

JAMES W. GRAU

Addresses: Department of Psychological and Brain Sciences
Texas A & M University
College Station, TX 77843

(979) 845-2584 (Office)
j-grau at tamu.edu

Current Status: Mary Tucker Currie Professor
Psychological and Brain Sciences
Texas A&M Institute for Neuroscience
Texas A&M University

Education: B.S. University of Colorado, Psychology and Molecular,
Cellular and Developmental Biology, 1981
M.S. University of Pennsylvania, Psychology, 1982
Ph.D. University of Pennsylvania, Psychology, 1985

Honors: Phi Beta Kappa (1981)
Fellow, American Psychological Association (Div. 3, 6 & 28; 1997)
President of Division 6, American Psychological Assn. (2004-2005)
University Faculty Fellow Award (2000-2005; \$100,000)
University Research Award (2001)
Mary Tucker Currie Professor of Liberal Arts (2005-present)
Fellow, American Psychological Society (2009)
Texas A&M Institute for Neuroscience Service Award, 2013
Jerry Johnston Andrew Spinal Research Award (2014, \$10,000)
TAMHSC IPN Inaugural Appreciation Award (2022)

Professional Experience:

Research Assistant Department of Psychology, University of Colorado, 1978-1981,
under Dr. S. F. Maier
Research Assistant Department of Psychology, University of Pennsylvania, 1982,
under Dr. R. A. Rescorla
Instructor (Learning) Department of Psychology, University of Pennsylvania,
1984-1985
Vis. Asst. Professor Department of Psychology, University of North Carolina at Chapel
Hill, 1985-1987
Assistant Professor Department of Psychology, Texas A&M University, 1987-1992
Visiting Scholar Department of Psychology, University of Texas at Austin, 1993-
1994
Associate Professor Department of Psychology and Faculty of Neuroscience, Texas
A&M University, 1992-1998
Visiting Scholar Psychology Department, University of Texas-Austin, Spring, 1998
Professor Department of Psychological and Brain Sciences and Faculty of
Neuroscience, Texas A&M University, 1998-present
Chair Faculty of Neuroscience, Texas A&M University, 2007-2010
Chair Texas A&M Institute for Neuroscience, 2010-2011
Graduate Faculty Texas A&M Health Science Center, 2011-present

Instruction of Courses at the University of North Carolina:

PSYC 22	Learning: Fall, 1985; Spring, 1986; Fall, 1986
PSYC 104	Cognitive Psychology (Current Topics in Psychology): Spring, 1987
PSYC 201	Experimental Methods: Conditioning and Learning: Fall, 1986 (Guest Lecturer)
PSYC 202	Biological Psychology: Spring, 1987 (Guest Lecturer)
PSYC 301	Seminar on Animal Learning and Memory: Spring, 1986 (with D. Eckerman)
PSYC 333	Research Seminar in Experimental Psychology: Fall, 1985; Fall, 1986 (Organized with M. Picker)
PSYC 334	Research Seminar in Experimental Psychology: Spring, 1986, 1987 (Organized with M. Picker)

Instruction of Courses at Texas A & M University:

PSYC 107	Introduction to Psychology: Fall 1987; Spring, 1988
PSYC 107H	Introduction to Psychology, Honors: Fall, 1989; Spring, 1989
PSYC 320	Sensation-Perception: Spring, 1989, 1990, 1991, 1992, 1993, 1996, 2001; Fall, 1999; Summer, 1995
PSYC 320H	Sensation-Perception, Honors: Fall, 1991
PSYC/NRSC 340	Psychology of Learning: Fall, 1987, 1988, 1989, 1990, 1991, 1992, 1994, 1996, 1998, 2000, 2001, 2010, 2014, 2015, 2016, 2017, 2018, 2019; 2020, 2021, 2022, 2023; Spring, 1990, 2006, 2007, 2008, 2012, 2013, 2014, 2015, 2017, 2018, 2019, 2020, 2024
PSYC 340H	Psychology of Learning, Honors: Fall, 1990; Spring, 1992, 2000, Fall, 1995, 1997, 2001, 2003
PSYC 345H	Human Cognitive Processes, Honors: Spring, 1988
NRSC 602	Principles of Neuroscience II (part 2): Spring, 2011-2017
PSYC/NRSC 606	Learning (Graduate): Fall, 1988, 1990, 1992, 1994, 1996, 1998, 2000, 2002, 2004, 2006, 2007, 2008, 2009, 2011, 2012, 2013, 2014, 2016, 2018, 2020, 2021, 2022, 2023
PSYC 615	Perceptual Processes: Spring, 1997; Fall, 1999
PSYC 649	Seminar in Behavioral Neuroscience (Mechanisms of Learning): Spring, 1995, 1999
PSYC 689	Special Topics in Behavioral Neuroscience (Pain Modulation): Spring, 1990

Instruction of Courses at University of Texas

PSYC 394	Contemporary Learning Theory: Spring, 1994 (with M. Domjan)
PSYC 394	Neurobehavioral Studies of Learning: Spring, 1998 (with M. Domjan and Paco Gonzalez-Lima)

Postdoctoral Trainees

Michelle Hook (2002-2005; current: asst. prof. TAMHS)
Adam Ferguson (2003-2004; current: asst. prof. UCSF)
Luis Carcoba (co-Advisor with Mary Meagher; 2005-2008)
Kyle Baumbauer (2005-2011; current: asst. prof. University of Kansas Med, Ctr.)
Sandra Garraway (2008-2013; current: asst. prof. U. Emory School of Medicine)
Kevin Hoy (2011-2012; current: Dir. Clinical Res., Case Cancer Ctr.)
Milly Lee (2013-2014; current: non-academic)
Kie Huang (2015-2017; Assoc. Dir. of Res., ChemPartner, Shanghai, China)

Ph.D. Committee Service (Chair):

1. Paul Illich (1990-1993; current: President Southeast Comm. College [Lincoln])
2. Tamara King (1994-1997; current: prof. U. New England)
3. Robin L. Joynes (1995-1998; current: assoc. prof. Kent State)
4. Eric Crown (2000-2002; asst. dir. global medical publishing AbbVie)
5. Adam Ferguson (2000-2003; current: assoc. prof. UCSF)
6. Stephanie Washburn (2005-2007; current: dir. clinical research InThera Med.)
7. Russell Huie (2007-2010; current: Research Asst. Prof., UCSF)
8. Denise Puga (2007-2011; current: Human Res. Protection Program Coordinator, TAMU)
9. Kevin Hoy (2008-2011; current: Dir. Clinical Research Office, Case Comprehensive Cancer Ctr., Case Western Reserve)
10. Milly Lee (2008-2013; current: non-academic)
11. Kie Huang (2010-2015; current: Associate Director of Research, ChemPartner, Shanghai, China)
12. Joel Turtle (2013-2018; MD / PhD; Orthopaedics, Utah School of Med.)
13. Misty Strain (2012-2017; current: post doc, Univ. Texas Health Science Center at San Antonio)
14. Gizelle Leal (Chair, 2016-2021; Clin. Res. Assoc., Medspace)
15. Jacob Davis (Chair, 2016-2022; post doc, UCSF)
16. Kelsey Hudson (Chair, 2018-2023, MD / PhD)
17. Travis Johnston (Chair, 2019-2023, McGovern Medical School)
18. Kayli Colpitts (Chair, 2022-present)
19. Alyssa Trevino (Chair, 2023-present)

Ph.D. Committee Service (Member):

Eddie Vela (Smith, 1988-1989)
Cathy Grover (Nation, 1989-1991)
Margaret Hale (Seaman, 1992-1993)
D. Hodgson (Bond [Marquarie Univ.], 1993)
Stephen Balfour (Smith, 1995-1997)
Robert T. Burkey (Nation, 1993-1995)
Lance R. McMahon (Wellman, 1994-1998)
Jamie Rhudy (Meagher, 1998-2000)
Woojin Lee (Batchelor (Environmental Engineering), 1998-2001)
Robin Johnson (Meagher, 2003-2006)
Jeff Grimes (Meagher, 2003-2006)
Suzannah Creech (Meagher, 2004-2007)
Nick Simon (Setlow, 2008-2010)
Yishi Liu (Garcia [Biol.], 2005-2010)
Jedediah Tressler (Smotherman [Biol.], 2006-2010)

Ian Mendez (Setlow, 2008-2010)
Elisabeth Vichaya (Meagher, 2007-2010)
Candi LaSarge (Bizon, 2010-2011)
Kevin Hoy (Chair, 2008-2011)
Eric Strickland (co-Chair w/ R. Miranda [NExT], 2009-2013)
Jason Boyle (Shea, 2011-2013)
Christopher Hansen (Basso [Ohio State Univ.], 2012-2014)
Sioui Maldonado (Hook, 2011-2014)
Deanna Kennedy (Shea, 2011-2015)
Sophia You (Meagher, 2010-2016)
Miriam Aceves (Hook, 2011-2017)
Gillian Acca (Nagaya, 2014-2017)
Travis Goode (Maren, 2013-2018)
Hans Lisenbardt (Meagher, 2013-2018)
Thomas Giustino (Maren, 2014-2019)
Kiralyn Brakel (Hook, 2016-2020)
Mabel Terminal (Hook, 2017-2020)
Eunyoung Bang (Griffith, 2018-2021)
Jessica Hoeschele (Hook, 2018-2023)
Bradley Jones (Smith, 2019-2023)
Stefan Jabez (Park, 2020-present)
Faith Ford (Woodman, 2020-present)
Alexander Stefanov (Hook, 2020-present)
Melissa Henwood (MD / PhD at UTMB, Chen, 2023-present)
Glenae Nora (Hook, 2023-present)

M.A. Committee Service:

Paul Illich (Chair, 1988-1990)
Mandy Biles (Chair, 1989-1990)
Tamara King (Chair, 1992-1994)
Charles Kalina (Chair, 1992-1994)
Robin L. Joynes (Chair, 1993-1995)
Lance L. McMahon (Wellman, 1992-1994)
Clay Splawn (McCann, 1995-1996)
Jamie Rhudy (Meagher, 1996-1998)
Simon Dembitzer (Allen, 1997-1998)
Magy Seif El-nasr (Computer Science, 1997-1999)
Amy Sieve (Chair, 1997-2000)
Eric Crown (Chair, 1997-2000)
Brian Partridge (Schenk, 1997-2000)
Jose Reynoso (Cepeda, 1997-2001)
Adam Ferguson (Chair, 1998-2001)
Erik Jackiw (Allen (Philosophy), 1998-2001)
Robin Johnson (Meagher, 2000-2003)
Jeff Grimes (Meagher, 2001-2003)
Suzannah Creech (Meagher, 2001-2004)
Stephanie Washburn (Chair, 2002-2005)
Anne Bopp (Chair, 2002-2005)
Steve Campbell (Varner [Philosophy], 2005-2006)
Elisabeth Good (Meagher, 2004-2007)
Denise Puga (Chair, 2004-2007)

Russell Huie (Chair, 2005-2007)
Jerrell Smith (Meagher, 2005-2008)
Kevin Hoy (Chair, 2005-2008)
Sarah Woller (Hook, 2007-2010)
Ross Colebrook (Varner, 2009-2011)
Inchoh Park (Buchanan, 2013-2014)

Honors Thesis Committee Service:

Andrea L. Brown (Hollins, 1986)
John A. Pelkey (Hollins, 1987)
Dawn Dekle (Chair, 1988-1989)
Keven Chen (Chair, 1990-1991)
Kyle Burks (Chair, 1991-1992)
Jesse McKenney (Chair, 1992-1993)
Kamran Janjua (Chair, 1994-1995)
Heath Penland (Chair, 1996-1997)
Sherilyn McLemore (Chair, 1997-1998)
Brianne Patton (Chair, 2000-2001)
Grace Liu (Chair, 2001-2002)
Christine Petrich (Chair, 2005-2006)
Kara Hudson (Chair, 2006-2007)

Undergraduate Research Thesis

Abbey Hughes (co-Chair with Kyle Baumbauer, 2008-2009)
Keri Callegari (2012-2013)
Ashley Niemerski (2013-2014)
Melissa Brumley (2015-2016)
Josh Reynolds (2015-2016)
Jason Lu (2016-2017)
Rachel Baine (2017-2018)
Megan Tarbet (2018-2019)
Paris Bean (2018-2019)
Emerson Lout (2019-2020)
Billie Nguyen (2020-2021)
Grace Giddings (2021-2022)
Natsuka Kobayashi (2023-2024)
Avery Awalt (2024-2025)
Isabel Moreno (2024-2025)

Independent Study Students:

James Bichsel (1986)	Leslie Schwandt (1987)
Chana Baum (1988)	Georgetta Brown (1988)
Mandy Morrison (1988-1989)	Juan Salinas (1988-1990)
Dan O'Keefe (1989)	Wendy Roe (1989)
Keven Chen (1989-1990)	Julie Barter (1990-1992)
Pamela Sellers (1990-1991)	Kyle Burks (1991)
Bryan Rumsey (1991)	Charles Parker (1991-1992)
Rebecca Perez (1991-1992)	Margaret Payne (1993)
Jennifer Surber (1992-1993)	Kamran Janjua (1993)
Douglas Barstow (1992-1993)	Heath Penland (1996)
Darren Minke (1997-1998)	Sherilyn McLemore (1997-1998)
Mark Naftanel (1999)	Grace Lui (1997-2002)
Brie Patton (1999-2002)	Shivali Dhruv (2000-2002)
Stephanie Washburn (2000-2002)	Jill Olson (2001)
David Kiehnhoff (2002)	Christine George (2002-2003)
Russell Huie (2002-2005)	Marissa Maulsby (2004-2006)
Christine Petrich (2004-2006)	Cynthia Lin (2004-2005)
Kara Hudson (2005-2006)	Robyn Baldyn (2005-2007)
Ananth Arjunan (2005-2007)	Varun Chowdhary (2006-2007)
Georgina Moreno (2007-2009)	Abbey Hughes (2007-2009)
Jeremy Wurbs (2009-2010)	Joel Turtle (2010)
Elena Lischau (2010)	Kathryn Hanan (2010)
Jamal Malik (2010)	Evy Munro (2012)
Jacob Horton (2012)	Keri Callegari (2012-2013)
Austin Wang (2012-2013)	Ashley Niemerski (2012-2013)
Madeline Matthews (2013)	Brandon Pesek (2013)
Callierae Stump (2013-2014)	Lauren Murphy (2013-2016)
Ashley Kozicz (2014-2015)	Melissa Brumley (2014-2016)
Derek Lehtonen (2014-2015)	Josh Reynolds (2014-2016)
Pablo Gonzalez (2015)	Allison Morris (2015)
Paige Stobaugh (2015)	Deleon, Ashley (2016)
ChunChen (Jason) Lu (2016-2017)	Julia Forsberg (2016)
Clarence Lim (2016-2017)	Sumedha Rao (2017)
Travis Johnston (2016-2018)	Rachel Baine (2017-2018)
Ashton Norris (2017-2018)	Paris Bean (2017-2018)
Megan Tarbet (2017-2018)	Carol Cox (2018-2019)
Emerson Lout (2018-2019)	Sara Gonzales (2018-2019)
Pranali Haribhakti (2018-2019)	Billie Nguyen (2019-2021)
Grace Giddings (2019-2022)	Hannah Borland (2019-2022)
Alexandra Campbell (2019-2020)	Samantha King (2020)
Madelyn Sievert (2020-2021)	Xixin Zhang (2020)
Abigail Riley (2021-2022)	Kim Bordwine (2021-2022)
Noah Joseph (2021-2022)	Emily Kim (2021-2022)
Shriya Patil (2022-present)	Rafael Elejalde (2022-present)
John Dulak (2023)	Janak Abraha (2023-present)
Paige Beltz (2022-2023)	Natsuka Kobayashi (2023-present)
Isabel Moreno (2024-present)	Victoria (Tori) Balentine (2024-present)
Pranav Chandramohan (2024-present)	Hana Syed (2024-present)

Department Committee Service:

Advisory Committee (1996-2005)
Animal Care (1987-1993; Chair, 1987-2000)
Area Head, Behavioral Neuroscience (2000-2005)
Behavioral Neuroscience Search Committee (2002,
Spring & Fall, Fall 2004, Fall 2007-Spring 2011, 2013, Chair [2002-2011])
Cognitive Neuroscience Search Committee (1989)
Developmental Search Committee (2000)
Department Events (2017-2018)
Department Operations Review (2000-2003)
Department Space Committee (2018-2019)
Director of Graduate Studies (1996-1999)
Diversity & Inclusion: Retention & Recruitment of BIPOC Staff Subcommittee
(2020-2021)
Doctoral Program Review (2000-2002)
Evaluation Committee (2003-2005, 2009-2011 [elected])
Faculty Development and Awards (2020-present).
fMIR Search committee (2014)
Graduate Admissions (1988-1992, 1998-1999, 2002; Chair, 1989-1991, 1995-1997,
1999-2001; 2012-2013)
Graduate Program Poster (Chair, 1987-1991, 1996)
Graduate Studies (1994-1995, 1999-2001; Chair, 1996-1999; 2012-2014; 2016-2017)
Head Search Committee (2002, 2006, 2012-2013 [elected])
Library (Department Representative, 1987-1989; 1989-1990)
Program Structure (1988-1989)
Space Committee (2018-2020)
Special Events (1994-1995)
Undergraduate Studies (2014-2016)
Web Advisory (1995-1996; 2000-2001)

