

Heather Bryte Bradshaw

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Education

1994 Florida State University, BS in Nutrition
2001 Florida State University, PhD in Neuroscience
2001-2004 Brown University, Post-doctoral fellow
2004-2007 Indiana University, Post-doctoral fellow

Positions and Employment

2018-present Professor of Psychological and Brain Sciences at Indiana University
2013-2018 Associate Professor of Psychological and Brain Sciences at Indiana University
2007-2013 Assistant Professor, Psychological and Brain Sciences at Indiana University
2015-present Scientific Advisory Board for PhytECS Pharmaceuticals
2016-present Director STARS (Science and Technology Research Scholars),
College of Arts and Sciences Indiana University
2019-present Scientific Advisory Board for Medicane Pharmaceuticals

Other Experience and Professional Memberships

1995-present Society for Neuroscience
2001-present International Cannabinoid Research Society
2012-2016 Editorial Board, British Journal of Pharmacology
2016-2019 President of the International Cannabinoid Research Society
2018-present Editorial Board, Frontiers in Physiology: Lipids

Honors

2003-2006 Individual NRSA (NIDA)
2006 Society for Neuroscience Women in Neuroscience travel award

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2006	Outstanding achievement in a lecture: International Cannabinoid Research Society
2007	Organization for the Study of Sex Differences Young Investigator travel award
2016	National Academy of Sciences Kavli Scholar
2016	Indiana University Trustee Teaching Award
2019	Florida State University Department of Psychology "Graduate of Distinction Award"

Research Articles (H-index 48; undergraduates underlined)

1. Farkas DJ, Inan S, Heydari LN, Johnson CT, Zhao P, **Bradshaw HB**, Ward SJ, Rawls SM. Cannabinoid mechanisms contribute to the therapeutic efficacy of the kratom alkaloid mitragynine against neuropathic, but not inflammatory pain. *Life Sci.* 2023 Sep 1;328:121878. doi: 0.1016/j.lfs.2023.121878. Epub 2023 Jun 29. PMID: 37392779
2. Bashashati M, **Bradshaw H**, Johnson C, Zuckerman M, Sarosiek J, McCallum R, Sarosiek I. Plasma endocannabinoids and cannabimimetic fatty acid derivatives are altered in cyclic vomiting syndrome: The effects of sham feeding. *J Investig Med.* 2023 Aug 12:10815589231196591. doi: 0.1177/10815589231196591. Online ahead of print. PMID: 37572030
3. Carrica LK, Choi CY, Walter FA, Noonan BL, Shi L, Johnson CT, **Bradshaw HB**, Liang NC, Gulley JM. Effects of combined use of alcohol and delta-9-tetrahydrocannabinol on working memory in Long Evans rats. *Behav Brain Res.* 2023 Jul 9;449:114475. doi: 10.1016/j.bbr.2023.114475. Epub 2023 May 3. PMID: 37146720
4. Sadaka AH, Canuel J, Febo M, Johnson CT, **Bradshaw HB**, Ortiz R, Ciumo F, Kulkarni P, Gitcho MA, Ferris CF. Effects of inhaled cannabis high in Δ 9-THC or CBD on the aging brain: A translational MRI and behavioral study. *Front Aging Neurosci.* 2023 Feb 1;15:1055433. doi: 10.3389/fnagi.2023.1055433. eCollection 2023. PMID: 36819730 Free PMC article.
5. **Bradshaw HB**, Johnson CT. Measuring the Content of Endocannabinoid-Like Compounds in Biological Fluids: A Critical Overview of Sample Preparation Methodologies. *Methods Mol Biol.* 2023;2576:21-40. doi: 10.1007/978-1-0716-2728-0_3. PMID: 36152175
6. Sokabe T, **Bradshaw HB**, Tominaga M, Leishman E, Chandel A, Montell C. Endocannabinoids produced in photoreceptor cells in response to light activate *Drosophila* TRP channels. *Sci Signal.* 2022 Oct 11;15(755):eabl6179. doi: 10.1126/scisignal.abl6179. Epub 2022 Oct 11. PMID: 36219683
7. Andreis K, Billingsley J, Naimi Shirazi K, Wager-Miller J, Johnson C, **Bradshaw H**, Straiker A. Cannabinoid CB1 receptors regulate salivation. *Sci Rep.* 2022 Aug 19;12(1):14182. doi: 10.1038/s41598-022-17987-2. PMID: 35986066
8. Johnson CT, de Abreu GHD, Mackie K, Lu H-C; and **Bradshaw HB**. Cannabinoids accumulate in mouse breast milk and differentially regulate lipid composition and lipid

