

DUKE UNIVERSITY MEDICAL CENTER

CURRICULUM VITAE

Date Prepared: December 2017

Name: Andrea G. Nackley, Ph.D.

Primary academic appointment: Duke University

Primary academic department: Department of Anesthesiology

Present academic rank and title (if any): Associate Professor

Date and rank of first Duke Faculty appointment: January 1, 2016

Date of birth: September 11, 1975                      Place of birth: Hampton, VA USA

Citizen of : United States of America

<u>Education</u>	<u>Institution</u>	<u>Date (Year)</u>	<u>Degree</u>
High School	Mills E Godwin	1993	Diploma
College	Virginia Polytechnic Institute	1997	BS
Graduate School	Radford University	2000	MA
Graduate School	University of Georgia	2003	PhD

Scholarly societies:

2000-present Psi Chi

2000-present Society for Neuroscience

2001-2003 Neuroscience Student Organization (NSO)

2001-2002 Vice President, NSO

2002-2003 President, NSO

2002-present Sigma Xi: The Scientific Research Society

2003-present International Cannabinoid Research Society

2004-present Women in Neuroscience

2005-2008 American Society of Human Genetics

2005-present International Association for the Study of Pain

2006-present American Pain Society (APS)

2012-2014 Co-Chair, Genetics and Pain Special Interest Group, APS

2015-present Nominating Committee, APS

2017-2019 Chair, Early Career Forum, APS

Professional training and academic career:

<u>Institution</u>	<u>Position/Title</u>	<u>Dates</u>
The University of North Carolina at Chapel Hill	Postdoctoral Fellow	2003-2006
The University of North Carolina at Chapel Hill	Research Assistant Professor	2006-2008
The University of North Carolina at Chapel Hill	Assistant Professor	2008-2013
The University of North Carolina at Chapel Hill	Associate Professor	2013-2016
The University of North Carolina at Chapel Hill	Director, Molecular Profiling Core	2013-2016
Duke University School of Medicine	Associate Professor	2016-present

Publications:

Refereed journals:

1. **Nackley AG**, Makriyannis A and Hohmann AG. Selective activation of cannabinoid CB<sub>2</sub> receptors suppresses inflammation-induced spinal Fos protein-expression and pain behavior. *Neuroscience* 2003; 119:747-757.
2. Gutierrez T, **Nackley AG**, Neely MH, Freeman KG, Edwards GL and Hohmann AG. Effects of neurotoxic destruction of descending noradrenergic pathways on cannabinoid anti-nociception in rat models of acute and tonic pain sensitivity. *Brain Res* 2003 Oct 17; 987:176-185.
3. **Nackley AG**, Makriyannis A and Hohmann AG. Activation of cannabinoid CB<sub>2</sub> receptors suppresses C-fiber responses and windup in spinal wide dynamic range neurons in the absence and presence of inflammation. *J Neurophys* 2004 Dec; 92, 3562-3574.
4. **Nackley AG**, Suplita RL and Hohmann AG. A peripheral cannabinoid mechanism suppresses spinal Fos protein-expression and pain behavior in a rat model of inflammation. *Neuroscience* 2003; 117:659-670.
5. Diatchenko LB, Slade GD, **Nackley AG**, Bhalang K, Sigurdsson A, Belfer I, Goldman D, Xu K, Shabalina S, Shagin D, Max MB, Makarov SS and Maixner W. Genetic basis for individual variations in pain perception and the development of a chronic pain condition. *Human Mol Gen* 2005 Jan 1; 14(1):135-143.
6. Fecho K, **Nackley AG**, Wu Y and Maixner W. Basal and carrageenan-induced pain behavior in sprague-dawley, lewis and fisher rats. *Physiol Behav* 2005 Jun 2; 85:177-186.
7. Hohmann AG, Neely MH, Pina J, and **Nackley AG**. Neonatal chronic hindpaw inflammation alters sensitization to intradermal capsaicin in adult rats: a behavioral and immunocytochemical study. *J Pain* 2005 Dec; 6(12):798-808.
8. Diatchenko LB, **Nackley AG**, Slade GD, Bhalang K, Belfer I, Max MB, Goldman D, and Maixner W. (2006) Catechol-O-Methyltransferase genetic polymorphisms are associated with multiple pain-evoking stimuli. *Pain* 2006 Dec 5; 125(3):216-224.
9. **Nackley AG**, Shabalina SA, Tchivileva, IE, Satterfield KS, Korchynskyy O, Makarov SS, Maixner W, and Diatchenko L. Human catechol-O-methyltransferase haplotype modulates protein expression by altering mRNA secondary structure. *Science* 2006 Dec 22; 314(5807):1930-1933.
10. Tan KS, **Nackley AG**, Satterfield K, Maixner W, Diatchenko L, and Flood PM. B<sub>2</sub>-adrenergic receptor activation stimulates pro-inflammatory cytokine production in macrophages via PKA- and NF- $\kappa$ B-independent mechanisms. *Cell Signal* 2007 Feb; 19(2):251-260.
11. **Nackley AG**, Tan KS, Fecho K, Flood P, Maixner W, and Diatchenko L. Catechol-O-methyltransferase inhibition increases pain sensitivity through activation of both  $\beta_2$  and  $\beta_3$  adrenergic receptors. *Pain* 2007 Apr; 128(3):199-208.

