. and Grace M. Showalter Research Trust Fund, \$60,000, PI
- 2015-2017 Molecular Targeting of Migraine in the NF1 Population, Children's Tumor Foundation, 1% effort, \$90,000, Sponsoring PI
- 2016-2018 Synodos - NF1 Porcine Model Collaborative Research Program, Children's Tumor Foundation, 10% effort, \$287,601, PI
- 2021 TAF1, T-Type channels, and X-linked Dystonia Parkinsonism, Collaborative Center for X-linked Dystonia Parkinsonism (CCXDP), 10% effort, \$549,916, PI (*declined*)

University

- 2012 Development of analgesic peptide therapeutics for AIDS-related neuropathic pain, Funding Opportunities for Research Commercialization and Economic Success (FORCES) grant, Indiana University Research Technology and Commercialization, \$25,000, PI
- 2012 Treatment of neuropathic pain by a small-molecule inhibitor of beta subunits of voltage-gated calcium channel complexes, Program Project Planning (P3) grant from Indiana University, \$100,000, multi-PI
- 2013 CBD3, a novel peptide therapeutic for chronic pain, Research Invention and Scientific Commercialization Program, Indiana Clinical and Translational Sciences Institute, \$25,000, PI
- 2015 Inducible CRISPR-Cas9 Knock-in Mice for Genome Editing and Neuropathic Pain Modeling, University of Arizona Genetically Engineered Mouse Modeling Core Grant, \$10,000, PI
- 2016 Evaluating novel pain therapeutics targeting sodium channels in human nociceptors for improved success of clinical translatability, Arizona Area Health Education Centers (AHEC) Program Research Grants, \$10,000, PI
- 2016 Regulators of NaV1.7 Channels: Novel Anti-Nociceptive Drug Candidates, Tech Launch Arizona Asset Demonstration Award, \$50,000, multi-PI
- 2016 Drug metabolism and pharmacokinetic (DMPK) and Safety Profiling of Regulators of Sodium Channels (ReNs) 155 and 194, Tech Launch Arizona Asset Demonstration Award, \$65,000, multi-PI
- 2017 From Pathophysiology to Therapeutics in Childhood Epilepsy: A translational approach using an SCN8A mouse model and human induced pluripotent stem cells, Improving Health/BIO5 Institute Accelerate for

- Success Program, \$99,164 (PI: Michael Hammer; Co-Is: Thomas Cowen, Tom Doetschman, Rajesh Khanna, Tally Largent-Milnes, Lalitha Madhavan, Helena Morrison, Todd Vanderah)
- 2021 Blocking NRP-1 for the Treatment of Pain, Cancer and Prevention of Viral Entry; Tech Launch Arizona Asset Demonstration Award, \$59,910, PI
- 2021 A Nav1.7 mouse lacking the CRMP2-binding domain: examining specificity of Nav1.7-CRMP2 coupling and testing if pain resolution requires endogenous opioid signaling; 2021 Core Facilities Pilot Program, \$10,000, PI
- 2024 Targeting Nav1.7 for the Alleviation of Chronic Pain in Parkinson's Disease and Dystonia; Fixel-Tyler's Hope Pilot Research and Education Grants Targeting Dystonia, \$22,500 (Tyler S. Nelson, R. Khanna, PI).

SUBMITTED

- 2019 Modulation of EAE disease by Collapsin Response Mediator Protein 2, NIH R01, 10% effort, Co-Investigator (PI: Feinstein, UIC)
- 2019 CRMP2, Mitochondria, and Huntington's Disease (Administrative Supplement) NIH, 10% effort, multi-PI (multi-PI: Brustovetsky, UA) 09/01/2019 - 08/31/2020
- 2019 The University of Arizona Health Sciences Older Americans Independence Center, NIH P30, 10% (coinvestigator; Co-Leader of Biological Mediators Measurement Core)
- 2020 Age-dependent recovery after mild traumatic brain injury through remote ischemic conditioning NIH R21 A1, 3% effort, Co-I (Multi-PIs: Kaveh Laksari and Elizabeth Hutchinson)
- 2020 Evaluation of Contulakin-G a novel, non-opioid, neurotensin analogue for the treatment of cancer pain NIH R01, 5% effort, Co-Investigator (PI: Patwardhan, UA)
- 2021 SARS-CoV-2 Spike protein highlights a role for VEGF-A/Neuropilin-1 receptor signaling in nociceptive processing, NIHR01, 20% effort, PI (Co-Investigator – Aubin Moutal) **Impact 30, percentile 20**
- 2021 Zinc Finger Protein based repression of VEGF-A for Neuropathic Pain, NIH R41, 10% effort, PI (Aubin Moutal, Pharmacology, PI of UA subcontract)
- 2021 Targeting the neuropilin-1 receptor (NRP-1)/VEGF-A axis for neuropathic pain, NIH R41, 10% effort, PI (Aubin Moutal, Pharmacology, PI of UA subcontract)
- 2021 Novel Drug Candidates for Rare Extreme Pain Disorder, NIH R41, 10% effort, PI (Aubin Moutal, Pharmacology, PI of UA subcontract)
- 2021 Inhibitors of CRMP2 phosphorylation for pain relief, NIH R41, 10% effort, PI (Aubin Moutal, Pharmacology, PI of UA subcontract) **36% percentile**
- 2022 Slc7a5 (Lat1) Inhibitors for Chronic Pain, NIH R34, 5% effort, co-I (Aubin Moutal, Pharmacology, multi-PI with Dr. Sascha Alles, Univ. New Mexico) **Impact Score: 47**
- 2022 Studies on RGS4 regulated pathways in models of neuropathic pain, NIHR01 5% effort, co-I (PI: Venetia Zachariou) **40% percentile**
- 2022 CRMP2 and mitochondrial dynamics in Alzheimer's disease, NIHR01 10% effort, MPI (Multi-PIs: Rajesh Khanna and Nickolay Brustovetsky (contact PI)) **Impact Score: 60; Percentile:47**
- 2022 Validation of Neuropilin-1 receptor signaling in nociceptive processing NIHR01 5% effort, MPI (MultiPIs: Rajesh Khanna (contact PI) and Aubin Moutal) **Percentile: 35**
- 2023 A novel accessory protein for Nav1.8 in chronic pain NIHR01 10% effort, MPI (Multi-PIs: Rajesh Khanna and Aubin Moutal (contact PI) \$3,812,541.00 **Impact Score: 59; Percentile: 52.0**
- 2023 Mechanisms of voltage-gated channel inhibition by triterpene natural products NIHR01 12.5% effort, PI (MPI: Leslie Gunatilaka) \$3,846,545 **Impact Score: 38**
- 2023 Calcium Channel ORAI1 Regulates Oral Cancer Progression and Modulates Pain NIHR01 7.5% effort, PI: Rodrigo Lacruz, Rajesh Khanna and Yi Ye (co-Is)
- 2023 CRMP2, mitochondria, and Alzheimer's disease, NIHR01 10% effort, MPI (Multi-PIs: Rajesh Khanna and Nickolay Brustovetsky (contact PI)) \$3,948,671 **Impact Score: 50; Percentile: 36.0**
- 2023 Targeting Schwann cell dysfunction and repair signaling in chemotherapy induced painful neuropathy,