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- signaling molecules involved in infant development. BBA Advances, Vol 2, 2022, 100054 doi:10.1016/j.bbadv.2022.100054
9. Johnson CT, **Bradshaw HB**. Modulatory Potential of Cannabidiol on the Opioid-Induced Inflammatory Response. Cannabis Cannabinoid Res. 2021 Jun;6(3):211-220. doi: 10.1089/can.2020.0181. PMID: 34115948
 10. Maciel IS, de Abreu GHD, Johnson CT, Bonday R, **Bradshaw HB**, Mackie K, Lu HC. Perinatal CBD or THC Exposure Results in Lasting Resistance to Fluoxetine in the Forced Swim Test: Reversal by Fatty Acid Amide Hydrolase Inhibition. Cannabis Cannabinoid Res. 2021 Jun 28. doi: 10.1089/can.2021.0015. Online ahead of print. PMID: 34182795
 11. Sadaka AH, Ozuna AG, Ortiz RJ, Kulkarni P, Johnson CT, **Bradshaw HB**, Cushing BS, Li AL, Hohmann AG, Ferris CF. Cannabidiol has a unique effect on global brain activity: a pharmacological, functional MRI study in awake mice. J Transl Med. 2021 May 24;19(1):220. doi: 10.1186/s12967-021-02891-6. PMID: 34030718
 12. Manchanda M, Leishman E, Sangani K, Alamri A, **Bradshaw HB**. Activation of TRPV1 by Capsaicin or Heat Drives Changes in 2-Acyl Glycerols and N-Acyl Ethanolamines in a Time, Dose, and Temperature Dependent Manner. Front Cell Dev Biol. 2021 Apr 16;9:611952. doi: 10.3389/fcell.2021.611952. eCollection 2021. PMID: 33937226
 13. Bashashati M, Leishman E, **Bradshaw H**, Sigaroodi S, Tatro E, Bright T, McCallum R, Sarosiek I. Plasma endocannabinoids and cannabimimetic fatty acid derivatives are altered in gastroparesis: A sex- and subtype-dependent observation Neurogastroenterol Motil. 2020 Aug 10:e13961. doi: 10.1111/nmo.13961. Online ahead of print PMID: 32779297
 14. Moussa-Tooks AB, Larson ER, Gimeno AF, Leishman E, Bartolomeo LA, **Bradshaw HB**, Green JT, O'Donnell BF, Mackie K, Hetrick WP. Long-Term Aberrations To Cerebellar Endocannabinoids Induced By Early-Life Stress. Sci Rep. 2020 Apr 29;10(1):7236. doi: 10.1038/s41598-020-64075-4. PMID: 32350298 [PubMed - in process]
 15. Leishman E, Kunkler PE, Hurley JH, Miller S, **Bradshaw HB**. Bioactive Lipids in Cancer, Inflammation and Related Diseases: Acute and Chronic Mild Traumatic Brain Injury Differentially Changes Levels of Bioactive Lipids in the CNS Associated with Headache. Adv Exp Med Biol. 2019;1161:193-217. doi: 10.1007/978-3-030-21735-8_16. PMID: 31562631
 16. Wang ZJ, Hu SS, **Bradshaw HB**, Sun L, Mackie K, Straiker A, Heinbockel T. Cannabinoid receptor-mediated modulation of inhibitory inputs to mitral cells in the main olfactory bulb. J Neurophysiol. 2019 Aug 1;122(2):749-759. doi: 10.1152/jn.00100.2018. Epub 2019 Jun 19. PMID: 31215302
 17. Leishman E, Mackie K, **Bradshaw HB**. Elevated Levels of Arachidonic Acid-Derived Lipids Including Prostaglandins and Endocannabinoids Are Present Throughout ABHD12 Knockout Brains: Novel Insights Into the Neurodegenerative Phenotype. Front Mol Neurosci. 2019 May 31;12:142. doi: 10.3389/fnmol.2019.00142. PMID: 31213981

