

Curriculum Vitae WUSM Format – Jose A. Moron-Concepcion, Ph.D.

Date: 11/18/2024

Personal Information:

Sex: Male

Place of Birth: Spain

Citizenship: US Citizen

Address and Telephone Numbers:

Department of Anesthesiology

Department of Neuroscience

Department of Psychiatry

Washington University Pain Center

Washington University School of Medicine

660 So. Euclid, Campus Box, 8054

St. Louis, MO, 63110

314-362-0078

jmoron-concepcion@wustl.edu

Present Position:

Henry E. Mallinckrodt Professor of Anesthesiology (with Tenure)

Chief of the Division of Basic Research

Professor Department of Anesthesiology

Professor Department of Neuroscience

Department of Psychiatry

Washington University Pain Center

Washington University School of Medicine

Education:

09/1988-12/1993 B.S. in Biochemistry. Universidad Autonoma de Barcelona, Spain

07/1993-07/1994 M.S. in Biochemistry and Molecular Biology. Universidad Autonoma de Barcelona, Spain

08/1994-12/1998 Ph.D. in Biochemistry and Molecular Biology at the Department of Biochemistry and Molecular Biology, School of Medicine. Universidad Autonoma de Barcelona, Spain

PhD thesis title: “Characterization of new MAO inhibitors as potential therapeutic tools for depression”.

Mentor: Mercedes Unzeta, Ph.D.

Academic Positions/Employment:

01/1999-06/2001	Postdoctoral Scientist, Behavioral Neuroscience Branch, National Institute on Drug Abuse, National Institutes of Health, Baltimore
07/2001-06/2002	Postdoctoral Scientist, Department of Pharmacology, University of Texas Health Science Center at San Antonio, San Antonio
07/2002-09/2003	Neurology R&D Programme Manager. Neurological diseases Biomarker Team Leader, Proteomika S.L., Barcelona (Spain)
10/2003-11/2006	Research Instructor, Department of Pharmacology and Biological Chemistry. Mount Sinai School of Medicine, New York
12/2006-12/2009	Assistant Professor, Department of Pharmacology and Toxicology. University of Texas Medical Branch, Galveston
12/2009-06/2013	Assistant Professor of Clinical Anesthesiology, Department of Anesthesiology. Columbia University Medical Center, New York
07/2013-09/2015	Associate Professor, Department of Anesthesiology. Columbia University Medical Center, New York
10/2015-06/2019	Associate Professor, with Tenure, Department of Anesthesiology, Department of Neuroscience, Washington University Pain Center, Washington University School of Medicine, St Louis
07/2019-present	Full Professor, with Tenure, Department of Anesthesiology, Department of Neuroscience, Department of Psychiatry, Washington University School of Medicine, St Louis
09/2019-present	Chief Division of Basic Science Research, Department of Anesthesiology, Washington University School of Medicine, St Louis
04/2020-present	Endowed Henry E. Mallinckrodt Professor of Anesthesiology

University and Hospital Appointments and Committees:

University of Texas Medical Branch-School

2008-Member, GSBS Admissions committee

University of Texas Medical Branch - Departmental

2007-2009 Co-chair, PHTO Admissions committee

2008-2009 Director of the Seminar Program

Columbia University Medical Center – Departmental

2010-2015 Chair, Mentoring Committee Basic Science Junior Faculty

Washington University in St Louis

2016 Program committee and judge for Postdoctoral Symposium.

2018 Program committee and judge for Postdoctoral Symposium.

2017-present Director of the Seminar Series at the Dept of Anesthesiology

2018-present Neuroscience Graduate School Program Admission Committee
2019-present Member of the Appointments and Promotions Committee
2019-2020 Member of the Committee for the Neuroscience Department Head Search
2020-2021 Member of the Committee for the Biochemistry Department Head Search

Medical Licensure and Board Certification:

None

Honors and Awards:

09/1993-07/1994 Erasmus Program Student from the European Community
08/1994-12/1998 Predoctoral Fellowship from the Comissionat per a Universitats i Recerca, Generalitat de Catalunya, Spain
01/1999-06/2001 Postdoctoral Visiting Fellowship from the National Institutes of Health, Bethesda, USA
12/2012 Elected to the American College of Neuropsychopharmacology

Editorial Responsibilities:

Journal of Neuroscience; PloS ONE; Journal of Neurochemistry; Hippocampus; Molecular Pharmacology; Brain Research; Drug and Alcohol Dependence; Neuropsychopharmacology; Psychopharmacology; European Journal of Neuroscience; British Journal of Pharmacology; Journal of Pharmacology and Experimental Therapeutics.

Professional Societies and Organizations:

American College of Neuropsychopharmacology (Full Member; election is by nomination only)
Society for Neuroscience
International Narcotics Research Conference (Member of the Executive Committee from 2013-2016).
American Pain Society
National Hispanic Society of Neuroscience

Federal Review Committees:

Adhoc Member of NIDA/NIH Study Section for B/START awards ZDA 1-MXS-M from 2008-2010
Adhoc Member of NIDA/NIH Study Section Special Emphasis Panel (Medications Development for Substance related disorders) ZDA1 JXR-D (10) 07/2010
Member of NIDA/NIH Study Section for Cutting-Edge Basic Research Awards (CEBRA) ZDA1 SXC-E(11) 03/2012
Adhoc member of NIH Study Section NTRC (Neurotransporters, Receptors and Ca²⁺ Signaling) 06/ 2012, 02/2013
Adhoc member of NIH Study Section NMB (Neurobiology of Motivated Behavior) 10/2012

Regular member of NIH Study Section MNPS (Molecular Neuropharmacology and Signaling) September 2013-June 2017

Adhoc member of NIDA Study Section for Center Grants (P50 and P30) 03/2017, 03/2018, 03/2020

International Review Committees:

External reviewer for the Government of Catalunya, Investigator Grants, Spain (2010-2015)

External reviewer for the Einstein Foundation Berlin, Germany (2016)

Committee Responsibilities:

National

2006-present Reviewer, National Student Research Forum

2016-2017 **Member for the National Academic of Sciences advisory committee to the FDA on Improving the use of prescription opioids to treat pain.**

2018-present **Member of the Program Committee for the Society for Neuroscience**

2019-present **Member of the Interagency Pain Research Coordinating Committee at the NIH**

2023-2027 **Member of NIH Council for the National Institute of Dental and Craniofacial Research.**

Major Invited Professorships and Lectureships:

Bordeaux Institute of Neuroscience, France. March 2006

University of Texas Medical Branch, Galveston, TX. April 2006

University of Texas at San Antonio, TX. August 2007

Rosalind Franklin University, Chicago, IL. February 2008

Rush University, Chicago, IL. September 2008

Boston University Medical School, MA, March 2009

Mount Sinai School of Medicine, New York, NY, April 2009

Columbia University, New York, NY, April 2009

NIDA Intramural Research Program, Baltimore, March 2010

University of Pennsylvania, Philadelphia, June 2010

Universitat Autònoma Barcelona, Spain, January 2011

Washington University, St. Louis, MO, March 2011

University of Texas Medical Branch, Galveston, TX, May 2011

University of Sherbrooke, Quebec, Canada, August 2011

Gallo Clinic and Research Center, UCSF, Emeryville, CA, October 2011

Johns Hopkins University, Baltimore, MD, January 2012

University of Texas Health Science Center, San Antonio, TX, April 2012

University of Arizona, Tucson, AZ, September 2012

Temple University, Philadelphia, PA, January 2013

Mount Sinai School of Medicine, New York, NY, February 2013

University of Massachusetts Medical School, Worcester, MA, September 2013

University of Miami, Miller School of Medicine, FL, February 2014

University of Michigan, Ann Arbor, March 2014

University of Maryland, Baltimore, June 2014
University of Kentucky, Lexington, September 2014
National Institute on Drug Abuse, Baltimore, March 2015
National Institute on Alcohol Abuse, Bethesda, May 2015
Vanderbilt University, Nashville, April 2016
University of Barcelona, Barcelona, June 2016
University of Valencia, Valencia, June 2016
University of Calgary, Canada, September 2016
University of Minnesota, Minneapolis, October 2016
University of California Los Angeles, LA, December 2016
University of Texas San Antonio, TX, May 2017
University of Michigan, MI, September 2017
University of California San Francisco, CA, September 2017
Northwestern University in Chicago, IL, February 2018
University of Valencia, Spain, March 2018
Rosalind Franklin University, IL, March 2018
Columbia University, NYC, May 2018
Vanderbilt University, Nashville, June 2018
National Institute on Drug Abuse, January 2019
University of Texas at Dallas, February 2019
University of North Carolina, Chapel Hill, March 2019
University of Minnesota, Minneapolis, MN, March 2019
University of Indiana, April 2019
University of Valencia, Spain, May 2019
National Center of Complementary and Integrative Health, Bethesda, MD, June 2019
University of Alberta, Canada, September 2019
University of Texas Medical Branch, November 2019
University of Texas San Antonio, March 2020
MD Anderson, April 2021
University of Texas health Science Center San Antonio, June 2021
Medical School of South Carolina, April 2022

Talks at Pharmaceutical Companies

Janssen Pharmaceutica, Beerse, Belgium. May 2005
Wyeth Pharmaceuticals, Princetown, NJ. April 2005

Consulting Relationships and Board Memberships:

None

Research Support:

Area of Research

Neuropsychopharmacology; mechanisms of action of opiates; neuroplasticity induced by opiates, interactions between opiate dependence and pain sensitivity; effects of chronic pain on motivated behavior; role of the periphery in pain mechanisms.

ACTIVE

Title: **Dissecting the role of dorsal hippocampus to nucleus accumbens circuits in opioid seeking behavior**

*Major Goals: The overall goal of this proposal is to investigate the role of excitatory transmission from the dHPC to the NAc in opioid-seeking behavior and identify novel molecular targets that may mitigate the influence of drug-cue associations on relapse. Accordingly, the aims here will 1) determine whether dHPC to NAc projecting neurons are necessary and sufficient for fentanyl-seeking; 2) examine the effects of fentanyl-seeking behavior on function and plasticity of NAc neurons receiving inputs from the dHPC; 3) determine the cell-type-specific role of NAc MSNs receiving input from the dHPC in fentanyl seeking behavior.