College Committee Service:

Graduate Instruction Committee (1995-1998)
Endowed Chairs Advisory Committee (2007-2010)

University Committee Service:

CMP Director Search (2009-2010)
Council of Built Environment (2015-2017)
Council of Chairs (2007-2010)
Council of Principal Investigators (2005-2011, 2014-2017, elected)
Council of Principal Investigators Executive Committee (2014-2015)
Faculty of Neuroscience Travel Awards (1995-1997)
Faculty of Neuroscience Membership Committee (1999-2003)
Interdisciplinary Life Sciences Bldg (ILSB) Executive Committee (2010-2016)
Life Science Advisory Committee (2004-2009)
Life Science Building Committee (2001-2009)
Life Science Task Force (2002-2004; co-Chair, 2004)
Neuroscience & Experimental Therapeutics Search Committee (2013)
Path Forward—BIMS Life Science Meta-Major (Group 13, Spring 2022)
Research Development Fund (2019-present)
TAMIN-Graduate Recruiting Committee (2012-2016)
TAMIN-Finance Committee (2012-2017; Chair, 2020-2024)

TAMIN-Undergraduate Program Committee (Chair, 2013-2021)
TIRR Faculty Search Committee (Chair, 2015-2018)
University Lab Animal Care Committee (2001-2002)
VPR Advisory Committee (2008-2009)

Administration

Chair, Texas A&M Institute for Neuroscience (2007-2011; elected)
Ph.D. program review (Fall, 2008)
Approval of the Ph.D. program in Neuroscience (Spring, 2009)
Selected as one of 8 interdisciplinary programs (out of 111) for funding under the Initial University Multidisciplinary Research Initiatives (IUMRIs; 2009)
Awarded 10 Heep Fellowships for graduate training (Spring, 2010)
Allocated funds to recruit 3 senior scientists (Spring, 2010)
Texas A&M Institute for Neuroscience (TAMIN) approved by Regents (Spring, 2010)
Spinal Cord Hiring Initiative (2014-2018)
Orchestrated a University-wide initiative to hire 4 assistant professors in the area of spinal cord injury, supported by a \$1.5 million dollar gift from the TIRR Foundation; completed last hire in 2018
Texas A&M Spinal Cord Initiative (TAMSCI; 2017-2023)
Coordinating the development of a center for spinal cord injury research, to be jointly administered through TAMU and TAMHSC.

State

Advisory Faculty, Texas Consortium in Behavioral Neuroscience (T32; 2002-2007)
Mission Connect Internal Advisory Committee (2017-2019)

National Service:

APA: Membership & Growth Committee, Division 6 (1997-2000)
Secretary/Treasurer, Division 6 (1999-2003)
Elected President, Division 6 (2003-2006)
Committee on Scientific Awards (2014-2016; Chair, 2016)

Associate Editor: *Frontiers in Systems Neuroscience* (2018-present)

Editorial Board: *Experimental Neurology* (2020-present)
Cells (2020-present)

Consulting Editor: *Behavioral Neuroscience* (1998-present)

National Institute of Child Health & Human Development: NICHD's Scientific Vision: The Next Decade, workshop on plasticity, January, 2011.

Spinal Cord Injury Preclinical Data Workshop: NINDS, October, 2016

Society for Neuroscience: Committee on Neuroscience Departments and Programs (2007-2011)

Journal Review:

Acta Biomaterialia, Adaptive Behavior, Animal Behaviour, Animal Learning and Behavior, Aviation, Space, and Environmental Medicine, Behavioral Neuroscience, Behavioural Brain Research, BMC Neurology, BMC Neuroscience, Brain, Behavior, and Immunity, Brain Communication, Brain Research, Cells, Cellular and Molecular Life Sciences, CNS Drugs, Developmental Psychobiology, European Journal of Neuroscience, Experimental Neurology, Frontiers in Cellular Neuroscience, Frontiers in Integrative Physiology, Frontiers in Neural Circuits, Frontiers in Neurology, Frontiers in Neuropharmacology, Frontiers in Neuroscience, Frontiers in Pharmacology, Frontiers in Psychology, Frontiers in Systems Neuroscience, Fundamentals in Clinical Pharmacology, Journal of Behavioral and Neuroscience Research, Journal of Experimental Psychology: Animal Behavior Processes, Journal of Neurophysiology, Journal of Neuroinflammation, Journal of Neuroscience, Journal of Neuroscience Methods, Journal of Neuroscience Research, Journal of Neurotrauma, Journal of Pain, Journal of Visualized Experiments, Learning and Memory, Learning and Motivation, Memory and Cognition, Life, Nature Communication, Neural Regeneration, Neurobiology of Learning and Memory, Neuroinflammation, Neurorehabilitation and Neural Repair, Neuroreport, Neuroscience, Neuroscience Methods, Neurosignals, Neurorehabilitation and Neural Repair, NeuroReport, Neurotoxicity, Pain, Pharmacology, Biochemisrty & Behavior, Psyche, Physiological Psychology, Physiology & Behavior, PLOS ONE, Progress in Neurobiology, Psychobiology, Psychological Review, Psychopharmacology, Teaching of Psychology, Journal of Spinal Cord Medicine

Grant Review:

Ad hoc reviewer for NSF
Department of Defense Congressionally Directed Medical Research
Programs (CDMRP; 2010, 2011, 2012, 2013)
Medical University of South Carolina, Stroke and Spinal Cord Injury (2020-
2022)
Neilsen Foundation (external: 2007, 2008, 2009);
ad hoc panel member (2015-2016)
Review Board (2017-2025), Spinal Cord Injury Research on the
Translational Spectrum (SCIRTS)
NINDS Program Projects (1999)
Paralyzed Veterans of America (PVA; 2016)
NIH: Clinical neuroplasticity and neurotransmitters (CNNT; 2/17, 11/18,
2/19, 6/19, 10/19, 2/20; Member 7/1/20-6/30/24)
Ad hoc reviewer for South Carolina Spinal Cord Injury Research Fund (3/18,
3/20)

International Service:

Symposium on Spinal Cord Plasticity, UCLA, November (1998)
Ad hoc reviewer for the Australian Research Council Panel of Assessors
(2004-2015)
Ad hoc reviewer for Medical Research Council (United Kingdom; 12/19)
Ad hoc reviewer for Natural Sciences and Engineering Research Council
(NSERC) of Canada (2021)
Ad hoc reviewer for Paracelsus Medical University (Austria; 2/19)
Ad hoc reviewer for Swiss NSF-Biology and Medicine (12/20)
Ad hoc reviewer for Wings for Life (2015-2019, 2022-2024)

Dissertation: "The central representation of an aversive event maintains the opioid and nonopioid forms of analgesia"

Current Research Interests:

- Spinal plasticity / learning / metaplasticity
- Recovery of function after spinal cord injury
- Cell death, secondary injury, and hemorrhage
- GABA function and ionic plasticity
- How brain-dependent processes foster tissue loss after injury
- Cardiovascular function, hypertension, and tissue loss after spinal cord injury
- Promoting recovery through rehabilitation (learning)

Professional Organizations:

- American Association for the Advancement of Science
- American Psychological Association (Fellow)
- American Psychological Society (Fellow)
- American Society for Neurorehabilitation
- International Pain Society
- Neurotrauma
- Society for Neuroscience

Invited Presentations:

American Psychological Association (4)
American Society for Neurochemistry
American Society for Neurorehabilitation
American Spinal Injury Association
Brown University-Psychology
Columbia University
Current Advances in Spinal Cord Injury Symposium
Dartmouth University-Psychology
Drexel University College of Medicine (2)
Duke University-Biopsychology (2)
Eastern Psychological Association
Emory University
Houston Methodist (Grand Rounds)
ICORD (Vancouver, BC; 2)
I-OSCIRS
International Spinal Research Trust (ISRT, London)
International Symposium on Neural Regeneration (ISNR)
Kentucky Spinal Cord Injury Research Center (2)
Kentucky Spinal Cord Injury Research Center Symposium (2)
Mission Connect (2), Houston, TX
Nanotech., Biotech., Information Tech. and Cognitive Science (UCLA)
Neural Restoration Workshop, Sandia National Laboratories
OSU-Neuroscience
Pavlovian Society (2)
Southwestern University-Neuroscience
Southwestern Comparative Psychological Association (Keynote)
Texas A&M-Neuroscience (2)
UCLA-Biopsychology
UCLA-Neuroscience
UCLA-Symposium on Spinal Cord Plasticity
University of California-San Francisco
University of Colorado
University of Indiana (2)
University of Iowa (2)
University of Kentucky
University of Michigan
University of Mississippi Medical Center
University of North Carolina-Biopsychology (2)
University of Pennsylvania
University of Texas-Biopsychology (4)
University of Texas Health Science Center (2)
University of Washington
Yale University-Biopsychology

External Grant Support (PI):

NIDA R03, "The role of the central nucleus of the amygdala in pain", 1/87-6/88, \$21,289.

Texas Advanced Research Program, "Opioid sensitization: Determinants and neural mechanisms", 11/89-8/92, \$62,536.

NIDA R03, "Activation of the hormonal form of opioid analgesia", 5/89-4/90, \$33,134.

NSF Grant, "Conditioned changes in pain reactivity: The variables which determine the direction and the form of the conditioned response", 3/89-2/91, \$74,651.

NIMH R01, "Spinal plasticity and pain: Mechanisms and function", 5/92-4/96, \$233,491.

NIMH R01, "Sensitization: Behavioral properties & neural mechanisms", 12/96-11/00, \$335,591 (1.3 percentile).

NIMH R01, "Spinal cord plasticity: Behavioral and neural mechanisms", 4/1/00-3/31/04, \$646,416.

NINDS R01 NS41548, "Learning within the spinal cord: Clinical implications", 12/1/01-2/14/07, 1,820,265 (1.3 percentile).

NINDS ARRA Grant NS41548-08S1, "Learning within the spinal cord: Clinical implications", 9/30/09-8/31/11, \$105,194.

NINDS R01 NS41548, "Learning within the spinal cord: Clinical implications", 2/1/07-1/31/13, \$1,461,899 (5.1 percentile, first submission).

NICHD R01 HD058412, "Influence of environmental stimulation and learning on recovery after injury", 9/28/07-7/31/13, \$1,214,400 (10.1 percentile, first submission).

Mission Connect, "Neurotrophin Delivery Using Injectable Hydrogels for Increased Plasticity after Spinal Cord Injury", 10/1/12-9/30/14, \$50,000.

Mission Connect, "Probenecid: "A potential treatment to reduce cell death, and chronic pain, after spinal cord injury". Mission Connect Research Priority Award, 9/1/14-11/30/15, \$19,886.

Craig H. Neilsen Foundation, "How and when does peripheral input affect recovery after SCI?", Spinal Cord Injury Research on the Translational Spectrum (SCIRTS) Award, 12/31/14-12/30/18, \$553,435.

NINDS R21 NS091723, "Effect of inflammation on recovery and pain after spinal cord injury", 2/1/16-1/31/18, \$402,205 (5th percentile).

NINDS R56 NS104422, Nociceptive input after spinal cord injury (SCI) expands the region of secondary injury and undermines long-term recovery. 7/1/17-7/31/18, \$327,368.

SCIRP Investigator-Initiated Research Award (DOD/CDMRP; Grant #: 1254207, Log #: SC170241), Nociceptive (Pain) Input After Spinal Cord Injury (SCI) Enhances Secondary Injury: Identifying Treatments That Can Be Translated to Clinical Practice. 9/30/18-9/29/22; \$719,147.

NINDS R01 NS104422, Nociceptive input after spinal cord injury (SCI) expands the region of secondary injury and undermines long-term recovery, 8/1/18-6/30/24, \$1,633,288.

Craig H. Neilsen Foundation (1000927), Protecting the injured spinal cord, 7/1/23-7/30/26, \$799,778 (\$242,357/yr. dir. costs to J.G.).

SCIRP Investigator-Initiated Research Award (DOD /CDMRP; Award #: 13971258, Log #: SC230210), Protecting the injured spinal cord: Modulating autonomic function after spinal cord injury (sci) to reduce tissue loss and improve neurological outcome. 7/1/24-6/30/27, \$746,972 (\$166,616/yr. dir. costs to J.G.).

External Grant Support (coPI/coI/coMentor/Consultant):

NINDS Grant (R03 NS051443), "Pavlovian conditioning in injured spinal cord systems", 9/1/05-8/30/07, \$144,000, PI: Dr. M. Hook.

NIDA Grant (B-Start), "The effects of morphine on sensory and motor functions after a spinal cord injury", 1/1/06-12/31/08, \$71,512, PI: Dr. M. Hook.

NIH T32 Training Grant, "Texas Consortium in Behavioral Neuroscience", 2002-2007, supporting 2 grads. and 1 post doc. trainee at A&M, coPI (PI: P. Gonzalez-Lima).

NINDS R01 NS069537, "Metaplasticity and recovery after spinal cord injury: Cellular mechanisms", 4/10-3/14, \$1,136,357 (\$75,000 direct/yr. to J. Grau), coPI (PI: A. Ferguson) (5 percentile, first submission).

Mission Connect, "The effects of morphine on recovery of function after SCI", 5/1/09-4/30/12, \$120,000 (PI: M. Hook)

NIDA Grant (R01), "Morphine undermines recovery of function after SCI: Neurobiological mechanisms", 3/1/2011-2/28/2016, coI (PI: M. Hook), \$1,172,000.

NINDS Grant (R21), "Cellular mechanisms underlying pain following spinal cord injury", coI (PI: S. Garraway), \$396,000, 7/1/2013-6/30/2016.

NIDA Grant (R44), "Service and software solution for the rigorous design of animal studies", consultant (PI: K. Drake), \$2,018,262, 3/1/2016-2/28/2019.

Neilsen Foundation (546639), "Neural stem cells for mitigating pain after spinal cord injury", coI (PI: J. Dulin), \$299,135, 7/31/18-7/30/20.

Mission Connect (2006284), Closed-loop peripheral sensory-driven motor augmentation to promote gait, coI (PI: H. Park), \$60,000, 12/9/20-12/9/22.

Neilsen Foundation (Postdoctoral training award, 890467), A kinematic-based closed-loop brain stimulation intervention for enhancing brain plasticity and motor function in persons with spinal cord injury, coMentor to S. Bao (Mentor: Y. Lei), \$150,000 (\$0/yr. to J. Grau), 6/31/22-8/30/24.

Neilsen Foundation (890901), "Effect of estrous cycle on secondary injury after spinal cord injury", Consultant (PI: E. Giles), \$400,000, 8/1/22-7/31/24 (\$96,321 dir./yr. to J.G.).

Other Support:

TAMU Minigrant: "Activation of the analgesic systems at the level of the brainstem", 1/1/88-7/31/88, \$750.

Biomedical Research Support Grant: "A behavioral technique to assess the role of neural systems and peptides in pain, and their contribution to behavioral plasticity", 4/1/88-3/31/89, \$5,000.

TAMU Minigrant, "Sensitization of the opioid system by food deprivation", 5/89-12/89, \$800.

TAMU Minigrant: "Pain modulation in the spinal cord", 7/90-12/90, \$1,000.

Biomedical Research Support Grant: "Conditioned hyperalgesia: When does it occur and how does it affect pain reactivity?", 4/91-3/92, \$5,500.

TAMU Minigrant: "The impact of food deprivation on morphine's reinforcing effects", 6/93-12/93, \$900.

TAMU Minigrant: "Role of the THC receptor in learned helplessness", 5/94-10/94, \$1,448.

TAMU Program to Enhance Scholarly and Creative Activities: "Unconditioned hyperalgesia: A preliminary analysis of the underlying neural mechanisms", 5/96-4/97, \$7,466.

TIRR Foundation, The institute for rehabilitation and research foundation gift agreement, 4/21/16-8/31/19, \$1,500,000 (dir. to TAMU).

T3 "Mechanisms For Motor Learning Deficits After Human Spinal Cord Injury", (PI: Y. Lei), \$30,000, 1/20-12/21.

TAMU Seed Grant Program for Promoting Research Collaborations (\$10,000) to James Grau (PI; PBSI) and Richard Gomer (coI; BIOL), Type I -Testing a potential therapeutic for spinal cord injury. 6/1/22-5/31/23.