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18. Murataeva N, Miller S, Dhopeswarkar A, Leishman E, Daily L, Taylor X, Morton B, Lashmet M, **Bradshaw H**, Hillard CJ, Romero J, Straiker A. Cannabinoid CB2R receptors are upregulated with corneal injury and regulate the course of corneal wound healing. *Exp Eye Res.* 2019 May;182:74-84. doi: 10.1016/j.exer.2019.03.011. Epub 2019 Mar 21. PMID: 30905716
19. Brierley DI, Harman JR, Giallourou N, Leishman E, Roashan AE, Mellows BAD, **Bradshaw HB**, Swann JR, Patel K, Whalley BJ, Williams CM. Chemotherapy-induced cachexia dysregulates hypothalamic and systemic lipamines and is attenuated by cannabigerol. *J Cachexia Sarcopenia Muscle.* 2019 Aug;10(4):844-859. doi: 10.1002/jcsm.12426. Epub 2019 Apr 29. PMID: 31035309
20. Dunbar CA, Rayaprolu V, Wang JC, Brown CJ, Leishman E, Jones-Burrage S, Trinidad JC, **Bradshaw HB**, Clemmer DE, Mukhopadhyay S, Jarrold MF. Dissecting the Components of Sindbis Virus from Arthropod and Vertebrate Hosts: Implications for Infectivity Differences. *ACS Infect Dis.* 2019 Apr 15. doi:10.1021/acsinfecdis.8b00356 PMID: 30986033 [PubMed - as supplied by publisher]
21. Leishman E, Murphy MN, Murphy MI, Mackie K, **Bradshaw HB**. Broad and Region-Specific Impacts of the Synthetic Cannabinoid CP 55,940 in Adolescent and Adult Female Mouse Brains. *Front Mol Neurosci.* 2018 Nov 27;11:436. doi: 10.3389/fnmol.2018.00436. eCollection 2018. PMID: 30542263
22. Miller S, Daily L, Leishman E, **Bradshaw H**, Straiker A. Δ^9 -Tetrahydrocannabinol and Cannabidiol Differentially Regulate Intraocular Pressure. *Invest Ophthalmol Vis Sci.* 2018 Dec 3;59(15):5904-5911. doi: 10.1167/iovs.18-24838. PMID:30550613
23. Leishman E, Manchanda M, Thelan R, Miller S, Mackie K, and **Bradshaw H**. CBD's upregulation of N-acyl ethanolamines in the CNS requires NAPE-PLD. *Cannabis Cannabinoid Res.* 2018 Nov 30;3(1):228-241. doi: 10.1089/can.2018.0031. eCollection 2018. PMID: 30515459
24. Toguri JT, Leishman E, Szczesniak AM, Laprairie RB, Oehler O, Straiker AJ, Kelly M, **Bradshaw HB**. Inflammation and CB2 signaling drive novel changes in the ocular lipidome and regulate immune cell activity in the eye. *Prostaglandins Other Lipid Mediat.* 2018 Sep 16. pii: S1098-8823(18)30025-X. doi: 10.1016/j.prostaglandins.2018.09.004. [Epub ahead of print] PMID:30232034
25. Borowska-Fielding J, Murataeva N, Smith B, Szczesniak AM, Leishman E, Daily L, Toguri T, Hillard C, Romero J, **Bradshaw H**, Kelly M, Straiker A. Revisiting cannabinoid receptor 2 expression and function in murine retina. *Neuropharmacology.* 2018 Aug 16. pii: S0028-3908(18)30477-5. doi: 10.1016/j.neuropharm.2018.08.007. [Epub ahead of print] PMID: 30121200
26. Leishman E, Murphy M, Mackie K, **Bradshaw HB**. Δ^9 -Tetrahydrocannabinol changes the brain lipidome and transcriptome differentially in the adolescent and the adult. *Biochim Biophys Acta.* 2018 May;1863(5):479-492. doi: 10.1016/j.bbaliip.2018.02.001. Epub 2018 Feb PMID: 29408467
27. Sun X, Tavenier A, Deng W, Leishman E, **Bradshaw HB**, Dey SK. Metformin attenuates susceptibility to inflammation-induced preterm birth in mice with higher endocannabinoid levels. *Biol Reprod.* 2017 Dec 5. doi: 10.1093/biolre/iox164. [Epub ahead of print] PMID: 29228105