Project Number: **R01DA058613**

Name of PD/PI: Moron-Concepcion

Source of Support: **NIH/NIDA**

Project/Proposal Start and End Date: (MM/YYYY) (if available): 04/01/2024-03/30/2029

Total Award Amount (including Indirect Costs): \$ 2,853,715

Title: **Sex-specific mechanisms underlying the effects of pain on opioid seeking**

Major Goals: The focus of our research proposal is to dissect the neuronal and cellular mechanisms underlying alterations in opioid circuits that lead to opioid misuse in pain conditions and in a sex-dependent manner. Findings generated from the proposed research will provide critical insight on the circuit-based mechanisms underlying pain-induced increase in opioid intake with an insight on sex differences, transforming our understanding of opioid misuse and abuse.

Project Number: **R01DA054900**

Name of PD/PI: Moron-Concepcion

Source of Support: **NIH/NIDA**

Project/Proposal Start and End Date: (MM/YYYY) (if available): 09/15/2022-06/30/2027

Total Award Amount (including Indirect Costs): \$2,720,935

Title: **Determining the impact of BNST CRF systems on inflammatory pain-induced disruptions of behavior**

Major Goals: The overarching goal of this application is to examine the role for the BNST CRF system on pain-induced alterations in behaviors. Previous work in our laboratory has shown that the induction of persistent inflammatory pain leads to the emergence of negative affect which is characterized by a reduction/loss of motivated behaviors. The scope of the Moron-Concepcion laboratory for this project is to examine the manipulation of the BNST CRF systems in the impact of pain on goal directed behaviors for natural reinforcers as a proxy for motivational states.

Project Number: **R01NS122230**

Name of PD/PI: Kash (Site PI: Moron-Concepcion)

Source of Support: **NIH (UNC)**

Project/Proposal Start and End Date: (MM/YYYY) (if available): 04/01/2021-03/31/2026

Total Award Amount (including Indirect Costs): \$664,274

Title: Amygdala Kappa Opioid System Involvement in Opioid Relapse in Pain States

Major Goals: The overarching goal of this application is to examine the role for the dynorphin-Kappa opioid receptor (KOR) system within the Central Amygdala (CeA) in the mechanisms underlying relapse to opioid seeking behavior in chronic pain conditions. The scope of the Moron-Concepcion laboratory for this project is to examine whether the dynorphin-KOR system in the CeA mediates negative reinforcement in chronic pain. More specifically, our laboratory will be conducting studies to: 1- Examine whether activation of dyn-KOR system in the CeA promotes place aversion. 2- Examine whether relapse to opioid seeking behavior is mediated via activation of the dyn-KOR system within the CeA.

Project Number: **R01DA053752**

Name of PD/PI: Cahill (Site PI: Moron-Concepcion)

Source of Support: **NIH (UCLA)**

Project/Proposal Start and End Date: (MM/YYYY) (if available): 05/01/2022-02/28/2027

Total Award Amount (including Indirect Costs): \$450,210

Title: Biomedical Research Training in Drug Abuse

Major Goals: This is a renewal of an Institutional National Research Service Award, which we have held for 30 years to support multidisciplinary, interdepartmental post-doctoral training focused on the neurobiology of substance abuse with a strong emphasis on neuroimaging, molecular and familial genetics, pharmacoepidemiology, behavior, neural circuits, and pharmacology.

Project Number: **5 T32 DA007261-31**

Name of PD/PI :Agrawal/Moron-Concepcion

Source of Support: NIDA

Project/Proposal Start and End Date: 9/30/91-6/30/27

Total Award Amount (including Indirect Costs): \$501,686

Title: The WUSTL PREP post-bacc program to enhance doctoral readiness in neuroscience

Major Goals: The Neuroscience Postbaccalaureate Research Education Program (NeuroPREP) will contribute to national efforts aiming to address these systemic problems by increasing access for UR students to graduate training in Neuroscience. We will build regional networks of Schools to identify, recruit and foster program participation from students who currently lack access to in-depth research experiences. After 2 years, NeuroPREP students will be fully prepared to pursue graduate training in neuroscience.

Project Number: **1R25NS130965-01**

Name of PD/PI: Moron-Concepcion/Paul Taghert

Source of Support: NINDS

Project/Proposal Start and End Date: (MM/YYYY) (if available): 02/01/2023-01/31/2027

Total Award Amount (including Indirect Costs): \$1,408,938

Title: Neurogenetic modeling of acute fentanyl toxicity in Drosophila

Major Goals: Fentanyl overdose is now the primary cause for accidental and intentional OUD-related deaths. Although the addictive aspects of fentanyl abuse seem to be mediated via its action as a ligand of the canonical opioid receptors, the specific pathways that mediate its acute toxic effects remain mostly a mystery at the genetic, molecular, and cellular levels. To address this important gap, here we propose to develop genetically tractable Drosophila model for identifying targets of acute fentanyl toxicity.

Project Number: **Here and Next Strategic Plan**

Name of PD/PI: Moron-Concepcion

Source of Support: **Washington University Research Development Office**

Project/Proposal Start and End Date: (MM/YYYY) (if available): 07/01/2024-06/30/2025

Total Award Amount (including Indirect Costs): \$50,000

Pending

Title: Dissecting the mechanisms underlying fentanyl induced respiratory depression

Reviewed, 10% (27 priority score)

Major Goals: In this application we propose studies to assess how fentanyl complicates treatment of opioid overdose. In addition, our proposed studies might establish the mechanisms underlying fentanyl-induced respiratory depression. Overall, findings generated in this proposal will eventually lead to develop new therapeutic interventions to prevent and rescue fentanyl-induced fatal overdoses.

Project Number: R01DA063220

Name of PD/PI: Moron-Concepcion

Source of Support: NIH/NIDA

Project/Proposal Start and End Date: (MM/YYYY) (if available): 04/01/2025-03/31/2030

Total Award Amount (including Indirect Costs): \$3,057,465

COMPLETED:

Title: Dissecting the central and peripheral mechanisms to fentanyl induced respiratory depression

Major Goals: In this application we propose studies to assess how fentanyl complicates treatment of opioid overdose. In addition, our proposed studies might establish the mechanisms underlying fentanyl-induced respiratory depression. Overall, findings generated in this proposal will eventually lead to develop new therapeutic interventions to prevent and rescue fentanyl-induced fatal overdoses.

Project Number: **R56DA059067**

Name of PD/PI: Moron-Concepcion

Source of Support: **NIH/NIDA**

Project/Proposal Start and End Date: (MM/YYYY) (if available): 07/01/2023-06/30/2024

Total Award Amount (including Indirect Costs): \$442,484

Title: Defining a role for KAPPA opioid system in affective behavior and drug escalation in pain

Major Goals: Using a series of multidisciplinary approaches including electrophysiology, microdialysis, voltammetry, optogenetics, chemogenetics, mouse genetics, and rodent PET imaging tools, we propose to determine whether in vivo manipulation of dynorphin-KOPR system in the VTA-NAc circuit prevents pain-induced negative affect which drives opioid dose escalation.

Project Number: **R01DA045463**

Name of PD/PI: Moron-Concepcion

Source of Support: **NIH/NIDA**

Project/Proposal Start and End Date: (MM/YYYY) (if available): 09/30/2018-07/30/2024

Total Award Amount (including Indirect Costs): \$1,404,798

Title: **Development of an implantable closed-loop system for delivery of naloxone for the prevention of opioid-related overdose deaths**

Major Goals: In the UG3 phase, our first aim is to design, fabricate, and demonstrate functional closed-loop delivery of naloxone in rat. The second aim is to perform pilot studies in pig that will inform preclinical trials to be carried out in the UH3 phase. In the UH3 phase our first aim is to develop a robust, biocompatible implantable device scaled for use in large animals and humans. The second aim is to conduct a preclinical trial in pigs to test the hypothesis that the newly developed closed-loop device is able to rescue a pig in acute respiratory depression induced by intravenous fentanyl.

Project Number: **UH3DA050303**

Name of PD/PI: Gereau, Rogers (Moron-Concepcion, Co-Investigator)

Source of Support: **NIH/NIDA**

Project/Proposal Start and End Date: (MM/YYYY) (if available): 09/15/2021-09/14/2024

Total Award Amount (including Indirect Costs): \$6,275,050

Title: Role of SK2 Channels in Morphine Dependence

Major Goals: The overall objectives are to uncover the cellular mechanisms underlying morphine-induced activation of SK2 channels, and to investigate how the activation of hippocampal SK2 channels is integral for formation of morphine conditioned behavior (CPP) and its reinstatement.

Project Number: R01DA042499

Name of PD/PI: Moron-Concepcion

Source of Support: NIH/NIDA

Project/Proposal Start and End Date: (MM/YYYY) (if available): 05/01/2017-01/31/2023
NCE

Total Award Amount (including Indirect Costs): \$1,883,500

Title: *Dissecting Circuits Mediating Pain-Induced Alterations in Motivated Behavior*

Major Goals: In this application, we propose cross disciplinary cutting-edge approaches to dissect the neuronal and cellular mechanisms underlying the downregulation of mu-opioid circuits in the presence of inflammatory pain.

Project Number: R01DA041781

Name of PD/PI: Moron-Concepcion

Source of Support: NIH/NIDA

Project/Proposal Start and End Date: (MM/YYYY) (if available):02/01/2017-11/30/2022
NCE

Total Award Amount (including Indirect Costs): \$456,028

R33DA041883 (Nelson, Dougherty, & Moron-Concepcion)

04/01/2018-03/31/2022

NIH/NIDA

\$237,000

Using Transgenic Mice to Examine the Role of CNH3 Variants in Opioid Dependence

This proposal will determine gene expression in response to morphine, focusing on addition-related brain regions in which AMPA receptor subunit mice with the protective and risk-associated haplotypes. We will also examine potential routes by which haplotype-associated effects may be mediated.

Role: Co-Principal Investigator

NARSAD (Moron-Concepcion)

09/15/2017-09/14/2019

Brain & Behavior Research Foundation

\$46,297

Role of KAPPA Opioid Receptors in the Comorbidity Between Pain and Affective Disorders

In this application we propose cross disciplinary cutting-edge approaches to dissect the neuronal and cellular mechanisms underlying the downregulation of mu-opioid circuits in the presence of inflammatory pain.

