

## **Margaret Gruen, DVM, MVPH, PhD, DACVB (Behavior)**

**Qualifications:** Doctor of Veterinary Medicine (NC Licensed)  
*Board Certified by the American College of Veterinary Behaviorists*  
Doctorate, Comparative Biomedical Sciences  
Master's in Public Health (Veterinary)

**Current Position:** Associate Professor of Behavioral Medicine (with tenure)  
Comparative Behavioral Research Laboratory  
North Carolina State University College of Veterinary Medicine  
Raleigh, NC  
<https://comparativebehavioralresearch.wordpress.ncsu.edu>

## **Education & Training**

**Duke University, Durham, NC**

*Postdoctoral Associate/Stanton Foundation Fellow, 2016-2018*

*Co-director, Duke Canine Cognition Center, 2016-2018*

*Duke University Affiliate, 2018 - current*

- Projects include:
  - Development of a cognitive battery for use in puppies
  - Longitudinal cognitive testing of puppies bred to be service dogs
  - Evaluation of the involvement of therapy dogs to facilitate pediatric echocardiograms
- Supervision and mentoring of students in the Duke Canine Cognition Center

**North Carolina State University College of Veterinary Medicine; Raleigh, NC**

*Ph.D. Comparative Biomedical Science, 2016*

- Thesis: Qualitative and Quantitative Assessment of Pain in a Naturally-occurring Model of Chronic Pain in Cats (Degenerative Joint Disease)
- Internship with the Pediatric Center of Excellence at Quintiles (Now IQVia)

*Residency in Animal Behavior, 2006-2009*

- Included rotations on Internal Medicine and Neurology
- Primary responsibility for cases seen at the Behavioral Medicine Service
- Consultations with referring veterinarians and other specialty services at the Veterinary Teaching Hospital

*Master's Degree in Veterinary Public Health, 2008*

*Rotating Internship, 2005-2006*

- Animal Welfare Focus
- Rotations in Internal Medicine, Surgery, Emergency/Critical Care, Neurology, Dermatology, and Cardiology

**University of Illinois College of Veterinary Medicine; Urbana, IL**

*Doctor of Veterinary Medicine, May 2005*

- Current Licensure in North Carolina

**Haverford College; Haverford, PA**

*Bachelor of Arts in Psychology/ Neural & Behavioral Sciences Concentration, May 1998*

## Professional Experience

### **North Carolina State University;** Raleigh, NC

*Associate Professor (with tenure), Department of Clinical Sciences, July 2022 – current*

*Full Member of the Graduate Faculty, May 2018 – current*

*Assistant Professor, Department of Clinical Sciences, April 2018 – July 2022*

*Adjunct Assistant Professor, Department of Clinical Sciences, January 2017 – 2018*

*Associate Member of the Graduate Faculty, May 2017 – April 2018*

*Research Assistant Professor, Department of Clinical Sciences, July 2011-January 2013*

*Clinical Assistant Professor, Department of Clinical Sciences, July 2009 – July 2011*

*Resident in Animal Behavior, Department of Clinical Sciences, July 2006 – June 2009*

*Board Certification - American College of Veterinary Behaviorists, 2010*

*Intern in Animal Welfare, Department of Clinical Sciences, July 2005 – June 2006*

### **Angell Memorial Animal Hospital;** Boston, MA

*Nursing Supervisor, September 1999-June 2001*

### **Alkermes, Inc.;** Cambridge, MA

*Research Associate in Pharmacology Group, September 1998 – September 1999*

### **SPSS, Inc.;** Chicago, IL

*Management Technician, May-August 1998*

### **National Institute of Mental Health;** Washington, D.C.

*Stanley Foundation Summer Scholar, Clinical Brain Disorders Branch, Summer 1997*

### **National Institute of Mental Health;** Washington, D.C.

*Stanley Foundation Summer Scholar, Clinical Brain Disorders Branch, Summer 1996*

## Awards & Honors

### **North Carolina State University College of Veterinary Medicine**

*Goodnight Early Career Innovator Award Winner, 2022*

*Zoetis Distinguished Veterinary Teacher Award Nominee, 2021*

*Goodnight Early Career Innovator Award, CVM Nominee, 2021*

*Comparative Medicine Institute New Investigator Clinical Research Award, 2019  
(\$3200)*

### **Duke University**

*Emerging Leaders Institute, 2017*

### **North Carolina State University College of Veterinary Medicine (pre-faculty)**

*Leroy Coggins Graduate Fellowship Award, 2015*

*Department of Clinical Sciences Graduate Student of the Year, 2014*

*Certificate of Recognition, Veterinary Research Forum, 2014*

*Member: Phi Kappa Phi Honor Society*

### **University of Illinois College of Veterinary Medicine**

*Dean's List: Spring 2003, Fall 2004, Spring 2004, Fall 2005, Spring 2005*

Member: Mu Chapter of Phi Zeta Honor Society  
Anna M. Gulick Scholarship, 2004  
*Awarded for a good academic record, good moral character, and financial need*  
Dr. J.E. Salsbury Scholarship, 2004  
*Awarded for superior scholarship, initiative, perseverance, and leadership potential*

## **Professional Organizations**

- American College of Veterinary Behaviorists, 2010 – current
- Fear Free<sup>SM</sup> Advisory Board, 2016 – current
- International Association for the Study of Pain, 2015 – current
- American Veterinary Medical Association, 2005 – current
- American Veterinary Society of Animal Behavior, 2005 – current
- North Carolina Veterinary Medical Association, 2006 – current
- The Honors Society of Phi Zeta - Mu Chapter
- The Honors Society of Phi Kappa Phi

## **Professional Development**

- Translational Research Immersion Program, University of Wisconsin, 2019
- Faculty Development Program, National Center for Faculty Development and Diversity, 2019
- Emerging Leaders Institute, Duke University, 2017
- Writing from the Reader's Perspective, Duke University, 2017
- Fear Free<sup>SM</sup> Certification, 2017
- Collaborative Institutional Training Initiative, Duke University, 2017
  - Biomedical Research
  - Good Clinical Practice
  - Vulnerable Subjects – Research involving children
- Preparing Future Leaders, North Carolina State University, 2016
- Fundamentals in Teaching, North Carolina State University, 2014-2016
  - Introduction to teaching
  - Writing learning outcomes
- Wolfpack Leadership Conference, North Carolina State University, 2010
- Frank Communication Training, Colorado State University, 2010
- Bayer Communication Training, North Carolina State University, 2006

## **Service and Extension**

### **Within North Carolina State University College of Veterinary Medicine**

- Founding Member of the Comparative Pain Research and Education center; 2018 – current
- Comparative Medicine Institute Member (TPP); 2018 – current
- ACVB Residency program director; 2018 – current
- Faculty advisor – Student Chapter of the American Veterinary Society of Animal Behavior; 2018 – current

- Faculty co-advisor – Comfort Crew; 2018 – current
- Search Committee Member
  - Neuroscience/Neurobiology, Molecular and Biomedical Sciences Department; 2021
  - Global Production Animal Welfare, Molecular and Biomedical Sciences Department; 2018
- Clinical Ethics Committee Member; 2018 – current

### **Outside North Carolina State University College of Veterinary Medicine**

- American College of Veterinary Behaviorists
  - Exam committee Co-Chair 2012-2014
  - Exam committee member 2011 – 2021
  - Board of Regents (Member-at-large) 2016 – 2018
- AAHA Pain Guidelines Task Force Co-chair (2020-2021)
- UNC/NCSU Collaborative Dog Bite Prevention in Children Project (2019)
  - Developed and produced video clips designed to increase awareness of dog bite prevention and dog behavior aimed at parents of toddlers