Refereed Publications (h-index: 51; h-index since 2019: 23)

1. Maier, S. F., Coon, D. J., McDaniel, M. A., Jackson, R. L., and Grau, J. W. (1979). The time course of learned helplessness, inactivity, and nociceptive deficits in rats. *Learning and Motivation*, 10, 467-487.
2. Maier, S. F., Davies, S., Grau, J. W., Jackson, R. R., Morrison, D. H., Moye, T., Madden, J., and Barchas, J. D. (1980). Opiate antagonists and the long-term analgesic reaction induced by inescapable shock in rats. *Journal of Comparative and Physiological Psychology*, 94, 1172-1183.
3. Drugan, R. C., Grau, J. W., Maier, S. F., Madden, J., and Barchas, J. D. (1981). Cross tolerance between morphine and the long-term analgesic reaction to inescapable shock. *Pharmacology, Biochemistry and Behavior*, 14, 677-682.
4. Grau, J. W., Hyson, R. L., Maier, S. F., Madden, J., and Barchas, J. D. (1981). Long-term stress-induced analgesia and activation of the opiate system. *Science*, 213, 1409-1411.
5. Moye, T. B., Coon, D. J., Grau, J. W., and Maier, S. F. (1981). Therapy and immunization of long-term analgesia in rats. *Learning and Motivation*, 12, 133-148.
6. Hyson, R. L., Ashcraft, L. H., Drugan, R. C., Grau, J. W., and Maier, S. F. (1982). Extent and control of shock affects naltrexone sensitivity of stress-induced analgesia and reactivity to morphine. *Pharmacology, Biochemistry and Behavior*, 17, 1019-1025.
7. Maier, S. F., Drugan, R. C., and Grau, J. W. (1982). Controllability, coping behavior, and stress-induced analgesia in the rat. *Pain*, 12, 47-56.
8. Moye, T. B., Hyson, R. L., Grau, J. W. and Maier, S. F. (1983). Immunization of opioid analgesia: Effects of prior escapable shock on subsequent shock-induced and morphine-induced antinociception. *Learning and Motivation*, 14, 238-251.
9. Grau, J. W. and Rescorla, R. A. (1984). Role of context in autoshaping. *Journal of Experimental Psychology: Animal Behavior Processes*, 10, 324-332.
10. Grau, J. W. (1984). Influence of naloxone on shock-induced freezing and analgesia. *Behavioral Neuroscience*, 98, 278-292.
11. Rescorla, R. A., Grau, J. W. and Durlach, P. J. (1985). Analysis of the unique cue in configural conditioning. *Journal of Experimental Psychology: Animal Behavior Processes*, 11, 356-366.
12. Grau, J. W. (1987). The central representation of an aversive event maintains the opioid and nonopioid forms of analgesia. *Behavioral Neuroscience*, 101, 272-288.
13. Grau, J. W. (1987). The variables which control the activation of analgesic systems: Evidence for a memory hypothesis and against the coulometric hypothesis. *Journal of Experimental Psychology: Animal Behavior Processes*, 13, 215-225.

14. Grau, J. W., & Kemler-Nelson, D. G. (1988). The distinction between integral and separable dimensions: Evidence for integrality of pitch and loudness. *Journal of Experimental Psychology: General*, 117, 347-370.
15. Meagher, M. W. and Grau, J. W., & King, R. A. . (1989). Prefrontal cortex lesions block the opioid and nonopioid hypoalgesia elicited by brief shocks, but not long shock-induced hypoalgesia. *Behavioral Neuroscience*, 103, 1366-1371.
16. Meagher, M. W., Grau, J. W., & King, R. A. (1990). The role of supraspinal systems in analgesia: The impact of spinalization and decerebration on the analgesia observed after very brief versus long shocks. *Behavioral Neuroscience*, 104, 328-338.
17. Grau, J. W., Salinas, J. A., Illich, P. A., & Meagher, M. W. (1990). Associative learning and memory for an antinociceptive response in the spinalized rat. *Behavioral Neuroscience*, 104, 489-494.
18. Illich, P. A., & Grau, J. W. (1990). The impact of shock on reactivity to a tactile stimulus. *Learning and Motivation*, 21, 287-298.
19. Grau, J. W., Illich, P. A., Chen, P., & Meagher, M. W. (1991). The role of cholinergic systems in pain modulation I: The impact of scopolamine on shock-induced hypoalgesia. *Behavioral Neuroscience*, 105, 105-124.
20. Grau, J. W., Biles, M. K., & Illich, P. A. (1991). The impact of naltrexone and morphine tolerance on mild shock-induced analgesia. *Psychobiology*, 19, 85-90.
21. Illich, P.A., Salinas, J.A., & Grau, J.W. (1991). Conditioned changes in pain reactivity II: In search of the elusive phenomenon of conditioned hyperalgesia. *Behavioral Neuroscience*, 105, 478-481.
22. Illich, P. A., & Grau, J. W. (1991). Conditioned changes in pain reactivity I: A discrete CS elicits hypoalgesia, not hyperalgesia, on the tail-flick test. *Learning and Motivation*, 22, 421-438.
23. Illich, P. A., Allen, A., & Grau, J. W. (1991). Long-term effects of food deprivation II: Impact on mild shock-induced hypoalgesia. *Psychobiology*, 19, 345-354.
24. Biles, M. K., Illich, P. A., & Grau, J. W. (1992). Long-term effects of food deprivation II: Impact on morphine reactivity. *Psychobiology*, 20, 85-91.
25. Meagher, M. W., Chen, P., Salinas, J. A., & Grau, J. W. (1993). Activation of the opioid and nonopioid hypoalgesic systems at the level of the brainstem and spinal cord: Does a coulometric relation predict the emergence or form of environmentally-induced hypoalgesia? *Behavioral Neuroscience*, 107, 493-505.
26. Illich, P. A., Salinas, J.A., & Grau, J. W. (1994). Latent inhibition and overshadowing of an antinociceptive response in spinalized rats. *Behavioral and Neural Biology*, 62, 140-150.
27. Kallina, C. F., & Grau, J. W. (1995). The Tail-Flick Test I: The Impact of a Suprathreshold Exposure to Radiant Heat. *Physiology and Behavior*, 58, 161-165.

28. Illich, P. A., King, T. E., & Grau, J. W. (1995). Impact of shock on pain reactivity: I. Whether hypo- or hyperalgesia is observed depends on how pain reactivity is tested. *Journal of Experimental Psychology: Animal Behavior Processes*, 21, 331-347.
29. Meagher, M. W., Barter, J., King, T. E., & Grau, J. W. (1995). Presentation of a distractor speeds the decay of a pentobarbital-insensitive nonopioid hypoalgesia in rats. *Psychobiology*, 23, 314-321.
30. Prentice, T. W., Joynes, R. L., Meagher, M. W., & Grau, J. W. (1996). Impact of shock on pain reactivity: III. The magnitude of hypoalgesia observed depends on test location. *Behavioral Neuroscience*, 109, 528-541.
31. King, T. E., Joynes, R. L., Meagher, M. W., & Grau, J. W. (1996). Impact of shock on pain reactivity: II. Evidence for enhanced pain. *Journal of Experimental Psychology: Animal Behavior Processes*, 22, 265-278.
32. Grau, J. W., Burks, K., Kallina, C. F., King, T. E., & Meagher, M. W. (1996). Activation of the opioid and nonopioid antinociceptive systems in pentobarbital anesthetized rats: Assessing the role of shock severity. *Psychobiology*, 24, 71-84.
33. Joynes, R. L., & Grau, J. W. (1996). Mechanisms of Pavlovian conditioning: The role of protection from habituation in spinal conditioning. *Behavioral Neuroscience*, 110, 1375-1387.
34. Joynes, R. L., Illich, P. A., & Grau, J. W. (1997). Evidence for spinal conditioning in intact rats. *Neurobiology of Learning and Memory*, 67, 64-68.
35. King, T. E., Joynes, R. L., & Grau, J. W. (1997). The Tail-Flick Test II: The role of supraspinal systems and avoidance learning. *Behavioral Neuroscience*, 111, 754-767.
36. Grau, J. W., Barstow, D. G. & Joynes, R. L. (1998). Instrumental learning within the spinal cord: I. Behavioral properties. *Behavioral Neuroscience*, 112, 1366-1386.
37. King, T. E., Crown, E. D., Sieve, A. N., Joynes, R. L., Grau, J. W., & Meagher, M. W. (1999). Shock-induced hyperalgesia: I. Evidence forebrain systems play an essential role. *Behavioural Brain Research*, 100, 33-42.
38. McLemore, S., Crown, E. D., Meagher, M. W., & Grau, J. W. (1999). Shock-induced hyperalgesia: II. Role of the dorsolateral periaqueductal gray. *Behavioral Neuroscience*, 112, 539-549.
39. Grau, J. W., & Meagher, M. W. (1999). Pain Modulation: It's a two-way street. *Psychological Science Agenda*, 12 (3), 10-12.
40. Crown, E. D., King, T. E., Grau, J. W., & Meagher, M. W. (2000). Shock-induced hyperalgesia: III. Role of the bed nucleus of the stria terminalis, the basolateral and central amygdaloid nuclei. *Behavioral Neuroscience*, 114, 561-573.
41. Sieve, A. N., King, T. E., Grau, J. W., & Meagher, M. W. (2001). Pain and negative

- affect: Evidence the inverse benzodiazepine agonist DMCM inhibits pain and learning. *Psychopharmacology*, 153, 180-190.
42. Meagher, M. W., Ferguson, A. R., Crown, E. D., McLemore, S., King, T. E., Sieve, A. N., & Grau, J. W. (2001). Shock-induced hyperalgesia IV: Generality. *Journal of Experimental Psychology: Animal Behavior Processes*, 27, 219-238.
 43. Crown, E. D., & Grau, J. W. (2001). Preserving and restoring behavioral potential within the spinal cord using an instrumental training paradigm. *Journal of Neurophysiology*, 86, 845-855.
 44. Crown, E. D., Ferguson, A. R., Joynes, R. L., & Grau, J. W. (2002). Instrumental learning within the spinal cord: II. Evidence for central mediation. *Physiology & Behavior*, 77, 259-267.
 45. Crown, E. D., Joynes, R. L., Ferguson, A. R., & Grau, J. W. (2002). Instrumental learning within the spinal cord: IV. Induction and retention of the behavioral deficit observed after noncontingent shock. *Behavioral Neuroscience*, 116, 1032-1051.
 46. Ferguson, A. R., Washburn, S. N., Crown, E.D., & Grau, J. W. (2003). GABA_A receptor activation is involved in non-contingent shock inhibition of instrumental conditioning in spinal rat. *Behavioral Neuroscience*. 117, 799-812.
 47. Joynes, R. L., Ferguson, A. R., Crown, E. D., Patton, B. C., & Grau, J. W. (2003). Instrumental learning within the spinal cord: V. Evidence the behavioral deficit observed after noncontingent nociceptive stimulation reflects an intraspinal modification. *Behavioural Brain Research*, 141, 159-170.
 48. Joynes, R. L., & Grau, J. W. (2004). Instrumental learning with the spinal cord: III. Prior exposure to noncontingent shock induces a behavioral deficit that is blocked by an opioid antagonist. *Neurobiology of Learning and Memory*, 82, 35-51.
 49. Hook, M. A., Ferguson, A. R., Garcia, G., Washburn, S. N., Koehly, L. M., & Grau, J. W. (2004). Monitoring recovery after injury: Procedures for deriving the optimal test window. *Journal of Neurotrauma*, 21, 109-118.
 50. Joynes, R. L., Janjua, K. R., & Grau, J. W. (2004). Instrumental learning within the spinal cord: VI. Disruption of learning by the NMDA antagonist APV. *Behavioural Brain Research*, 154, 431-438.
 51. Patton, B. C., Hook, M. A., Crown, E. D., Ferguson, A. R., & Grau, J. W. (2004). The behavioral deficit observed following noncontingent shock in spinalized rats is prevented by the protein synthesis inhibitor cycloheximide. *Behavioral Neuroscience*, 118, 653-658.
 52. Ferguson, A. R., Patton, B. C., Bopp, A. C., Meagher, M. W., & Grau, J. W. (2004). Brief exposure to a mild stressor enhances morphine conditioned place preference in male rats. *Psychopharmacology*, 175, 47-52.
 53. Crown, E. D., Grau, J. W., & Meagher, M. W. (2004). Pain in a balance: Noxious

- events engage opposing processes that concurrently modulate nociceptive reactivity. *Behavioral Neuroscience*, 118, 1418-1426.
54. Ferguson, A. R., Hook, M. A., Garcia, G., Bresnahan, J. C., Beattie, M. S., & Grau, J. W. (2004). A simple transformation that improves the metric properties of the BBB scale. *Journal of Neurotrauma*, 21, 1601-1613.
 55. Grau, J. W., Washburn, S. N., Hook, M. A., Ferguson, A. R., Crown, E. D., Garcia, G., Bolding, K. A., & Miranda, R. C. (2004). Uncontrollable nociceptive stimulation undermines recovery after spinal cord injury. *Journal of Neurotrauma*, 21, 1795-1817.
 56. Grau, J. W., & Joynes, R. L. (2005). A neural-functionalist approach to learning. *International Journal of Comparative Psychology*, 18, 1-22.
 57. Grau, J. W., & Joynes, R. L. (2005). Neurofunctionalism revisited: Learning is more than you think it is. *International Journal of Comparative Psychology*, 18, 46-59.
 58. Liu, G. T., Crown, E. D., Miranda, R. C., & Grau, J. W. (2005). Instrumental learning within the rat spinal cord: Localization of the essential neural circuit. *Behavioral Neuroscience*, 119, 538-547.
 59. Crown, E. D., & Grau, J. W. (2005). Evidence that descending serotonergic systems protect spinal cord plasticity against the disruptive effect of uncontrollable stimulation. *Experimental Neurology*, 196, 164-176.
 60. Ferguson, A. R., Crown, E. D., & Grau, J. W. (2006). Nociceptive plasticity inhibits adaptive learning in the spinal cord. *Neuroscience*, 141, 421-431.
 61. Grau, J. W., & Hook, M. A. (2006). Spinal neurons exhibit a surprising capacity to learn and a hidden vulnerability when freed from the brain's control. *Current Neurology and Neuroscience Reports*, 6, 77-80.
 62. Grau, J. W., Crown, E. D., Ferguson, A. R., Washburn, S. N., Hook, M. A., & Miranda, R. C. (2006). Instrumental learning within the spinal cord: Underlying mechanisms and implications for recovery after injury. *Behavioral and Cognitive Neuroscience Reviews*, 5, 191-239.
 63. Washburn, S. N., Patton, B. C., Ferguson, A. R., Hudson, K. L., & Grau, J. W. (2007). Exposure to intermittent nociceptive stimulation under pentobarbital anesthesia disrupts spinal cord function in rats. *Psychopharmacology*, 192, 243-252.
 64. Hook, M. A., Liu, G. T., Washburn, S. N., Ferguson, A. R., Bopp, A. C., Huie, J. R., & Grau, J. W. (2007). The impact of morphine after a spinal cord injury. *Behavioural Brain Research*, 179, 281-293.
 65. Bigbee, A. J., Crown, E. D., Ferguson, A. R., Roy, R. R., Tillakaratne, N. J. K., Tobin, A. J., Grau, J. W., & Edgerton, V. R. (2007). Two chronic motor training paradigms differentially alter the potential to perform a novel motor learning task in spinally transected rats. *Behavioural Brain Research*, 180, 95-101.

66. Gómez-Pinilla, F., Huie, J. R., Ying, Z., Ferguson, A., Crown, E.D., Baumbauer, K.M., Edgerton, V.R., & Grau, J.W. (2007). BDNF and learning: Evidence that instrumental training promotes learning within the spinal cord by up-regulating BDNF expression. *Neuroscience*, 148, 893-906.
67. Hook, M. A., & Grau, J. W. (2007). An animal model of functional electrical stimulation: Evidence that the central nervous system modulates the consequences of training. *Spinal Cord*, 45, 702-712.
68. Hook, M. A., Huie, J. R., & Grau, J. W. (2008). Peripheral inflammation undermines the plasticity of the isolated spinal cord. *Behavioral Neuroscience*, 122, 233-249.

Recommended: Faculty of 1000 Biology

69. Washburn, S. N., Maultsby, M. L., Puga, D. A., & Grau, J. W. (2008). Opioid regulation of spinal cord plasticity: Evidence the kappa-2 opioid receptor agonist GR89686 inhibits learning within the rat spinal cord. *Neurobiology of Learning and Memory*, 89, 1-16.
70. Baumbauer, K. M., Hoy, K. C., Huie, J. R., Hughes, A. J., Woller, S. A., Puga, D. A., Setlow, B., & Grau, J. W. (2008). Timing in the absence of supraspinal input I: Variable, but not fixed, spaced stimulation of the sciatic nerve undermines spinally-mediated instrumental learning. *Neuroscience*, 155, 1030-1047.