R21DA042581 (Moron-Concepcion)

06/01/2016-05/31/2018

NIH/NIDA

\$125,000

In vivo imaging of dynamic structural plasticity driving morphine conditioned place preference

In this proposal we will conduct *in vivo* imaging analyses in awake mice to elucidate the temporal dynamics of hippocampal dendritic spine remodeling and its relationship to the formation of drug-context associations that may play a role in the mechanisms underlying reinstatement of drug seeking. In addition we will implement novel virtual navigation approaches to examine hippocampal circuit dynamics during the formation of morphine-context associations.

Role: Principal Investigator

NIH/NIDA 1R03DA023454-01; “PSD-protein expression in extinction of morphine-dependent conditioned behavior”; Principal Investigator, 07/01/2007-06/30/2008, \$50,000.

This project examine alterations in the expression profile of PSD proteins during the extinction of morphine-induced conditioned place preference.

Irving Institute for Clinical and Translational Research , Clinical Trials Office Pilot Award; “Glial inhibitors: Novel therapeutic tools for opioid abuse and pain”;

Principal Investigator, 07/01/2012-06/30/2013, \$50,000.

This project is conducted in collaboration with Dr Sandra Comer from the Dept Psychiatry at Columbia. The main goal of the project is to characterize the role of glial inhibitors on the abuse liability of opiates in the presence of chronic pain.

NIH/NIDA 1R01DA025036; “Mechanisms underlying opiate-induced neuroplasticity at the synapse”; Principal Investigator, 01/01/2009-11/30/2013, \$1,320,000.

This project examines the role of AMPA and NMDA receptors in the neuroadaptations in response to morphine administration.

Skin Disease Research Center/Department of Dermatology Pilot Grant Award, Pilot and Feasibility Study Program, Columbia University; “Characterization and identification of AMPA receptors in the skin”. Principal Investigator. 07/01/2013-06/30/2014, \$25,000

This project will identify and characterize the expression of AMPA glutamate receptors in keratinocytes and their implication in the adverse effects of opioid treatments such as itch and hyperalgesia. This project will be conducted in collaboration with Drs Ellen Lumpkin and David Owens from the Dept Dermatology at Columbia.

R01DA027460 (Moron-Concepcion) 07/01/2010-06/30/2016 3.6 calendar months
NIH/NINDS \$423,123 NCE

“AMPA Receptors: Common role in opiate withdrawal and pain sensitivity”.

Overall, these studies will provide insight into the neuroplasticity that may lead to novel approaches for pharmacotherapeutic intervention for pain treatment in opiate addicts.

Role: Principal Investigator

R21DA036826 (Moron-Concepcion) 06/01/2014-05/31/2017 NCE 1.8 calendar
months NIH/NINDS \$76,018

Role for delta opioid receptor in morphine tolerance during chronic pain

In this application we propose that pretreatment with DOP antagonists or disruption of the MOP-DOP heteromer will result in an attenuation of the analgesic tolerance that develops after repeated morphine injections during chronic pain. We also propose that morphine-induced analgesic tolerance is mediated by increased DOP function and MOP-DOP heteromer abundance, which in turn reduces MOP-mediated inhibition of excitatory transmission.

Role: Principal Investigator

McDonnell Small Grants (Moron-Concepcion) 07/01/2016-06/30/2017 0 calendar months

Center for Cellular and Molecular Neurobiology \$40,000

Dissecting the neural circuits involved in the effects of pain on opioid addiction

The overall goal of this proposed application is to determine whether the presence of persistent pain modifies the patterns of prescription opiate (i.e. morphine) self-administration by promoting tolerance to the reinforcing properties of the drug which could act to precipitate drug escalation.

Role: Principal Investigator

microPET Pilot Project (Moron-Concepcion) 04/01/2016-03/01/2017 0 calendar months

Internal grant \$22,000

The overall objectives for this resource are to optimize small animal imaging approaches to determine the specific anatomical localization of the reduction in DA transmission in this pathway.

Patents:

None

Teaching Experience and Responsibilities:

University of Texas Medical Branch

a. Teaching:

Graduate School

2007-2009 PHTO 6212 – Autonomic Cardiovascular and CNS Pharmacology

2007- PHTO 6223 – Neuropharmacology

b. Students/Mentees/Advisees/Trainees:

Post-doctoral fellows:

Sophie Grimond-Billa, Ph.D., 03/2007 – 01/2010

Sri Rayja Rudrabhatla, Ph.D., 06/2008 – 11/2009

Nicole Bjorklund, Ph.D. 01/2008 – 01/2010

Undergraduate students:

Mary Eldhart, 05-08/2007 (SURP Program)

Columbia University Medical Center

a. Teaching:

CA2 Anesthesiology residents
2010-present ABA-Basic Pharmacology of Opioids
Pain Medicine Fellows

2010-2015 Basic Research in Pain Medicine

2011-2015 New Advances in Pain Research

b. Former and Current Research Fellows

Post-doctoral fellows:

Yan Xia, PhD	12/2009-01/2011
George Portugal, Ph.D	07/2010-05/2013
David Cabanero Ferri, DVM, PhD	05/2010-07/2014
Lucia Hipolito, Ph.D	08/2011-08/2014
Zara Melyan, Ph.D	12/2010-2015
Amanda Fakira, Ph.D	02/2011-2015
Adrienne Wilson-Poe, Ph.D	10/2014-06/2019
Nicolas Massaly, Ph.D	11/2014-present

Clinical Faculty

Anis Dizdarevic, M.D. 01/2012-2015

Dr Dizdarevic is a clinical faculty at the Pain Center at Columbia. We are conducting a collaborative project about the use of delta-opioid receptor ligands to prevent morphine-induced analgesic tolerance in animal chronic pain models.

Residents and Fellows

Takeshi Irie, MD, PhD	06/2012-January 2013 (Anesthesia Resident)
Kristoff Padjen, MD, PhD	09/2012-2015 (Pain Fellow)

Medical Students

Elaine Zhong	03/2013-2014 (second year Columbia medical student)
Blake Butler	06/2014-2015 (third year Columbia medical student)

Undergraduate Students:

Claudia Chauvet	04-06/2011
Brianna Carussillo	05/2011-01/ 2012
Arthur Avakian	06/2012-06-2013
Jose Gonzalez	06/2012-08/2014
Alexandra Berman	06/2013-09/2015
Rebecca Blandon	05/2013-08/2013
Katherine Lopez	05/2014-09/2015

Washington University School of Medicine

b. Former and Current Research Fellows

Post-doctoral fellows

Adrienne Wilson-Poe, Ph.D	10/2015-06/2019
Nicolas Massaly, Ph.D	10/2015-present
Sidney Williams, PhD	06/2016-06/2020

Nisa Ibrahim, PhD	01/2019-present
Brian Ruyle, PhD	05/2019-present
Jessica Higginbotham, PhD	09/2019-present
Yolanda Campos, PhD	01/2020-present

Graduate Students:

Tamara Markovic (Neuroscience)	04/2016-04/2021
Hannah Frye (Neuroscience)	04/2016-04/2021
Dominika Burek (Neuroscience)	08/2016-08/2021
Tania Lintz (Neuroscience)	06/2021-present

Residents and Fellows

Nicholas Gregory, MD, PhD	10/2015-05/2019
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Undergraduate Students:

Kristine Yoon	01/2016-04/2017
Mathew Bredder	01/2016-05/2017
Will Post	01/2016-05/2019
Kevin Nakajima	05/2016-05/2018
Kyung Bae Lee	06/2016-05/2018
Beth Weise	07/2016-06/2018
Eriz Sze	09/2018-present
Luis Cuevas	09/2018-present
Grace Yu	05/2019-present

Technicians:

Chris Trousdale, Bsc	01/2016-05/2019
Will Post, Bsc	05/2017-06/2019
Jennifer Garcia, Bsc	09/2017-06/2019
Kristine Yoon Bsc	05/2017-05/2021
Justin Meyer Bsc	08/2019-present
Yinka Idowu	04/2019-present

Thesis Advisor:

Hannah Frye, PhD candidate, Washington University. Role: Advisor. Thesis Defense: April 2021

Tamara Markovic, PhD candidate, Washington University. Role: Advisor. Thesis Defense: April 2021.

Dominika Burek, PhD candidate, Washington University. Role: Advisor. Thesis Defense: August 2021.

Thesis Committees:

Samantha White, PhD candidate, University of Pennsylvania. Advisor: Dr Christopher Pierce. Thesis defense: June 21, 2013 (external committee member).

Daniel Christofell, PhD candidate, Mount Sinai School of Medicine. Advisor: Dr Scott Russo. Thesis defense: August 14, 2013 (external committee member)

Sam Golden, PhD candidate, Mount Sinai School of Medicine. Advisor: Dr Scott Russo. Thesis defense: September 26, 2014 (external committee member)

Greg Salimando, PhD candidate, Vanderbilt University. Advisory: Dr Danny Winder.

Jose Grajales, MD/PhD candidate, Washington University. Advisor: Dr Rob Gereau.

Kyla Nygaard, PhD candidate, Washington University. Advisor: Dr Joe Dougherty

Bibliography:

A. ARTICLES:

(*) Indicates senior authorship

1) M.Valoti, J.A. Morón, G.P. Sgaragli and M. Unzeta. "Evidence of a coupled mechanism between monoamine oxidase and peroxidase in the metabolism of tyramine in rat intestinal mitochondria". *Biochemical Pharmacology* (1998) 55: 37-43.

2) J.A. Morón, V. Perez, E. Fernandez-Alvarez, J.L. Marco and M. Unzeta. "In vitro effects of some 5-hydroxy-indolealkylamine derivatives on monoamine uptake systems". *Journal of Neural Transmission* (1998) [suppl] 52: 343-349.

3) J.A. Morón, V. Pérez, E. Fernández-Alvarez, J.L. Marco and M. Unzeta. "New 2-[(5-methoxy-1-methylindolyl)]alkylamine derivatives: the effect of branching and elongation of the side chain on MAO inhibition". *Journal . Enzyme Inhibition* (1998) 13: 237-251

4) J.A. Morón, V. Pérez, M. Pastó, J.M. Lizcano and M. Unzeta. "Effects of a new MAO-A inhibitor, FA70, on monoamine metabolism in mice brain cortex". *Journal of Pharmacology and Experimental Therapeutics* (2000) 292:788-794.