## **Bibliography**

### **Original works in Peer-Reviewed Journals:**

1. Fefer G, Khan MZ, Panek WK, Case B, **Gruen ME\***, Olby NJ\*. Relationship between hearing, cognitive function, and quality of life in aging companion dogs. (accepted, Journal of Veterinary Internal Medicine, June 2022). **\*Co-senior authors**
2. Mondino A, Wagner G, Russell K, Lobaton E, Griffith E, Gruen M, Lascelles BDX, Olby N. Static posturography as a novel measure of the effects of aging on postural control in dogs. (accepted to PLOS one, April 2022). **\*Contributing author**
3. Fefer G, Panek WK, Khan MZ, Singer M, Westermeyer H, Mowat FM, Murdoch DM, Case B, Olby NJ\*, **Gruen ME\***. Use of cognitive testing, questionnaires and plasma biomarkers to quantify cognitive impairment in an aging pet dog population. (accepted, Journal of Alzheimers Disease, March 2022). **\*Co-senior authors**
4. **Gruen ME\***, Lascelles BDX\*, Colleran E, Gottlieb A, Johnson J, Lotsikas P, Marcellin-Little D, Wright B. (2022) 2022 AAHA Pain Management Guidelines for Dogs and Cats. *Journal of the American Animal Hospital Association*, <https://doi.org/10.5326/JAAHA-MS-7292>. **\*Corresponding authors, Task force co-chairs**
5. McKenzie BA, Chen FL, **Gruen ME**, Olby NJ. (2022) Canine geriatric syndrome: A framework for advancing research in veterinary geroscience. *Frontiers in Veterinary Science*, <https://doi.org/10.3389/fvets.2022.853743>. **Contributing author**
6. Pankratz K, Korman J, Emke C, Johnson B, Griffith EH, **Gruen ME** (2021) Randomized, placebo-controlled prospective clinical trial evaluating the efficacy of the Assisi Anti-Anxiety Device (Calmer Canine) for the treatment of canine separation anxiety. *Frontiers in Veterinary Science*, <https://doi.org/10.3389/fvets.2021.819135>. **\*Corresponding author (mentee first author)**

7. Hoel JA, Templeton GB, Fefer G, Case B, Shah A, **Gruen ME\***, Olby NJ\*. (2021) Sustained Gaze is a Reliable In-Home Test of Attention for Aging Pet Dogs *Frontiers in Veterinary Science*, <https://doi.org/10.3389/fvets.2021.819135> **\*Co-senior authors.**
8. Cunningham R, **Gruen ME\***, Thomson A, Lascelles BDX\*. (2021) Evaluation of a nutritional supplement for the alleviation of pain associated with feline degenerative joint disease: A prospective, randomized, stratified, double-blind, placebo-controlled clinical trial. *Journal of Feline Medicine and Surgery*, <https://doi.org/10.1177/2F1098612X211053484>. **\*Corresponding authors, equal contribution to manuscript**
9. **Gruen ME\***, Myers JAE, Tena JKS, Becskei C, Cleaver DM, Lascelles BDX\*. Solensia® (frunevetmab, a felinized anti-NGF monoclonal antibody) for the treatment of pain from osteoarthritis in cats. (2021) *Journal of Veterinary Internal Medicine* <https://doi.org/10.1111/jvim.16291>. **Lead author \*equal contribution to manuscript**
10. Cunningham RM, Park RM, Knazovicky D, Lascelles BDX, **Gruen ME.** (2021) Assessment of sensory thresholds in dogs using mechanical and hot thermal quantitative sensory testing. *Journal of Visualized Experiments*, <https://dx.doi.org/10.3791/62841>. **Corresponding author (mentee first author)**
11. Solomons H, Smith K, Callahan-Beckel M, Callahan M, Levy K, Kennedy BS, Bray E, Gnanadesikan GE, Horschler DJ, **Gruen M**, Tan J, White P, MacLean E, Hare B. (2021) Cooperative communication with humans evolved to emerge early in dogs. *Current Biology* <https://doi.org/10.1016/j.cub.2021.06.051>. **Contributing author**
12. Park RM, Royal KD, **Gruen ME.** (2021) A literature review: Pet bereavement and coping mechanisms. *Journal of Applied Animal Welfare Science*, 10.1080/10888705.2021.1934839. **Corresponding author (mentee first author)**
13. **Gruen ME\***, Meyers J, Lascelles BDX\*. Efficacy and safety of an anti-Nerve Growth Factor antibody (frunevetmab) for the treatment of degenerative joint disease-associated chronic pain in cats: A multi-site pilot field study. *Frontiers in Veterinary Science*; 10.3389/fvets.2021.610028. **Lead author \*equal contribution to manuscript**
14. Adrian D, King JN, Parrish RS, King SB, Budsberg SC, **Gruen ME**, Lascelles BDX. (2021) Robenacoxib shows efficacy for the treatment of chronic musculoskeletal disorder-associated pain in cats: A randomized and masked pilot clinical trial. *Scientific Reports*; 10.1038/s41598-021-87023-2 **Contributing author**
15. Enomoto M, Lascelles BDX, **Gruen ME.** (2021) Refinement of the Feline Musculoskeletal Pain Index (FMPI) and development of the short form FMPI. *Journal of Feline Medicine and Surgery*; <https://doi.org/10.1177/1098612X211011984>. **Corresponding author**
16. Fogle JE, Hudson L, Thomson A, Sherman B, **Gruen M**, Lascelles BDX, Clary G, Longo F, Meeker R. (2021) Improved neurocognitive performance in FIV infected cats following treatment with the p75 neurotrophin receptor ligand LM11A-31. *Journal of Neurovirology*; <https://doi.org/10.1007/s13365-021-00956-2> **Contributing author**
17. Park R, **Gruen ME**, Royal K. (2021) Association between owner demographics and decision to seek veterinary care. *Veterinary Sciences*; 8(1), 7; <https://doi.org/10.3390/vetsci8010007>. **Contributing author**