Recommended: Faculty of 1000 Biology

71. Ferguson, A. R., Bolding, K. A., Huie, J. R., Hook, M. A., Santillano, D. R., Miranda, R. C., & Grau, J. W. (2008). Group I metabotropic glutamate receptors control metaplasticity of spinal cord learning through a PKC-dependent mechanism. *Journal of Neuroscience*, 28, 11939-11949.
72. Hook, M. A., Moreno, G., Woller, S., Puga, D., Hoy, K., Baldyn, R., & Grau, J. W. (2009). Intrathecal morphine attenuates recovery of function after a spinal cord injury. *Journal of Neurotrauma*, 26, 741-752.
73. Vichaya, E. G., Baumbauer, K. M., Carcoba, L. M., Grau, J. W., & Meagher, M. W. (2009). Spinal glia modulate both adaptive and pathological processes. *Brain, Behavior, and Immunity*, 23, 969-976.
74. Baumbauer, K.M., Huie, J. R., Hughes, A. J., & Grau, J.W. (2009). Timing in the Absence of Supraspinal Input II: Regular spaced stimulation induces a lasting alteration in spinal function that depends on the NMDA receptor, BDNF release, and protein synthesis. *Journal of Neuroscience*, 29, 14383-14393.

Featured: "This Week in the Journal"

75. Brown, A. K., Woller, S. A., Moreno, G., Grau, J. W., & Hook, M. A. (2011). Exercise therapy and recovery after SCI: Evidence that early intervention improves recovery of function. *Spinal Cord*, 49, 623-628.
76. Hook, M. A., Washburn, S. N., Moreno, G., Woller, S., Lee, K. H., and Grau, J. W. (2011). An IL1 receptor antagonist blocks a morphine-induced attenuation of locomotor recovery after spinal cord injury. *Brain, Behavior, & Immunity*, 25, 349-

77. Baumbauer, K. M., & Grau, J. W. (2011). Timing in the absence of supraspinal input III: Regularly spaced cutaneous stimulation prevents and reverses the spinal learning deficit produced by peripheral inflammation. *Behavioral Neuroscience*, 125, 37-45.
78. Strickland, E. R., Hook, M. A., Balaraman, S., Huie, R., Grau, J. W., & Miranda, R. C. (2011). MicroRNA dysregulation following spinal contusion: Implications for neural plasticity and repair, *Neuroscience*, 186, 146-160.
79. Garraway, S. M., Turtle, J. D., Huie, J. R., Lee, K. H., Hook, M. A., Woller, S. A., & Grau, J. W. (2011). Intermittent noxious stimulation following spinal cord contusion injury impairs locomotor recovery and reduces spinal BDNF-TrkB signaling in adult rats. *Neuroscience*, 199, 86-102.
80. Huie, J. R., Garraway, S. M., Hoy, K. C., & Grau, J. W. (2012). Learning in the spinal cord: BDNF mediates the beneficial effects of instrumental training. *Neuroscience*, 200, 74-90.
81. Woller, S. A., Moreno, G. L., Hart, N., Wellman, P. J., Grau, J. W., & Hook, M. A. (2012). Analgesia or addiction: Implications for morphine use after spinal cord injury. *Journal of Neurotrauma*, 28, 1650-1662.
82. Huie, J.R., Baumbauer, K.M., Lee, K.H., Beattie, M.S., Bresnahan, J.C., Ferguson, A.R., & Grau, J.W. (2012). Glial tumor necrosis factor alpha (TNF α) Generates Metaplastic Inhibition of Spinal Learning. *PLoS ONE*, 7, e39751.
84. Grau, J. W., Huie, J. R., Garraway, S. M., Hook, M. A., Crown, E. D., Baumbauer, K. M., Lee, K. H., Hoy, K. C., & Ferguson, A. F. (2012). Impact of behavioral control on the processing of nociceptive stimulation. *Frontiers in Integrative Physiology*, 3, 1-21. doi: 10.3389/fphys.2012.00262
85. Ferguson, A. R., Huie, J. R., Crown, E. D., & Grau, J. W. (2012). Central nociceptive sensitization vs. spinal cord training: Opposing forms of plasticity that dictate function after complete spinal cord injury. *Frontiers in Integrative Physiology*, 3, 396. doi: 10.3389/fphys.2012.00396.
86. Baumbauer, K. M., Puga, D. A., Lee, K. H., Woller, S. A., Hughes, A. J., & Grau, J. W. (2012). Temporal regularity determines the impact of electrical stimulation on tactile reactivity and response to capsaicin in spinally transected rats. *Neuroscience*, 227, 119-133.
87. Ferguson, A. R., Huie, J. R., Crown, E. D., Baumbauer, K. M., Hook, M. A., Garraway, S. M., Lee, K. H., Hoy, K. C., & Grau, J. W. (2012). Maladaptive spinal plasticity opposes adaptive spinal learning after spinal cord injury. *Frontiers in Integrative Physiology*, 3, 399. doi: 10.3389/fphys.2012.00399
88. Hoy, K. C., Huie, J. R., & Grau, J. W. (2013). AMPA receptor mediated behavioral plasticity in the isolated rat spinal cord. *Behavioural Brain Research*, 236, 319-326.
89. Grau, J. W. (2014). Learning from the spinal cord: How the study of spinal cord

plasticity informs our view of learning. *Neurobiology of Learning and Memory*, 108, 155-171.

90. Strickland, E.R., Woller, S.A., Hook, M.A., Grau, J.W., & Miranda, R.C. (2014). The association between spinal cord trauma-sensitive miRNAs and pain sensitivity, and their regulation by morphine. *Neurochemistry International*, 77, 40-49.
91. Grau, J.W., Huie, J.R., Lee, K.H., Hoy, K.C., Huan, Y.-J., Turtle, J.D., Strain, M.M., Miranda, R.M., Hook, M.A., Ferguson, A.R., & Garraway, S.M. (2014). Metaplasticity and behavior: How training and inflammation affect plastic potential within the spinal cord and recovery after injury. *Frontiers in Neural Circuits*, 8, 100. doi: 10.3389/fncir.2014.00100.
92. Garraway, S. M., Woller, S. A., Huie, J. R., Hartman, J. J., Hook, M. A., Miranda, R. C., Huang, Y.-J., Ferguson, A. R., & Grau, J. W. (2014). Peripheral noxious stimulation reduces withdrawal threshold to mechanical stimuli after spinal cord injury: Role of tumor necrosis factor alpha and apoptosis. *Pain*, 155, 2344-2359.
93. Strickland, E. R., Garraway, S. M., Woller, S. A., Hook, M. A., Grau, J. W., & Miranda, R. C. (2014). Regulatory effects of intermittent noxious stimulation on spinal cord injury-sensitive microRNAs and their presumptive targets following spinal cord contusion. *Frontiers in Neural Circuits*, 8, 117. doi: 10.3389/fncir.2014.00117.
94. Lee, K. H., Turtle, J. D., Strain, M. M., Huang, Y.-J., Baumbauer, K. M., & Grau, J. W. (2015). Learning about time within the spinal cord: Evidence that spinal neurons can abstract and store an index of regularity. *Frontiers in Behavioral Neuroscience*, 9: 274. doi: 10.3389/fnbeh.2015.00274
95. Huie, J. R., Stuck, E. D., Lee, K. H., Irvine, K. A., Beattie, M. S., Bresnahan, J. C., Grau, J. W., & Ferguson, A. R. (2015). AMPA receptor phosphorylation and synaptic co-localization on motor neurons drive maladaptive plasticity below complete spinal cord injury. *eNeuro*. doi: 10.1523/eneuro.0091-15.2015
96. Lee, K. H., Huang, Y.-J., & Grau, J. W. (2016). Learning about time within the spinal cord II: Evidence that temporal regularity is encoded by a spinal oscillator. *Frontiers in Behavioral Neuroscience*, 10:14. doi: 10.3389/fnbeh.2016.00014
97. Hansen, C. N., Faw, T. D., Kerr, S. C., Fisher, L. C., Deibert, R. J., White, S., Buford, J. A., Grau, J. W., & Basso, M. (2016). Sparing of descending systems rescues interneuron plasticity in the lumbar cord to allow adaptive learning after thoracic spinal cord injury. *Frontiers in Neuroscience*, 10, 11. doi: 10.3389/fncir.2016.00011
98. Huang, Y.-J., Lee, K. H., Murphy, L., Garraway, S. M., & Grau, J. W. (2016). Acute spinal cord injury (SCI) transforms how GABA affects nociceptive sensitization. *Experimental Neurology*, 285, 82-95.
99. Khaing, Z. Z., Park, J., Shangjing, X., Agrawal, N. K., Plumton, G., Lee, K. H., Huang, Y.-J., Niemerski, A. L., Schmidt, C. E., Grau, J. W. (2016). Localized and Sustained Release of BDNF from Injectable Hydrogel/Microparticle Composites Fosters Spinal Learning after SCI. *Journal of Materials Chemistry B*, 4, 7560-7571.

100. Turtle, J. D., Strain, M. M., Aceves, M., Huang, Y.-J., Reynolds, J. A., Hook, M. A., & Grau, J. W. (2017). Pain input impairs recovery after spinal cord injury: Treatment with lidocaine. *Journal of Neurotrauma*, 34, 1200-1208.
101. Grau, J. W., Huang, Y.-J., Turtle, J. D., Strain, M. M., Miranda, R. M., Garraway, S. M., & Hook, M. A. (2017). When pain hurts: Nociceptive stimulation induces a state of maladaptive plasticity and impairs recovery after spinal cord injury. *Journal of Neurotrauma*, 34, 1873-1890.
102. Huang, Y.J., Lee, K. H., & Grau, J. W. (2017). Complete spinal cord injury (SCI) transforms how brain derived neurotrophic factor (BDNF) affects nociceptive sensitization. *Experimental Neurology*, 288, 38-50.
103. Baumbauer, K. M., Turtle, J. D., & Grau, J. W. (2017). Fixed spaced stimulation restores adaptive plasticity within the spinal cord: Identifying the eliciting conditions. *Physiology & Behavior*, 174, 1-9.
104. Grau, J.W. & Huang, Y.-Y. (2018) Metaplasticity within the spinal cord: Evidence brain-derived neurotrophic factor (BDNF), tumor necrosis factor (TNF), and alterations in GABA function (ionic plasticity) modulate pain and the capacity to learn. *Neurobiology of Learning and Memory*, 154, 121-135.
105. Huang, Y.J., & Grau, J.W. (2018). Ionic plasticity and pain: The loss of descending serotonergic fibers after spinal cord injury transforms how GABA affects pain. *Experimental Neurology*, 306, 105-116.
106. Turtle, J.D., Strain, M., Reynolds, J., Huang, Y.J., Lee, K., Henwood, M.K., Garraway, S., & Grau, J.W. (2018). Pain input after spinal cord injury undermines long-term recovery and engages signal pathways that promote cell death. *Frontiers in Systems Neuroscience*, 12, doi: 10.3389/fnsys.2018.00027
107. Turtle, J. D., Brumley, M.K., Strain, M.M., Huang, Y.J., Miranda, R.C., & Grau, J.W. (2019). Engaging pain fibers after a spinal cord injury (SCI) fosters hemorrhage and expands the area of secondary injury. *Experimental Neurology*, 311, 115-124.
108. Reynolds, J. A., Henwood, M. K., Turtle, J. D., Baine, R. E., Johnston, D. T., & Grau, J. W. (2019). Spared fibers can fuel pain-induced hemorrhage at the site of injury and increase tissue loss after spinal cord injury. *Frontiers in Systems Neuroscience*, 13, doi: 10.3389/fnsys.2019.00044
109. Grau, J. W. (2019) Achieving adaptive plasticity in the spinal cord. *Oxford Research Encyclopedia of Neuroscience*, ed. Murray Sherman. New York and Oxford: Oxford University Press. doi:10.1093/acrefore/9780190264086.013.00243
110. Strain, M. M., Hook, M. A., Reynolds, J. D., Huang, Y.-J., Henwood, M. K., & Grau, J. W. (2019). A brief period of moderate noxious stimulation induces hemorrhage and impairs locomotor recovery after spinal cord injury. *Physiology & Behavior*, 212, 112695.
111. Grau, J. W., Baine, R. E., Bean, P. A., Davis, J. A., Fauss, G. N., Henwood, M. K., Hudson, K. E., Johnston, D. T., Tarbet, M. M., & Strain, M. M. (2020). Learning to promote recovery after spinal cord injury. *Experimental Neurology*, 330, 113334 (1-

- 20).
112. Davis, J. A., Bopp, A. C., Henwood, M. K., Baine, R. E., Cox, C. C., & Grau, J. W. (2020). Pharmacological transection of brain-spinal cord communication blocks pain-induced hemorrhage and locomotor deficits after spinal cord injury. *Journal of Neurotrauma*, 37, 1729-1739.
 113. Hoy, K. C., Strain, M. M., Turtle, J. D., Lee, K. H., Huie, J. R., Hartman, J. J., Tarbet, M. M., Harlow, M. L., Magnuson, D. S. K., & Grau, J. W. (2020). Evidence that the central nervous system can induce a modification at the neuromuscular junction that contributes to the maintenance of a behavioral response. *Journal of Neuroscience*, 40, 9186-9209.
 114. Strain, M. M., Johnston, D. T., Baine, R.E., Reynolds, J.A., Huang, Y.-J., Henwood, M. K., Fauss, G. N., Davis, J. A., Miranda, R., West, C. R., & Grau, J. W. (2021). Hemorrhage and locomotor deficits induced by pain input after spinal cord injury are partially mediated by changes in hemodynamics. *Journal of Neurotrauma*, 38, 3406-3430.
 115. Fauss, G. N. K., Strain, M. M., Huang, Y. J., Reynolds, J. A., Davis, J. A., Henwood, M. K., West, C. R., & Grau, J. W. (2021). Contribution of Brain Processes to Tissue Loss After Spinal Cord Injury: Does a Pain-Induced Rise in Blood Pressure Fuel Hemorrhage? *Frontiers in Systems Neuroscience*, 15. doi: 10.3389/fnsys.2021.733056
 116. Baine, R. E., Johnston, D. T., Strain, M. M., Henwood, M. K., Davis, J. A., Reynolds, J. A., Giles, E. D., & Grau, J. W. (2022). Noxious stimulation induces acute hemorrhage and impairs long-term recovery after spinal cord injury (SCI) in female rats: Evidence estrous cycle may have a modulatory effect. *Neurotrauma Reports*, 3.1.
 117. Fauss, G. N. K., Hudson, K. E., & Grau, J. W. (2022). Role of descending serotonergic fibers in the development of pathophysiology after spinal cord injury (SCI): Contribution to chronic pain, spasticity, and autonomic dysreflexia. *Biology*, 11.
 118. Grau, J. W., Hudson, K. E., Tarbet, M. M., & Strain, M. M. (2022). Behavioral studies of spinal conditioning: The spinal cord is smarter than you think it is. *Journal of Experimental Psychology: Animal Learning and Cognition*, 48, 435-457.
 119. Hudson, K. E., & Grau, J. W. (2022). Ionic plasticity: Common mechanistic underpinnings of pathology in spinal cord injury and the brain. *Cells*, 11, 2910.
 120. Davis, J. A., Bopp, A. C., Henwood, M. K., Baine, R. E., Bean, P., & Grau, J. W. (2023). General anesthesia blocks pain-induced hemorrhage and locomotor deficits after spinal cord injury in rats. *Journal of Neurotrauma*, 40, 2552-2565.
 121. Davis, J. A., & Grau, J. W. (2023). Protecting the injured central nervous system: Do anesthesia or hypothermia ameliorate secondary injury? *Experimental Neurology*, 363, 11439.
 122. Grau, J. W., Hudson, K. E., Johnston, D. T., & Partipilo, S. R. (2024) Updating perspectives on spinal cord function: Motor coordination, timing, relational

processing, and memory below the brain. Invited paper for *Horizons in Systems Neuroscience, Frontiers in Systems Neuroscience, 18*.

Books

1. Patterson, M. M., & Grau, J. W. (2001, 2012 [paperback]). *Spinal cord plasticity: Alterations in reflex function*. Norwell, MA: Kluwer Academic Publishers.

Major Contributor (Book)

Grau, J. W. (2015). Neuroscience of learning. In M. Domjan's *Principles of learning and behavior*, 7th edition. Belmont, CA: Wadsworth.

1. The material mind
2. Learning in an invertebrate
3. Eyeblink conditioning and the search for the engram
4. Conditioning and the amygdala
5. Learned helplessness: Role of the prefrontal cortex and dorsal raphe
6. Neuroeconomics: Imaging habit and executive control
7. The role of dopamine in addiction and reward
8. Hippocampal function and long-term potentiation
9. Consolidating memories requires protein synthesis
10. Instrumental learning within the spinal cord
11. Genes and learning
12. Neurobiology of time

Book Chapters:

1. Maier, S. F., Drugan, R. C., Grau, J. W., Hyson, R. L., MacLennan, A. J., Moye, T. B., Madden, J., and Barchas, J. D. (1982). Learned helplessness, pain inhibition, and the endogenous opiates. In M. D. Zeiler, and P. Harzem (Eds.), *Advances in Analysis of Behavior, Vol. 4*. New York: John Wiley and Sons.
2. Rescorla, R. A., Durlach, P. J. and Grau, J. W. (1985). Contextual learning in Pavlovian conditioning. In P. Balsam and A. Tomie (Eds.), *Context and Learning*. Hillsdale, N. J.: Erlbaum.
3. Grau, J. W. & Joynes, R. L. (2001). Pavlovian and instrumental conditioning within the spinal cord: Methodological issues. In M. M. Patterson & J. W. Grau (Eds.), *Spinal cord plasticity: Alterations in reflex function*. Kluwer Academic Publishers.
4. Grau, J. W. & Joynes, R. L. (2001). Spinal cord plasticity and the recovery of function. In M. E. Carroll & J. B. Overmier (Eds.), *Linking animal research and human psychological health*. Washington, DC: American Psychological Association.
5. Grau, J. W. (2002). Learning and memory without a brain. In M. Bekoff, C. Allen, & G. Burghardt (Eds.), *The cognitive animal*. Cambridge, Mass.: MIT Press.
6. Allen, C., Grau, J. W., & Meagher, M. W. (2014). The lower bounds of cognition: What do spinal cords reveal? In J. Bickle (Ed.), *The Oxford Handbook of Philosophy*

of Neuroscience (pp. 129-142). Oxford: Oxford Press.