12. Tchivileva IE, **Nackley AG**, Qian L, Wentworth S, Conrad M, and Diatchenko L. Characterization of NF-kappaB-mediated inhibition of catechol-O-methyltransferase. *Mol Pain* 2009 Mar; 16;5:13.
13. Tchivileva IE, Tan KS, Gambarian M, Medvedev A, **Nackley AG**, Satterfield K, Romanov S, Flood PM, Maixner W, Makarov S, and Diatchenko L. Signaling pathways mediating beta3-adrenergic receptor-induced production of interleukin-6 in adipocytes. *Mol Immunol* 2009 Jul; 46(11-12):2256-66.
14. **Nackley AG**, Shabalina SA, Lambert JE, Conrad MS, Gibson DG, Spiridonov AN, Satterfield K, and Diatchenko L. Low enzymatic activity haplotypes of the human catechol-O-methyltransferase gene: enrichment for marker SNPs. *PLoS ONE* 2009; 4(4) e5237.
15. Cevidanes LHS, Hajati A-K, Paniagua B, Lim, PF, Walker DG, Falconet G, **Nackley AG**, Ludlow JB, Styner MA, Zhu H, Phillips C. Quantification of condylar resorption in TMJ osteoarthritis. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2010 Jul; 110(1):110-7.
16. Gris P, Gauthier J, Cheng P, Gibson DG, Gris D, Laur O, Pierson J, Wentworth S, **Nackley AG**, Maixner W, Diatchenko L. A novel alternatively spliced isoform of the mu-opioid receptor: functional antagonism. *Molecular Pain* 2010; 6:33.
17. Segall SK, **Nackley AG**, Diatchenko L, Lariviere WR, Lu X, Marron JS, Grabowski-Boase L, Walker JR, Slade G, Bailey JS, Steffy BM, Maynard TM, Tarantino LM, Wiltshire T. *COMT1* genotype and expression; anxiety and nociceptive sensitivity in inbred strains of mice. *Genes Brain Behav* 2010 Nov; 9(8):933-46.
18. Slade GD, Conrad MS, Diatchenko L, Rashid NU, Zhong S, Smith S, Rhodes J, Medvedev A, Makarov S, Maixner W, **Nackley AG**. Cytokine biomarkers and chronic pain: Association of genes, transcription, and circulating proteins with temporomandibular disorders and widespread palpation tenderness. *Pain* 2011 Dec; 152(12):2802-12.
19. Sanders AE, Maixner W, **Nackley AG**, Diatchenko L, By K, Miller VE, Slade GD. Excess risk of temporomandibular disorder associated with cigarette smoking in young adults. *J Pain* 2012 Jan; 13(1):21-31.
20. Chen H, **Nackley AG**, Miller V, Diatchenko L, Maixner W. Multisystem dysregulation in painful temporomandibular disorders. *Journal of Pain* 2013 Sep 14(9): 983-996.
21. Hartung JE, Ciszek BP, and **Nackley AG**.  $\beta_2$ - and  $\beta_3$ -adrenergic receptors drive COMT-dependent pain by increasing production of nitric oxide and cytokines. *Pain* 2014 July 155(7):1346-1355.
22. Cevidanes LH, Walker D, Schilling J, Sugai J, Giannobile WV, Paniagua B, Benavides E, Zhu H, Marron JS, Jung B, Baranowski D, Rhodes J, Ludlow JB, **Nackley AG**, Lim PF, Nguyen T, Goncalves J, Wolford L, Kapila S, Styner M. 3D osteoarthritic changes in TMJ condylar morphology correlates with specific systemic and local biomarkers of disease. *Osteoarthritis and Cartilage* 2014 Oct 22(10): 1657-67.
23. Smith SB, Reenila R, Mannisto PT, Slade GD, Maixner W, Diatchenko L, and **Nackley AG**. Epistasis between polymorphisms in COMT, ESR1, and GCH1 influences COMT enzyme activity and pain. *Pain* 2014 Nov. 155(11): 2390-2399.
24. Kline RH 4th, Exposto FG, O'Buckley SC, Westlund KN, **Nackley AG**. Catechol-O-methyltransferase inhibition alters pain and anxiety-related volitional behaviors through activation of  $\beta$ -adrenergic receptors in the rat. *Neuroscience*. 2015 Apr 2;290:561-9.
25. Applebaum L, **Nackley AG**, Bair E, Maixner W, and Khan A. Genetic variants in cyclooxygenase-2 contribute to post-treatment pain among endodontic patients. *Journal of Endodontics* 2015 Aug 41(8): 1214-1218.
26. Ciszek BP, Khan AA, Dang H, Slade GD, Smith SB, Bair E, Maixner W, Zolnoun D, and **Nackley AG**. MicroRNA expression profiles differentiate chronic pain condition subtypes. *Translational Research* 2015 Dec 166(6): 706-720.
27. Hartung JE, Eskew O, Wong T, Tchivileva IE, Oladosu FA, O'Buckley SC, and **Nackley AG**. Nuclear factor-kappa B regulates pain and COMT expression in a rodent model of inflammation. *Brain, Behavior, and Immunity* 2015 Nov 50: 196-202.

28. Oladosu FA, Conrad MS, O'Buckley SC, Rashid NU, Slade GD, and **Nackley AG**. Mu opioid splice variant MOR-1K contributes to the development of opioid-induced hyperalgesia. *PLoS One* 2015 Aug 13; 10(8).
29. Ciszek BP, O'Buckley SC, **Nackley AG**. Persistent catechol-O-methyltransferase-dependent pain is initiated by peripheral beta-adrenergic receptors. *Anesthesiology*. 2016 May;124(5):1122-35.  
Corresponding editorial: Flood P and Clark DJ. Molecular Interaction between Stress and Pain. *Anesthesiology*. 2016 May;124(5):994-5.
30. Harmon JB, Sanders AE, Wilder RS, Essick GK, Slade GD, Hartung JE, and **Nackley AG**. Circulating omentin-1 and chronic temporomandibular disorder pain. *Journal of Oral & Facial Pain and Headache*. 2016 Summer; 30(3):203-209. Doi: 10.11607/ofph.1608.
31. Oladosu FA, Ciszek BP, O'Buckley SC, and **Nackley AG**. Novel intrathecal and subcutaneous catheter delivery systems in the mouse. *Journal of Neuroscience Methods*. 2016 Mar 264:119-128.
32. Geller EJ, Babb E, **Nackley AG**, Zolnoun D. Incidence and risk factors for pelvic pain following mesh implant surgery for the treatment of pelvic floor disorders. *J Minim Invasive Gynecol*. 2016 Oct 16.
33. Martin L, Smith S, Khoutorsky A, Magnussen C, Samoshkin A, Sorge RE, Cho C, Yousefpour N, Sivaselvachandran S, Tohyama S, Cole T, Khuong T, Mir E, Gibson D, Wieskopf J, Sotocinal S, Austin JS, Beraldo C, Gitt J, Gkogkas C, Sonenberg N, Greenspan J, Fillingim, Ohrbach R, Slade G, Knott C, Dubner R, **Nackley AG**, Ribeiro-da-Silva A, Neely GG, Maixner W, Zaykin D, Mogil J, and Diatchenko L. Involvement of epiregulin and epidermal growth factor receptor in pain. *Journal of Clinical Investigation*. 2017 Sep 1;127(9):3353-66.
34. Ji RR, **Nackley AG**, Terrando N, Huh Y, and Maixner W. Neuroinflammation and central sensitization in chronic pain. *Anesthesiology*. 2018 Feb 19.
35. Shepherd SD, O'Buckley SC, Harrington J, Haines L, Rothrock GD, Johnson LM, and **Nackley AG**. A moldable sustained release bupivacaine formulation for tailored treatment of post-operative dental pain. *Under Review*.
36. Zhang X, Hartung JE, Bortsov A, Kim S, O'Buckley SC, Kozlowski J, and **Nackley AG**. Sustained stimulation of  $\beta_2$ - and  $\beta_3$ -adrenergic receptors leads to persistent functional pain and neuroinflammation. *Brain, Behavior, and Immunity*. 2018 In Press.
37. Kim S, Zhang X, O'Buckley SC, Cooter M, Park JJ, **Nackley AG**. Acupuncture treatment reverses chronic pain and neuroinflammation in a mouse model of chronic overlapping pain conditions. *Journal of Pain*. 2018 In press.
38. Han Q, Liu D, Convertino M, Wang Z, Jiang C, Kim Y, Luo X, Zhang X, **Nackley AG**, Dokholyan NV, Ji R. miRNA-711 binds and activates TRPA1 extracellularly to evoke acute and chronic pruritus. *Neuron under revision*.
39. Smith SB, Parisien M, Bair E, Belfer I, Chabot-Dore A, Gris P, Khoury S, Tansley S, Torosyan Y, Zaykin DV, Berhardt O, Serrano P, Gracely RH, Jain D, Jarvelin M, Kaste LM, Kerr KF, Kocher T, Lahdesmaki R, Laniado N, Laurie CC, Laurie CA, Mannikko M, Meloto CB, **Nackley AG**, Nelson SC, Pesonen P, Ribeiro-Dasilva MC, Rizzatti-Barbosa CM, Sanders AE, Schwahn C, Sipila K, Sofer T, Teumer A, Mogil JS, Fillingim RB, Greenspan JD, Ohrbach R, Slade GD, Maixner W, Diatchenko L. Genome-wide association reveals contribution of MRAS to painful temporomandibular disorder in males. *Nature communication under revision*.