18. Panek WK, Murdoch DM, **Gruen ME**, Mowat FM, Marek RD, Olby N. (2021) Plasma amyloid beta concentrations in aged and cognitively impaired pet dogs. *Molecular Neurobiology*; **58**, 483–489. <https://doi.org/10.1007/s12035-020-02140-9>. **Contributing author**
19. Woods HJ, Li MF, Patel UA, Lascelles BDX, Samson DR, **Gruen ME**. (2020) Let sleeping dogs lie: A functional linear modeling approach to sleep-wake cycles in dogs. *Scientific Reports*; 10, 22233 <https://doi.org/10.1038/s41598-020-79274-2> **Corresponding author**
20. Perdeu I, Emke C, Johnson B, Dixit V, Song Y, Griffith E, Watson P, **Gruen ME**. (2020) Evaluation of Pexion® (imepitoin) for treatment of storm anxiety in dogs: A randomized, double-masked, placebo-controlled trial. *Veterinary Record*; <https://doi.org/10.1002/vetr.1>. **Corresponding author**
21. Bray EE, **Gruen ME**, Gnanadesikan GE, Horschler DJ, Leby KM, Kennedy BS, Hare BA, MacLean EL. (2020) Dog cognitive development: A longitudinal study across the first two years of life. *Animal Cognition*; <https://doi.org/10.1007/s10071-020-01443-7> **Contributing author**
22. **Gruen ME**, Case BC, Robertson J, Campbell S, Korpivaara M. (2020) Evaluation of repeated dosing of Sileo® (dexmedetomidine oromucosal gel) for treatment of noise aversion in dogs over a series of noise events. *Veterinary Record*; 187.12: 489-495. **Lead and corresponding author**
23. Bray E, **Gruen ME**, Hare B, Gnanadesikan G, Horschler D, Levy K, Kennedy B, MacLean E. (2020) Cognitive characteristics of 8- to 10-week-old assistance dog puppies. *Animal Behaviour*; 166, 193-20. **Contributing author**
24. Enomoto M, Lascelles BDX, **Gruen ME**. (2020) Development of a checklist for the detection of degenerative joint disease-associated pain in cats. *Journal of Feline Medicine and Surgery*; doi: 10.1177/1098612X20907424. **Corresponding author**
25. **Gruen ME**, Samson D, Lascelles BDX. (2020) Functional linear modeling of activity data shows analgesic-mediated improved sleep in dogs with spontaneous osteoarthritis pain. *Scientific Reports*; doi: 10.1038/s41598-019-50623-0. **Lead and corresponding author**
26. **Gruen ME**, White P, Hare B. (2020) Do dog breeds differ in pain sensitivity? Veterinarians and the general public believe they do. *PLOS One*; doi: 10.1371/journal.pone.0230315. **Lead and corresponding author**
27. Mills DS, Demontigny-Bedard I, **Gruen ME**, Klinck MP, McPeake KJ, Barcelos AM, Hewison L, Van Haevermaet H, Denenberg S, Hauser H, Koch C, Ballantyne K, Wilson C, Mathkari CV, Pounder J, Garcia E, Darder P, Fatjo J, Levine E. (2020) Pain and problem behavior in cats and dogs. *Animals*; 10(2), 318; <https://doi.org/10.3390/ani10020318>. **Contributing author**
28. Panek WK, **Gruen ME**, Murdoch DM, Marek R, Stachel AF, Mowat FM, Saker KE, Olby NJ. (2020) Plasma neurofilament light chain as a translational biomarker of aging and neurodegeneration in dogs. *Molecular Neurobiology*; **57**, 3143–3149. <https://doi.org/10.1007/s12035-020-01951-0>. **Contributing author**
29. Foster M, Brugarolas R, Walker K, Mealin S, Cleghern Z, Yuschak S, Condit K, **Gruen M**, Roberts DL, Adin D, Sherman B, Bozkurt A. (2020) Preliminary Evaluation of a Wearable Sensor System for Assessment of Heart Rate in Guide Dog Puppies. *Sensors*; 20(16), 9449-9459. doi: 10.1109/JSEN.20202986159. **Contributing author**
30. Holder T, **Gruen M**, Roberts D, Somers T, Bozkurt A. (2020) Methodology, efficacy, and theory of animal assisted interventions in oncology: (Part I):



- Methods and Results. *Integrative Cancer Therapies*; doi: 10.1177/1534735420943278. **Contributing author**
31. Holder T, **Gruen M**, Roberts D, Somers T, Bozkurt A. (2020) Methodology, efficacy, and theory of animal assisted interventions in oncology: (Part II): Theoretical Mechanisms and Frameworks. *Integrative Cancer Therapies*; doi: 10.1177/1534735420943269. **Contributing author**
  32. **Gruen ME**, Foster ML, Lazarowski L, Jeffries A, Sherman BL, Dorman DC. (2019) Does the cognitive bias test in dogs depend on spatial learning? *Journal of Veterinary Behavior Clinical Applications and Research*; 33, 1-6. **Lead author**
  33. **Gruen ME**. (2018) Which drugs are used to treat Cognitive Dysfunction *Clinician's brief*; December ed. **Lead author**
  34. Kennedy CJ, Thomson AE, Griffith EH, Fogle J, Lascelles BDX, Meeker RB, Sherman BL, **Gruen ME**. (2018) Enrichment Preferences of FIV-Infected and Uninfected Laboratory-Housed Cats. *Viruses*; 10(7), 353. doi:10.3390/v10070353. **Corresponding author**
  35. Naik R, Witzel A, Albright J, Siegfried K, **Gruen ME**, Thompson A, Price J, Lascelles BDX. (2018) Pilot study evaluating the impact of feeding method on overall activity of indoor, client-owned cats. *Journal of Veterinary Behavior: Clinical Applications and Research*; 25, 9-13. **Contributing author**
  36. Klinck MP, **Gruen ME**, del Castillo JRE, Guillot M, Thomson AE, Heit M, Lascelles BDX, Troncy E. (2017) Development and preliminary validity and reliability of the Montreal Instrument for Cat Arthritis Testing for use by caretaker/owner, MI-CAT(C), via a randomized clinical trial. *Applied Animal Behaviour Science*; <https://doi.org/10.1016/j.applanim.2017.11.013> **Contributing author**
  37. **Gruen ME**, Roe SC, Griffith EH, Sherman BL. (2017) The use of trazodone to facilitate calm behavior following elective orthopedic surgery in dogs: Results and lessons learned from a clinical trial. *Journal of Veterinary Behavior: Clinical Applications and Research*; 22:41-45. **Lead author**
  38. **Gruen ME**, Dorman DC, Lascelles BDX. (2017) Caregiver placebo effect in analgesic clinical trials for painful cats with naturally-occurring degenerative joint disease. *Veterinary Record*; 180(19):473. doi: 10.1136/vr.104168. **Lead author**
  39. Fish RE, Foster ML, **Gruen ME**, Sherman BL, Dorman DC. (2017) Wearing of a jacketed telemetry system affects behavior in the dog during an open field test. *Journal of the American Association for Laboratory Animal Science*; 56(4): 382-389. **Contributing author**
  40. MacLean EL, Gesquiere LR, **Gruen ME**, Sherman BL, Carter CS. (2017) Endogenous oxytocin, vasopressin and aggression in domestic dogs. *Frontiers in Psychology*; <https://doi.org/10.3389/fpsyg.2017.01613>. **Contributing author**
  41. **Gruen ME**, Alfaro-Cordoba M, Thomson AE, Worth A, Staicu AM, Lascelles BDX. (2017) The use of functional data analysis to evaluate activity in a spontaneous model of degenerative joint disease in cats. *PLoS ONE*; 12(1): e0169576. doi:10.1371/journal.pone.0169576. **Lead author**
  42. **Gruen ME**, Messenger KM, Thomson AE, Griffith EH, Aldrich LA, Vaden S, Lascelles BDX. (2017) Evaluation of serum cytokines in cats with and without degenerative joint disease and associated pain. *Veterinary Immunology and Immunopathology*; 183:49-59. **Lead author**
  43. **Gruen ME**, Caney S, Rishniw M, Lascelles BDX. (2017) Veterinarian's attitudes toward clinical research: A survey study. *Journal of the American Veterinary Medical Association*; 250(1):86-97. **Lead author**