7. Grau, J. W., & Patterson, M. M. (2016). Neural plasticity of spinal reflexes. *Neuroscience and Biobehavioral Psychology*, Elsevier Reference.
8. Grau, J. W. (2019) Achieving adaptive plasticity in the spinal cord. Oxford Research Encyclopedias (Neuroscience). Oxford: Oxford Press.
doi.org/10.1093/acrefore/9780190264086.013.243

Commentaries and Entries:

1. Maier, S.F., Davies, S., Grau, J. W., Jackson, R. R., Morrison, D. H., Moye, T., Madden, J., and Barchas, J. D. (1986). Opiate antagonists and the long-term analgesic reaction induced by inescapable shock in rats. Reprinted in N. A. Marlin (Ed.), *Directed Readings for the Principles of Learning & Behavior*, (2nd edition). Monterey, CA: Brooks/Cole.
2. Domjan, M., & Grau, J. W. (2000). Avoidance Learning. In A. E. Kazdin (Ed.), *Encyclopedia of Psychology*. Washington, D.C.: American Psychological Association, and New York: Oxford University Press.
3. Grau, J. W. (2000). Instrumental conditioning. In W. E. Craighead & C. B. Nemeroff (Eds.), *Encyclopedia of Psychology and Neuroscience* (3rd edition). New York: John Wiley & Sons.
4. Grau, J. W. (2012). Spinal learning. In N. M. Seal (Ed.), *Encyclopedia of the Sciences of Learning*. New York: Springer Publishing.

Published Abstracts:

1. Grau, J. W. (1986). The central representation of an aversive event maintains the opioid and nonopioid forms of analgesia (Doctoral dissertation, University of Pennsylvania, 1985). *Dissertation Abstracts International*, 46, 4434B.
2. Grau, J. W., & Meagher, M. W. (1987). Lesions of the frontal cortex attenuate the analgesia observed after very brief, but not long, shocks. *Society for Neuroscience Abstracts*, 13, 990.
3. Meagher, M. W., & Grau, J. W. (1987). Decerebration blocks the analgesia observed after very brief, but not long, shocks. *Society for Neuroscience Abstracts*, 13, 990.
4. Grau, J. W., & Meagher, M. W. (1988). The impact of cholinergic drugs on mild shock-induced analgesia parallels their impact on memory. *Society for Neuroscience Abstracts*, 14, 709.
5. Meagher, M. W., & Grau, J. W. (1988). Intense, but not weak, shocks induce a transient nonopioid, and a long-lasting opioid, analgesia in spinal rats. *Society for Neuroscience Abstracts*, 14, 709.
6. Illich, P. A., & Grau, J. W. (1989). Previously food deprived rats exhibit a naltrexone reversible increase in both reactivity to shock and shock-induced analgesia. *Society for Neuroscience Abstracts*, 15, 156.
7. Biles, M. K., Illich, P. A., & Grau, J. W. (1989). Previously food deprived rats exhibit an exaggerated morphine analgesia. *Society for Neuroscience Abstracts*, 15, 847.
8. Meagher, M. W., Grau, J. W., & King, R. A. (1989). Does a coulometric relation determine whether analgesia in the decerebrate rat is opioid or nonopioid in form? *Society for Neuroscience Abstracts*, 15, 850.
9. Salinas, J. A., Illich, P. A., Meagher, M. W., & Grau, J. W. (1989). Conditioned analgesia in the spinalized rat. *Society for Neuroscience Abstracts*, 15, 847.
10. Salinas, J. A., Illich, P. A., & Grau, J. W. (1990). Latent inhibition and overshadowing of a conditioned antinociceptive response in the spinalized rat. *Society for Neuroscience Abstracts*, 16, 99.
11. Biles, M. K., Barter, J. M., & Grau, J. W. (1990). Adrenalectomy and dexamethasone attenuate mild shock-induced analgesia. *Society for Neuroscience Abstracts*, 16, 99.
12. Chen, P. S., Illich, P. A., Meagher, M. W., & Grau, J. W. (1990). The impact of scopolamine on conditioned and shock-induced analgesia. *Society for Neuroscience Abstracts*, 16, 99.
13. Biles, M. K., & Grau, J. W. (1991). A period of restraint is necessary to observe a strong opioid analgesia after mild shock or a low-dose of morphine in rats. *Society for Neuroscience Abstracts*, 17, 110.
14. Chen, P. S., Illich, P. A., Meagher, M. W., & Grau, J. W. (1991). Impact of scopolamine and yohimbine on pain reactivity and shock-induced antinociception in spinalized rats. *Society for Neuroscience Abstracts*, 17, 1374.
15. Illich, P. A., Burks, K. D., & Grau, J. W. (1991). Associative learning of an antinociceptive response at the level of the spinal cord in intact rats. *Society for Neuroscience Abstracts*, 17, 1008.
16. Grau, J. W., Illich, P. A., Burks, K. D., & Meagher, M. W. (1992). Influence of shock severity on the activation of analgesic systems in pentobarbital treated rats. *Society for Neuroscience Abstracts*, 18, 686.
17. Parker, C. W., Illich, P. A., Grau, J. W., & Meagher, M. W. (1992). Controllable, but not uncontrollable shock elicits an antinociception in spinalized rats. *Society for Neuroscience Abstracts*, 18, 1026.

18. Illich, P. A., Parker, C. W., Burks, K. D., & Grau, J. W. (1992). Mild shock produces an unconditioned naltrexone-insensitive increase in reactivity on the vocalization magnitude and threshold tests. *Society for Neuroscience Abstracts*, 18, 1026.
19. King, T. E., Payne, M., & Grau, J. W. (1993). Evidence the tail-flick response is spinally mediated in rats irrespective of test temperature. *Society for Neuroscience Abstracts*, 19, 965.
20. Kallina, C. F., King, T. E., & Grau, J. W. (1993). A supra-threshold tail-flick trial induces hyperalgesia in pentobarbital anesthetized rats but not in awake rats. *Society for Neuroscience Abstracts*, 19, 966.
21. Barstow, D. G., Grau, J. W., & Meagher, M. W. (1993). The importance of equating flexion force when studying "instrumental learning" in spinalized subjects. *Society for Neuroscience Abstracts*, 19, 1001.
22. King, T. E., & Grau, J. W. (1994). Shock-induced hyperalgesia in rats: Behavioral properties. *Society for Neuroscience Abstracts*, 20, 762.
23. Joynes, R. L., Prentice, T. W., & Grau, J. W. (1994). Conditioned antinociception in the spinalized rat The role of nonassociative mechanisms. *Society for Neuroscience Abstracts*, 20, 762.
24. Prentice, T. W., Grau, J. W., & Meagher, M. W. (1994). The magnitude of shock-induced antinociception observed on the tail-flick test in rats depends on where radiant heat is applied. *Society for Neuroscience Abstracts*, 20, 764.
25. Barstow, D. G., Grau, J. W., Joynes, R. L., & Prentice, T. W. (1994). The relative contribution of shock onset (punishment) and offset (escape) to learning of a flexion response in the spinal rat. *Society for Neuroscience Abstracts*, 20, 787.
26. Joynes, R. L., Janjua, K. R., & Grau, J. W. (1995). Operant learning at the level of the spinal cord is blocked by the NMDA antagonist APV. *Society for Neuroscience Abstracts*, 21, 415.
27. King, T. E., Grau, J. W. (1995). Avoidance learning on the tail-flick test. *Society for Neuroscience Abstracts*, 21, 388.
28. King, T. E., Joynes, R. L., Meagher, M. W., & Grau, J. W. (1996). Shock-induced hyperalgesia in rats. *Society for Neuroscience Abstracts*, 22, 120.
29. Grau, J. W., Joynes, R. L., Penland, H. R. (1996). Inescapable shock disrupts spinal learning: Evidence for spinal mediation and naltrexone reversibility. *Society for Neuroscience Abstracts*, 22, 1840
30. Joynes, R. L., & Grau, J. W. (1996). Conditioned antinociception in spinal rats: Associative learning versus protection from habituation. *Society for Neuroscience Abstracts*, 22.
31. Joynes, R. L., McLemore, S., & Grau, J. W. (1997). Operant learning at the level of the spinal cord: Induction and retention. *Society for Neuroscience Abstracts*, 23, 1041.
32. King, T. E., Joynes, R. L., Minke, D. E., Penland, H., Meagher, M. W., & Grau, J. W. (1997). Deep lesions of the frontal pole eliminate shock-induced hyperalgesia in rats. *Society for Neuroscience Abstracts*, 23, 161.
33. Joynes, R. L., & Grau, J. W. (1998). Noncontingent shock disrupts learning in spinal rats: Reversibility by intrathecal naltrexone during testing. *Society for Neuroscience Abstracts*, 24, 1152.
34. Sieve, A., King, T., Crown, E., Meagher, M. W., & Grau, J. W. (1998). The role of anxiety in shock-induced hyperalgesia in rats. *Society for Neuroscience Abstracts*, 24, 1901.
35. Crown, E. D., King, T. E., Meagher, M. W., & Grau, J. W. (1998). Amydala lesions

- block shock-induced hyperalgesia in rats. *Society for Neuroscience Abstracts*, 24, 1901.
36. McLemore, S., Crown, E. D., Grau, J. W., & Meagher, M. W. (1998). Dorsolateral periaqueductal gray lesions eliminate shock-induced hyperalgesia in rats. *Society for Neuroscience Abstracts*, 24, 1901.
 37. Meagher, M. W., McLemore, S., King, T. E., & Grau, J. W. (1998). The generality of shock-induced hyperalgesia in rats. *Society for Neuroscience Abstracts*, 24, 1901.
 38. Joynes, R. L., & Grau, J. W. (1998). Noncontingent shock disrupts learning in spinal rats: Reversibility by intrathecal opioid antagonists during testing. Symposium on Spinal Cord Plasticity, UCLA, November, 1998.
 39. Crown, E. D., Joynes, R. L., Ferguson, A. R., & Grau, J. W. (1998). Instrumental learning within the spinal cord: Exposure to noncontingent shock disrupts learning for at least 20 hours. Symposium2 on Spinal Cord Plasticity, UCLA, November, 1998.
 40. Meagher, M. W., Crown, E. D., & Grau, J. W. (1999). Evidence inescapable shock produces hyperalgesia in rats. *Society for Neuroscience Abstracts*, 25, 688.
 41. Crown, E. D., & Grau, J. W. (1999). Instrumental learning of a flexion response in spinalized rats: Evidence that prior learning facilitates acquisition on the contralateral leg. *Society for Neuroscience Abstracts*, 25, 2156.
 42. Ferguson, A., Crown, E., & Grau, J. W. (1999). Instrumental learning of a flexion response in spinalized rats: Evidence learning depends on the sciatic nerve. *Society for Neuroscience Abstracts*, 25, 2156.
 43. Grau, J. W., & Crown, E. D. (2000). Instrumental learning in spinalized rats: Characterizing the behavioral deficit observed after noncontingent shock. *Society for Neuroscience Abstracts*, 26, 2207.
 44. Ferguson, Crown, E. D., Dhruv, S., Washburn, S. N., & Grau, J. W. (2000). Instrumental learning in spinalized rats: The GABA antagonist bicuculline prevents the behavioral deficit observed after noncontingent shock. *Society for Neuroscience Abstracts*, 26, 2207.
 45. Crown, E. D., & Grau, J. W. (2000). Instrumental learning of a flexion response in spinalized rats: Evidence for behavioral immunization and therapy. *Society for Neuroscience Abstracts*, 26, 2207.
 46. Meagher, M. W., Crown, E. D., Patton, B., Ferguson, A. R., & Grau, J. W. (2000). Shock-induced hyperalgesia in rats: Dorsolateral funiculus lesions unveil hyperalgesia after long shock. *Society for Neuroscience Abstracts*, 26, 653.
 47. Sieve, A. N., Garcia, G., Crown, E. D., Grau, J. W., & Meagher, M. W. (2000). Shock-induced hyperalgesia in rats: Evidence the dorsolateral periaqueductal gray is necessary but not sufficient. *Society for Neuroscience Abstracts*, 26, 653.
 48. Grau, J. W., Garcia, G., Ferguson, A. R., Crown, E. D., & Miranda, R. C. (2001). Exposure to a nociceptive stimulus impairs recovery after a contusion injury. *Society for Neuroscience Abstracts*, 27, 2039.
 49. Ferguson, A. R., Crown, E. D., Washburn, S. N., Miranda, R. C., & Grau, J. W. (2001). Instrumental learning in spinalized rats: Peripheral inflammation undermines behavioral potential in the spinal cord. *Society for Neuroscience Abstracts*, 27, 2202.
 50. Crown, E., Ferguson, A., Dhruv, S., Patton, B., & Grau, J. W. (2001). Descending noradrenergic systems protect spinal cord neurons from the deleterious effects of nociceptive stimulation. *Society for Neuroscience Abstracts*, 27, 2482.
 51. Washburn, S. N., Ferguson, A. R., Patton, B. C., & Grau, J. W. Uncontrollable shock induces a behavioral deficit in the rat spinal cord: Role of GABA. Program No. 166.6. 2002 Abstract Viewer/Itinerary Planner. Washington, DC: Society for Neuroscience, 2002. CD-ROM.

52. Ferguson, A. R., Crown, E. D., Patton, B. C., & Grau, J. W. Intrathecal administration of the NMDA antagonist MK-801 prevents the behavioral deficit observed after noncontingent shock in spinalized rats. Program No. 166.7. *2002 Abstract Viewer/Itinerary Planner*. Washington, DC: Society for Neuroscience, 2002. CD-ROM.
53. Liu, G. T., Crown, E. R., Miranda, R. C., & Grau, J. W. Instrumental learning within the rat spinal cord: localization of the essential neural circuit Program. No. 167.17. *2002 Abstract Viewer/Itinerary Planner*. Washington, DC: Society for Neuroscience, 2002. CD-ROM.
54. Hook, M. A., Garcia, G., Crown, E. D., Ferguson, A. R., Miranda, R. C., & Grau, J. W. Uncontrollable nociceptive stimulation undermines locomotor recovery in spinally contused rats. Program No. 204.11. *2002 Abstract Viewer/Itinerary Planner*. Washington, DC: Society for Neuroscience, 2002. CD-ROM.
55. Crown, E. D., & Grau, J. W. Descending serotonergic systems protect spinal cord neurons from the deleterious effects of nociceptive stimulation. Program No. 363.3. *2002 Abstract Viewer/Itinerary Planner*. Washington, DC: Society for Neuroscience, 2002. CD-ROM.
56. Olson, J. M., Garcia, G., Washburn, S. N., Miranda, R. C., & Grau, J. W. Pretreatment with the endotoxin lps enhances recovery in rats after a contusion injury. Program No. 800.6. *2002 Abstract Viewer/Itinerary Planner*. Washington, DC: Society for Neuroscience, 2002. CD-ROM.
57. Bopp, A.C., Ferguson, A.R., Miranda, R.C., Grau, J.W. (2003). Blocking neural conduction rostral to an injury in rats has a protective effect that reduces the adverse consequences of nociceptive stimulation. Program No. 744.11. *2003 Abstract Viewer/Itinerary Planner*. Washington, D.C: Society for Neuroscience, 2003. CD-ROM.
58. Washburn, S.N., Grau, J.W. (2003). The kappa-2 opiod receptor agonist GR89696 produces a behavioral deficit in spinalized rats. *Abstract Viewer/Itinerary Planner*. Washington, D.C: Society for Neuroscience, 2003. CD-ROM.
59. Ferguson, A. R., Hook, M. A., Garcia, G., Bresnahan, J.C., Beattie, M.S., Grau, J.W. (2003). A simple transformation that improves the metric properties of the BBB scale for rats with moderate to severe spinal cord injury. *Abstract Viewer/ Itinerary Planner*. Washington, D.C.: Society for Neuroscience, 2003. CD-ROM.
60. Patton, B.C., Hook, M.A., Crown, E.D., Ferguson, A. R., Grau, J.W. (2003). The behavioral deficit observed following uncontrollable shock in spinalized rats depends on protein synthesis. *Abstract Viewer/ Itinerary Planner*. Washington, D.C: Society for Neuroscience, 2003. CD-ROM.
61. Bolding, K.A., Hook, M.A., Ferguson, A.R., Grau, J.W. (2003). The general protein kinase C inhibitor, bisindolylmaleimide-I, dose-dependently prevents a shock-induced behavioral deficit in spinalized rats. *Abstract Viewer/ Itinerary Planner*. Washington, D.C: Society for Neuroscience, 2003.
62. Hook, M.A., Ferguson, A.R., Garcia, G., Washburn, S.N., Koehly, L. M., Grau, J. W. (2003) Monitoring recovery after injury: equal statistical power in half the time. *Abstract Viewer/ Itinerary Planner*. Washington, D.C: Society for Neuroscience, 2003. CD-ROM.
63. Bigbee, A. J., Crown, E.D., Ferguson, A.R., Shah, R., Roy, R., Tillakaratne, N., Tobin, A.J., Grau, J. W., Edgerton, V. R. (2003) Instrumental spinal learning is inhibited by unilateral, extensor-biased motor training in spinally transected rats. *Abstract Viewer/ Itinerary Planner*. Washington, D.C.: Society for Neuroscience, 2003. CD-ROM.
64. Liu, G.T., Miranda, R. C., Wilkie, J. M., Washburn, S. N., Bolding, K. A., Hook, M.A., Crown, E. D., Ferguson, A. R., Grau, J. W. (2003) Exposure to uncontrollable nociceptive stimulation increases vulnerability to apoptosis in spinally transected rats.