Non-refereed publications:

1. **Nackley AG**. An Integrative review of data and theoretical perspectives regarding brain function in the vibrissal system. Radford University, Radford, VA, 2000. 35 pgs.
2. **Nackley AG**. A peripheral cannabinoid CB<sub>2</sub> mechanism modulates the activity of spinal wide dynamic range neurons in a rat model of inflammation. The University of Georgia, Athens, GA, 2003. 57 pgs.

Chapters in books:

1. **Nackley AG** and Diatchenko L. Assessing potential functionality of catechol-*O*-methyltransferase (COMT) polymorphisms associated with pain sensitivity and temporomandibular joint disorders. In *Analgesia: Methods and Protocols*, Methods Mol Biol, Arpad Szallasi (ed.). New York: Humana Press; 2010:Vol. 617; Chapter 28:375-93.

Selected abstracts:

1. **Nackley AG**, Suplita RL and Hohmann AG. Suppression of carrageenan-evoked Fos protein-expression in rat spinal cord by a peripheral cannabinoid mechanism. Program number 716.8 *Society for Neuroscience Abstracts*, San Diego, CA, 2001.
2. Suplita RL, **Nackley AG** and Hohmann AG. Site of action of endocannabinoid mechanisms of nonopioid stress-induced analgesia. Program number 716.10 *Society for Neuroscience Abstract*, San Diego, CA, 2001.
3. Hohmann AG, **Nackley AG**, Suplita RL and Neely MH. New developments in understanding cannabinoid analgesic mechanisms. *National Institute on Drug Abuse Workshop on Cannabinoids: Chemistry and Biology*, Bethesda, MD, 2001.
4. **Nackley AG**, Makriyannis A and Hohmann AG. The CB<sub>2</sub> selective cannabinoid agonist AM1241 suppresses the development of inflammation-evoked Fos protein expression in rat spinal cord. Program number 453.9 *Society for Neuroscience Abstract Viewer/Itinerary Planner CD-ROM*, Orlando, FL, 2002.
5. Gutierrez T, **Nackley AG**, Freeman K, Edwards G and Hohmann AG. Effects of neurotoxic destruction of descending noradrenergic pathways on cannabinoid antinociception in models of acute and tonic pain sensitivity. Program number 131 *International Cannabinoid Research Society*, 13<sup>th</sup> annual symposium on the cannabinoids, Cornwall, Ontario, CANADA, 2003.
6. **Nackley AG**, Makriyannis A and Hohmann AG. A peripheral cannabinoid CB<sub>2</sub> mechanism modulates the activity of spinal wide dynamic range neurons in a rat model of inflammation. *International Cannabinoid Research Society*, 13<sup>th</sup> annual symposium on the cannabinoids, Cornwall, Ontario, CANADA, 2003.
7. **Nackley AG**, Makriyannis A and Hohmann AG. The development of inflammation-evoked pain behavior and neuronal activity is attenuated via a peripheral cannabinoid CB<sub>2</sub> mechanism. Program number 3273 *Abstracts of the International Behavioral Res Org*, Prague, Czech Republic, 2003.
8. **Nackley AG**, Makriyannis A and Hohmann AG. A peripheral cannabinoid CB<sub>2</sub> mechanism suppresses the activity of wide dynamic range neurons in the spinal dorsal horn in a rat model of inflammation. Program number 909.3 *Society for Neuroscience Abstract Viewer/Itinerary Planner CD-ROM*, New Orleans, LA, 2003.
9. **Nackley AG**, Wu Y, Diatchenko LB and Maixner W. Catechol-*O*-methyltransferase haplotypes modulate pain sensitivity. Program number 519.3 *Society for Neuroscience Abstract Viewer/Itinerary Planner CD-ROM*, San Diego, CA, 2004.
10. Fecho K, **Nackley AG**, Wu Y, Faison JM, and Maixner W. Genetic differences in basal and inflammatory pain behavior and in morphine's analgesic effects in the rat. Program number 623. *American Pain Society*, 24<sup>th</sup> annual scientific meeting, Vancouver, BC, Canada, 2004.
11. **Nackley AG**, Lambeth BL, Faison JM, Fecho K, Diatchenko LB, and Maixner W. Catechol-*O*-methyltransferase inhibition produces enhanced pain sensitivity and cytokine production via a  $\beta$ -adrenergic mechanism. *International Association for the Study of Pain*, 11<sup>th</sup> world congress on pain, Sydney, Australia, 2005.
12. **Nackley AG**, Shabalina S, Maixner W, and Diatchenko LB. Common human catechol-*O*-methyltransferase haplotypes modulate RNA stability, protein expression, and enzymatic activity. *American Society for Human Genetics*, Salt Lake City, UT, 2005.