44. Knazovicky D, Case B, Thomson A, Helgeson ES, **Gruen ME**, Maixner W, Lascelles BDX. (2017) Replicate effects and test-retest reliability of quantitative sensory threshold testing in dogs with chronic pain. *Veterinary Anesthesia and Analgesia*; 44:615-624. doi:10.1016/j.vaa.2016.08.008. **Contributing author**
45. Stevens BJ, Frantz E, Orlando JM, Griffith EH, Harden LB, **Gruen ME**, Sherman BL. (2016) The use of trazodone to reduce feline travel anxiety and improve veterinary exam tractability. *Journal of the American Veterinary Medical Association*; 249(2): 202-207. doi: 10.2460/javma.249.2.202. **Contributing author**
46. **Gruen ME**, Thomson AE, Griffith EH, Paradise H, Gearing D, Lascelles BDX. (2016) A feline-specific anti-nerve growth factor antibody improves mobility in cats with degenerative joint disease-associated pain: A pilot proof of concept study. *Journal of Veterinary Internal Medicine*; 30(4):1138-48. doi: 10.1111/jvim.13972. **Lead author**
47. Muller C, Gaines B, **Gruen ME**, Case BC, Arrafut K, Innes J, Lascelles BDX. (2016) Clinical metrology instrument administration: evaluation of baseline variability and the effect of independent versus dependent interviewing on pain and mobility scores in dogs with osteoarthritis. *Journal of Veterinary Internal Medicine*; 30(3):836-46. doi: 10.1111/jvim.13923. **Contributing author**
48. **Gruen ME**, Messenger K, Thomson A, Griffith E, Paradise H, Vaden S, Lascelles BDX. (2016) A comparison of serum and plasma values using a multiplexed cytokine assay in cats. *Veterinary Immunology and Immunopathology*; 182:69-73. doi:10.1016/j.vetimm.2016.10.003. **Lead author**
49. Knazovicky D, Helgeson ES, Case BC, **Gruen ME**, Maixner W, Lascelles BDX. (2016) Widespread somatosensory sensitivity in naturally occurring canine model of osteoarthritis. *Pain*;157(6):1325-32. doi:10.1097/j.pain.0000000521. **Contributing author**
50. **Gruen ME**, Griffith EH, Thomson AE, Simpson W, Lascelles BDX. (2015) Criterion validation testing of clinical metrology instruments for measuring degenerative joint disease associated mobility impairment in cats. *PLoS ONE*; doi: 10.1371/journal.pone.0131839. **Lead author**
51. **Gruen ME**, Case BC, Foster ML, Lazarowski L, Fish RE, Landsberg G, DePuy V, Dorman DC Sherman BL. (2015) Military working dog assessment: The use of an open field model to assess sound-associated anxiety. *Journal of Veterinary Behavior: Clinical Applications and Research*; 10(4):338-345. **Lead author**
52. Sherman BL, **Gruen ME**, Case BC, Foster ML, Fish RE, Lazarowski L, Dorman DC. (2015) Development of an emotional reactivity test for behavioral evaluation of explosive-detecting military working dogs. *Journal of Veterinary Behavior: Clinical Applications and Research*; 10:94-102. **Contributing author**
53. Lazarowski L, Foster ML, **Gruen ME**, Sherman BL, Case BC, Fish RE, Milgram NW, Dorman DC. (2015) Acquisition of an olfactory discrimination task in dogs using a two-choice operant conditioning procedure. *Animal Cognition*; 18(6):1255-65. **Contributing author**
54. **Gruen ME**, Roe S, Griffith E, Hamilton A, Sherman BL. (2014) The use of trazodone to facilitate post-surgical confinement in dogs. *Journal of the American Veterinary Medical Association*; 245(3):296-301. **Lead author**
55. Tomas A, Pultorak EL, **Gruen ME**, Breitschwerdt EB, Lascelles BDX. (2014) Relationship between degenerative joint disease, pain and *Bartonella* spp. seroreactivity in domesticated cats. *Journal of Veterinary Internal Medicine*; 29(1): 21-27. **Contributing author**



56. **Gruen ME**, Jiamachello KN, Thomson A, Lascelles BDX. (2014) Clinical trials involving cats: what factors affect owner participation? *Journal of Feline Medicine and Surgery*; 16(9): 727-735. **Lead author**
57. Marino CL, Lascelles BDX, Vaden SL, **Gruen ME**, Marks SL. (2014) Prevalence and classification of chronic kidney disease in cats randomly selected from four age groups and in cats recruited for degenerative joint disease studies. *Journal of Feline Medicine and Surgery*; 16(6): 465-572. **Contributing author**
58. Lazarowski L, Foster ML, **Gruen ME**, Sherman BL, Case BC, Fish RE, Milgram NW, Dorman DC. (2014) Acquisition of a visual discrimination and reversal learning task by Labrador retrievers. *Animal Cognition*; 17 (3):787-792. **Contributing author**
59. **Gruen ME**, Griffith E, Thomson A, Simpson W, Lascelles BDX. (2014) Detection of clinically relevant pain relief in cats with degenerative joint disease associated pain. *Journal of Veterinary Internal Medicine*; 28(2): 346-350. **Lead author**
60. Stevens BJ\*, **Gruen ME\***. (2014) Training veterinary students in shelter medicine: A service-learning community-classroom technique. *Journal of Veterinary Medical Education*; 41(1): 83-89. **\*Equal contribution to manuscript**
61. **Gruen ME**, Thomson A, Clary G, Hamilton A, Hudson L, Meeker R, Sherman B. (2013) Conditioning laboratory cats to handling and transport. *Lab Animal*; 42:385-389. **Lead author**
62. **Gruen ME**. (2013) How I Treat: Cognitive Dysfunction. *Clinician's Brief*; 11(12): 13-18. **Lead author**
63. Sherman BL, **Gruen ME**, Meeker RB, Milgram B, DiRivera C, Thomson A, Clary G, Hudson L. (2013) The use of a T-maze to measure cognitive-motor function in cats (*Felis catus*). *Journal of Veterinary Behavior: Clinical Applications and Research*; 8:32-39. **Contributing author**
64. Benito J, **Gruen, ME**, Thomson A, Simpson W, Lascelles BDX. (2012) Owner-assessed indices of quality of life in cats and the relationship to the presence of degenerative joint disease. *Journal of Feline Medicine and Surgery*; 14(12): 863-870. **Contributing author**
65. **Gruen ME**, Sherman BL. (2008) The Use of Trazodone as an Adjunctive Agent in Canine Anxiety Disorders: 56 Cases (1995-2007). *Journal of the American Veterinary Medical Association*; 233(12):1902-1907. **Lead author**

#### **Pre-Prints**

1. Patel UA, **Gruen ME**, and Samson DR. A brief report of sleep and circadian rhythm quotas in a population of dog owners in North Carolina, USA. 2021; bioRxiv 22233. **Contributing author**
2. Solomons H, Smith K, Callahan-Beckel M, Callahan M, Levy K, Kennedy BS, Bray E, Gnanadesikan GE, Horschler DJ, **Gruen M**, Tan J, White P, MacLean E, Hare B. Cooperative communication with humans evolved to emerge early in dogs. 2021; bioRxiv doi: 10.1101/2021.01.12.425620. **Contributing author**

#### **Rigorously Peer-Reviewed Conference Proceedings** (presenter underlined)

1. Foster M, Bozkurt A, Roberts D, **Gruen M**. Preliminary Evaluation of Dog-Drone Technological Interfaces: Challenges and Opportunities in *Animal Computer Interaction Conference (accepted as full paper)*, 2019.
2. Roberts D, Park J, Pappas A, Carson M, **Gruen ME**. Automated tail position tracking with millimeter accuracy using depth sensing and Mask R-CNN, in

- Proceedings of the 6<sup>th</sup> International Conference on Animal- Computer Interaction Conference (accepted as full paper)*, 2019.
3. **Foster M**, Beppler E, Holder T, Dieffenderfer J, Erb P, Everette K, **Gruen M**, Somers T, Evans T, Daniele M, Roberts D, “A System for Assessment of Canine-Human Interaction during Animal-Assisted Therapies,” in *IEEE EMBC*, 2018.
  4. **Cleghorn, Z.**, **Gruen, M.**, and Roberts, DL “Using decision tree learning as an interpretable model for predicting candidate guide dog success,” in *In Measuring Behavior Conference 2018. Pending publication*, 2018.
  5. **Foster M**, Erb P, Plank B, West H, Russenberger J, **Gruen M**, Daniele M, Roberts D, Bozkurt A. “3-D-Printed electrocardiogram electrodes for heart rate detection in canines,” in *BioCas IEEE*, 2018.