5) J.A. Morón, M. Campillo, V. Pérez, M. Unzeta and L. Pardo. "Molecular determinants of MAO selectivity in a series of indolealkylamine derivatives: biological activities, 3D-QSAR/CoMFA analysis and computational simulation of ligand recognition". *Journal of Medicinal Chemistry* (2000) 43: 1684-1691.

6) V. Perez, J.A. Moron, M. Pasto and M. Unzeta. "Neuroprotective aspects of a novel MAO-B inhibitor PF9601N". *Neurobiology* 2000;8(3-4):231-6.

7) V. Chefer, J.A. Morón, B. Hope, W. Rea and T. S. Shippenberg. "Kappa opioid receptor activation prevents alterations in mesocortical dopamine neurotransmission that occur during abstinence from cocaine". *Neuroscience* (2000) 101(3):619-627.

- 8) L. Daws, P. Callaghan, J.A. Morón, K. Kahlig, T. Shippenberg, J. Javitch and A. Galli. "Cocaine increases dopamine uptake and cell surface expression of dopamine transporters". *Biochemical and Biophysical Research Communications* (2002) 290: 1545-1550.
- 9) J.A. Morón, L. Carvelli, K. Kahlig, J. Ferrer, N. Sen, J. Lechleiter, L. Leeb-Lundberg, G. Merrill, E. Lafer, L. Ballou, T. Shippenberg, J. Javitch, R. Lin and A. Galli. "PI 3-kinase regulation of dopamine uptake". *Journal of Neurochemistry* (2002) 81: 859-869.
- 10) J. A. Morón, A. Brockington, R. Wise, B. Rocha and B. Hope. "Dopamine uptake through the NET in brain regions with low levels of the DAT: Evidence from knockout mouse lines". *Journal of Neuroscience* (2002) 22(2):389-395
- 11) J. A. Morón, I. Zakharova, J. Ferrer, G. Mirrel, B. Hope, E. Lafer, Z. Lin, J. Wang, J. Javitch, A. Galli and T. Shippenberg. "Mitogen-Activated Protein Kinase regulates dopamine transporter surface expression and dopamine transport capacity". *Journal of Neuroscience* (2003) 23: 8480-8488.
- 12) B. Garcia, Y. Wei, J.A. Morón, R. Lin, J.A. Javitch, A. Galli. "AKT is essential for insulin modulation of amphetamine-induced human dopamine transporter cell surface redistribution". *Molecular Pharmacology* (2005) 68: 102-109.
- 13) V. Chefer, T. Czyzyk, E. Bolan, J. Morón, J. Pintar, T. Shippenberg. "Endogenous kappa opioid receptor systems regulate mesoaccumbal dopamine dynamics and vulnerability to cocaine". *Journal of Neuroscience* (2005) 25: 5029-5037.
- 14) J.A. Morón, Abul-Husn NS, Rozenfeld R, Dolios G, Wang R, Devi LA. "Morphine administration alters the profile of hippocampal postsynaptic density-associated proteins: A proteomic study focusing on endocytic proteins". *Mol Cell Proteomics*. (2007) 6: 29-42.
- 15) J.A. Morón and L.A. Devi. "Use of proteomics for the identification of novel drug targets in brain diseases". *J Neurochem* (2007) 102(2):306-15.
- 16) N.S. Abul-Husn, I. Bushlin, J.A. Morón, S. Jenkins, G. Dolios, R. Wang, R. Iyengar, A. Ma'ayan, and L.A. Devi. "Systems approach to explore components and interactions in the presynapse". *Proteomics* (2009) 9:3303-3315.
- 17) S. Billa, N. Sinha, S. Rudrabhatla, and J.A. Morón. "Extinction of morphine-dependent conditioned behavior is associated with increased phosphorylation of the GluR1 subunit of AMPA receptors at hippocampal synapses". *European Journal of Neuroscience* (2009) 29:55-64. (*)
- 18) J.A. Morón, S. Gullapalli, C. Taylor, A. Gupta, I. Gomes and L.A. Devi. "Modulation of opiate-related signaling molecules in morphine-dependent conditioned behavior: conditioned place preference to morphine induces CREB phosphorylation". *Neuropsychopharmacology* (2010) 35(4):955-966.

- 19) J.A. Morón and T. A. Green. "Exploring the molecular basis of addiction: Drug-induced neuroadaptations". *Neuropsychopharmacology* (2010) 35(1): 337-338. (*)
- 20) S. Billa, J. Liu, N. Bjorklund, N. Sinha, Y. Fu, P. Shinnick-Gallagher, and J.A. Morón. "Increased insertion of GluR2-lacking receptors at hippocampal synapses upon repeated morphine administration". *Molecular Pharmacology* (2010) 77:874-883 [Epub ahead of print Feb 16]. (*)
- 21) S. Billa, Y. Xia J.A. Morón. "Disruption of morphine CPP by delta-2-opioid receptor antagonist: study of mu- and delta-opioid receptor expression at hippocampal synapses" *European Journal of Neuroscience* (2010) 32:625-631[Epub ahead of print July 19]. (*)
- 22) Y. Xia, G. Portugal, A. Fakira, Z. Melyan, R. Neve, HT Lee, S. Russo, J. Liu, J.A. Morón. "Hippocampal GluA1-containing AMPA receptors mediate context-dependent sensitization to morphine". *Journal of Neuroscience* (2011) 3(45):16279-16291. (*)
- 23) T. Leung , Y. Lu , M. Yan, J.A. Morón-Concepcion, S.C. Ward, X. Ge , L. Conde de la Rosa. Nieto N. "Argininosuccinate synthase conditions the response to acute and chronic ethanol-induced liver injury in mice". *Hepatology*. (2012) 55(5):1596-609.
- 24) D. Cabanero, S. Zhou, A. Baker, Z. Melyan, S. Carlton and J.A. Morón. "Pain after discontinuation of morphine treatment is associated with synaptic increase of GluA4-containing AMPAR in the dorsal horn of the spinal cord". *Neuropsychopharmacology* (2013) 38(8):1472-84. (*)
- 25) D. Hogan, A. Baker, J. A. Morón, Susan M. Carlton. "Systemic morphine treatment induces changes in firing patterns and responses of nociceptive afferent fibers in mouse glabrous skin". *Pain* (2013) Nov: 154(11):2297-309.
- 26) A. Fakira, G. Portugal, B. Carusillo, Z. Melyan, and J.A. Morón. "Increased SK channel-NMDAR mediated negative feedback on NMDA receptors impairs synaptic plasticity following context-dependent sensitization to morphine". *Biological Psychiatry* (2014) 75(2): 105-114. (*)
- 27) Portugal GS, Al-Hasani R, Fakira AK, Gonzalez-Romero JL, Melyan Z, McCall JG, Bruchas MR, Morón JA. "Hippocampal Long-Term Potentiation Is Disrupted during Expression and Extinction But Is Restored after Reinstatement of Morphine Place Preference" *J Neurosci*. 2014 Jan 8;34(2):527-38. (*)
- 28) C. Cahill, A. Taylor, C. Cook, E. Ong, J.A. Morón, C. Evans. "Does kappa opioid receptor system contribute to pain aversion?" *Frontiers in Pharmacology* (2014) 5:253.
- 29) E. Gallo, M. Salling, J. Javitch, J.A. Morón, N. Harrison, C. Kellendonk. "Upregulation of dopamine D2 receptors in the nucleus accumbens indirect pathway increases

locomotion but does not reduce alcohol consumption." *Neuropsychopharmacology*, 2015 June 40(7):1609-18.

30) H. Beaudry, L. Gendron, and J.A. Morón. "Implication of DOP2 but not DOP1 in development of morphine analgesic tolerance in a rat model of chronic inflammatory pain" *Eur J Neurosci*. 2015 Apr;41(7):901-7. (*)

31) L. Hipolito, A. Fakira, D. Cabanero, R. Blandon, S. Carlton, J.A. Morón. Z. Melyan. "In vivo activation of the SK channel in the spinal cord reduces the NMDAR antagonist dose needed to produce antinociception in an inflammatory pain model". *Pain* 2015 May 156(5):849-58.

32) Stockton SD Jr, Gomes I, Liu T, Moraje C, Hipólito L, Jones MR, Ma'ayan A, Morón JA, Li H, Devi LA.". *Mol Cell Proteomics*. 2015 Oct;14(10):2564-76.

33) Elliot C. Nelson, Arpana Agrawal, Andrew C. Heath, Richard Sherva, Bo Zhang, Ream Al-Hasani, Michael R. Bruchas, Yi-Ling Chou, Amanda K. Fakira, Lindsay A. Farrer, Alison Goate, Scott Gordon, Anjali K. Henders, Victor Hesselbrock, Manav Kapoor, Michael T. Lynskey, Pamela A.F. Madden, J.A. Morón, John P. Rice, Nancy L. Saccone, Sibylle G. Schwab, Fiona L. Shand, Alexandre A. Todorov, Leanne Wallace, Ting Wang, Naomi Wray, Xin Zhou, Louisa Degenhardt, Nicholas G. Martin, Henry R. Kranzler, Joel Gelernter, Laura J. Bierut, David J. Clark, and Grant W. Montgomery. "A genome-wide association study provides evidence of *CNIH3* involvement in opioid dependence". *Molecular Psychiatry* 2015, Aug 4. doi: 10.1038/mp.2015.102. [Epub ahead of print]

34) L. Hipolito, A. Wilson-Poe, Y. Campus-Jurado, E. Zhong, J. Gonzalez-Romero, L. Virag, R. Whittington, S. Comer, S. Carlton, B. Walker, M. Bruchas and J.A. Morón. "Inflammatory pain promotes increased opioid self-administration: role of dysregulated ventral tegmental area mu opioid receptors". *Journal of Neuroscience* 2015 Sept 2:35(35): 12217-12231 (*)

35) J. Moreno, P. Miranda-Azpiazu, A.Garcia-Bea, Y. Younkin, M. Cui, A. Kozlenkov, A. Ben-Ezra, G. Voloudakis, A. Fakira, L. Baki, Y. Ge, A. Georgakopoulos, J.A. Morón., G. Milligan, J. Lopez-Gimenez, N. Robakis, D. Logothetis, J. Meana, J. Gonzalez-Maeso. "Mechanistic insights into the allosteric crosstalk between mGlu2 and 5-HT2A receptors acting as an altered heteromer in schizophrenia". *Science Signaling* 2016 Jan 12;9(410).