13. **Nackley AG**, Faison JM, Lambeth BL, Tan KS, Fecho K, Flood P, Diatchenko LB and Maixner W. Catechol-O-methyltransferase modulates pain behavior and cytokine production via  $\beta_{2/3}$ -adrenergic receptor mechanisms. Program number 393.14 *Society for Neuroscience Abstract Viewer/Itinerary Planner CD-ROM*, Washington, DC, 2005.
14. **Nackley AG**, Tchivileva IE, Conrad M, Cooke B, Maixner W, and Diatchenko LB. The role of NF- $\kappa$ B in modulating inflammatory pain and catechol-O-methyltransferase expression. *American Pain Society Conference*, Washington, DC, 2007.
15. Lambert J, Conrad M, Shabalina, SA, Satterfield K, Maixner W, Diatchenko L, and **Nackley AG**. Effect of minor SNPs on enzymatic activity regulated by common human haplotypes of the catechol-O-methyltransferase gene. *American Association of Endodontists Conference*, Davie, FL, 2007.
16. Lambert J, Conrad M, Shabalina, SA, Satterfield K, Maixner W, Diatchenko L, and **Nackley AG**. Effect of minor SNPs on enzymatic activity regulated by common human haplotypes of the catechol-O-methyltransferase gene. Program number 649 *Society for Neuroscience Abstract Viewer/Itinerary Planner CD-ROM*, San Diego, CA, 2007.
17. Conrad M, Arunasalam R, Gibson D, Bair E, Smith S, Slade G, Maixner W, Diatchenko L, and **Nackley AG**. Proinflammatory cytokine profiles associated with TMD case status and related intermediate phenotypes. *American Pain Society Conference*, Tampa, FL, 2008.
18. **Nackley AG**, Conrad M, Gibson D, Diatchenko L, and Maixner W. Cytokine profiles associated with TMD case status. *7<sup>th</sup> Cytokines and Inflammation Conference*, San Diego, CA, 2009
19. Conrad M, Wentworth S, Prusik D, Gauthier J, Sukumar R, Maixner W, Diatchenko L, and **Nackley AG**. Role of MOR-1K in opioid induced hyperalgesia. Program number 560 *Society for Neuroscience Abstract Viewer/Itinerary Planner CD-ROM*, Chicago, IL, 2009.
20. **Nackley AG**, Conrad M, Slade G, Smith S, Gibson D, Kasravi P, Miller V, Lim P, Maixner W, Diatchenko L. Cytokines associated with TMD case status and related intermediate phenotypes. *29<sup>th</sup> Annual Scientific Meeting, American Pain Society*, Baltimore, MD, 2010.
21. Slade GD, Diatchenko L, **Nackley AG**. Contributions of inflammation mediators to localized TMD and widespread pain. *89<sup>th</sup> General Session and Exhibition, International Association for Dental Research/American Association for Dental Research/Canadian Association for Dental Research*. San Diego, CA, 2011.
22. Oladosu FA, Conrad MS, Prusik D, Gauthier J, Slade GD, Rashid NU, Diatchenko L, **Nackley AG**. MOR-1K gene expression levels parallel opioid-induced pain behavior in three strains of mice. *Society for Neuroscience Abstract Viewer/Itinerary Planner CD-ROM*, New Orleans, LA, 2012.
23. Ciszek B, **Nackley AG**. Chronic catechol-O-methyltransferase-dependent pain: a peripheral contribution. *Society for Neuroscience Abstract Viewer/Itinerary Planner CD-ROM*, New Orleans, LA, 2012.
24. Chen H, Diatchenko L, Slade G, **Nackley AG**, Maixner W. Allosteric load in females with temporomandibular disorders with or without comorbid pain conditions- a case-control study. *American Academy of Orofacial Pain 36<sup>th</sup> Annual Meeting*, Pasadena, CA, 2012.
25. Ciszek B, Khan A, Dang H, Bair E, Lewis J, Muddana A, Maixner W, **Nackley AG**, Zolnoun D. Biomarkers of a persistent pain disorder: vestibulodynia. *International Pelvic Pain Society Annual Meeting*, Orlando, FL, 2013.
26. Hartung JE, Conrad M, Ghouli N, **Nackley AG**. Contribution of peripheral and central nitric oxide to catechol-o-methyltransferase-dependent pain. *Society for Neuroscience Abstract Viewer/Itinerary Planner CD-ROM*, San Diego, CA, 2013.
27. Ciszek B, Khan A, Zolnoun D, Bair E, Maixner W, **Nackley AG**. MicroRNA biomarkers of complex persistent pain conditions. *Society for Neuroscience Abstract Viewer/Itinerary Planner CD-ROM*, San Diego, CA, 2013.

28. Oladosu F, O'Buckley S, **Nackley AG**. MOR-1K contributes to opioid-induced hyperalgesia. *Society for Neuroscience Abstract Viewer/Itinerary Planner CD-ROM*, San Diego, CA, 2013.
29. Cevedanes L, **Nackley AG**. Integrated imaging and biological marker analysis of temporomandibular joint osteoarthritis. *American Association for Dental Research*. Ann Arbor, MI, 2013.
30. Ciszek B, Bair E, Khan A, **Nackley AG**, Muddana A, Zolnoun D. Biomolecular correlates of a persistent pain disorder: vestibulodynia. *International Pelvic Pain Society Conference*, Orlando, FL, 2013.
31. Ciszek B, **Nackley AG**. Chronic Catechol-O-methyltransferase-dependent pain: A peripheral contribution. *Dental Research in Review Day*, UNC School of Dentistry, 2013.
32. Hartung JE and **Nackley AG**.  $\beta_2$ - and  $\beta_3$ -adrenergic receptors drive COMT-dependent pain by increasing release of pro-inflammatory molecules. *Dental Research in Review Day*, UNC School of Dentistry, 2013.
33. Ciszek B, Khan A, Dang H, Smith S, Bair E, Maixner W, Zolnoun Z, **Nackley AG**. microRNA expression profiles differentiate chronic pain condition subtypes. *Dental Research in Review Day*, UNC School of Dentistry, 2013.
34. Oladosu B, O'Buckley S, **Nackley AG**. Elucidating the role of MOR-1K in opioid-induced hyperalgesia via siRNA gene knockdown. *International Association for the Study of Pain*, Buenos Aires, Argentina 2014.
35. Ciszek B, Khan A, Dang H, Slade G, Smith S, Bair E, Maixner W, Zolnoun D, **Nackley AG**. MicroRNA expression profiles differentiate chronic pain condition subtypes. *International Association for the Study of Pain*, Buenos Aires, Argentina 2014.
36. Smith S, Diatchenko L, Maixner W, and **Nackley AG**. Genetic interaction between COMT and convergent molecular pathways influences COMT enzyme activity, musculoskeletal pain, and mood. *International Association for the Study of Pain*, Buenos Aires, Argentina 2014.
37. Oladosu F, O'Buckley SC, and **Nackley AG**. The effect of MOR-1 splice variation on morphine-dependent pain phenotypes. *Pierre Morell Research Day and Dental Research in Review Day*, Chapel Hill, NC, 2015.
38. Hartung JE, Eskew O, Wong T, O'Buckley SC, Oladosu FA, Tchivileva IE, and **Nackley AG**. Nuclear Factor-kappa B contributes to inflammatory pain and regulates COMT expression. *Pierre Morell Research Day and Dental Research in Review Day*, Chapel Hill, NC, 2015.
39. Ciszek BP, Khan A, Dang H, Slade G, Smith S, Bair E, Maixner W, Zolnoun D, and **Nackley AG**. MicroRNA and cytokine biomarkers for local and widespread pain conditions. *Translational Medicine Symposium and Dental Research in Review Day*, Chapel Hill, NC 2015.
40. Wang C, Oladosu F, and **Nackley AG**. The functional role of 41aa in MOR-1K receptor function. *Dental Research and Review Day*, Chapel Hill, NC 2015.
41. Geller EJ, Babb E, **Nackley AG**, Khan AA, and Zolnoun D. Prevalence and risk factors for pelvic pain following mesh implant surgery for the treatment of pelvic organ prolapse and stress urinary incontinence. *Society of Gynecologic Surgeons, 41<sup>st</sup> Annual Scientific Meeting*, Orlando, FL, 2015.
42. Ciszek BP, O'Buckley SC, and **Nackley AG**. Persistent catechol-O-methyltransferase-dependent pain is initiated, but not maintained, by peripherally located beta-adrenergic receptors. *American Pain Society*, Austin, TX 2016.
43. Oladosu F, O'Buckley SC, and **Nackley AG**. Strain-specific polymorphisms and their correlation to MOR-1K receptor function. *American Pain Society*, Austin, TX 2016.
44. Hartung JE, Ciszek BP, O'Buckley SC, and **Nackley AG**. Distinct mechanisms underlie the development and maintenance of COMT-dependent pain. *American Pain Society*, Austin, TX 2016.
45. Zhang X, Kozlowski J, Ballard H, and **Nackley AG**. Sustained activation of  $\beta^2$ - and  $\beta^3$ ARs leads to phosphorylation of neuronal MAPKs and activation of glial cells in spinal cord and DRG. *American Pain Society*, Pittsburgh, PA 2017.