- NIHR01 7.5% effort, PI: Yi Ye, Rajesh Khanna (co-I) \$4,629,515 **Impact Score: 35**
- 2023 TIMP-1, NaV channels, and pain, NIHR01 7.5% effort, PI: Kyle Baumbauer, Rajesh Khanna (co-I) \$998,521 **Impact Score: 42; Percentile: 34.0**
- 2023 Dissection of NTSR2/calcium channel signaling as a non-opioid spinal analgesic mechanism for the treatment of high impact chronic pain, NIHR01 1R01 10% effort, (Multi-PIs: Rajesh Khanna and Amol Patwardhan (contact PI)) **Impact Score: 27; Percentile: 16.0**
- 2024 Dissection of NTSR2/calcium channel signaling as a non-opioid spinal analgesic mechanism for the treatment of high impact chronic pain 1R01NS139492-01, 10% effort, (Multi-PIs: Rajesh Khanna and Amol Patwardhan (contact PI)) \$4,007,348 **Impact Score: 43; Percentile: 38.0**
- 2024 DEcipher Chronic low back pain heterogeneity (DECODE), NIH RM1, 10% effort (Contact PI: Kimberly T. Sibille, Rajesh Khanna (co-I)). \$8,545,768 **Impact 42**
- 2024 A peptidomimetic modulator of the CaV2.2 N-type calcium channel for chronic pain, NIH UG3/UH3 UG3NS141724, 20% effort (Rajesh Khanna (PI)) \$13,544,214 **Impact 47**
- 2024 The role of CRMP2 Regulation of the Nav1.7 Sodium Channel in Osteoarthritis Pain, NIHRO1 R01AR085522, 30% effort (Rajesh Khanna, PI; Kyle Allen and Amol Patwardhan (Co-Is))
- 2024 Fibronectin modulation of oral cancer nociception, NIHRO1 GRANT14202463, 10% effort, PI: Aditi Bhattacharya (NYU), Rajesh Khanna, co-I.
- 2024 X-ray and Cryo-EM Studies on NRP1 Inhibitors and NRP1-VEGFA165-VEGFR2 Complex, Administrative Supplement for NIHR01 7RF1NS131165-00, 10% effort, (Rajesh Khanna (PI)), \$911,054
- 2024 Deciphering the CRMP2 molecular QR code for pain signaling, 1R35NS143031-01, 50% effort (Rajesh Khanna (PI)) \$4,270,000
- 2024 Role of Slc7a5 (Lat1) in mouse and human sensory neurons in chronic pain, NIHRO1, 20% effort, MPI (Multi-PIs: Rajesh Khanna and Sascha Alles (contact PI))
- 2024 Development of Veragranine analogs as CaV3.2 inhibitors for treatment of osteoarthritis pain, 1R61NS143603-01, 20% effort (Rajesh Khanna (MPI)) \$1,625,371.00
- 2024 Exploring CRMP2 Modulation in the DMM Osteoarthritis Model: An Indirect Strategy for Targeting Nav1.7 Channels; Chicago Center on Musculoskeletal Pain Pilot Grant, Rajesh Khanna (PI), \$25,000

LIST OF COLLABORATORS

University of Florida

Kyle Allen, PhD; Yenisel Cruz-Almeida, PhD; May Khanna, PhD; John Neubert, DDS, PhD; Holger Russ, PhD.

External

Nick Betley, PhD; Mohab Ibrahim, MD, PhD; Amol Patwardhan, MD, PhD; Todd Vanderah, PhD, Nickolay Broustovetsky, PhD; Carlos J Camacho, PhD; Jerome Honnorat, MD, PhD; Tim Hucho, PhD; Anna Moroni, Ph.D.; Theodore Price, PhD; Jill Weimer, PhD; John Wood, PhD; Dawn Quelle, PhD; Gerald W Zamponi, PhD.

This is a true and accurate statement of my activities and accomplishments.



Signed: _____ Date: 11/15/2024