36) A. Fakira, N. Massaly, O. Cohensedgh, A. Berman, J.A. Morón. "Morphine-associated contextual cues induce structural plasticity in hippocampal CA1 pyramidal neurons" *Neuropsychopharmacology*. 2016 Jun 1. doi: 10.1038/npp.2016.69 (*)

37) D. Cabanero, T. Irie, M. Celorrio, C. Trousdal, D. Owens, D. Virley, P. Albrecht, M. Caterina, F. Rice, and J.A. Morón. "Identification of an epidermal keratinocyte AMPA glutamate receptor involved in dermatopathies associated with sensory abnormalities". *Pain Reports* 1(3):e573, September 2016. (*)

38) N. Massaly, J.A. Morón, R. Al-Hasani. "A trigger for opioid misuse: Chronic pain and stress dysregulate the mesolimbic pathway and kappa opioid system". *Frontiers in Neuroscience* 2016, Nov 7; 10:480.

39) A. Wilson-Poe, J.A. Morón "The dynamic interaction between pain and opioid misuse" *Br J Pharmacology* 2017, Jun 11. doi: 10.1111/bph.13873. [Epub ahead of print] (*)

40) C. Bavley, R. Rice, D. Fischer, A. Fakira, M. Byrne, M. Boboila, D. Del Prete, B. Rizzo, A. Alaedini, J.A. Morón, J. Higgins, L. D'Adamio, and A. Rajadhyaksha "Rescue of learning and memory deficits in the human non-syndromic intellectual disability cereblon knockout mouse model by targeting the AMPK-mTORC1 translational pathway". *Journal of Neuroscience*, 2018 Mar 14;38(11):2780-2795

41) N. Massaly & J.A. Morón "Pain and Opioid Systems, Implications in The Opioid Epidemic". *Current Opinion in Behavioral Sciences*, 2019 Volume 26: 69-74.

42) Taylor BK, Sinha GP, Donahue RR, Grachen CM, Morón JA, Doolen S. "Opioid receptors inhibit the spinal AMPA receptor Ca²⁺ permeability that mediates latent pain sensitization". *Experimental Neurology*. 2019 Apr;314:58-66.

43) N. Massaly, A. Wilson-Poe, L. Hipolito, T. Markovic, S.Liu, D. Batthi, B. Walker, R. Neve, C. Cahill, K. Shoghi, R. Al-Hasani, M. Bruchas. J.A. Morón "Pain-induced negative affect is mediated via recruitment of the Nucleus Accumbens kappa opioid system". *Neuron*, Mar 13. pii: S0896-6273(19)30164-3. doi: 10.1016/j.neuron.2019.02.029 (*)

44) Sidney B Williams, Moises Arriaga, William W Post, Akshata A Korgaonkar, Jose A Moron*, Edward B. Han*. "Hippocampal Activity Dynamics During Contextual Reward Association in Virtual Reality Place Conditioning". *BioRxiv*. February 10, 2019. doi: <https://doi.org/10.1101/545608> (*) *Co-corresponding

45) H. Frye, S. Williams, C. Trousdale, J. Dougherty, E. Nelson, J.A. Morón. "Cornichon Homolog-3 (CNIH3) Modulates Spatial Memory in Female Mice". *BioRxiv*, 2019. doi: <https://doi.org/10.1101/724104> (*)

46) Bechara A, Berridge KC, Bickel WK, Morón JA, Williams SB, Stein JS. " A Neurobehavioral Approach to Addiction: Implications for the Opioid Epidemic and the Psychology of Addiction". *Psychol Sci Public Interest*. 2019 Oct;20(2):96-127. doi: 10.1177/1529100619860513. PMID: 31591935

47) Campos-Jurado Y, Martí-Prats L, Morón JA, Polache A, Granero L, Hipólito L. "Dose-dependent induction of CPP or CPA by intra-pVTA ethanol: Role of mu opioid

receptors and effects on NMDA receptors". *Prog Neuropsychopharmacol Biol Psychiatry*. 2020 Jan 21:109875. doi: 10.1016/j.pnpbp.2020.109875. [Epub ahead of print] PMID: 31978422

48) Faouzi, Abdelfattah; Uprety, Rajendra; Gomes, Ivone; Massaly, Nicolas; Keresztes, Attila; Le Rouzic, Valerie; Gupta, Achla ; Zhang, Tiffany; Yoon, Hye; Ansonoff, Michael; Allaoa, Abdullah; Pan, Ying; Pintar, John; Morón, Jose; Streicher, John; Devi, Lakshmi; Majumdar, Susruta. "Synthesis and pharmacology of a novel μ - δ opioid receptor heteromer- selective agonist based on the carfentanyl template" *J Med Chemistry*. 2020, Nov 25;63(22):13618-13637.

49) Dominika J. Burek, B.A.; Nicolas Massaly, Ph.D.; Michelle Doering, B.A.; Azra Zec, B.S.; Jordan Gaelen, B.S.; Jose A Moron, PhD. "Long-Term Inflammatory Pain Does Not Impact Exploratory Behavior and Stress Coping Strategies in Mice". *PAIN*, 2021, Jan 5; Publish Ahead of Print. doi: 10.1097/j.pain.0000000000002179. (*)

50) Adrienne Rae Wilson-Poe, PhD; Beth Wiese, PhD; Cherkaouia Kibaly, PhD; Lindsay Lueptow, PhD; Jeniffer Garcia, MS; Preeti Anand, MD; Catherine Cahill, PhD; Jose A. Morón, PhD. "Effects of Inflammatory Pain on CB1 Receptor in the Midbrain Periaqueductal Gray". *PAIN Reports, Pain Rep*. 2021 Mar 5;6(1):e897.(*)

51) Pain, negative affective states and opioid-based analgesics: Safer pain therapies to dampen addiction. Massaly N, Markovic T, Creed M, Al-Hasani R, Cahill CM, Moron JA. *Int Rev Neurobiol*. 2021;157:31-68. doi: 10.1016/bs.im.2020.09.002. Epub 2021 Feb 2.(*)

52) Daniel C. Castro, Corinna S. Oswell, Eric T. Zhang, Christian E. Pedersen, Sean C. Piantadosi, Mark A. Rossi, Avery Hunker, Anthony Guglin, Jose A. Morón, Larry S. Zweifel, Garret D. Stuber, Michael R. Bruchas. An endogenous mu-opioid peptide circuit for modulating appetitive behavior. *Nature*, 2021 Oct 13. doi: 10.1038/s41586-021-04013-0.

53) Hannah E. Frye, Yukitoshi Izumi, Min-Yu Sun, Sidney B. Williams, Christopher R. Trousdale, Alexis N. Harris, Andrew D. Sauerbeck, Terrance T. Kummer, Steven Mennerick, Charles F. Zorumski, Elliot C. Nelson, Joseph D. Dougherty, and Jose A. Morón. Cornichon Homolog-3 Mediates Spatial Memory and Synaptic Plasticity in an Estrous Dependent Manner. *Biological Psychiatry*, 2021. Jul 23:S0006-3223(21)01465-7. doi: 10.1016/j.biopsych.2021.07.014 (*)

54) T. Markovic, N. Massaly, C. Pedersen, M. Bruchas, M. Creed, J.A. Morón. "Pain induces somatic adaptations in Ventral Tegmental Area Dopamine neurons to drive anhedonia-like behavior". *Nature Neuroscience*, 2021. doi: 10.1038/s41593-021-00924-3 (*)

55) Dominika Burek, Nicolas Massaly, Hi-Yean Yoon, Jose A. Moron. Behavioral outcomes of Complete Freund's Adjuvant-induced inflammatory pain in the rodent hind-paw: A systematic review and meta-analysis. *PAIN*, 2021 Aug 27. doi: 10.1097/j.pain.0000000000002467. (*)

56) Jessica A. Higginbotham, Tamara Markovic, Nicolas Massaly and Jose A. Morón. Endogenous opioid systems alterations in pain and opioid use disorder . *Front. Syst. Neurosci.*, 19 October 2022 <https://doi.org/10.3389/fnsys.2022.1014768> (*)

57) Jessica A. Higginbotham, Julian G. Abt, Rachel H. Teich, Jose A. Moron. Time-dependent enhancement in ventral tegmental area dopamine neuron activity drives pain-facilitated fentanyl intake in males, 2022, <https://www.biorxiv.org/content/10.1101/2022.08.19.504549v1.full.pdf> (*)

58) Nicolas Massaly, Khairunisa Mohamad Ibrahim, Hye-Jean Yoon, Rossana Sandoval, Sidney Williams, Hannah Frye, William Post, Waylin Yu, Olayinka Idowu, Azra Zec, Sulan Pathiranage, Thomas Kash, Jose A. Moron. Dorsal Hippocampus To Nucleus Accumbens Projections Drive Reinforcement Via Activation of Accumbal Dynorphin Neurons, 2022, <https://www.biorxiv.org/content/10.1101/2022.08.08.503098v1.full.pdf> (*)

59) Bernard Mulvey, Hannah E. Frye, Tania Lintz, Stuart Fass, Eric Tycksen, Elliot C. Nelson, Jose A. Morón, Joseph D. Dougherty. Typical hippocampal transcriptional response across estrous is dysregulated by *Cnih3* gene deletion, 2022, <https://www.biorxiv.org/content/10.1101/2022.04.11.487915v2.full.pdf>

60) Traynor JR, **Moron JA** [Opioid research in the time of the opioid crisis](#). *Br J Pharmacol.* 2023 Apr;180(7):793-796. doi: 10.1111/bph.16043.

61) Bernard Mulvey, Hannah Frye, Tania Lintz, Stuart Fass, Eric Tycksen, Elliot Nelson, Jose Morón, and Joseph Dougherty. *Cnih3* Deletion Dysregulates Dorsal Hippocampal Transcription Across the Estrous Cycle. *eNeuro*, Mar; 10(3): ENEURO.0153-22.2023.