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28. Crowe MS, Wilson CD, Leishman E, Prather PL, **Bradshaw HB**, Banks ML, Kinsey SG. The monoacylglycerol lipase inhibitor KML29 with gabapentin synergistically produces analgesia in mice. *Br J Pharmacol*. 2017 Dec;174(23):4523-4539. doi: 10.1111/bph.14055. Epub 2017 Nov 20. PMID: 28963716
29. Murphy M, Mills S, Winstone J, Leishman E, Wager-Miller J, **Bradshaw H**, Mackie K. Chronic adolescent Δ 9-tetrahydrocannabinol treatment of mice leads to long-term cognitive and behavioral dysfunction, which are prevented by concurrent cannabidiol treatment. *Cannabis and Cannabinoid Research*. September 2017, 2(1): 235-246. <https://doi.org/10.1089/can.2017.0034>
30. Bariani MV, Correa F, Leishman E, Domínguez Rubio AP, Arias A, Stern A, **Bradshaw HB**, Franchi AM. Resveratrol protects from lipopolysaccharide-induced inflammation in the uterus and prevents experimental preterm birth. *Mol Hum Reprod*. 2017 Aug 1;23(8):571-581. doi: 10.1093/molehr/gax036. PMID: 28810692 [PubMed - in process]
31. Miller S, Hu S-S, Leishman E, Morgan D, Wager-Miller J, **Bradshaw H**, Straiker A. A GPR119 signaling system in the murine eye regulates intraocular pressure in a sex dependent manner. *Ophthalmol Vis Sci*. 2017 Jun 1;58(7):2930-2938. doi: 10.1167/iovs.16-21330. PMID: 28593245
32. Leishman E, Kunkler PD, Manchanda M, Sangani K, Stuart JM, Oxford GS, Hurley JS, and **Bradshaw HB**. Acrolein Exposure Alters Levels of Endogenous Lipids, Including TRP Agonists: A Potential Molecular Mechanism for Headache Driven by TRPA1 activation. *Neurobiology of Pain* 2017 May 17 Vol1.
33. Ho JM, Bergeon Burns CM, Rendon NM, Rosvall KA, **Bradshaw HB**, Ketterson ED, Demas GE. Lipid signaling and fat storage in the dark eyed junco. *Gen Comp Endocrinol*. 2017 Jun 1;247:166-173. doi: 10.1016/j.ygcen.2017.01.029. Epub 2017 Feb 2. PMID: 28161439
34. Miller S, Oehler O, Leishman E, Daily L, Murataeva N, Wager-Miller J., **Bradshaw H**, Straiker A. Evidence for a GPR18 role in diurnal regulation of intraocular pressure. *Ophthalmol Vis Sci*. 2016 Nov 1;57(14):6419-6426. doi: 10.1167/iovs.16-19437. PMID: 27893106
35. McAllister SL, Giourgas BK, Faircloth EK, Leishman E, **Bradshaw HB**, Gross ER. Prostaglandin levels, vaginal innervation, and cyst innervation as peripheral contributors to endometriosis-associated vaginal hyperalgesia in rodents. *Mol Cell Endocrinol*. 2016 Aug 11. pii: S0303-7207(16)30311-2. doi: 10.1016/j.mce.2016.08.017. [Epub ahead of print] PMID: 27524411
36. Deng W, Cha J, Yuan J, Haraguchi H, Bartos A, Leishman E, Viollet B, **Bradshaw HB**, Hirota Y, Dey SK. p53 coordinates decidual sestrin 2/AMPK/mTORC1 signaling to govern parturition timing. *J Clin Invest*. 2016 Jul 25. pii: 87715. doi: 10.1172/JCI87715. PMID: 27454290
37. Tung L-W, Lu G-L, Lee Y-H, Yu L, Lee JS, Leishman E, **Bradshaw H**, Hwang L-L, Hung M-S, Mackie K, Zimmer A, and Chiou L-C. Orexins contribute to restraint stress-induced cocaine relapse by endocannabinoid-mediated disinhibition of