- Abstract Viewer/ Itinerary Planner. Washington, D.C: Society for Neuroscience, 2003. CD-ROM.
65. Ferguson, A.R., Hook, M.A., & Grau, J.W. (2004) Uncontrollable stimulation inhibits plasticity within the rat spinal cord: Role of group I metabotropic glutamate receptors. Abstract Viewer/ Itinerary Planner. Washington, D.C: Society for Neuroscience, 2004. CD-ROM.
 66. Liu, G.T., Ferguson, A.R., Huie, R., Bopp, A.C., Hook, M.A., & Grau, J.W. (2004) Morphine treatment slows recovery after a contusion injury in rats and does not reduce the negative consequences of aversive stimulation. Abstract Viewer/ Itinerary Planner. Washington, D.C: Society for Neuroscience, 2004. CD-ROM.
 67. Washburn, S.N., Patton, B.C., Ferguson, A.R., & Grau, J.W. (2004) Exposure to uncontrollable stimulation during pentobarbital anesthesia has a long-term disruptive effect. Abstract Viewer/ Itinerary Planner. Washington, D.C: Society for Neuroscience, 2004. CD-ROM.
 68. Gómez-Pinilla, F., Ying, Z., Ferguson, A., Crown, E., Edgerton, V.R., & Grau, J.W. (2004) BDNF supports spinal cord learning. Abstract Viewer/ Itinerary Planner. Washington, D.C: Society for Neuroscience, 2004. CD-ROM.
 69. Huie, J.R., Ferguson, A.R., & Grau, J.W. (2004) Instrumental learning in spinalized rats: neuropathic pain inhibits learning in the spinal cord. Abstract Viewer/ Itinerary Planner. Washington, D.C: Society for Neuroscience, 2004. CD-ROM.
 70. Ferguson, A.R., Hook, M.A., & Grau, J.W. (2004) Loss of learning in the spinal cord: Role of glutamate systems. National Neurotrauma Society, San Diego. *J. Neurotrauma*, 21, 2004, 1338.
 71. Bopp, A.C., & Grau, J.W. (2004) Brain-dependent processes contribute to the adverse consequences of nociceptive stimulation on recovery of function. National Neurotrauma Society, San Diego. *J. Neurotrauma*, 21, 2004, 1290.
 72. Washburn, S.N., Hook, M.A., Ferguson, A.R., Crown, E.D., Garcia, G., Bolding, K.A., Miranda, R.C., & Grau, J.W. (2004) Uncontrollable stimulation undermines recovery of function after spinal cord injury. National Neurotrauma Society, San Diego. *J. Neurotrauma*, 21, 2004, 1291.
 73. Hook, M.A., Huie, J.R., & Grau, J.W. Instrumental learning in spinalized rats: the induction of central sensitization undermines behavioral plasticity in the spinal cord. Program No. 783.12. 2005 Abstract Viewer/Itinerary Planner. Washington, DC: Society for Neuroscience.
 74. Huie, J.R., Gomez-Pinilla, F., Ying, Z., Edgerton, V.R., & Grau, J.W. BDNF enables learning in the rat spinal cord. Program No. 175.16. 2005 Abstract Viewer/Itinerary Planner. Washington, DC: Society for Neuroscience.
 75. Puga, D.A., Washburn, S.N., & Grau, J.W. Restraint stress has a negative impact on recovery of function after spinal cord injury in rats. Program No. 783.6. 2005 Abstract Viewer/Itinerary Planner. Washington, DC: Society for Neuroscience.
 76. Washburn, S.N., Maultsby, M.L., & Grau, J.W. The K2 opioid receptor agonist GR89696 has both adverse and beneficial effects on spinal cord plasticity. Program No. 396.19. 2005 Abstract Viewer/Itinerary Planner. Washington, DC: Society for Neuroscience.
 77. Hook, M.A., Joynes, R.L., Crown, E.D., Ferguson, A.R., & Grau, J.W. A rodent model of functional electrical stimulation: Evidence spinal neurons modulate adaptive capacity. National Neurotrauma Society, Washington DC. *J. Neurotrauma*, 22, 2005, 1172.

78. Baumbauer, K. M., Hoy, K. C., Setlow, B., & Grau, J. W. Electrical stimulation of the sciatic nerve results in a learning deficit in spinal rats. Program No. 555.13. 2006 Neuroscience Meeting Planner. Atlanta, GA: Society for Neuroscience, 2006. Online.
79. Good, E., Baumbauer, K. M., Carcoba, L. M., Meagher, M. W., & Grau, J. W. Administration of fluorocitrate blocks the acquisition of an instrumental response in spinal rats. Program No. 555.14. 2006 Neuroscience Meeting Planner. Atlanta, GA: Society for Neuroscience, 2006. Online.
80. Puga, D. A., & Grau, J. W. Opponent consequences of intermittent and continuous stimulation within the rat spinal cord. Program No. 555.15. 2006 Neuroscience Meeting Planner. Atlanta, GA: Society for Neuroscience, 2006. Online.
81. Hook, M., Huie, J. R., Grau, J. W. Restoring the potential for behavioral plasticity after central sensitization in the spinal cord. Program No. 555.18. 2006 Neuroscience Meeting Planner. Atlanta, GA: Society for Neuroscience, 2006. Online.
82. Huie, J. R., Hoy, K. C., Miranda, R., & Grau, J. W. BDNF facilitates learning in the rat spinal cord. Program No. 555.17. 2006 Neuroscience Meeting Planner. Atlanta, GA: Society for Neuroscience, 2006. Online.
83. Hoy, K. C., Huie, J. R., & Grau, J. W. Administration of the AMPA antagonist CNQX blocks the acquisition of the learning deficit in spinally transected rats. Program No. 555.16. 2006 Neuroscience Meeting Planner. Atlanta, GA: Society for Neuroscience, 2006. Online.
84. Washburn, S. N., Prentice, T. W., Balden, R. L., Hudson, L. L., Hook, M. A., Miranda, R. C., & Grau, J. W. Uncontrollable shock disrupts recovery of function after contusion injury: role of corticosterone. Program No. 646.17. 2006 Neuroscience Meeting Planner. Atlanta, GA: Society for Neuroscience, 2006. Online.
85. Hook, M., Washburn, S. N., Prentice, T. W., Balden, R., Miranda, R. C., & Grau, J. W. Morphine elevates corticosterone and IL-1B levels in a rat model of spinal contusion injury. Program No. 902.12. 2007 Neuroscience Meeting Planner. San Diego, CA: Society for Neuroscience, 2007. Online.
86. Baumbauer, K. M., Hoy, K. C., Huie, J. R., Puga, D. A., Setlow, B., & Grau, J. W. Nociceptive electrical stimulation of the sciatic nerve results in a learning deficit in rats with complete spinal cord transections. Program No. 404.15. 2007 Neuroscience Meeting Planner. San Diego, CA: Society for Neuroscience, 2007. Online.
87. Huie, J. R., Hoy, K. C., Miranda, R. A., & Grau, J. W. Instrumental learning in the spinalized rat: A therapeutic effect of BDNF. Program No. 404.12. 2007 Neuroscience Meeting Planner. San Diego, CA: Society for Neuroscience, 2007. Online.
88. Washburn, S. N., Prentice, T. W., Baumbauer, K. M., Puga, D. A., Steelman, A. J., Welsh, C. J. R., Meagher, M. W., Miranda, R. C., & Grau, J. W. Uncontrollable shock disrupts recovery of function after contusion injury in rats: Role of pro-inflammatory cytokines. Program No. 600.2. 2007 Neuroscience Meeting Planner. San Diego, CA: Society for Neuroscience, 2007. Online.
89. Hoy, K. C., Huie, J. R., Baumbauer, K. M., & Grau, J. W. Administration of AMPA-receptor agonist AMPA disrupts instrumental learning in spinally transected rats. Program No. 404.13. 2007 Neuroscience Meeting Planner. San Diego, CA: Society for Neuroscience, 2007. Online.
90. Puga, D. A., Washburn, S. N., & Grau, J. W. Continuous shock to the rat spinal cord induces an antinociceptive response that is mediated by mu and kappa opioid receptors. Program No. 404.16. 2007 Neuroscience Meeting Planner. San Diego, CA: Society for Neuroscience, 2007. Online.

91. Vichaya, E. G., Baumbauer, K. M., Grau, J. W., & Meagher, M. W. The effect of minocycline on a rat model of spinal instrumental learning. Program No. 404.14. 2007 Neuroscience Meeting Planner. San Diego, CA: Society for Neuroscience, 2007. Online.
92. Puga, D., Hook, J., Hoy, K., & Grau. Continuous shock has a protective effect against the spinal learning deficit induced by intermittent shock. National Neurotrauma Society, Orlando FL. *J. Neurotrauma*, 25, 2008, 873.
93. Woller, S., Moreno, G., Grau, J., & Hook, M. Effect of morphine after a spinal contusion injury. National Neurotrauma Society, Orlando FL. *J. Neurotrauma*, 25, 2008, 934.
94. Baumbauer, K. M., Hughes, A. J., Huie, J. R., Hoy, K. C., & Grau, J. W. Evidence of timing in the absence of supraspinal input: Fixed space stimulation protects against the detrimental effects of uncontrollable tailshock. Program No. 571.3. 2008 Neuroscience Meeting Planner. Washington, DC: Society for Neuroscience, 2008. Online.
95. Hook, M., Woller, S., Moreno, G., Puga, D., Meagher, M., Grau, J. An IL-1 receptor antagonist attenuates a morphine-induced recovery of function after a spinal contusion injury. Program No. 352.18. 2008 Neuroscience Meeting Planner. Washington, DC: Society for Neuroscience, 2008. Online.
96. Hoy, K. C., Huie, J. R., Grau, J. W. Pharmacological and physiological evidence for peripherally mediated memory. Program No. 73.11. 2008 Neuroscience Meeting Planner. Washington, DC: Society for Neuroscience, 2008. Online.
97. Hughes, A. J., Baumbauer, K. M., Huie, J. R., & Grau, J. W. Evidence of timing in the absence of supraspinal input: Fixed space stimulation engages a form of NMDA-mediated spinal plasticity. Program No. 571.11. 2008 Neuroscience Meeting Planner. Washington, DC: Society for Neuroscience, 2008. Online.
98. Huie, J. R., Baumbauer, K. M., Hughes, A. L., & Grau, J. W. Evidence of timing in the absence of supraspinal input: fixed space stimulation enables future instrumental learning. Program No. 571.4. 2008 Neuroscience Meeting Planner. Washington, DC: Society for Neuroscience, 2008. Online.
99. Moreno, G. L., Woller, S., Hoy, K., Puga, D., Grau, J. W., & Hook, M. A. Intrathecal morphine undermines recovery of function after a spinal contusion injury. Program No. 352.20. 2008 Neuroscience Meeting Planner. Washington, DC: Society for Neuroscience, 2008. Online.
100. Prentice, T. W., Washburn, S. N., Baumbauer, K. M., Puga, D. A., Miranda, R. C., & Grau, J. W. Uncontrollable shock disrupts recovery of function after contusion injury in rats: evidence for enhanced cell death. Program No. 838.9. 2008 Neuroscience Meeting Planner. Washington, DC: Society for Neuroscience, 2008. Online.
101. Puga, D. A., Hook, M. A., Huie, J. R., Baumbauer, K. M., & Grau, J. W. Continuous shock has a protective effect against the spinal learning deficit induced by intermittent shock. Program No. 73.13. 2008 Neuroscience Meeting Planner. Washington, DC: Society for Neuroscience, 2008. Online.
102. Vichaya, E. G., Baumbauer, K. M., Grau, J. W., & Meagher, M. W. Fluorocitrate attenuates an LPS-induced spinal learning deficit. Program No. 589.13. 2008 Neuroscience Meeting Planner. Washington, DC: Society for Neuroscience, 2008. Online.
103. Woller, S. A., Moreno, G. G., Grau, J. W., & Hook, M. A. A contusion injury increases morphine-induced place preference. Program No. 352.11. 2008 Neuroscience Meeting Planner. Washington, DC: Society for Neuroscience, 2008. Online.
104. Garraway, S.M., Prentice, T.W., Baumbauer, K.M., Hughes, A.J., Huie, R.J., & Grau, J.W. Instrumental learning in the spinal cord increases the expression of tyrosine kinase

- receptor B (TrkB) in the lumbar spinal cord of adult rats. Program No. 79.16. 2009 Neuroscience Meeting Planner. Chicago, IL: Society for Neuroscience, 2009. Online.
105. Hoy, K.C. Jr., Huie, J.R., & Grau, J.W. Instrumental learning in spinally transected rats: Where is the memory? Program No. 79.1. 2009 Neuroscience Meeting Planner. Chicago, IL: Society for Neuroscience, 2009. Online.
 106. Moreno, G.L., Hook, M.A., Baumbauer, K.M., & Grau, J.W. Uncontrollable stimulation impairs spinal plasticity in contused rats. Program No. 79.18. 2009 Neuroscience Meeting Planner. Chicago, IL: Society for Neuroscience, 2009. Online.
 107. Marshall, K.L., Hook, M.A., & Grau, J.W. Intermittent stimulation below, but not above, a moderate contusion injury impairs the recovery of locomotor function in rats. Program No. 79.19. 2009 Neuroscience Meeting Planner. Chicago, IL: Society for Neuroscience, 2009. Online.
 108. Baumbauer, K.M., Hughes, A.J., & Grau, J.W. Timing in the absence of supraspinal input: Fixed spaced sciatic stimulation has a voltage and frequency dependent therapeutic capacity that reverses the detrimental effect of variable nociceptive input. Program No. 79.20. 2009 Neuroscience Meeting Planner. Chicago, IL: Society for Neuroscience, 2009. Online.
 109. Huie, J.R., Grau, J., Beattie, M., Bresnahan, J., & Ferguson, A.. Instrumental learning in the spinalized rat: TNF-alpha inhibits learning in the spinal cord. Program No. 79.21. 2009 Neuroscience Meeting Planner. Chicago, IL: Society for Neuroscience, 2009. Online.
 110. Lee, K.H., Baumbauer, K.M., Huie, J.R., & Grau, J.W. Timing in the absence of supraspinal input: When do spinal neurons classify an input as variable? Program No. 79.22. 2009 Neuroscience Meeting Planner. Chicago, IL: Society for Neuroscience, 2009. Online.
 111. Puga, D.A., Hook, M.A., Huie, J.R., & Grau, J.W. The protective effect of continuous shock on spinal plasticity: The role of BDNF. Program No. 79.23. 2009 Neuroscience Meeting Planner. Chicago, IL: Society for Neuroscience, 2009. Online.
 112. Gomez-Pinilla, F., Ying, Z., Ferguson, A., Crown, E., Huie, R., & Grau, J. Program No. 411.6. 2009 Neuroscience Meeting Planner. Chicago, IL: Society for Neuroscience, 2009. Online.
 113. Brown, A.K., Woller, S.A., Moreno, G.L., Grau, J.W., & Hook, M. Exercise therapy implemented during the acute phase of SCI facilitates functional recovery. Program No. 542.24. 2009 Neuroscience Meeting Planner. Chicago, IL: Society for Neuroscience, 2009. Online.
 114. Strickland, E., Balaraman, S., Hook, M.A., Huie, J.R., Prentice, T.W., Grau, J.W., & Miranda, R.C. MicroRNA dis-regulation following spinal cord contusion: Implications for neural plasticity and repair. Program No. 742.22. 2009 Neuroscience Meeting Planner. Chicago, IL: Society for Neuroscience, 2009. Online.
 115. Woller, S.A., Moreno, G.L., Hart, N., Wellman, P.J., Grau, J.W., & Hook, M.A. Self-administration of morphine after a spinal contusion injury: Addictive potential is reduced in the acute phase of SCI. Program No. 858.6. 2009 Neuroscience Meeting Planner. Chicago, IL: Society for Neuroscience, 2009. Online.
 116. Baumbauer, K.M., Puga, D.A., Lee, K.H., Woller, S.A., Hughes, A.J., & Grau, J.W. Regularly spaced low frequency electrical stimulation dampens tactile reactivity and attenuates capsaicin-induced allodynia. 2010 Neuroscience Meeting Planner. San Diego, CA: Society for Neuroscience, 2010.
 117. Beas, B.S. Huie, J.R., Montgomery K. S., LaSarge, C.L. Baumbauer, K.M., Grau, J.W., & Bizon J.L. Instrumental learning enhances levels of BDNF mRNA in spinally