62) Yolanda Campos-Jurado & Jose A. Morón. Inflammatory pain impacts alcohol intake in a dose dependent manner in male rats in the intermittent access model. *PAIN Reports*, 2023 . Jun 27;8(4):e1082. (*)

63) Khairunisa Mohamad Ibrahim, Nicolas Massaly, Hye-Jean Yoon, Rossana Sandoval, Sidney Williams, Hannah Frye, William Post, Waylin Yu, Olayinka Idowu, Azra Zec, Sulan Pathiranage, Thomas Kash, Jose A. Moron. Dorsal Hippocampus To Nucleus Accumbens Projections Drive Reinforcement Via Activation of Accumbal Dynorphin Neurons, *Nature Communications*, 2024, Jan 29;15(1):750. doi: 10.1038/s41467-024-44836-9. (*)

64) Tamara Markovic, Jessica Higginbotham, Brian Ruyle, Nicolas Massaly, Hye Jean Yoon, Jiwon Yi, Jeniffer J. Garcia, Eric Sze, Julian Abt, Jose A. Morón. A locus coeruleus to dorsal hippocampus pathway mediates cue-induced reinstatement in opioid self-administration, *Neuropsychopharmacology*, 2024 May;49(6):915-923. doi: 10.1038/s41386-024-01828-z. Epub 2024 Feb 19. (*)

65) Dr Charlie Kwok , Dr Erika Harding , Dr Nicole Burma , Dr Tamara Markovic , Dr Nicolas Massaly , Dr Nynke van den Hoogen , Dr Eder Gambeta , Ms Kristina Komarek, Hye Jean Yoon , Ms Kathleen Navis , Dr Julia Canet-Pons , Dr Churmy Fan , Ms Rebecca Dalgarno , Dr Evgueni Gorobets , Dr James Papatzimas , Dr Zizhen Zhang , Yuta Kohro , Mr Connor Anderson , Professor Roger Thompson , Professor Darren Derksen , Dr Gerald Zamponi , Dr Jose A. Moron , Ms Sierra Stokes-Heck , Dr Brendan McAllister. Dr Tuan Trang. Pannexin-1 channel inhibition alleviates opioid withdrawal by modulating locus coeruleus to spinal cord circuitry. *Nature Communications*, 2024, *ul* 24;15(1):6264. doi: 10.1038/s41467-024-50657-7.

67) Joanna L. Ciatti^{1,2†}, Abraham Vazquez-Guardado^{2,3†}, Victoria E. Brings^{4,5}, Jihun Park², Brian 5 Ruyle^{4,5,6}, Rebecca A. Ober^{7,8}, Alicia J. McLuckie⁷, Michael R. Talcott⁹, Emily A. Carter⁷, Amy R. Burrell⁷, Rebecca A. Sponenburg¹⁰, Jacob Trueb², Prashant Gupta^{4,5}, Joohee Kim², Raudel Avila^{11‡}, Minho Seong², Richard A. Slivicki^{4,5}, Melanie A. Kaplan^{2,11}, Bryan Villalpando-Hernandez^{1,2}, Nicolas Massaly^{4,5}, Michael C. Montana⁴, Mitchell Pet¹², Yonggang Huang^{1,11,13}, Jose A. Morón^{4,5,6}, Robert W. Gereau IV^{4,5,6,14 *}, John A. Rogers. An Autonomous Implantable Device for the Prevention of Death from Opioid Overdose, 2024 *In Press Science Advances*.

66) Brian C. Ruyle, Sarah Masud, Rohith Kesaraju, Mubariz Tahirkheli, Juhi Modh, Sofia Angulo-Lopera, Tania Lintz, Jessica A. Higginbotham, Nicolas Massaly, Jose A Moron. Peripheral opioid receptor antagonism disrupts fentanyl-induced cardiorespiratory depression and is devoid of aversive effects, 2024, *Under Review at eLife* (*)

68) Jessica A. Higginbotham, Julian G. Abt, Rachel H. Teich, Tania Lintz, and Jose A Morón. Estradiol protects against pain-facilitated fentanyl use via suppression of opioid-evoked dopamine activity, 2024, *Under Review at Neuron* (*)

69) Dominika J. Burek*, Khairunisa Mohamad Ibrahim*, Andrew G. Hall, Ashish Sharma, Erik S. Musiek, Jose A. Morón*, and William A. Carlezon, Jr*. Inflammatory pain in mice induces light cycle-dependent effects on sleep architecture, 2024, *Under Review at Nature Communications* (*)

B. OTHER:

Proceedings and Symposia

1. Annual Meeting of the Spanish Society of Toxicology. "Proteomic analysis of morphine addiction". March 2005. Logrono, Spain (invited speaker)
2. Annual Experimental Biology Meeting. "Neuroproteomics of Drug Addiction". April 2006, San Francisco, USA (invited speaker).
3. International Narcotics Research Conference. "Changes in the presynaptic active zone and PSD proteins during chronic morphine". July 2006, Minnesota, USA (invited speaker).
4. College on Problems on Drug Dependence. "Mechanisms of morphine-induced neuroplasticity at the synapse". June 2008. San Juan, Puerto Rico (invited speaker).
5. International Narcotics Research Conference. "Context-dependent behavioral sensitization to morphine alters hippocampal neuroplasticity". June 2011. Hollywood, Florida (invited speaker).
6. American Pain Society. "Targeting of spinal GluA2-lacking AMPA receptors abolishes morphine-induced hyperalgesia". May 2012, Honolulu, Hawaii (invited speaker).
7. Eastern Pain Association Annual Meeting. "Molecular mechanisms underlying opiate dependence and opiate-induced hyperalgesia". December 2012, New York (invited speaker).
8. Winter Brain Research Conference. "AMPA receptors and addiction: the chicken or the egg". January 2013, Colorado (panel Chair).
9. International Narcotics Research Conference. "AMPA receptors in the spinal cord mediate morphine-induced hyperalgesia". July 2013, Cairns, Australia (invited speaker).
10. American Pain Society. "Novel mechanisms of opioid-induced hyperalgesia: A focus in the periphery". May 2014, Tampa, Florida (invited speaker).
11. International Narcotics Research Conference. "New technologies in Drug Addiction". July 2014, Montreal, Canada. Discussion Leader.
12. American Society of Pharmacology and Experimental Therapeutics meeting. "Chronic inflammatory pain increases opioid intake through a accumbal mechanism". March 2015, Boston (invited speaker).

13. Spring Pain meeting. "Effect of pain on the reward pathway and drug intake". May 2015. Palm Springs, California (invited speaker).
14. American Pain Society. "GluA4 containing AMPAR are expressed in epidermal keratinocytes: A possible role in chronic itch and painful conditions". May 2015, Palm Springs, California (invited speaker).
15. Winter Brain Research Conference. "Opioid-induced neuroplasticity in the brain". January 2016, Colorado (invited speaker).
16. Winter Brain Research Conference. "Kappa opioid receptors mediate the effect of pain on motivated behavior". January 2016, Colorado (invited speaker).
17. Pain Mechanisms and Therapeutics Conference. "Effects of pain on the reward pathway". June 2016, Sicily (panel Chair).
18. International Narcotics Research Conference. "Inflammatory pain affects opioid intake and associated motivated behavior" July 2016, Bath, UK.
19. Winter Brain Research Conference. "Pain affects opioid intake and associated motivated behavior". January 2017, Montana (invited speaker).
20. American Academy of Pain Medicine. "Impact of pain on the reward pathway". March 2017, Florida (panel Chair).
21. Canadian Pain Society. "Pain enhances opioid self-administration through dysregulation of the opioids system. May 2017, Halifax, Canada (invited speaker).
22. International Narcotics Research Conference. "Cutting-edge approaches to examine neural plasticity" July 2017, Chicago, IL (panel Chair).
23. International Addiction Research Meeting. "Opioid induced plasticity and the intersection with pain" September 2017, Dubrovnik, Croatia. (invited speaker)
24. American College of Neuropsychopharmacology. "Opioids and pain: a role for kappa opioid receptor" December 2017, California. (invited speaker)
25. Winter Brain Research Conference. "Role of kappa opioid receptor in pain-induced negative affect". January 2018, Whistler, Canada. (invited speaker)
26. Experimental Biology. "Opioid-induced neuroplasticity: novel imaging approaches". April 2018. San Diego, CA (invited speaker)
27. Pain Mechanisms and Therapeutics Conference. "Kappa opioid receptors in Pain". June 2018, Taormina, Italy (panel Chair).

28. Molecular Psychiatry Conference. "Pain-induced negative affect is mediated via recruitment of the kappa opioid system". September 2018, Kauai, HI. (invited speaker).
29. American College of Neuropsychopharmacology. "Novel in vivo imaging and virtual reality paradigms to dissect neural circuits underlying brain plasticity". December 2018, Hollywood, FL (panel Chair).
30. Anxiety and Depression Association of America. "Lessons from the bench to address the opioid crisis". March 2019, Chicago (invited speaker).
31. American Pain Society. "Opioid-induced plasticity and the intersection with pain". Plenary Lecture, April 2019 Milwaukee, WI (invited plenary speaker).
32. Gordon Research Conference on Catecholamines. "A novel role for the kappa opioid receptor in pain and motivated behavior". August, 2019. Newry, ME (invited speaker).
33. Keystone Symposia on Pain: Aligning the Target. "Dissecting the neural circuits driving pain-induced negative affect". February 2020, Keystone CO (invited plenary speaker).

Book Chapters

- 1) J.A. Morón & L.A. Devi. "Kappa opioid peptide receptor" In: xPharm (Bylund, D. and Enna, S. eds.) Elsevier Science, Inc. New York, (2005) Varia (online modules, CDs)

Abstracts

(*) Indicates senior authorship

- 1) J.A. Morón, M. Unzeta, G.P. Sgaragli and M. Valoti. "Interactions between rat intestinal monoamine oxidase and peroxidase in the metabolism of tyramine". 6th Amine Oxidase Workshop and 5th Trace Amine Conference. 1994. Saskatoon, Saskatchewan, Canada.
- 2) J.A. Morón, V. Pérez, E. Fernandez-Alvarez, J.L. Marco and M. Unzeta. "In vitro effects of some 5-OH-indolealkylamine derivatives on monoamine uptake systems". 6th Rappaport Symposium and 7th Amine Oxidase Workshop. 1996. Shavei Zion, Israel.
- 3) J.A. Morón, V. Pérez, E. Fernández-Alvarez, J.L. Marco and M. Unzeta. "In vitro effects of some substituted tryptamine analogues on monoamine uptake systems".