- dopaminergic neurons. *Nat Commun.* 2016 Jul 22;7:12199. doi: 10.1038/ncomms12199.
38. Miller S, Leishman E, Hu SS, Elghouche A, Daily L, Murataeva N, **Bradshaw H**, Straiker A. Harnessing the Endocannabinoid 2-Arachidonoylglycerol to Lower Intraocular Pressure in a Murine Model. *Invest Ophthalmol Vis Sci.* 2016 Jun 1;57(7):3287-96. doi: 10.1167/iovs.16-19356.PMID: 27333182
39. Murataeva N, Dhopeswarkar A, Yin D, Mitjavila J, **Bradshaw H**, Straiker A, Mackie K. Where's my entourage? The curious case of 2-oleoylglycerol, 2-linolenoylglycerol, and 2-palmitoylglycerol. *Pharmacol Res.* 2016 Apr 23. pii: S1043-6618(16)30334-6. doi: 10.1016/j.phrs.2016.04.015. [Epub ahead of print]
40. Carry L, Slivicki R, Leishman, E, **Bradshaw HB**, Hohmann A. A pro-nociceptive phenotype revealed in mice lacking the anandamide hydrolyzing enzyme fatty-acid amide hydrolase. *Mol Pain.* 2016 May 13;12. pii: 1744806916649192. Print 2016.
41. Leishman E, Cornett B, Spork K, Straiker A, Mackie, K, and **Bradshaw HB***. Broad impact of deleting endogenous cannabinoid hydrolyzing enzymes and the cannabinoid receptor CB1 on the endogenous cannabinoid-related lipidome in eight regions of the mouse brain. *Pharmacol Res.* 2016 Apr 22. pii: S1043-6618(16)30344-9. doi: 10.1016/j.phrs.2016.04.020. PMID: 27109320
42. Leishman, E, Mackie, K, Luguët S, and **Bradshaw HB**. Lipidomics profile of a NAPEPLD KO mouse provides evidence of a broader role of this enzyme in lipid metabolism in the brain. *Biochim Biophys Acta.* 2016 Jun;1861(6):491-500. doi: 10.1016/j.bbalip.2016.03.003. Epub 2016 Mar 5. PMID: 26956082
43. Sun X, Deng W, Li Y, Tang S, Leishman E, **Bradshaw H** and Dey SK. Sustained Endocannabinoid Signaling Compromises Decidual Function and Promotes Inflammation-induced Preterm Birth. *J Biol Chem.* 2016 Apr 8;291(15):8231-40. doi: 10.1074/jbc.M115.707836. Epub 2016 Feb 21. PMID: 26900150
44. **Bradshaw HB**, Leishman E. Levels of bioactive lipids in cooking oils: olive oil is the richest source of oleoyl serine. *J Basic Clin Physiol Pharmacol.* 2015 Nov 13. [Epub ahead of print] PMID: 26565552
45. Wolfson ML, Correa F, Leishman E, Vercelli C, Cymeryng C, Blanco J, **Bradshaw HB**, Franchi AM. Lipopolysaccharide-induced murine embryonic resorption involves changes in endocannabinoid profiling and alters progesterone secretion and inflammatory response by a CB1-mediated fashion. *Mol Cell Endocrinol.* 2015 Aug 15;411:214-22. doi: 10.1016/j.mce.2015.04.032. Epub 2015 May 6. PMID: 25958042
46. Murataeva N, Li S, Oehler O, Miller S, Dhopeswarkar A, Hu SS, Bonanno JA, **Bradshaw H**, Mackie K, McHugh D, Straiker A. Cannabinoid-induced chemotaxis in bovine corneal epithelial cells. *Invest Ophthalmol Vis Sci.* 2015 May 1;56(5):3304-13. doi: 10.1167/iovs.14-15675. PMID:26024113
47. Woolcott OO, Richey JM, Kabir M, Chow RH, Iyer MS, Kirkman EL, Stefanovski D, Lottati M, Kim SP, Harrison LN, Ionut V, Zheng D, Hsu IR, Catalano KJ, Chiu JD, **Bradshaw H**, Wu Q, Bergman RN. High-Fat Diet-Induced Insulin Resistance Does Not Increase Plasma Anandamide Levels or Potentiate Anandamide Insulinotropic Effect in Isolated Canine Islets. *PLoS One.* 2015 Apr 9;10(4):e0123558. doi:

- 10.1371/journal.pone.0123558.
48. Crowe MS, Leishman E, Banks ML, Gujjar R, Mahadevan A, **Bradshaw HB**, Kinsey SG. Dual inhibition of monoacylglycerol lipase and cyclooxygenases synergistically reduces neuropathic pain in mice. *Br J Pharmacol*. 2014 Nov 13. doi: 10.1111/bph.13012. PMID: 25393148
49. Raboune S, Stuart JM, Leishman E, Takacs SM, Rhodes B, Basnet A, Jameyfield E, McHugh D, Widlanski T, **Bradshaw HB**. Novel endogenous *N*-acyl amides activate TRPV1-4 receptors, BV-2 microglia, and are regulated in brain in an acute model of inflammation. *Front Cell Neurosci*. 2014 Aug 1;8:195. doi: 10.3389/fncel.2014.00195. eCollection 2014
50. Balakrishna S, Song W, Achanta S, Doran SF, Liu B, Kaelberer MM, Yu Z, Sui A, Cheung M, Leishman E, Eidam HS, Ye G, Willette RN, Thorneloe KS, **Bradshaw HB**, Matalon S, Jordt SE. TRPV4 inhibition counteracts edema and inflammation and improves pulmonary function and oxygen saturation in chemically induced acute lung injury. *Am J Physiol Lung Cell Mol Physiol*. 2014 Jul 15;307(2):L158-72. doi: 10.1152/ajplung.00065.2014. Epub 2014 May 16
51. Sałaga M, Mokrowiecka A, Zakrzewski PK, Cygankiewicz A, Leishman E, Sobczak M, Zatorski H, Małacka-Panas E, Kordek R, Storr M, Krajewska WM, **Bradshaw HB**, Fichna J Experimental colitis in mice is attenuated by changes in the levels of endocannabinoid metabolites induced by selective inhibition of fatty acid amide hydrolase (FAAH). *J Crohns Colitis*. 2014 Sep 1;8(9):998-1009. doi: 10.1016/j.crohns.2014.01.025. Epub 2014 Feb 14.
52. Morgan D, Davis B, Kearn C, Cook A, Wager-Miller J, Straiker A, Myoga M, Andrews MJ, Marcus D, Stuart J, Leishman E. Sim-Selley L, Czyzyk T, Selley D, **Bradshaw H**, and Kenneth Mackie. Mutation of putative GRK phosphorylation sites in the cannabinoid receptor 1 (CB1) confers resistance to cannabinoid tolerance and hypersensitivity to cannabinoids in mice." *J Neurosci*. 2014 Apr 9;34(15):5152-63. doi: 10.1523/JNEUROSCI.3445-12.2014.
53. Fichna J, Maciej S, Stuart J, Saur D, Sobczak M, Timmermans J-P, **Bradshaw HB**, Ahn K, and Storr M. Selective inhibition of FAAH produces anti-diarrheal and antinociceptive effect mediated by endocannabinoids and cannabinoid-like fatty acid amides. *Neurogastroenterol Motil*. 2014 Apr;26(4):470-81. doi: 10.1111/nmo.12272. Epub 2013 Dec 3
54. McHugh D, Roskowski D, Xie S, and **Bradshaw HB**. Δ^9 -THC and *N*-arachidonoyl glycine regulate BV-2 microglial morphology and cytokine release plasticity. *Front Pharmacol*. 2014 Jan 2;4:162. doi: 10.3389/fphar.2013.00162. eCollection 2014. PMID:24427137
55. Wu C-S, Morgan D, Jew CP, Haskins C, Andrews MJ, Spencer CM, Czyzyk T, Leishman E, **Bradshaw H**, Mackie K, Lu HC. Long-term consequences of perinatal fatty acid amino hydrolase inhibition. *Br J Pharmacol*. 2014 Mar;171(6):1420-34. doi: 10.1111/bph.12500 PMID: 24730060