#### **Case Reports in Peer-Reviewed Journals:**

1. **Gruen M**. Urine marking in a Himalayan cat. *Journal of the American Veterinary Medical Association* 2012; 241(11):1445-1447.
2. **Gruen ME**, Sherman BL. Animal behavior case of the month: Thunderstorm phobia in a Golden retriever. *Journal of the American Veterinary Medical Association* 2012; 241:1293-1295.

#### **Book Chapters:**

1. **Gruen ME**, Sherman BL. Feline housesoiling. In Tilly and Smith (Ed), *Blackwell's Five-Minute Veterinary Consult; Canine and Feline, 7<sup>th</sup> edition, April 2021*.
2. **Gruen ME**, Sherman BL. Feline compulsive disorders. In Tilly and Smith (Ed), *Blackwell's Five-Minute Veterinary Consult; Canine and Feline, 7<sup>th</sup> edition, April 2021*.
3. Sherman BL, **Gruen ME**. Aggression, overview – Dogs. In Tilly and Smith (Ed), *Blackwell's Five-Minute Veterinary Consult; Canine and Feline, 7<sup>th</sup> edition, April 2021*.
4. **Gruen ME**, Albright, JA. Behavior in senior cats. In Siracusa, Herron, and Horowitz (Ed), *Decoding Your Cat*, 2020.
5. **Gruen ME**, Sherman BL, Papich M. Drugs affecting animal behavior. In Reviere and Papich (Ed), *Veterinary Pharmacology and Therapeutics, 10<sup>th</sup> edition*; 2018.
6. Lascelles BDX, **Gruen ME**, Innes J. Joint pain in pet dogs and cats. In Arendt-Nielsen and Perrod (Ed), *Pain in the Joints*; 2016; 45-58.
7. **Gruen ME**. Behavior problems in old cats. In Horwitz (Ed), *Blackwell's Five-Minute Veterinary Consult Clinical Companion: Canine and Feline Behavior, 2<sup>nd</sup> edition*; October, 2017.
8. **Gruen ME**, Sherman BL. Feline housesoiling. In Tilly and Smith (Ed), *Blackwell's Five-Minute Veterinary Consult; Canine and Feline, 6<sup>th</sup> edition*. October, 2015; 639-642.
9. **Gruen ME**, Sherman BL. Feline compulsive disorders. In Tilly and Smith (Ed), *Blackwell's Five-Minute Veterinary Consult; Canine and Feline, 6<sup>th</sup> edition* October, 2015; 297-298.
10. Sherman BL, **Gruen ME**. Aggression, overview – Dogs. In Tilly and Smith (Ed), *Blackwell's Five-Minute Veterinary Consult; Canine and Feline, 6<sup>th</sup> edition*; October, 2015; 46-49.

#### **Funding**

##### **Fellowships**

Stanton Foundation Fellowship and Postdoctoral Research

9/01/2016-4/1/2018

Ruth L. Kirschstein National Research Service Award  
NIH T-32  
8/01/2013-2016

### **Externally Sponsored Grants Funded**

#### **Current**

Nolan MW, Lascelles BDX, Breen M, **Gruen ME**, Mishra SK.

Role: Co-I

Neuronal regulation of acute chemoradiotherapy-associated pain in patients with head and neck cancer.

Direct Sponsor: CTSA One Health Alliance

**Gruen ME**, Lascelles BDX

Role: Co-PI

Do dog breeds differ in pain sensitivity? Separating fact from perception.

Direct Sponsor: American Kennel Club/Canine Health Foundation, Inc.

3/1/2020 – 2/28/2022

**Gruen, M** & Hare, B

Role: Co-PI

Longitudinal cognitive and emotional development in working dogs

This project is designed to assess the cognitive and emotional development in working dogs, as it relates to success in placement. We will be assessing dogs longitudinally to evaluate when cognitive domains mature, and which domains are most able to predict success as a working dog.

Direct Sponsor: HD097732, NIH

02/01/2019 – 01/31/2023

#### **Completed**

**Gruen ME**, Pankratz KE

Role: PI

Randomized, placebo-controlled prospective clinical trial evaluating the use of the Assisi Anti-Anxiety device for the treatment of canine separation anxiety

Direct Sponsor: Assisi Animal Health

1/1/2019 – 9/30/2021

**Gruen ME**

Role: PI

Safety and Efficacy of Imepitoin for Storm Anxiety in Dogs

Direct Sponsor: Boehringer Ingelheim Vetmedica, Inc.

05/15/2019 – 06/30/2020

**Gruen ME**, Messenger KM, Pankratz KE

Role: Co-PI (Messenger)

Efficacy of Single Dose Dexmedetomidine Oromucosal Gel to Attenuate Anxiety in Client Owned Cats Presented for Routine Veterinary Care

Direct Sponsor: Fear Free, LLC

4/1/2019 – 3/31/2020

**Gruen ME**

Role: PI

The safety and efficacy of repeated doses of Sileo for treatment of recurrent episodes of noise aversion in dogs

Direct Sponsor: Zoetis, LLC

11/12/2018 – 11/11/2019

Barker P (PI), Keene BW, Campbell MJ, **Gruen M**

Role: Co-I

Impact of animal assisted therapy on quality, completeness, and patient and parental satisfaction in children undergoing clinical echocardiography

Direct Sponsor: Morris Animal Foundation-Human Animal Bond Research Initiative

**Gruen ME**, Lascelles BDX

Role: Co-PI

Development of a checklist for the detection of musculoskeletal pain in cats (Feline Musculoskeletal Pain Checklist)

Direct Sponsor: Zoetis, LLC

1/1/2019 – 12/31/2019

**Gruen ME**, Olby N

Role: Co-PI

Development of a novel non-ambulatory cognitive assessment to characterize and quantify cognitive deficits in geriatric dogs

Direct Sponsor: Morris Animal Foundation

5/15/2019 – 8/15/2019

Roberts D (PI), Bozkurt AY, **Gruen ME**

Role: Co-I

Wearable Physiological Monitors for Measuring Canine Stimulus Responses

Direct Sponsor: Oak Ridge National Laboratories (Prime – US Dept. of Energy)

7/1/2018 – 9/30/2019

Lascelles BDX, **Gruen ME**

Role: Co-I

Pilot study identifying clinically relevant movements in normal healthy cats

Direct Sponsor: Elanco, LLC

3/1/2019 – 6/30/2019

Lascelles BDX (PI), Vaden S, Messenger K, **Gruen M**, Griffith E

Role: Co-I

Evaluation of inflammatory mediator profiles in cats with pain associated with naturally-occurring degenerative joint disease

Direct Sponsor: Winn Feline Foundation

08/01/2014-07/31/2017

Sherman BL, **Gruen ME**, MacLean, E (Duke University, awardee)

The roles of oxytocin and vasopressin in canine aggression

Role: Collaborator (NCSU Co-PI)

Sponsor: Stanton Foundation (Direct sponsor: Duke University, subcontract)

01/01/2015-12/31/2016

Lascelles BDX, **Gruen M**

Role: Co-I

Pilot proof of principle: Evaluation of the pain alleviating effects of subcutaneously delivered NV-02 in cats suffering from degenerative joint disease (DJD)-associated pain

Direct Sponsor: Nexvet

03/31/2014-07/31/2015

Lascelles BDX, **Gruen M**

Role: Co-I

A pilot field study to evaluate efficacy endpoints and the effect of low dose oral meloxicam in cats with degenerative joint disease (*supplement*)

Direct Sponsor: Boehringer Ingelheim Vetmedica

10/17/2011 – 10/31/2013

**Gruen, M** and Lascelles BDX

Role: Co-PI

A pilot field study to evaluate efficacy endpoints and the effect of low dose oral meloxicam in cats with degenerative joint disease

Direct Sponsor: Boehringer Ingelheim

10/17/2011-05/31/2013

Dorman D, Sherman BL, **Gruen ME**

Role: Co-I

Developing the second generation of improvised explosive device detector dog

Sponsor: Office of Naval Research (NCSU subcontract #K2-NCSU-0493)

8/15/2011-5/30/2014

Meeker R, Hudson L, Sherman, B, **Gruen M**

Role: Co-I

Choroid Plexus Macrophages in FIV neuropathogenesis (Administrative Supplement Request for 5 R01 MH063646)

Sponsor: NIH

Hudson L, Sherman B, Meeker R, **Gruen M**

Role: Co-I

Quantifying cognitive-motor decline in FIV-infected cats.