46. Zhang X, O'Buckley S, and **Nackley AG**. Assessment of GCaMP Sensitivity of in vivo DRG neuron in COMT-dependent pain. *Duke Kunshan Translational Pain Research Symposium*, Kunshan, China 2017.
47. Zhang X, Kozlowski J, Ballard H, and **Nackley AG**. Activation of peripheral  $\beta^2$ - and  $\beta^3$ ARs leads to increased nociceptor activity. *American Pain Society*, Anaheim, CA 2018.
48. Zhang X, Kanter K, Smothers Z, O'Buckley SC, and **Nackley AG**. Independent and combined effects of low COMT and stress on pain, depressive-like behavior, and nociceptor activity. *International Association for the Study of Pain*, Boston, MA, 2018.
49. Scarneo S, Sell M, Totzke J, Hughes P, O'Buckley SC, Haystead T, and **Nackley AG**. Takinib, a selective TAK1 inhibitor, reduces TNF $\alpha$ -mediated pain and inflammation. *International Association for the Study of Pain*, Boston, MA, 2018.

Editorials, position, and background papers:

1. Diatchenko L, **Nackley AG**, Fillingim R, and Maixner W. Idiopathic pain disorders- pathways of vulnerability. *Pain* 2006; 123(3):226-230.
2. **Nackley AG**, Maixner W, and Diatchenko L. Perspectives on the genetic basis of opioid-induced hyperalgesia. *Anesthes* 2006; 104(5):909-910.
3. Diatchenko L, Slade GD, **Nackley AG**, Maixner W. Responses to Drs. Kim and Dionne regarding comments on Diatchenko, et al. Catechol-O-methyltransferase gene polymorphisms are associated with multiple pain-evoking stimuli. *Pain* 2006; 125:216-24. *Pain* 2007;129(3):366-370.
4. Diatchenko L, **Nackley AG**, Tchivileva IE, Shabalina SA, and Maixner W. Genetic architecture of human pain perception. *Trends in Genetics* 2007; 23(12):605-613.
5. Oladosu FA, Maixner W, **Nackley AG**. Alternative Splicing of G-protein coupled receptors: relevance to pain management. *Mayo Clinic Proceedings* 2015; 90(8): 1135-1151.

Consultant appointments:

2013-2014 Algnomics Personalized Pain Medications & Diagnostics

Professional awards and special recognitions:

- 2003 Herbert Zimmer Scholar: recognition of outstanding research accomplishments
- 2003 International Behavioral Research Organization Travel Award
- 2003 International Cannabinoid Research Society Travel Award
- 2003 University of Georgia Outstanding Teaching Assistant Award
- 2003 Sigma Xi Grants-in-Aid Research Grant
- 2005 International Association for the Study of Pain Travel Award
- 2005 Sigma Xi Outstanding Research Paper Award
- 2006 Postdoctoral Research Excellence Award
- 2010 John C. Liebeskind Early Career Scholar Award
- 2011 Arthur H. Wuehrmann Prize from The American Academy of Oral and Maxillofacial Radiology

Organizations and participation:

Service and Engagement Activities, University of North Carolina at Chapel Hill:

- 2008-2016 Judge, Dental Research in Review Day poster session, School of Dentistry
- 2009-2016 Reviewer, NC TraCS Pilot Grant Program
- 2009-2016 Member, DDS/PhD Admissions Committee



- 2009-2016 Member, Oral Biology Regular Admissions Committee
- 2009-2016 Member, Oral Biology Executive Admissions Committee  
Director, Pain Neurobiology Track
- 2011-2016 Member, Biomedical & Biological Sciences Program (BBSP) Cell Signaling Admissions Committee
- 2012-2015 Member, Faculty Grievance Committee
- 2013-2016 Member, Curriculum in Neurobiology Recruitment Committee
- 2014-2016 Member, Promotion and Tenure Committee, School of Dentistry

Service and Engagement Activities, Locally and Nationally:

- 2003-present Co-founder of the Science for Kids Program, The University of North Carolina, Chapel Hill, NC
- 2012-2014 Co-Chair, Genetics and Pain Special Interest Group, American Pain Society
- 2014-2016 Member, Nominating Committee, American Pain Society
- 2015-present Reviewer, NIH/NIDCR Study Section
- 2016 Judge, Duke Anesthesiology Academic Evening Research Symposium
- 2017-present Co-Chair, Early Career Forum, American Pain Society
- 2017 R01 Reviewer, Duke School of Medicine Path to Independence Program

Peer Review Journals and Editorial Boards:

- 2006-present Reviewer - *Anesthesiology*
- Reviewer - *Behavioral Brain Research*
- Reviewer - *Brain, Behavior, and Immunity*
- Reviewer - *Brain Research*
- Reviewer - *Cancer Epidemiology, Biomarkers & Prevention*
- Reviewer - *Clinical Chemistry and Laboratory Medicine*
- Reviewer - *Dental Research*
- Reviewer - *European Journal of Neuroscience*
- Reviewer - *European Journal of Pain*
- Reviewer - *Journal of Neuroscience*
- Reviewer - *Molecular Pain*
- Reviewer - *Pain*
- Reviewer - *Pharmacogenetics and Genomics*
- Reviewer - *Physiology and Behavior*
- Reviewer - *PLOS ONE*

Invited Oral Presentations, Locally:

- 2006 Cannabinoids: role in therapeutics and drug addiction. Department of Psychology Seminar, Duke University, Durham, North Carolina.
- 2010 COMT modulation of pain sensitivity: a bench to bedside story. MD-PhD Seminar, UNC, Chapel Hill, North Carolina.