- 24th Meeting of the Federation of European and Biochemical Societies. 1996. Barcelona, Spain.
- 4) J.A. Morón, A. Brockington and B. Hope. "Amphetamine regulation of AP-1 and CRE- dependent transcription in the intact nervous systems using AP1- and CRE-lacZ transgenic mice". Society for Neuroscience. 1999. Miami Beach, USA.
 - 5) J.A. Morón, B. Rocha, R. Wise and B. Hope. "Regional differences on DA uptake: Evidence from DAT knock-out mice". Workshop on Neural Mechanisms of Addiction. Fundacion Juan March. 1999. Madrid, Spain.
 - 6) J.A. Morón, A. Brockington, M. Caron, R. Wise, B. Rocha and B. Hope. " Cocaine regulates dopamine uptake through the blockade of NET in brain regions with low levels of DAT: Evidence from knockout mice". Society for Neuroscience. 2000. New Orleans, USA.
 - 7) V. Chefer, J.A. Morón, B. Hope, W. Rea and T. Shippenberg. "Effect of systemic administration of Kappa-opioid receptor agonist U-69593 on dopamine neurotransmission in the medial prefrontal cortex of sensitized rats". Society for Neuroscience. 2000. New Orleans, USA.
 - 8) J.A. Morón, J. Ferrer, G.Uhl, J. Javitch, A. Galli and T. Shippenberg. "MAPK regulation of dopamine transporter". (Oral Communication). Society for Neuroscience, 2001. San Diego, USA.
 - 9) I. Zakharova, J.A. Morón, J.B. Wang, J.A. Javitch, A. Galli, T. Shippenberg. "Inhibition of over-expression activated protein kinase regulates the activity and trafficking of dopamine transporter. Society for Neuroscience, 2002, Orlando, USA.
 - 10) B. Garcia, Y. Wei, J.A. Morón, J.A. Javitch, R.Z. Lin, A. Galli. "Insulin regulation of the human dopamine transporter activity: an AKT-dependent pathway". Society for Neuroscience, 2003, New Orleans, USA.
 - 11) J.A. Morón, N. Abul-Husn, G. Dolios, R. Wang, L. Devi. "Proteomic analysis of morphine treatment in the postsynaptic fraction of mouse hippocampus". International Narcotic Research conference, 2005. Annapolis, USA.
 - 12) N. Abul-Husn, J.A. Morón, G. Dolios, R. Wang, L. Devi. "A proteomic profile of mouse hippocampal synapses". Society for Neuroscience, 2005. Washington DC, USA.
 - 13) S. Billa, N. Sinha, J.A. Morón. "Morphine alters expression of PSD-associated proteins in the hippocampus". Society for Neuroscience, 2007. San Diego, CA, USA. (*)

- 14) S. Billa, N. Sinha, J.A. Morón. "Synaptic localization of hippocampal AMPA receptors is altered upon the extinction of morphine-dependent conditioned behavior". College on Problems on Drug Dependence, 2008. San Juan, Puerto Rico. (*)
- 15) S. Billa, N. Sinha, J.A. Morón. "Extinction of morphine-dependent conditioned behavior correlates with changes in synaptic localization and phosphorylation of the GluR1 subunit of AMPA receptors in the hippocampus". Society for Neuroscience, 2008. Washington DC, USA. (*)
- 16) J. Liu, S. Billa, N. Sinha, Z. Ding, S. Carlton, P. Shinnick-Gallagher, J.A. Morón. "Repeated morphine administration alters the expression and function of AMPA glutamate receptors in the hippocampus". Society for Neuroscience, 2008. Washington DC, USA. (*)
- 17) N. Bjorklund, S. Billa, B. Krishnan, J. Liu, J.A. Morón. "Morphine-induced changes in AMPA receptor expression and composition that may be persistent at hippocampal synapses". Society for Neuroscience, 2009. Chicago, USA. (*)
- 18) S. Billa, N. Bjorklund, J.A. Morón. "Blockade of morphine conditioned place preference by delta-2-opioid receptor antagonist: study of mu- and delta-opioid receptor interactions". Society for Neuroscience, 2009. Chicago, USA. (*)
- 19) B. Krishnan, N. Bjorklund, S. Zhou, J. Du, S. Billa, J. Liu, S. M. Carlton, J.A. Morón. "AMPA receptor modulation in the hippocampus and spinal cord as a mechanism underlying pain sensitization during morphine withdrawal in mice". Society for Neuroscience, 2009. Chicago, USA. (*)
- 20) Y. Xia, J. Liu, S. Billa, N. Bjorklund, J.A. Morón. "Regulation of AMPA receptor trafficking by morphine in the hippocampus". International Narcotic Research conference, 2010. Malmo, Sweden. (*)
- 21) J.Liu, Y. Xia, P. Shinnick-Gallagher, J.A. Morón. "Repeated morphine exposure promotes the insertion of GluR2-lacking AMPA receptor at hippocampal synapses: an electrophysiological study in vitro". International Narcotic Research conference, 2010. Malmo, Sweden. (*)
- 22) Y. Xia, D. Cabanero, N. Bjorklund, J. Liu, J.A. Morón. "Molecular mechanisms underlying morphine-induced trafficking of AMPA receptors in the hippocampus". Society for Neuroscience, 2010. San Diego, USA. (*)
- 23) G. Portugal, Y. Xia, Shinnick-Gallagher, J. Liu, J.A. Morón. "Morphine-induced insertion of GluR2-lacking AMPA receptors in the hippocampus: an electrophysiological study in vitro". Society for Neuroscience, 2010. San Diego, USA. (*)

- 24) Y. Xia, J.A. Morón, J. Liu. "Repeated cocaine administration alters synaptic GABA_A receptor in the medial prefrontal cortex". Society for Neuroscience, 2010. San Diego, USA.
- 25) G. Portugal, Y. Xia, J. Liu, J.A. Morón. "Context-dependent sensitization to morphine impairs hippocampal LTP". International Narcotic Research conference, 2011. Hollywood, FL, USA. (*)
- 26) D. Cabanero, Y. Xia, A. Baker, S. Zhou, S. M. Carlton, J.A. Morón. "Morphine-induced hyperalgesia is associated with AMPA receptor trafficking in the dorsal horn of the spinal cord". International Narcotic Research conference, 2011. Hollywood, FL, USA. (*)
- 27) Z. Melyan, A. Fakira, J.A. Morón. "Alteration of excitatory synaptic transmission in the hippocampus following context-dependent morphine administration". Society for Neuroscience, 2011. Washington DC. (*)
- 28) A. Fakira, G. Portugal, Y. Xia, R. Neve, S. Russo, J.A. Morón. "Intrahippocampal viral transfection of AMPA receptors subunit mutants modulates morphine-induced context dependent behavioral sensitization. Society for Neuroscience, 2011. Washington DC. (*)
- 29) G. Portugal, Y. Xia, J. Liu, J.A. Morón. "Context-dependent sensitization to morphine enhances basal synaptic transmission and impairs hippocampal LTP" Society for Neuroscience, 2011. Washington DC. (*)
- 30) D. Cabanero, Y. Xia, A. Baker, S. Zhou, S. M. Carlton, J.A. Morón. "Repeated morphine administration induces a delayed and long-lasting hyperalgesia and increases the insertion of calcium-permeable AMPA receptors in spinal cord synapse". Society for Neuroscience, 2011. Washington DC. (*)
- 31) D. Hogan, J.A. Morón, S. M. Carlton. "Morphine treatment changes the response characteristics of nociceptive fibers in mouse glabrous skin". Society for Neuroscience, 2011. Washington DC.
- 32) D. Cabañero, Y. Xia, Z. Melyan, A. Baker, S. Zhou, G. L. Hargett, S. M. Carlton, J. A. Morón. "Targeting of spinal GluA2-lacking AMPA receptors inhibits morphine induced hyperalgesia". American Pain Society, 2012, Honolulu, HI. (*)
- 33) D. Hogan, J. A. Morón, Susan M. Carlton. "Morphine treatment increases polymodal responses of nociceptive fibers in mouse glabrous skin". American Pain Society, 2012, Honolulu, HI.
- 34) A.K. Fakira, G.S. Portugal, B. Carusillo, Z. Melyan, J. A. Morón. "The role of NMDA receptors in the mechanisms underlying morphine-induced alterations in synaptic plasticity". International Narcotic Research conference, 2012. Kansas City, MO. (*)

- 35) L. Hipólito, H. Beaudry, A. Gupta, L. Devi, L. Gendron, J.A. Morón. “The delta-opioid receptor contributes to morphine tolerance in a rat model of chronic inflammatory pain”. International Narcotic Research conference, 2012. Kansas City, MO. (*)
- 36) A.K. Fakira, G.S. Portugal, B. Carusillo, Z. Melyan, J. A. Morón. “NMDA receptors in the hippocampus underlie morphine-induced alterations in synaptic plasticity”. Society for Neuroscience, 2012, New Orleans, LA. (*)
- 37) G. Portugal, R. Al-Hasani, M. Bruchas, J. A. Morón. “Morphine conditioned place preference alters basal synaptic transmission in the hippocampus and amygdala and is associated with decreased synaptic NMDA receptor subunit expression”. Society for Neuroscience, 2012, New Orleans, LA. (*)
- 38) A.K. Fakira, G.P. Portugal, Z. Meylan, D. Sulzer and J.A. Morón. “Enhanced protein phosphatase 2A (PP2A) activity drives SK2 channel mediated impairment of long term potentiation (LTP) in the hippocampus after context-dependent morphine”. Society for Neuroscience, 2013, San Diego, CA. (*)
- 39) L. Hipolito, L. Virag, R. Whittington, S. Comer and J.A. Morón. “Effects of CFA-induced chronic inflammatory pain on opioid self-administration and accumbal dopamine release in heroin dependent rats”. Society for Neuroscience, 2013, San Diego, CA. (*)
- 40) L. Hipólito, A. Fakira, D. Cabañero, J.A. Morón and Z. Melyan. “SK-channels in the spinal cord dorsal horn in chronic inflammatory pain”. Society for Neuroscience, 2013, San Diego, CA.
- 41) A.K. Fakira, G.S. Portugal, R. Al-Hasani, S. Golden, S. Russo, M. Bruchas, D. Sulzer, J.A. Morón. “NR2B-mediated changes in hippocampal spine morphology following morphine conditioned place preference”. International Narcotic Research conference, 2014. Montreal, Canada. (*)
- 42) L. Hipolito, L. Virag, R. Whittington, S. Comer and J.A. Morón. “Chronic pain increases opioid self-administration through an accumbal dopaminergic mechanism”. International Narcotic Research conference, 2014. Montreal, Canada. (*)
- 43) L. Hipolito, M. Bruchas and J.A. Morón. “Inflammatory Pain Impacts Motivation for Heroin Self-administration in Dependent Rats: A Possible Role for Kappa Opioid Receptors”. American College of Neuropsychopharmacology, 2014, Phoenix, AZ. (*)
- 44) A. Fakira, G. Portugal, R. Al-Hasani, S. Golden, M. Bruchas, S. Russo and J.A. Morón. “The role of NR2B in CA1 pyramidal spine morphology following morphine