- transected rats. 2010 Neuroscience Meeting Planner. San Diego, CA: Society for Neuroscience, 2010.
118. Garraway, S.M., Huie, J.R., Lee, K.H., Turtle, J.D., Hook, M.A., Woller, S.A., Ferguson, A.R., Beattie, M.S., Bresnahan, J.C., & Grau, J.W. Noxious tail-shock following contusion spinal cord injury increases the expression of TNF alpha in the spinal cord dorsal horn. 2010 Neuroscience Meeting Planner. San Diego, CA: Society for Neuroscience, 2010.
 119. Hook, M.A., Woller, S. A., Moreno, G. L., & Grau, J.W. Effects of morphine applied in the chronic phase of spinal cord injury. 2010 Neuroscience Meeting Planner. San Diego, CA: Society for Neuroscience, 2010.
 120. Hoy, K.C. Jr, Huie, J.R., & Grau, J.W. Spinal Instrumental Learning: the influence of the neuromuscular junction. 2010 Neuroscience Meeting Planner. San Diego, CA: Society for Neuroscience, 2010.
 121. Huie, J.R., Ferguson, A.R., Beattie, M.S., Bresnahan, J.C., & Grau, J.W. Instrumental learning in spinalized rat: TNF α inhibition rescues learning from long-term deficit. 2010 Neuroscience Meeting Planner. San Diego, CA: Society for Neuroscience, 2010.
 122. Lee, K.H., Garraway, S., Baumbauer, K.M., & Grau, J.W. Timing in the absence of supraspinal input: A qRT-PCR analysis of the effects of temporally regular stimulation on the spinal cord. 2010 Neuroscience Meeting Planner. San Diego, CA: Society for Neuroscience, 2010.
 123. Puga, D.A., & Grau, J.W. Continuous Electrical Stimulation Protects Against the Impact of Uncontrollable Stimulation in the Isolated Spinal Cord. 2010 Neuroscience Meeting Planner. San Diego, CA: Society for Neuroscience, 2010.
 124. Strickland, E., Balaraman, S., Hook, M.A., Huie, J.R., Grau, J., & Miranda, R.C. MicroRNA dis-regulation following spinal cord contusion: implications for neural plasticity and repair. 2010 Neuroscience Meeting Planner. San Diego, CA: Society for Neuroscience, 2010.
 125. Turtle, J.D., Garraway, S.M., Huie, J.R., Lee, K.H., Hook, M.A., Woller, S.A., & Grau, J.W. Uncontrollable tail-shock decreases BDNF-TrkB signaling in the dorsal spinal cord of adult contused rats. 2010 Neuroscience Meeting Planner. San Diego, CA: Society for Neuroscience, 2010.
 126. Woller, S.A., Saraiya, P., Brown, A.K., Wellman, P.J., Grau, J.W., & Hook, M.A. Self-administration of morphine after a spinal contusion injury. 2010 Neuroscience Meeting Planner. San Diego, CA: Society for Neuroscience, 2010.
 127. Huie, J. R., Dahl, E., Lee, M., Bresnahan, J., Beattie, M., Grau, J., & Ferguson, A. TNF-induced AMPA receptor changes undermine spinal plasticity. National Neurotrauma Symposium, Hollywood Beach, FL. *J. Neurotrauma*, 28, 2011, A-30.
 128. Woller, S. A., Saraiya, P., Wellman, P. J., Grau, J. W., & Hook, M. A. Self-administration of morphine after a spinal contusion injury. 2011 Neuroscience Meeting Planner. Washington, DC: Society for Neuroscience, 2011.
 129. Luedtke, K., Woller, S., Funk, M. K., Grau, J. W., & Hook, M. Depressive-like symptoms in a rodent model of spinal cord injury. 2011 Neuroscience Meeting Planner. Washington, DC: Society for Neuroscience, 2011.
 130. Huang, Y.-J., Garraway, S. M., & Grau, J. W. GABA-A antagonist bicuculline blocks the allodynia induced by noncontingent stimulation in spinal transected rats. 2011 Neuroscience Meeting Planner. Washington, DC: Society for Neuroscience, 2011.
 131. Hoy, K. C., Lompra, D. G., & Grau, J. W. Spinal instrumental learning: The influence of the neuromuscular glutamate signal. 2011 Neuroscience Meeting Planner. Washington, DC: Society for Neuroscience, 2011.

132. Baumbauer, K. M., Lee, K. H., Huie, J. R., & Grau, J. W. Evidence of timing in the absence of supraspinal input: Exposure to low, but not high, intensity regularly spaced electrical stimulation enhances spinally mediated learning. 2011 Neuroscience Meeting Planner. Washington, DC: Society for Neuroscience, 2011.
133. Lee, K. H., Lischau, E., Hanan, K., & Grau, J. W. Timing in the absence of supraspinal input: Evidence of summation and integration of stimuli by the spinal cord. 2011 Neuroscience Meeting Planner. Washington, DC: Society for Neuroscience, 2011.
134. Maldonado-Bouchard, S., Woller, S., Mathai, B., Klein, K., Mathews, C., Grau, J., & Hook, M. Assessing the effects of stress in an animal model of spinal cord injury. 2012 Neuroscience Meeting Planner. New Orleans, LA: Society for Neuroscience, 2012.
135. Huang, Y. -J., & Grau, J. W. Effect of GABA-A antagonist bicuculline and GABA-A agonist muscimol on the allodynia induced by capsaicin in spinal transected rats. 2012 Neuroscience Meeting Planner. New Orleans, LA: Society for Neuroscience, 2012.
136. Lee, K. H., Baumbauer, K. M., Horton, J. B., Munro, E., & Grau, J. W. Brain-derived neurotrophic factor reduces inflammation-induced allodynia in spinally transected rats. 2012 Neuroscience Meeting Planner. New Orleans, LA: Society for Neuroscience, 2012.
137. Hartman, J., Hoy, K., Harlow, M., & Grau, J. W. Adaptive learning in spinally transected rats: Evidence that training affects glutamatergic signaling at the neuromuscular junction. 2012 Neuroscience Meeting Planner. New Orleans, LA: Society for Neuroscience, 2012.
138. Stuck, E. D., Huie, J. R., Lee, K. H., Irvine, K. -A., Bresnahan, J. C., Beattie, M., Grau, J. W., & Ferguson, A. R. Synaptic GluA2-lacking AMPA receptors as a biomarker for maladaptive spinal plasticity following spinal cord injury. 2012 Neuroscience Meeting Planner. New Orleans, LA: Society for Neuroscience, 2012.
139. Garraway, S. M., Woller, S.A., Huie, J. R., Hook, M. A., Huang, Y. -Y., Hartman, J. J., Malik, J., Ferguson, A. A., Beattie, M. S., Bresnahan, J. C., & Grau, J. W. Peripheral noxious stimulation following contusion spinal cord injury increases the incidence of mechanical allodynia and the expression of TNF alpha in the spinal cord. 2012 Neuroscience Meeting Planner. New Orleans, LA: Society for Neuroscience, 2012.
140. Hansen, C. N., Kerr, S., Fisher, L., Deibert, R., Wohleb, E. S., Williams, J., Black, N., Godbout, J. P., Sheridan, J. F., Grau, J. & Basso, D. Thoracic SCI produces remote neuroinflammation that prevents plasticity in locomotor networks. 2013 Neuroscience Meeting Planner. San Diego, CA: Society for Neuroscience, 2013.
141. Garraway, S. M., Washburn, S., Hartman, J. J., Woller, S. A., Hook, M. A., & Grau, J. Enhanced mechanical reactivity after contusion spinal cord injury correlates with elevated levels of IL-6 and IL-6R. 2013 Neuroscience Meeting Planner. San Diego, CA: Society for Neuroscience, 2013.
142. Strain, M. M., Lee, K. H., Niemerski, A. L., & Grau, J. W. Treatment with 5HT and NMDA induces stepping in spinally transected adult rats while maintaining spinal cord plasticity. 2013 Neuroscience Meeting Planner. San Diego, CA: Society for Neuroscience, 2013.
143. Huie, J. R., Stuck, E., Lee, K. H., Irvine, K.-A., Bresnahan, J. C., Beattie, M. S., Grau, J. W., & Ferguson, A. R. Ca²⁺ permeable AMPA receptor activity mediates maladaptive plasticity in the injured spinal cord. 2013 Neuroscience Meeting Planner. San Diego, CA: Society for Neuroscience, 2013.
144. Huang, Y.-J., Lee, K. H., Garraway, S.M., & Grau, J. W. SCI alters the effect of GABAergic system on nociception: Different effect of GABA-A antagonist bicuculline on capsaicin-induced allodynia in sham vs. spinally transected rats. 2013 Neuroscience Meeting Planner. San Diego, CA: Society for Neuroscience, 2013.
145. Lee, K. H., Strain, M. M., Huan, Y.-J., & Grau, J. . Timing in the absence of supraspinal

- input: integration of fixed spaced stimulation. 2013 Neuroscience Meeting Planner. San Diego, CA: Society for Neuroscience, 2013.
146. Hartman, J., Hoy, K. C., Harlow, M., & Grau, J. W. Adaptive learning in spinally transected rats: Evidence that training affects acetylcholine receptor density at the neuromuscular junction in vivo. 2013 Neuroscience Meeting Planner. San Diego, CA: Society for Neuroscience, 2013.
 147. Khaing, Z., Park, J., Grau, J., Lee, K., Niemerski, A., & Schmidt, C. Local and sustained delivery of BDNF mediates spinal learning after injury. 2014 Biomedical Engineering Society Annual Meeting (<https://www.bmes.org/archive>). San Antonio TX.
 148. Huie, J. R., Stuck, E. D., Lee, K. H., Irvine, K. A., Bresnahan, J. C., Beattie, M. S., Grau, J. W., & Ferguson, A. R. Peripheral nociceptive input overdrives AMPA receptor activity to produce maladaptive plasticity after spinal cord injury (SCI). National Neurotrauma Symposium. *J. Neurotrauma*, 31, 2014, A-6.
 149. Grau, J.W., Strain, M.M., Huang, Y.-J., Turtle, J.D., Lee, K.H., Kozicz, A., Pesek, B.S., & Garraway, S.M. Peripheral inflammation disrupts locomotor recovery after spinal contusion injury. 2014 Neuroscience Meeting Planner. Washington, DC: Society for Neuroscience, 2014.
 150. Huang, Y.-J., Lee, K.H., & Grau, J. W. Spinal injury transforms how GABAergic system regulate nociceptive systems within the spinal cord: Role of KCC2. 2014 Neuroscience Meeting Planner. Washington, DC: Society for Neuroscience, 2014.
 151. Lee, K.H., Baumbauer, K.M., & Grau, J.W. Brain-derived neurotrophic factor reduces inflammation-induced allodynia. 2014 Neuroscience Meeting Planner. Washington, DC: Society for Neuroscience, 2014.
 152. Strain, M.M., Pesek, B.S., Huang, Y.-J., Stump, C.R., Turtle, J.D., Lee, K.H., & Grau, J.W. Acquired pendulate tail: Evidence for the activation of an oscillator following fixed spaced shock. 2014 Neuroscience Meeting Planner. Washington, DC: Society for Neuroscience, 2014.
 153. Turtle, J.D., Murphey, L.M., Strain, M.M., Hoy, K.C., Magnuson, D.S.K., & Grau, J.W. Adaptive plasticity at the neuromuscular junction (NMJ). 2014 Neuroscience Meeting Planner. Washington, DC: Society for Neuroscience, 2014.
 154. Khaing, Z.Z., Park, J., Grau, J., Lee, K.H., Niemerski, A., & Schmidt, C.E. Local and sustained delivery of BDNF mediates spinal learning after injury. 2014 Neuroscience Meeting Planner. Washington, DC: Society for Neuroscience, 2014.
 155. Turtle, J., Strain, M., Reynolds, J., Huang, Y.-J., Garraway, S., & Grau, J. Nociceptive stimulation induces caspase 1 activation following spinal cord injury. National Neurotrauma Symposium, Santa Fe, NM. *J. Neurotrauma*, 32, 2015, A-91.
 156. Strain, M., Brumley, M., Lehtonen, D., Pesek, B., Murphy, L., Turtle, J., & Grau, J. Examination of stepping and tail oscillations as a result of temporal relations and frequency. National Neurotrauma Symposium, Santa Fe, NM. *J. Neurotrauma*, 32, 2015, A-109.
 157. Turtle, J., Reynolds, J. A., Strain, M. M., Huang, Y. J., Garraway, S. M., & Grau, J. W. Nociceptive stimulation activates caspase 1 following spinal cord injury by inducing pathological purinergic signaling. 2015 Neuroscience Meeting Planner. Chicago, IL: Society for Neuroscience, 2015.
 158. Y.-J. Huang, Lee, K. H., & Grau, J. W. Loss of descending serotonergic fibers transforms how GABA regulates nociceptive systems within the spinal cord: Role of KCC2. 2015 Neuroscience Meeting Planner. Chicago, IL: Society for Neuroscience, 2015.
 159. Agrawal, N., Park, J., Xin, S., Lee, K., Grau, J., Schmidt, C.E., Khaing, Z., & Niemerski, A. A composite hydrogel microparticle platform for controlled delivery of BDNF after

- spinal cord injury. 2015 Biomedical Engineering Society Annual Meeting (<https://www.bmes.org/archive>). Tampa FL.
160. Strain, M. M., Turtle, J. D., Hoy, K. C., & Grau, J. W. Examination of the mechanisms that contribute to the induction and maintenance of a peripheral memory. 2015 Neuroscience Meeting Planner. Chicago, IL: Society for Neuroscience, 2015.
 161. Brumley, M. K., Reynolds, J. A., Turtle, J. D., Huang, Y.-J., Garraway, S. M., & Grau, J. W. Nociceptive stimulation increases blood brain barrier permeability following spinal cord injury. 2015 Neuroscience Meeting Planner. Chicago, IL: Society for Neuroscience, 2015.
 162. Turtle, J., Strain, M., Reynolds, J., Brumley, M., Huang, Y.-J., & Grau, J. W. Nociceptive stimulation engages pathologic purinergic signaling to induce inflammation, hemorrhage, and pyroptosis after spinal cord injury. American Physicians Scientists Association, Chicago, IL, 2016.
 163. Huang, Y. J., Lee, K. H., & Grau, J. W. Ying-yang of BDNF: KCC2 expressional change regulate the effect of BDNF before and after spinal cord injury (SCI). National Neurotrauma Symposium, Lexington, KY. *J. Neurotrauma*, 33, A-107, 2016.
 164. Brumley, M. K., Turtle, J., Forsberg, J., Reynolds, J., Y.-J. Huang, & Grau, J. W. Peripheral pain increases lesion-site hemorrhage after contusive spinal cord injury. National Neurotrauma Symposium, Lexington, KY. *J. Neurotrauma*, 33, A-108, 2016.
 165. Strain, M. M., Turtle, J. D., Huang, Y.-J., Reynolds, J. A., Brumley, M. K., DeLeon, A., & Grau, J. W. Lidocaine blocks the detrimental effects of C-fiber activation on recovery after injury. National Neurotrauma Symposium, Lexington, KY. *J. Neurotrauma*, 33, A-72, 2016.
 166. Turtle, J., Strain, M. M., Huang, Y.-J., Reynolds, J. A., Brumley, M. K., & Grau, J. W. Spinal block with lidocaine: An effective treatment for reducing secondary injury after SCI and acute pain. Neuroscience Meeting Planner. San Diego, CA: Society for Neuroscience, 2016.
 167. Reynolds, J. A., Turtle, J. D., Huang, Y.-J., Strain, M. M., & Grau, J. W. Spared fibers promote the development of secondary spinal injury in response to acute pain. Neuroscience Meeting Planner. San Diego, CA: Society for Neuroscience, 2016.
 168. Strain, M. M., Turtle, J. T., & Grau, J. W. Conditioning at the Neuromuscular Junction: Understanding the behavioral properties. Neuroscience Meeting Planner. San Diego, CA: Society for Neuroscience, 2016.
 169. Huang, Y. J., Lee, K. H., & Grau, J. W. Ying-yang of BDNF: KCC2 expressional change regulate the effect of BDNF before and after spinal cord injury (SCI). An effective treatment for reducing secondary injury after SCI and acute pain. Neuroscience Meeting Planner. San Diego, CA: Society for Neuroscience, 2016.
 170. Brumley, M. K., Turtle, J. D., Forsberg, J. M., & Grau, J. W. Acute pain after SCI exacerbates progressive hemorrhagic necrosis. Neuroscience Meeting Planner. San Diego, CA: Society for Neuroscience, 2016.
 171. Reynolds, J., Turtle, J., Leal, G., Huang, Y.-J., Strain, M., & Grau, J. W. (2017). Inflammatory response to peripheral pain input after SCI is blocked by a spinal transection. National Neurotrauma Symposium, Snowbird, UT. *J. Neurotrauma*, 34, A-6, 2017.
 172. Davis, J., Huang, Y.-J., Strain, M., Reynolds, J., & Grau, J. W. (2017). Pain induced hemorrhage after spinal cord injury is blocked by pentobarbital anesthesia. National Neurotrauma Symposium, Snowbird, UT. *J. Neurotrauma*, 34, A-121, 2017.
 173. Strain-Malamakal, M., Huang, Y.-J., Reynolds, J., Baine, R., Davis, J., Brumley, M., Leal, G., Golub, V., & Grau, J. (2017). A brief period of nociceptive stimulation after