- 2012 Individualized treatment for TMD: a bench to bedside story. Dental Research in Review Day Lunch and Learn Seminar, UNC, Chapel Hill, North Carolina.
- 2012 Individual Variations in Pain Perception. COAST (Conferences on Orthodontic Advances in Science and Technology) meeting, UNC, Chapel Hill, North Carolina.
- 2013 Moving toward individualized treatment for chronic pain conditions. All Carolina Biosciences Celebration, Chapel Hill, North Carolina.
- 2013 Biomarkers for chronic pain. Carolina Neuroscience Club, Chapel Hill, North Carolina.
- 2013 MicroRNA markers of chronic pelvic pain. Department of OB-GYN meeting, UNC, Chapel Hill, North Carolina.
- 2014 Dysregulations in adrenergic signaling contribute to chronic pain. NCSU Veterinary School, Raleigh, NC
- 2014 Dysregulations in adrenergic signaling contribute to chronic pain. Department of Anesthesiology, Duke University, Durham, NC
- 2015 miRNA and pain. Pain Research Forum Webinar, NeuroDiscovery Center, Harvard Medical School.
- 2017 Contribution of  $\beta$ -adrenergic Receptors to Acute and Chronic Pain. Academic Career Enrichment Scholars (ACES) Program, Department of Anesthesiology, Duke University, Durham NC

Invited Oral Presentations, Nationally and Internationally:

- 2011 COMT modulation of pain sensitivity: molecular genetic and receptor mechanisms. Seminar with the Hussman Institute of Human Genetics and the Department of Anesthesiology, University of Miami, Miami, Florida.
- 2013 A role for COMT and adrenergic systems in mediating pain. University of Kentucky, Lexington, Kentucky.
- 2013 Opioid-induced hyperalgesia: an emerging role for MOR-1K. Annual American Pain Society Meeting, New Orleans, Louisiana.
- 2013 Opioid-induced hyperalgesia: clinical evidence and basic underlying mechanisms. Symposium Moderator, 32<sup>nd</sup> Annual American Pain Society Meeting, New Orleans, Louisiana.
- 2014 Circulating microRNA signatures of chronic pain. Annual American Pain Society Meeting, Tampa, FL.
- 2014 Basic science of opioid-induced hyperalgesia. Pain Society of the Carolinas Annual Meeting and Scientific Sessions, The Charleston Place Hotel, Charleston, South Carolina.
- 2014 Basic science of pelvic pain. Pain Society of the Carolinas Annual Meeting and Scientific Sessions, The Charleston Place Hotel, Charleston, South Carolina.
- 2014 Molecular profiles of site-specific vs. general chronic pain. The TMJ Association's Seventh Scientific Meeting on Genetics and Epigenetics of Temporomandibular Disorders and Related Overlapping Conditions, Bethesda, Maryland.
- 2017 Biological and clinical features of vulvodynia. Vulvodynia Conference. Department of Obstetrics and Gynecology at Howard University Hospital. Washington, DC.
- 2017 Differential contributions of peripheral, spinal, and central adrenergic systems to pain. Annual American Pain Society Meeting, Pittsburgh, PA.
- 2017 Common and unique pathways of vulnerability for overlapping pain conditions. Translational Pain Research Symposium, Duke Kunshan University, China.
- 2017 Etiology of pelvic pain. Pain Society of the Carolinas Annual Meeting and Scientific Sessions, The Charleston Place Hotel, Charleston, South Carolina.

- 2018 Role of peripheral  $\beta^2$ - and  $\beta^3$ ARs in pain, inflammation, and nociceptor activity. Department of Korean Medical Science, Pusan National University, Busan, Korea.
- 2018 Acupuncture Resolves Functional Pain and Neuroinflammation Linked to Abnormalities in Catecholamine Signaling, Conference on Trends in Meridian and Acupoint Studies, Seoul, Korea.

Teaching responsibilities:

Graduate Course Participation:

- 2006-2013 Co-Instructor, OBIO 723/732: Oral Biology Pain Seminar Series, Department of Oral Biology, The University of North Carolina, Chapel Hill, NC. (20 students; Dentistry, Oral Biology, Pharmacology, Neurobiology)
- 2008-2016 Lecturer, OBIO 720: Advanced Topics in Oral Biology, Department of Oral Biology, The University of North Carolina, Chapel Hill, NC. (20 students; Oral Biology)
- 2011-2016 Co-Instructor, PHCO 702: Principles of Pharmacology, Department of Pharmacology, The University of North Carolina, Chapel Hill, NC. (20 students; Pharmacology)
- 2012-2015 Co-Instructor, First Year Group, Biological and Biomedical Sciences Program, The University of North Carolina, Chapel Hill, NC (25 students; Neurobiology, Pharmacology, Immunology).
- 2014-2016 Course Director, OBIO 723/732 / NBIO 732 / PHCO 747: Introduction to Pain Neurobiology, Department of Oral Biology, The University of North Carolina, Chapel Hill, NC. (20 students; Dentistry, Oral Biology, Pharmacology, Neurobiology, Physiology)
- 2014-2016 Course Director, OBIO 733 / NBIO 733 / PHCO 748: Translational Pain Medicine, Department of Oral Biology, The University of North Carolina, Chapel Hill, NC. (20 students; Dentistry, Oral Biology, Pharmacology, Neurobiology, Physiology)
- 2014-2016 Co-Instructor, DA 36: Dental Pharmacology, Department of Dentistry. The University of North Carolina, Chapel Hill, NC. (80 students; Dentistry)
- 2016-pres Co-Instructor, OBIO 733 / NBIO 733 / PHCO 748: Translational Pain Medicine, Department of Oral Biology, The University of North Carolina, Chapel Hill, NC. (20 students; Dentistry, Oral Biology, Pharmacology, Neurobiology, Physiology)

Undergraduate Research Mentoring Projects Supervised:

- 2006-2008 Undergraduate Advisor  
Matthew Conrad  
Biology 395  
Project Title: *“Catecholamine separation and quantification using HPLC-MS.”*  
Recipient of a 2008 Research Commendation in Biology
- 2008 Undergraduate Advisor  
Dustin Prusik  
Biology 395  
Project Title: *“Role of RGS2 and RGS4 in COMT-dependant pain sensitivity.”*
- 2009-2010 Undergraduate Advisor  
Nikita Goel  
Psychology 395  
Thesis Title: *“The effects of catechol-O-methyltransferase inhibition on expression of nitric oxide synthase subtypes.”*  
Recipient of a 2010 Highest Honors with Distinction in Psychology
- 2009-2011 Undergraduate Advisor  
Edina Wang  
Psychology 395  
Thesis Title: *“The role of NF- $\kappa$ B in modulating COMT expression and pain behavior.”*

Recipient of the 2010 Carolina Summer Fellowship Award

- 2012-2014 Undergraduate Advisor  
Olivia Eskew  
Biology 395  
Thesis Title: *“COMT expression and pain behavior in IKK-deficient mice.”*
- 2014 Undergraduate Advisor  
Julia Fuller  
Biology 395  
Thesis Title: *“The interaction between COMT inhibition and exercise in mice.”*
- 2014-2015 Undergraduate Advisor  
Naseeruddin Ahmed  
Biology 395  
Thesis Title: *“Kinase activation in a model of COMT-dependent pain.”*
- 2014-2015 Undergraduate Advisor  
Michael Batres  
Chemistry 395  
Thesis Title: *“The interaction between COMT and exercise.”*
- 2014-2016 Undergraduate Advisor  
Marc Gutierrez  
Chemistry 395  
Thesis Title: *“MOR-1K gene expression in genetically diverse mouse strains.”*  
2015 Recipient of a UNC Summer Undergraduate Research Fellowship  
2015 Recipient of the William and Ida W. Taylor Honors Mentored Research Fellowship
- 2016-2017 Undergraduate Advisor  
Harrison Ballard  
Neuroscience 493  
Thesis Title: *“The role of GRK2 in resolving COMT-dependent pain”*
- 2016-2018 Undergraduate Advisor  
Julia Kozlowski  
Neuroscience 493  
Thesis Title: *“Characterizing MAPK phosphorylation in glia and neurons in an animal model of functional pain”*  
Graduated with distinction, for her thesis work
- 2016-2018 Undergraduate Advisor  
Katie Kanter  
Neuroscience 493  
Thesis Title: *“Genetic predictors of analgesic response to opioid drugs”*  
2017 Recipient of the Summer Neuroscience Program Fellowship

Post-Baccalaureate Research Mentoring Projects Supervised:

- 2008-2010 Sean Wentworth  
Center for Pain Research and Innovation  
*“Using confocal microscopy to localize expression of MOR-1, MOR-1K, and  $\beta$ 2-adrenergic receptors in HEK293 cells”*  
Current Position: MD student at Wake Forest University, NC
- 2010-2011 Jesse Rhodes  
Center for Pain Research and Innovation  
*“Analysis of cytokines and transcription factors associated with temporomandibular disorders and widespread palpation tenderness”*

Current Position: MD student at UNC

2011-2012 Brittney Ciszek  
Center for Pain Research and Innovation  
*“Peripheral contribution of  $\beta$ -adrenergic receptors to chronic COMT-dependent pain”*  
Current Position: PhD student at UNC  
Recipient of the 2012 Doctoral Merit Assistantship for study in Biological and Biomedical Science and the 2012 BBSP Director’s Award.

Masters Thesis Research Committees:

2005-2007 Graduate Thesis Committee Member  
Jason Lambert, DDS  
Department of Endodontics  
Thesis Title: *“Effects of minor SNPs on enzymatic activity regulated by common human haplotypes of the catechol-O-methyltransferase gene.”*  
Recipient of the 2007 American Association of Endodontists Oral Presentation Award

2007-2009 Graduate Thesis Committee Member  
Elizabeth Chanenson, DDS  
Department of Endodontics  
Thesis Title: *“Genetic basis for individual variation in pain perception among endodontic patients.”*

2013-2015 Graduate Thesis Committee Member  
Jennifer Harmon  
Department of Dental Hygiene  
Thesis Title: *“Circulating omentin-1 and chronic Temporomandibular disorder pain.”*  
Recipient of the 2015 Outstanding Student Post-doctoral Award

Predoctoral Dissertation Research Committees:

2008-2010 Graduate Thesis Committee Member  
Samantha Segall, BS  
Department of Genetics  
Dissertation Title: *“COMT enzymatic function and pain perception in common inbred strains of mice.”*  
2009 Recipient of the Turner Student Award in Recognition for Excellence in Dental Research  
2011-2013 NextGen Postdoctoral Research Fellowship

2008-2013 Graduate Thesis Committee Member  
Jason Goldsmith, BS  
Department of Pharmacology  
Dissertation Title: *“The role of IL-22/STAT3 signaling in MOR-mediated intestinal injury response.”*

2012-2016 Graduate Advisor  
Brittney Ciszek, BS  
Curriculum in Oral Biology  
Thesis Title: *“The site of action of chronic COMT-dependent pain.”*  
2012 Recipient of the UNC Director’s Award  
2012 Recipient of the UNC Merit Fellowship  
2013 Acceptance into the Translational Medicine Program (HHMI funded award)  
2014 Recipient of the Freedland Advanced Dental Education Fellowship  
2016 First-place recipient of the 24th Annual Duke Anesthesiology Academic Evening’s *Excellence in the Pre-Doctoral Non-Medical Student* category

- 2012-2016 Graduate Advisor  
Jane Hartung, BS  
Curriculum in Neurobiology  
Thesis Title: *“The role of  $\beta$ ARs in mediating the activation of neurons, microglia, and astrocytes following sustained COMT inhibition.”*  
2013 Recipient of the NextGen T32 Training Grant Award  
2014 Recipient of the NIH/NIAMS F31 Grant Award  
2013 Recipient of the UNC Graduate Mentorship Award
- 2011-2016 Graduate Advisor  
Folabomi Oladosu, BS  
Curriculum in Neurobiology  
Thesis Title: *“The role of MOR-1K in opioid-induced hyperalgesia.”*  
2012-2015 Recipient of an NIH/NINDS R01 minority supplement  
2015 Recipient of the Dissertation Completion Fellowship Award
- 2017-2018 Graduate Thesis Committee Member  
Alexander Chamessian, BS  
Departments of Pharmacology, Cancer Biology, and Anesthesiology  
Thesis Title: *“The Cellular Determinants of Peripheral and Spinal Pain Processing.”*
- 2017-present Graduate Thesis Advisor  
Scott Scarneo, BS  
Department of Pharmacology  
Thesis Title: *“TAK1 inhibition for treatment of pain.”*  
2018 Best Poster Award, Duke Academic Evening
- 2017-present Pre-medical Research Thesis Advisor  
Zachary Smothers, BS  
School of Medicine  
Thesis Title: *“Role of Adrb3 in mediating nociception.”*  
2018 Duke’s Charles D Watts Travel Award to the American Pain Society Scientific Summit