Sponsor: NIH (R21)

Dunning D, **Gruen M**

Role: Co-I

Shelter Population Index study

Direct Sponsor: National Council on Pet Population Study and Policy

### **Internally Sponsored Grants Funded**

Lascelles BDX, **Gruen ME**, Messenger KM, Nolan M, Mishra S, Pierce J.  
Center for Pain Education and Research (CPREC) Seed Grant 2018

Sherman BL, **Gruen ME**.

Use of Trazodone to facilitate post-operative exercise restriction. 2010 (CVM Competitive Research Grant)

## Lectures, Presentations, and Continuing Education

**Scientific and Educational Presentations with Proceedings** (since starting as Assistant Professor (2018) of 117 total; presenter underlined)

1. Caddiell RMP, Cunningham RM, Lascelles BDX, **Gruen ME**. Dog breed differences in reactions to a disgruntled stranger partially support veterinarian's distinct pain sensitivity ratings. *International Society for Applied Ethology, Ohrid (North Macedonia) September 2022*.
2. Caddiell RMP, Cunningham RM, Lascelles BDX, **Gruen ME**. Canine emotional reactivity differs by dog breed, but not in the way veterinarians believe. *Veterinary Behavior Symposium, Austin TX, June 2022*
3. Muñoz AC, Maulini J, Griffith EH, Zhao J, **Gruen ME**. Efficacy and safety of long-term oral imepitoin treatment for control of anxiety and fear associated with noise phobia and noise aversion in dogs using an individual dose titration approach during storms. *Veterinary Behavior Symposium, Austin TX, June 2022*
4. Muñoz AC, Maulini J, Griffith EH, Zhao J, **Gruen ME**. Efficacy and safety of long-term oral imepitoin for control of canine storm-associated anxiety and fear. *American College of Veterinary Internal Medicine Forum, Austin TX, June 2022*
5. Khan M, Case BC, Vero A, Russell K, Fefer G, Olby N, **Gruen ME**. Engagement and cognitive performance in aging canines. *Veterinary Behavior Symposium, Austin TX, June 2022*
6. Mondino A, Thomson A, Giovagnoli S, Russell K, **Gruen ME**, Lascelles BDX, Olby N. The relationship between activity patterns and cognition, pain, and motivation in senior dogs. *American College of Veterinary Internal Medicine Forum, Austin TX, June 2022*
7. Olby N, **Gruen ME**, Johnson PJ. Aging of the canine nervous system. *American College of Veterinary Internal Medicine Forum, Austin TX, June 2022*
8. **Gruen ME** Cognitive Dysfunction in Senior Cats. *Congreso de Especialidades Veterinarias (Asociacion de veterinaries Españoles especialistas en pequeños animales) Zaragoza, Spain, April 2022*
9. **Gruen ME** Advances and future of psychopharmacology in the treatment of behavior problems in cats. *Congreso de Especialidades Veterinarias (Asociacion de veterinaries Españoles especialistas en pequeños animales) Zaragoza, Spain, April 2022*
10. **Gruen ME** Advances and future of psychopharmacology in the treatment of behavior problems in dogs. *Congreso de Especialidades Veterinarias (Asociacion de veterinaries Españoles especialistas en pequeños animales) Zaragoza, Spain, April 2022*
11. **Gruen ME** Pain and behavioral problems in dogs and cats. *Congreso de Especialidades Veterinarias (Asociacion de veterinaries Españoles especialistas en pequeños animales) Zaragoza, Spain, April 2022*
12. **Gruen ME** & Albright J. Canine Problem Behavior Interactive Case Discussion workshop. *Western Veterinary Conference, Las Vegas NV, March 2022*
  - a. Workshop was provided twice during the conference

13. **Gruen ME.** Simple, easy tricks to make cat visits a treat. *Western Veterinary Conference, Las Vegas NV, March 2022*
14. **Gruen ME.** Canine separation anxiety: What's new in managing an old problem. *Western Veterinary Conference, Las Vegas NV, March 2022*
15. **Gruen ME.** Simple, easy tricks to make cat visits a treat. *Veterinary Medicine Expo (VMX), Orlando FL, January 2022*
16. **Maulini J, Muñoz AC, Griffith EH, Zhao J, Gruen ME.** Efficacy and safety of long-term imepitoin treatment for canine storm anxiety with individual dose titration. *NC State University CVM Research Forum, Raleigh NC, April 2022*
17. **Zayas Santiago G, Khan M, Gruen ME.** The nose knows: Validation of an olfactory test in dogs with and without nosework training. *NC State University CVM Research Forum, Raleigh NC, April 2022*
18. **Pankratz K, Korman J, Emke C, Johnson B, Griffith EH, Gruen ME.** Randomized, placebo-controlled prospective clinical trial evaluating the efficacy of a pulsed electromagnetic field device for the treatment of canine separation anxiety. *Veterinary Behavior Symposium, Austin TX, June 2022*
19. **Gruen ME.** Cats don't make it easy: helpful tools to assess, manage, and treat feline OA. *Western Veterinary Conference, Las Vegas NV, September 2021*
20. **Gruen ME.** Behavior problems in senior cats. *Western Veterinary Conference, Las Vegas NV, September 2021*
21. **Gruen ME.** Feline housesoiling: who says it's inappropriate? *Western Veterinary Conference, Las Vegas NV, September 2021*
22. **Gruen ME.** Feline behavior: Case-based approach to problem behaviors. *Western Veterinary Conference, Las Vegas NV, September 2021*
23. **Gruen ME.** Medical, behavioral, or both: What's wrong with this cat? *Western Veterinary Conference, Las Vegas NV, September 2021*
24. **Khan M, Case B, Fefer G, Zayas Santiago G, Miller D, Olby N, Gruen ME.** Development of a novel olfactory task in canines. *Veterinary Behavior Symposium, virtual, August 2021*
25. **Enomoto M, Lascelles BDX, Robertson JB, Gruen ME.** Refinement of the Feline Musculoskeletal Pain Index (FMPI) and development of the short-form FMPI *Veterinary Orthopedic Society, Virtual, March 2021.*
26. **Cunningham RM, Gruen ME.** Thomson A, Lascelles BDX. Evaluation of a nutritional supplement for the alleviation of pain associated with feline degenerative joint disease. *Veterinary Orthopedic Society, Virtual, March 2021.*
  - a. Winner of the Resident Research Award
27. **Fefer G, Khan M, Panek W, Case B, Gruen ME, Olby NJ.** Relationship between hearing and cognitive function in senior and geriatric canines. *American College of Veterinary Internal Medicine Forum; virtual; June 2021.*
28. **Mowat FM, Panek WK, Fefer G, Banghart M, Wagner G, Westermeyer H, Gruen M, Olby N.** Age-related visual decline in companion dogs: a cross-sectional ERG study in a translational model species. *Association for Research in Vision and Ophthalmology; virtual; May 2021.*
29. **Gruen ME.** Measuring and optimizing cognition in dogs. *PennVet Conference, Virtual, September 2020.*
30. **Gruen ME.** Don't leave me here! What's new in the treatment and management of separation anxiety. *Fetch2020, Virtual, August 2020.*
31. **Carson MA, Pankratz KE, Messenger KM, Gruen ME.** Efficacy of dexmedetomidine oromucosal gel to attenuate anxiety in client owned cats