- spinal cord injury can expand the region of secondary injury. National Neurotrauma Symposium, Snowbird, UT. *J. Neurotrauma*, 34, A-139, 2017.
174. Brumley, M.K., Turtle, J.D., Forsburg, J., & Grau, J. (2017). Peripheral pain exacerbates secondary injury after contusive spinal cord injury (<http://theisnr.org/wp-content/uploads/2017/11/Full-abstracts-updated-with-Horner.pdf>). International Symposium on Neural Regeneration. Pacific Grove, CA.
 175. Strain, M.M., Huang, Y.J., Reynolds, J.A., Davis, J., Brumley, M., Leal, G., & Grau, J.W. Pain input after spinal cord injury (SCI) expands the region of secondary injury (<http://theisnr.org/wp-content/uploads/2017/11/Full-abstracts-updated-with-Horner.pdf>). International Symposium on Neural Regeneration. Pacific Grove, CA.
 176. Fauss, G.N.K., Strain, M.M., Huang, Y.-J., Reynolds, J.A., Davis, J.A., West, C.R., & Grau, J.W. (2017). Nociception induced hemorrhage and heperstesnion after spinal cord injury depend on brain systems. International Symposium on Neural Regeneration (<http://theisnr.org/wp-content/uploads/2017/11/Full-abstracts-updated-with-Horner.pdf>). Pacific Grove, CA.
 177. Davis, J.A., Fauss, G.N.K., Strain, M.M., Henwood, M.K., & Grau, J.W. (2018). Pain induced hemorrhage after spinal cord injury is blocked by lidocaine applied rostrally to injury. *Journal of Neurotrauma*, 35:A-2-A-285, A48-A49.
 178. Fauss, G.N.K., Strain, M.M., Huang, Y.J., Reynolds, J.A., Henwood, M.K., West, C.R., & Grau, J.W. (2018). Noxious stimulation after spinal cord injury induces a brain-dependent increase in hemorrhage. *Journal of Neurotrauma*, 35: A-2-A-285, A-176.
 179. Henwood, M.K., Strain, M.M., Reynolds, J.A., Fauss, G.N.K., Davis, J.A., & Grau, J.W. (2018). Pain-induced hemorrhage after SCI depends on lesion severity and time since injury. *Journal of Neurotrauma*, 35: A-2-A-285, A-37.
 180. Davis, J., Strain, M.M., Henwood, M.K., Baine, R., Leal, G.N., Johnston, T., & Grau, J.W. (2018). Pain induced hemorrhage after spinal cord injury is blocked by pentobarbital and lidocaine anesthesia. Neuroscience Meeting Planner. San Diego, CA: Society for Neuroscience, 2018.
 181. Brumley, M.K., Reynolds, J., Davis, J.A., Fauss, G., Turtle, J.D., Norris, A., Bean, P., & Grau, J.W. (2018). Pain after SCI expands the area of hemorrhage: Evaluating the spread of secondary injury and the effect of injury severity. San Diego, CA: Society for Neuroscience, 2018.
 182. Baine, R., Strain-Malamakal, M.M., Huang, Y.J., Reynolds, J.A., Henwood, M., Davis, J., Fauss, G.N., Bean, P., Norris, A., Johnston, T., Cox, C., & Grau, J.W. (2018). Pain input after a spinal cord injury increases tissue loss and impairs long-term recovery: A comparison of male and female rats. San Diego, CA: Society for Neuroscience, 2018.
 183. Leal, G.N., Strain, M.M., Huang, Y.J., Reynolds, J.A., Davis, J.A., Henwood, M.K., West, C.R., Grau, J.W. (2018). Noxious stimulation after spinal cord injury (SCI) induces a brain-dependent increase in hemorrhage. San Diego, CA: Society for Neuroscience, 2018.
 184. Strain, M.M., Johnston, T., Huang, Y.J., Reynolds, J.A., Baine, R.E., Davis, J.A., Henwood, M.K., Fauss, G.N.K., & Grau, J.W. (2018). Moderate pain input, given within days of a contusion injury, can expand the area of hemorrhage and undermine behavioral recovery. San Diego, CA: Society for Neuroscience, 2018.
 185. Baine, R.E., Strain, M.M., Henwood, M.K., Johnston, D.T., Davis, J.A., Grau, J.W. (2019). Pain input after spinal cord injury increases tissue loss and impairs long-term recovery in female rats. *Journal of Neurotrauma*. 36, A-72.

186. Bean, P.A., Henwood, M.K., Johnston D.T., Grau J. W. (2019). Pain increases hemorrhage at the lesion site after traumatic brain injury. *Journal of Neurotrauma*. 36, A-72.
187. Johnston, D. T., Baine, R. E., Hudson, K. E., Lout, E. T., Grau, J. W. (2019). Bumetanide promotes functional recovery of hindlimb function and reduces hemorrhage after spinal cord injury. *Journal of Neurotrauma*. 36, A-57.
188. Fauss, G.N.K., Strain, M.M., Huang, Y.J., Reynolds, J.A., Davis, J.A., Henwood, M.K., West, C.R., & Grau, J.W. (2019). Role of blood pressure in pain-induced hemorrhage after spinal cord injury: Brain systems may drive an increase in blood pressure, but this effect was not sufficient to induce hemorrhage. Chicago, IL: Society for Neuroscience, 2019.
189. Bean, P.A., Hewood, M.K., Johnston, D.T., & Grau, J.W. (2019). Pain (nociceptive) input increases lesion site hemorrhage after traumatic brain injury. Chicago, IL: Society for Neuroscience, 2019.
190. Johnston, D.T., Strain, M.M., Hudson, K.E., Henwood, M.K., Fauss, G.N., West, C.R., & Grau, J.W. (2019). Role of blood pressure in pain-induced hemorrhage after spinal cord injury: Does blocking the nociception-induced rise in blood pressure have a protective effect? Chicago, IL: Society for Neuroscience, 2019.
191. Davis, J.A., Henwoow, M.K., Cox, C., Baine, R., & Grau, J.W. (2019). Pain-induced hemorrhage after spinal cord injury: Pentobabital anesthesia and local application of lidocaine prevent hemorrhage when give before, but not after, noxious stimulation. Chicago, IL: Society for Neuroscience, 2019.
192. Baine, R., Strain, M.M., Reynolds, J.A., Henwood, M.K., Lout, E., Haribhakti, P., West, C.R., & Grau, J.W. (2019). Role of blood pressure in pain-induced hemorrhage after spinal cord injury: Effect of shock and capsaicin treatment on blood pressure, behavioral performance, and hemorrhage over time. Chicago, IL: Society for Neuroscience, 2019.
193. Tarbet, M.M., Hudson, K., Lout, E., & Grau, J.W. (2019). Memories at the neuromuscular junction are resistant to extinction. Chicago, IL: Society for Neuroscience, 2019.
194. Fauss, G. N. K., Strain, M. M., Huang, Y. J., Reynolds, J. A., Davis, J. A., Henwood, M. K., Tarbet, M. M., Hudson, K. E., Bean, P. A., & Grau, J. W. (2020). Role of rostral neural systems on the development of pain-induced hemorrhage after spinal cord injury. (<https://neuralregen.org/wp-content/uploads/2020/01/ISNR-2020-Final.pdf>) International Symposium on Neural Regeneration. Pacific Grove, CA.
195. Hudson, K. E., Tarbet, M. M., & Grau, J. W. (2020). Instrumental learning in the spinal cord: The role of ionic plasticity. (<https://neuralregen.org/wp-content/uploads/2020/01/ISNR-2020-Final.pdf>) International Symposium on Neural Regeneration. Pacific Grove, CA.
196. Davis, J. A., Bopp, A. C., Henwood, M. K., Baine, R. E., & Grau, J. W. (2020). Pain-induced hemorrhage after spinal cord injury: Pentobarbital anesthesia and local application of lidocaine prevent hemorrhage when given before, but not after, noxious stimulation. (<https://neuralregen.org/wp-content/uploads/2020/01/ISNR-2020-Final.pdf>) International Symposium on Neural Regeneration. Pacific Grove, CA.
197. Johnston, D. T., Lout, E. T., Henwood, M. K., Hudson, K. E., Strain, M. M., & Grau, J. W. (2020). Uncontrollable, but not controllable, intermittent nociceptive stimulation expands the area of hemorrhage in rats that have received a contusion injury. (<https://neuralregen.org/wp-content/uploads/2020/01/ISNR-2020-Final.pdf>) International Symposium on Neural Regeneration. Pacific Grove, CA.

198. Johnston, D.T., Lout, E., Baine, R.E., & Grau, J.W. (2021). Susceptibility of the spinal cord to pain and hypertension after injury. *Journal of Neurotrauma*, 38, A-96.
199. Davis, J., Baine, R., Tarbet, M., Fauss, G., Giddings, G., & Grau, J. (2021). Isoflurane anesthesia, but not ketamine, blocks the induction of nociceptive induced hemorrhage after SCI in rats. *Journal of Neurotrauma*, 38, A-96.
200. Davis, J.A., Baine, R.E., Tarbet, M.M., Fauss, G.N.K., Giddings, G., & Grau, J.W. (2021). Isoflurane anesthesia, but not ketamine, blocks the induction of nociception induced hemorrhage after SCI in rats. Chicago, IL: Society for Neuroscience, 2021.
201. Johnston, D.T., Lout, E.T., Baine, R.E., & Grau, J.W. (2021). Treatment with norepinephrine after spinal cord injury increases tissue loss and impairs functional recovery. Chicago, IL: Society for Neuroscience, 2021.
202. Partipilo, S.R., Fauss, G.N.K., Johnston, D.T., Baine, R.E., Davis, J.A., & Grau, J.W. (2021). Brain-dependent processes fuel pain-induced breakdown of the blood-spinal cord barrier after spinal cord injury. Chicago, IL: Society for Neuroscience, 2021.
203. Baine, R.E., Giles, E.D., & Grau, J.W. (2021). Estrous cycle modulates the harmful effects of pain after spinal cord injury (SCI). Chicago, IL: Society for Neuroscience, 2021.
204. Giddings, G.A., Bean, P.A., Tarbet, M.M., Johnston, D.T., Davis, J.A., Lout, E.T., Henwood, M.K., & Grau, J.W. (2021). Morphine attenuates pain-induced hemorrhage following traumatic brain injury (TBI). Chicago, IL: Society for Neuroscience, 2021.
205. Hudson, K.E., Tarbet, M.M., & Grau, J.W. (2021). Positivity in the spinal cord: Learning promotes adaptive responding in the face of uncontrollable stimulation. Chicago, IL: Society for Neuroscience, 2021.
206. Giddings, G.A., Johnston, D.T., Borland, H.L., Bean, P.A., Davis, J.A., Partipilo, S.R., Hudson, K.E., & Grau, J.W. (2022). Pentobarbital anesthesia attenuates pain induced hemorrhage after traumatic brain injury (TBI). National Neurotrauma Symposium, Atlanta, GA. *Journal of Neurotrauma*, 39, A30.
207. Partipilo, S.R., Johnston, D.T., Davis, J.A., Hudson, K.E., Giddings, G.A., & Grau, J.W. (2022). Bad blood: Blood serum transfusion from animals that received pain input fuels secondary injury. National Neurotrauma Symposium, Atlanta, GA. *Journal of Neurotrauma*, 39, A30.
208. Johnston, D.T., Giddings, G.A., Borland, H., West, C.R., & Grau, J. W. (2022). Whether norepinephrine treatment after spinal cord injury induces hemorrhage depends upon time of administration and sex. National Neurotrauma Symposium, Atlanta, GA. *Journal of Neurotrauma*, 39, A4.
209. Hudson, K.E., Tarbet, M., & Grau, J.W. (2022). Proprioceptive gating of nociceptive signaling: Positioning to minimize maladaptive plasticity after spinal cord injury. National Neurotrauma Symposium, Atlanta, GA. *Journal of Neurotrauma*, 39, A31.
210. Johnston, T., Giddings, G.A., Borland, H.L., Elejalde, R.S., West, C.R., & Grau, J.W. (2022). Whether norepinephrine treatment after spinal cord injury induces hemorrhage depends upon time, duration, and route of administration. San Diego, CA: Society for Neuroscience, 2022.
211. Partipilo, S.R., Davis, J.A., Hudson, K.E., Giles, E.D., & Grau, J.W. (2022). Deleterious effects of pain input after spinal cord injury can be transferred between animals via blood serum. San Diego, CA: Society for Neuroscience, 2022.
212. Davis, J., Baine, R., Tarbet, M.M., Johnston, T., Giddings, G., Borland, H., Fauss, G.N., Partipilo, S.R., & Grau, J.W. (2022). Pentobarbital anesthesia after spinal cord injury (SCI) blocks hemorrhage induced by stress. San Diego, CA: Society for Neuroscience, 2022.
213. Hudson, K.E., Tarbet, M.M., & Grau, J.W. (2022). Positivity in the spinal cord: Proprioceptive gating and learning promote adaptive plasticity in the spinal cord. San Diego, CA: Society for Neuroscience, 2022.
214. Grau, J.W., Hudson, K.E., & Tarbet, M.M. (2022). A framework for characterizing how behavioral control and temporal regularity affect spinal cord function. San Diego, CA: Society for Neuroscience, 2022.

215. Johnston, D. T., Elejalde, R. S., & Grau, J. W. (2023). Adrenergic receptor subtype activation may be implicated in recovery of function following spinal cord injury. National Neurotrauma Symposium, Austin, TX. *Journal of Neurotrauma*, 40, A-20.
216. Partipilo, S. R., Beltz, P. K., Kim, E. S., Giles, E. D., & Grau, J. W. (2023). Pain input after SCI fuels secondary injury via blood-borne factors that can be transferred between animals. National Neurotrauma Symposium, Austin, TX. *Journal of Neurotrauma*, 40, A-20.217.
217. Colpitts, K., Johnston, T., Partipilo, S., Patil, S., & Grau, J. W. (2023). Peripheral Pain Input Alters the Extent of Hemorrhage after Traumatic Brain Injury (TBI). National Neurotrauma Symposium, Austin, TX. *Journal of Neurotrauma*, 40, A-86.
218. Johnston, T., Colpitts, K. N., Giddings, G., Borland, H. L., & Grau, J. W. (2023). Level dependent effects of pain input after cervical spinal cord injury. Washington, DC: Society for Neuroscience, 2023.
219. Colpitts, K., Elejalde, R. S., Patil, S., Johnston, T., Sanchez, K., Giles, E. D., Grau, J. W. (2024). The effects of systemic estradiol or progesterone administration on pain induced hemorrhage and locomotor performance after spinal cord injury (SCI) in ovariectomized rats. National Neurotrauma Symposium, San Francisco, CA. *Journal of Neurotrauma*, 41.
220. Kobayashi, N., Phinney, C., Davis, J., & Grau, J. W. (2024). Application of a local anesthetic (bupivacaine) for 3-12 hr after spinal cord injury preserves locomotor function and attenuates hemorrhage at the site of injury. National Neurotrauma Symposium, San Francisco, CA. *Journal of Neurotrauma*, 41.
221. Colpitts, K., Johnston, T., Elejalde, R. S., Patil, S., Sanchez, K., Gibson, E., Giles, E. D., Grau, J. W. (2024). The effect of regional application of 17- β estradiol prior to thoracic Spinal Cord Injury (SCI) in ovariectomized rats. Chicago, IL: Society for Neuroscience, 2024.
222. Kobayashi, N., Phinney, C., Davis, J., & Grau, J. W. (2024). Protecting the Injury Spinal Cord: Application of a Local Anesthetic (Bupivacaine) Reduces Secondary Injury. Chicago, IL: Society for Neuroscience, 2024.
223. Trevino, A., Colpitts, K., & Grau, J. W. (2024). The impact of concurrent neural injuries on secondary tissue loss and behavioral function in rats. Chicago, IL: Society for Neuroscience, 2024.