Other Research Committees:

- 2007 Graduate Rotation Advisor  
Allison McMullen, BS  
Department of Pharmacology  
Project Title: *“A role for GRK2 and GRK6 in catechol-O-methyltransferase-dependent pain sensitivity.”*
- 2010 Kate White  
Pharmacology  
Doctoral Written Exam Committee
- 2010 Tyechia Culmer  
Pharmacology  
Doctoral Written and Oral Exam Committee
- 2011 Daniel E. Bonder  
Neurobiology  
Qualifying Exam Committee
- 2011 Graduate Rotation Advisor  
Cortney Winkle, BS  
Curriculum in Neurobiology

Project Title: “*The effects of COMT inhibition and swim stress on pain behavior in mast cell-deficient mice.*”

2014-2016 Pre-dental Research Advisor  
Connie Wang, BS  
Dentistry  
Project Title: “*Genetic regulation of Mu opioid receptor expression.*”  
2014 Recipient of the Short-term Summer Research Fellowship  
2015 Recipient of the AADR Student Research Fellowship

2015 Daniel Bloodgood  
Neurobiology  
Qualifying Exam Committee

#### Postdoctoral Fellows

2016-present Xin Zhang, PhD  
Project Title: “*Role of  $\beta$ ARs in nociceptor activity, neuroinflammation, and chronic pain.*”  
2017 Recipient of the APS Young Investigator Travel Award  
2017 Best Poster Award, Duke Kunshan Translational Pain Research Symposium  
2018 Recipient of the APS Young Investigator Travel Award  
2018 Best Poster Award, APS, Pain & Genetics Special Interest Group  
2018 Best Poster Award, Duke Academic Evening

2016-2017 Seungtae Kim, PhD  
Project Title: “Acupuncture treatment in an animal model of chronic functional pain.”

Areas of research interests (basic and applied) - list:

1. Functional genetics.
2. Gene regulation (e.g., microRNAs and alternative splicing).
3. Pain neurobiology.
4. Behavioral pharmacology.
5. Preclinical models of clinical pain.
6. Biomarkers for diagnosis and treatment of clinical pain conditions.

External support - gifts, grants, and contracts:

a) Past:

NIH/NICHHD Grant # K12 HD052191 “Multidisciplinary Clinical Research Career Development Award”. PI: E Orringer; Scholar & Project PI: AG Nackley 75% effort. Total Award: \$88,718.

NIH/NCRR Grant # KL2 RR025746 (This grant is a continuation of K12HD052191) “UNC Clinical Translational Science Award- K12 Scholars Program”. PI: E Pisano; Scholar & Project PI: AG Nackley 75% effort. Total Award: \$75,000.

NIH/OBSSR Grant # R24 DK067674 “UNC Gastrointestinal Biopsychosocial Research Program”. PI: D Drossman and W Whitehead; Scholar & Project CO-PI: AG Nackley 75% effort. Total Award: \$37,500.

National Vulvodynia Association & TMD Association “Proinflammatory Cytokine Profiles Associated with Functional Subgroups of Patients with VVS and TMD”. PI: AG Nackley and D Zolnoun 30% effort. Total Award: \$35,000.

NC TraCS Institute Grant # 50KR20929 “Characterizing the Role of a Newly Identified u1OR Isoform in Opioid-induced Behavioral Phenotypes”. PI: AG Nackley 30% effort. Total Award: \$50,000.

NIH/NINDS Grant # 3 R01 NS072205-01A1S1 “Persistent COMT-dependent Pain: Role of  $\beta$ -adrenergic Pathways” (Research Supplement to Promote Diversity in Health-Related Research Programs). PI: AG Nackley, No cost to the grant. Total Award: \$167,311.

NIH/NINDS Grant # 1R01NS072205-01A1 “Persistent COMT-dependent Pain: Role of  $\beta$ -adrenergic Pathways”. PI: AG Nackley 30% effort. Total Award: \$1,261,195.

NIH/NINDS Grant # 5P01NS045685-07 “Complex Persistent Pain Conditions: Common and Unique Pathways of Vulnerability”. Program Director: W Maixner, PI (Molecular Profiling Core): AG Nackley % effort, CO-PI (Etiology and Modeling Core): AG Nackley 22% effort. Total Award: \$6,015,584.

UNC NCTraCS Grant # 50KR81417 “Extended Release Local Anesthetics for the Treatment of Dental Pain” PI: AG Nackley. Total Award \$50,000.

NIDCR/NIH Grant # T32DE017245 “Clinical Research Training in Oral Diseases for Future Clinicians”. PI: JD Beck, Mentor: AG Nackley. No cost to the grant. Total Award: \$347,731.

NIDCR/NIH Grant # T90DE021986 “Training Program for the Next Generation of Oral Health Researchers (NextGen)”. PI: JD Beck, Mentor: AG Nackley. No cost to the grant. Total Award: \$306,513.

NIH/NIAMS Grant # F31 AR067671 “The Role of TNF-alpha and MAP Kinases in the Maintenance of COMT-dependent Pain.” Student: JE Hartung, Mentor: AG Nackley.

NVA Grant “Identification of microRNA Targets Altered in Distinct Subtypes of Vestibulodynia” PI: AG Nackley. Total Award \$30,000

b) Present:

NIH/NINDS Grant# R03NS106166 “Defining the role of adipocyte Adrb3 in chronic pain.” PI: A Nackley 10% effort. Total Award: \$200,000.

NIH/NIDCR Grant # R56DE025296-01 “Proteins, MicroRNAs and Genes Associated with TMD and Overlapping Conditions.” PI: A Nackley, 30% effort. Total Award: \$560,000.

NIH/NIDCR Grant # 5U01DE017018-07 “Risk Factors for Onset and Persistence of TMD.” CO-PI: W Maixner, Investigator: AG Nackley 10% effort. Total Award: \$18,559,810.

US Patent Pending: Pct/US2009/054300. “Alternatively-Spliced isoform of mu-Opioid Receptor Gene with cell excitatory Function.” Diatchenko L, Maixner W, Gris P, Gauthier, J., Nackley AG.

US Patent Pending: Pct/US2005/026201. “Methods and Materials for Determining Pain Sensitivity and Predicting and Treating Related Disorders.” Diatchenko L, Maixner W, Slade G, Nackley AG.

US Patent Pending: 4424-115. “Formulations for Controlled Release of Bupivacaine.” Johnson L, Rothrock G, O’Buckley SC, Nackley AG.