- presented for routine veterinary care. *Veterinary Behavior Symposium; Baltimore, MD, June 2020.*
- a. Winner of the student research award
32. **Gruen M**, Case B, Robertson J, Campbell S, Korpivaara M. Evaluation of repeated dosing of Sileo (dexmedetomidine oromucosal gel) for treatment of noise aversion in dogs over several noise events. *Veterinary Behavior Symposium; Baltimore, MD, June 2020.*
  33. **Blake JE**, Adrian D, Grady K, Lascelles BDX, **Gruen ME**. Evidence of increased positive affective state in dogs after treatment with firocoxib for osteoarthritis pain. *Veterinary Behavior Symposium; Baltimore, MD, June 2020.*
  34. **Gruen M**, Riapolova I, Dixit V, Song Y, Emke C, Nordstrom B, Sherman B, Watson P. Evaluation of Pexion (imepitoin) for treatment of storm anxiety in dogs. *Veterinary Behavior Symposium; Baltimore, MD, June 2020.*
  35. **Gruen ME**. Treating the whole cat: managing chronic pain. *Western States Veterinary Conference; Las Vegas NV, February 2020.*
  36. **Gruen ME**. Feline friendly veterinary exams: Less stress, less pain. *Western States Veterinary Conference; Las Vegas NV, February 2020.*
  37. **Gruen ME**. Establishing individual normals for cats with OA pain. *Western States Veterinary Conference; Las Vegas NV, February 2020.*
  38. **Gruen ME**. Understanding and treating noise aversion and reactivity in dogs. *Western States Veterinary Conference; Las Vegas NV, February 2020.*
  39. **Gruen ME**. Treating the whole cat: managing chronic pain. *Western States Veterinary Conference; Las Vegas NV, February 2020.*
  40. **Gruen ME**. Treating the whole cat: managing chronic pain. *Veterinary Medical Expo; Orlando FL, January 2020.*
  41. **Gruen ME**. Feline friendly veterinary exams: Less stress, less pain. *Veterinary Medical Expo; Orlando FL, January 2020.*
  42. **Gruen ME**. Understanding and treating noise aversion and reactivity in dogs. *Veterinary Medical Expo; Orlando FL, January 2020.*
  43. **Gruen ME**. Establishing individual normals for cats with OA pain. *Veterinary Medical Expo; Orlando FL, January 2020.*
  44. **Gruen ME**, Lascelles BDX. The future of OA identification and management for cats. *Veterinary Medical Expo; Orlando FL, January 2020.*
  45. **Gruen ME** Temperament assessment in working dogs. *State of the Art of Dog Behaviour: From Science to Practice; Oxford UK, October 2019*
  46. **Gruen ME**, Olby NJ. Changing mental status – cognitive decline in old dogs. *Canine Geriatrics Day: North Carolina State University College of Veterinary Medicine; Raleigh NC, September 2019.*
  47. **Panek WK**, Murdoch DM, **Gruen ME**, Marek RD, Stachel AF, Olby NJ. Plasma Neurofilament Light Chain as a Biomarker of Neuro-Aging in Dogs. *European College of Veterinary Neurology Meeting; Warsaw, Poland, September 2019.*
  48. **Gruen ME**. Identifying OA in cats. *World Small Animal Veterinary Association Congress; Toronto ON, July 2019.*
  49. **Gruen ME**, Robertson S. Assessment of Health-Related Quality of Life in pets. *World Small Animal Veterinary Association Congress; Toronto ON, July 2019.*
  50. **Gruen ME**, Creature Comforts: Quality of life for cats with chronic osteoarthritis pain. *World Small Animal Veterinary Association Congress (Pre-Congress Symposium); Toronto ON, July 2019.*

51. **Gruen ME.** Tips and tricks for identifying and monitoring chronic pain in cats with osteoarthritis. *World Small Animal Veterinary Association Congress (Pre-Congress Symposium); Toronto ON, July 2019.*
52. **Gruen ME,** Griffith E, Korman J. A Pilot-study evaluation of an anti-anxiety device for the treatment of separation anxiety. *International Veterinary Behavior Meeting; Washington D.C., July 2019.*
53. **Chiu KW, Gruen ME,** Marino C, Aldrich J, Meyers R, Ru H, Thomson AE, Lascelles BDX. IRIS Stage Influences Pain Level in Cats with Degenerative Joint Disease. *ACVS Conference, 2019.*
54. Adrian D, King JN, Parrish RS, King SB, Budsberg SC, **Gruen ME, Lascelles BDX.** Evaluation of the efficacy of robenacoxib for the treatment of chronic musculoskeletal disorder-associated pain and inflammation in cats. *American College of Veterinary Internal Medicine Forum, Phoenix, AZ, June 6-8 2019.*
55. **Gruen ME.** Uniquely feline: feline pain and itch. *Western Veterinary Conference; Las Vegas, NV, February 2019.*
56. **Gruen ME,** Norsworthy G. Herding cats into your veterinary practice. *Western Veterinary Conference; Las Vegas, NV, February 2019.*
57. **Gruen ME.** Uniquely feline: feline pain and itch. *Veterinary Medical Expo, Orlando, FL, January 2019.*
58. **Gruen ME,** Norsworthy G. Herding cats into your veterinary practice. *Veterinary Medical Expo, Orlando, FL, January 2019.*
59. **Gruen ME.** Behavior Problems in cats: Case Presentations. *Veterinary Medical Expo, Orlando, FL, January 2019.*
60. **Gruen ME.** Behavior in geriatric cats: taking care of the senior cats among us. *Veterinary Medical Expo, Orlando, FL, January 2019.*
61. **Gruen ME.** Cats with DJD: Recognition and measurement of chronic pain. *Veterinary Medical Expo, Orlando, FL, January 2019.*
62. **Gruen ME.** Top tips in feline housesoiling. *Veterinary Medical Expo, Orlando, FL, January 2019.*
63. **Gruen ME.** *North Carolina Veterinary Medical Conference, Raleigh NC 2019.*
  - a. Low-stress handling techniques for your practice (Part 1)
  - b. Low-stress handling techniques for your practice (Part 2)
64. **Gruen ME.** Identifying and managing chronic pain in cats. *International Veterinary Emergency and Critical Care Symposium, New Orleans, LA, September 2018.*
65. **Gruen ME.** Enrichment strategies for senior cats. *American Association of Feline Practitioners Conference, Charlotte NC September 2018.*
66. **Gruen ME.** Cognitive dysfunction in cats. *American Association of Feline Practitioners Conference, Charlotte NC September 2018*
67. Naik R, Witzel A, Albright J, Siegfried K, **Gruen ME,** Thompson A, Price J, Lascelles BDX. Pilot study evaluating the impact of feeding method on overall activity of indoor, client-owned cats. *American Academy of Veterinary Nutrition Clinical Nutrition & Research Abstract Symposium; Seattle, WA, June 2018.*

**Proceedings and Posters** (since starting as Assistant Professor (2018) of 19 total; presenter underlined):

1. Kurtz KL, Blake JE, **Gruen ME.** Use and applications of judgment bias tasks in veterinary species: A systematic review. *North Carolina State University College of Veterinary Medicine Annual Research Forum; Raleigh, NC, March 12, 2021.*