- conditioned place preference”. American College of Neuropsychopharmacology, 2014, Phoenix, AZ. (*)
- 45) A. Wilson-Poe, A. L. Hipolito, B. Walker, J.A. Morón. “Inflammatory pain dysregulates opioid function in the reward pathway”. International Narcotic Research conference, 2015. Phoenix, AZ. (*)
- 46) A. Fakira, A. Berman, O. Cohensedh, K. Wedderburb-Pugh, D. Sulzer, J.A. Morón. “Morphine conditioned place preference decreases dendritic spines in the hippocampus”. International Narcotic Research conference, 2015. Phoenix, AZ. (*)
- 47) N. Massaly, L. Hipolito, S. Sirohi, B. Walker, M. Bruchas, J.A. Morón. “Pain-induced decrease in motivation is mediated by kappa opioid receptors in the nucleus accumbens”. International Narcotic Research conference, 2015. Phoenix, AZ. (*)
- 48) A. Wilson-Poe, J.A. Morón. “Role of delta-opioid receptors in the PAG in morphine tolerance during inflammatory pain”. American Pain Society, 2016, Austin, TX. (*)
- 49) N. Massaly, L. Hipolito, R. Al-Hasani, S. Sirohi, B. Walker, M. Bruchas, J.A. Morón. “Kappa opioid receptors in the Nucleus Accumbens mediate pain-induced decrease in motivated behavior”. American Pain Society, 2016, Austin, TX. (*)
- 50) N. Massaly, L. Hipolito, R. Al-Hasani, S. Sirohi, B. Walker, M. Bruchas, J.A. Morón. “Kappa opioid receptors in the Nucleus Accumbens mediate pain-induced decrease in motivated behavior”. International Narcotic Research conference, 2016, Bath, UK. (*)
- 51) S. Williams, M. Arriaga, E. Han, J.A. Morón. “Development of a virtual reality paradigm for in vivo hippocampal imaging during morphine conditioned place preference”, Winter Conference on Brain Research, 2017, Big Sky, Montana. (*)
- 52) N. Massaly, R. Al-Hasani, A. Wilson-Poe, M. Bruchas, J.A. Morón. “Pain-induced alterations in motivational states are mediated via upregulation of the accumbal kappa opioid receptor system. Kappa Therapeutics Meeting, 2017, Philadelphia, PA, (*)
- 53) H. Frye, C. Trousdale, E. Nelson, J. Dougherty, J.A. Morón. “The role of hippocampal cornichon homolog-3 in the modulation of postsynaptic AMPA receptors”. International Narcotic Research conference, 2017, Chicago, IL. (*)
- 54) T. Markovic, N. Massaly, J.A. Morón. “Dissecting dopamine pathways altered by pain-induced dysfunction in opioid signaling”. International Narcotic Research conference, 2017, Chicago, IL. (*)
- 55) N. Massaly, J.A. Morón. “Pain recruits accumbal kappa opioid system and alters opioid consumption”. International Narcotic Research conference, 2017, Chicago, IL. (*)

- 56) S. Williams, M. Arriaga, E. Han, J.A. Morón. “Development of a virtual reality paradigm for in vivo hippocampal imaging during morphine conditioned place preference”. International Narcotic Research conference, 2017, Chicago, IL. (*)
- 57) T. Markovic, N. Massaly, J.A. Morón. “Dissecting dopamine pathways altered by pain-induced dysfunction in opioid signaling”, Society for Neuroscience conference, 2018, San Diego, CA. (*)
- 58) D. Burek, S.B. Williams, W. Post, J.A. Morón. “Role of hippocampal calcium-gated potassium channel SK2 in drug-paired contextual memory formation.” Society for Neuroscience Conference, 2018, San Diego, CA. (*)
- 59) H.E. Frye, C. Trousdale, S. Williams, E. Nelson, J. Dougherty, J.A. Morón. “Changes in mouse CNH3 expression modulate hippocampal synapse stability and AMPAR-dependent memory and learning.” Washington University Neuroscience Retreat, 2018, Potosi, MO. (*)
- 60) H.E. Frye, C. Trousdale, E. Nelson, J. Dougherty, J.A. Morón. “Effects of cornichon homolog-3 (CNH3) knockdown on hippocampal AMPA receptors and synaptic morphology.” Society for Neuroscience, 2018, San Diego, CA. (*)
- 61) N. Massaly, B.A. Copits, A.R. Wilson-Poe, L. Hipólito, T. Markovic, H.J. Yoon, K.I. Shoghi, R.W. Gereau, IV, J.G. McCall, R. Al-Hasani, M.R. Bruchas, J.A. Morón. “Pain recruits the dynorphin-kappa opioid system in the nucleus accumbens, altering fentanyl self-administration.” Pain Mechanisms and Therapeutics Conference, 2018, Taormina, Sicily. (*)
- 62) N. Massaly, A. Copits, A.R. Wilson-Poe, L. Hipólito, T. Markovic, H.J. Yoon, K.I. Shoghi, R.W. Gereau, IV, J.G. McCall, R. Al-Hasani, M.R. Bruchas, J.A. Morón. “Pain-induced Negative Affect is Mediated via Recruitment of the Nucleus Accumbens Kappa Opioid System.” International Narcotics Research Conference, 2018, San Diego, CA. (*)
- 63) N. Massaly, A. Copits, A.R. Wilson-Poe, L. Hipólito, T. Markovic, H.J. Yoon, K.I. Shoghi, R.W. Gereau, IV, J.G. McCall, R. Al-Hasani, M.R. Bruchas, J.A. Morón. “Pain-induced Negative Affect is Mediated via Recruitment of the Nucleus Accumbens Kappa Opioid System.” American College of Neuropsychopharmacology, 2018, Hollywood, FL. (*)
- 64) S.B. Williams, M.W. Arriaga, W.W. Post, E.B. Han, J.A. Morón. “Development of a virtual reality paradigm for in vivo hippocampal imaging during morphine conditioned place preference”. Washington University Anesthesiology Department Academic Evening, 2018, St. Louis, MO. (oral presentation)
- 65) S.B. Williams, S. Harlalka, M.W. Arriaga, W.W. Post, A.A. Korgoankar, E.B. Han, J.A. Morón. “Development of a virtual reality paradigm for *in vivo* hippocampal

- imaging during drug-induced contextual learning”. Society for Neuroscience, 2018, San Diego, CA. (poster presentation)
- 66) S.B. Williams. “Virtual reality place conditioning to uncover hippocampal neuron dynamics during drug-induced associative memory formation”. American College of Neuropsychopharmacology Annual Meeting, 2018, Hollywood, FL. (oral presentation)
- 67) T. Markovic, J. Garcia, N. Massaly, J. Yi, J.A. Morón. “Dissecting the role of dorsal hippocampus in the reinstatement of drug seeking behavior”. Society for Neuroscience conference, 2019, Chicago, IL. (*)
- 68) T. Markovic, J. Garcia, N. Massaly, J. Yi, J.A. Morón. “Dissecting the role of dorsal hippocampus in the reinstatement of drug seeking behavior”. Anesthesiology Academic Evening, 2019, St. Louis, MO. (*)
- 69) T. Markovic, N. Massaly, C. Pedersen, H. Shin, S. Liu, Y. Vachez, J. Garcia, C. Cahill, V. Alvarez, M. Bruchas, M. Creed, J.A. Morón. “Dissecting dopamine pathways altered by pain-induced dysfunction in opioid signaling”. Catecholamines Gordon Research conference, 2019, Newry, ME. (*)
- 70) D. Burek, N. Massaly, J.A. Morón. “Characterization of the Long-Term Effects of Inflammatory Pain on Depressive-Like Behaviors.” Society for Neuroscience Conference, 2019, Chicago, IL. (*)
- 71) H.E. Frye, C. Trousdale, E. Nelson, J. Dougherty, J.A. Morón. “CNIH3 expression in female mice modulates hippocampal synapse stability and AMPAR-dependent memory and learning.” National Institute of Drug Abuse Genetics Consortium, 2019, Washington D.C. (*)
- 72) N. Massaly, B.A. Copits, A.R. Wilson-Poe, L. Hipólito, T. Markovic, H.J. Yoon, S. Liu, M.C. Walicki, B.M. Walker, C.M. Cahill, K.I. Shoghi, R.W. Gereau, IV, J.G. McCall, R. Al-Hasani, M.R. Bruchas, J.A. Morón. “Pain-induced Negative Affect is Mediated via Recruitment of the Nucleus Accumbens Kappa Opioid System.” Therapeutic Potential of Kappa Opioids, 2019, Seattle, WA. (*)
- 73) N. Massaly, B.A. Copits, A.R. Wilson-Poe, L. Hipólito, T. Markovic, H.J. Yoon, S. Liu, M.C. Walicki, B.M. Walker, C.M. Cahill, K.I. Shoghi, R.W. Gereau, IV, J.G. McCall, R. Al-Hasani, M.R. Bruchas, J.A. Morón. “Pain-induced Negative Affect is Mediated via Recruitment of the Nucleus Accumbens Kappa Opioid System.” American Pain Society, 2019, Milwaukee, WI. (*)
- 74) S.B. Williams, S. Harlalka, M.W. Arriaga, W.W. Post, A.A. Korgoankar, E.B. Han, J.A. Morón. “Hippocampal activity dynamics during contextual reward association in virtual reality place conditioning”. Society for Neuroscience, 2019, Chicago, IL. (*)

75) S.B. Williams, S. Harlalka, M.W. Arriaga, W.W. Post, A.A. Korgoankar, E.B. Han, J.A. Morón. "Hippocampal activity dynamics during contextual reward association in virtual reality place conditioning". American College of Neuropsychopharmacology Annual Meeting, 2019, Orlando, FL. (*)