2. Park R, **Gruen ME**, Royal K. Barriers that prevent American dog owners from seeking veterinary care differ by client demographics. *North Carolina State University College of Veterinary Medicine Annual Research Forum; Raleigh, NC, March 12, 2021.*
3. Woods HJ, Li MF, Patel UA, Lascelles BDX, Samson DR, **Gruen ME**. Let sleeping dogs lie: A functional linear modeling approach to sleep-wake cycles in dogs. *North Carolina State University College of Veterinary Medicine Annual Research Forum; Raleigh, NC, March 12, 2021.*
4. Fefer G, Khan M, Panek W, Case B, **Gruen ME**, Olby NJ. Relationship between Hearing and Cognitive Function in Senior and Geriatric Canines. *North Carolina State University College of Veterinary Medicine Annual Research Forum; Raleigh, NC, March 12, 2021.*
5. Blake JE, Adrian D, Grady K, Lascelles BDX, **Gruen ME**. Evidence of increased positive affective state in dogs after treatment with firocoxib for naturally-occurring osteoarthritis pain. *Accepted: International Association for the Study of Pain World Congress; Amsterdam, Netherlands, August 2020.*
6. Panek W, Murdoch DM, **Gruen ME**, Marek RD, Stachel AF, Olby NJ. Plasma Neurofilament Light Chain as a Biomarker of Neuro-Aging in Dogs. *European College of Veterinary Neurology Meeting; Warsaw, Poland, 2019.*
7. Carson M, Roberts DL, **Gruen ME**. Behavioral correlates of canine tail position in a leash-associated aggression model. *International Veterinary Behavior Meeting; Washington D.C., July, 2019.*
8. Grady K & **Gruen ME**. Self-recognition in dogs: the olfactory mirror test. *International Veterinary Behavior Meeting; Washington D.C., July, 2019.*
9. Sharon KP, Thompson CM, **Gruen ME**, Lascelles BDX, Parrish RS. A new method for analyzing changes in physical activity in a spontaneous feline model of osteoarthritis-related pain. *International Association for the Study of Pain 17<sup>th</sup> World Congress; Boston, United States, October 2018.*

### **Invited Speaker Events**

- Darwin Day Speaker. The “secret” language of behavior. *Duke University; Durham, NC, 2022*
- Duke Pediatric Grand Rounds. The role of human-animal interaction in research. *Duke University; Durham, NC, 2019*

### **Lay Publications and Media Appearances:**

\*Role: Interviewee as key opinion leader

#### *Web and print based media*

- AKC News – COVID-19 and Dogs’ Sleep: Pandemic Routines Could be Stressing Canines Out\* 2021
- NCSU Veterinary Medicine News – New NC State Veterinary Medicine Project Aims to unlock mysteries of dog pain\* 2021
  - Picked up and summarized in WRAL Techwire
- Cary Magazine – Home alone: What happens when owners of pandemic pets return to the office?\* 2021
- Fear Free Pets – Study suggests simple cage modification to reduce stress in hospitalized cats\* 2021
- Fear Free Pets – The link between pain and problem behavior\* 2021

- Washington Post – Which pups will make the grade as a service dog?\* 2020
- Popular Science – How to help your pet with separation anxiety\* 2020
- Women’s Day – 9 dumbest dogs that are actually pretty smart\* 2020
- AAHA News – New tool helps diagnose feline degenerative joint disease\* 2020
- NCSU research blog (the Abstract) – Is your dog really happy you’re home?\* 2020
- NCSU research blog (the Abstract) – Does your cat have arthritis?\* 2020
- HealthyPet Magazine – Degenerative joint disease in cats\* 2020.
- Pain sensitivity in dogs of different breeds\* (Veterinary news feature in Brazil) 2020
- NCSU communications – Is your dog really happy you’re home?\* 2020
- Family Dog Magazine – Interviewed about PEMF for separation anxiety in dogs\* 2020
- Vox.com –Differences in cognition among dog breeds\* 2020.
- Duke Today – Duke puppy kindergarten admits seven new students\* 2019
- Home & Garden – Common behavior questions\* 2019
- NC State University News – How do pets show love?\* 2019
- Catster – The Signs of an Annoyed Cat\*, 2018
- Caster – Scruffing a cat, why you shouldn’t do it\*, 2017
- New York Times – Well blog\*, 2014
- Vetstreet.com - Ask-an-Expert consultant\*, 2013

### *Podcasts*

- Dog Edition (Dog Podcast Network) – Interviewed regarding pain sensitivity in different dog breeds; 2021
- Fresh Scoop (Morris Foundation Podcast) – Interviewed regarding Cognitive dysfunction in dogs; 2021
- UNC trauma talk – Preventing Dog Bites: Staying Safe While Social Distancing; 2020

### *Lay Presentations or Television*

- WRAL News – Dog bite prevention 2021
- RTP180° (Raleigh, NC) – Animal Behavior, 2017
- 5 On Your Side (WRAL, NC) – Preventing dog bites: <http://www.wral.com/beware-of-dog-canine-cues-often-precede-bites-attacks/16700013/>, 2017
- 5 On Your Side (WRAL, NC) – Tips to fend off dog attacks: <http://www.wral.com/don-t-try-to-run-tips-to-fend-off-dog-attacks/16700287/>, 2017
- Science on Screen (Cary Theater, NC) – Canine cognition, 2017
- Doctor Radio (SiriusXM) – Interview on anxiety disorders in pets, 2013
- My Carolina Today (NBC) – Interview on feline arthritis clinical study, 2012
- My Carolina Today (NBC) – Expert spokesperson on Dog bite prevention and travel safety for dogs, 2012
- News You Can Use (AM 680) – Interview on feline arthritis, 2012

- Everyday Edisons (PBS) – Interviewed about animal related inventions and behavioral effects from the season’s show, 2011
- Must Love Cats (Animal Planet) – Expert spokesperson on Feline inappropriate elimination, 2010

**Scientific Presentations not listed as Proceedings:**

1. Lascelles BDX (coordinator), **Gruen ME** (instructor), Crisman J, Colleran E, Palmer RH, Robertson SA, Simpson W, Login J. Elevating Care for Osteoarthritis in Cats. Lecture (Lascelles & **Gruen**) and Hands-on Lab (all instructors). *Western States Veterinary Conference; Las Vegas NV, February 2020.*
2. Lascelles BDX (coordinator), **Gruen ME** (instructor), Crisman J, Colleran E, Palmer RH, Robertson SA, Simpson W, Login J. Elevating Care for Osteoarthritis in Cats. Lecture (Lascelles & **Gruen**) and Hands-on Lab (all instructors). *Veterinary Medicine Expo, Orlando FL, January 2020.*

**Editorial and Scientific Reviewer Appointments**

- Journal of Applied Animal Welfare Science
  - Associate Editor, Companion Animal Section 2012-2014
- Proceedings of the National Academy of Science (2019)
  - Invited reviewer (ad hoc)
- Veterinary Record (2020)
  - Invited reviewer (ad hoc)
- Frontiers in Veterinary Science (2022)
  - Invited reviewer (ad hoc)
- Journal of Veterinary Internal Medicine (2021)
  - Invited reviewer (ad hoc)
- Journal of Veterinary Behavior (2021, 2022)
  - Invited reviewer (ad hoc)
- Clinician’s Brief (2019-2021)
  - Invited reviewer (ad hoc)
- Applied Animal Behaviour Science (2020)
  - Invited reviewer (ad hoc)
- Animals (Journal; 2020-2022)
  - Invited reviewer (ad hoc)
- Journal of Feline Medicine and Surgery (2018-2022)
  - Invited reviewer (ad hoc)
- Clinician’s Brief: Plumb’s Veterinary Drugs (2019-2021)
  - Invited reviewer (ad hoc)
- American Veterinary Society of Animal Behavior (2015-2018)
  - Invited reviewer of abstract submissions for annual meeting
- International Veterinary Behavior Meeting (2018)
  - Invited reviewer of abstract submissions for annual meeting