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56. Rimmerman N, Ben-Hail D, Porat Z, Juknat A, Kozela E, Daniels MP, Connelly PS, Leishman E, **Bradshaw HB**, Shoshan-Barmatz V, Vogel Z Direct modulation of the outer mitochondrial membrane channel, voltage-dependent anion channel 1 (VDAC1) by cannabidiol: a novel mechanism for cannabinoid-induced cell death. *Cell Death Dis.* 2013 Dec 5;4:e949. doi: 10.1038/cddis.2013.471. PMID: 24309936 [PubMed - in process]
57. Stuart JM, Paris J, Frye C, **Bradshaw HB**. Brain levels of prostaglandins, endocannabinoids and related lipids are affected by mating strategies. 2013 *International Journal of Endocrinology* Volume 2013, Article ID 436252, 14 pages, <http://dx.doi.org/10.1155/2013/436252>
58. Cha J, Bartos A, Egashira M, Haraguchi H, Saito-Fujita T, Leishman E, **Bradshaw H**, Dey SK, Hirota Y. Combinatory approaches prevent preterm birth profoundly exacerbated by gene-environment interactions. 2013 *J Clin Invest.* Sep 3;123(9):4063-75. doi: 10.1172/JCI70098. Epub 2013 Aug 27
59. Tortoriello G, Rhodes BP, Takacs SM, Stuart JM, Basnet A, Harkney T, **Bradshaw HB**. Targeted Lipidomics in *Drosophila melanogaster* Identifies Novel 2Monoacylglycerols and N-acyl Amides. 2013 *PLoS ONE* 8(7): e67865. doi:10.1371/journal.pone.0067865
60. Caldwell MD, Hu SS, Viswanathan S, **Bradshaw H**, Kelly ME, Straiker A. A GPR18based signaling system regulates IOP in murine eye. *Br J Pharmacol.* 2013 Mar 5. doi: 10.1111/bph.12136. [Epub ahead of print] PMID:23461720
61. Wu CS, Chen H, Sun H, Zhu J, Jew CP, Wager-Miller J, Straiker A, Spencer C, **Bradshaw H**, Mackie K, Lu HC. GPR55, a G-Protein Coupled Receptor for Lysophosphatidylinositol, Plays a Role in Motor Coordination. *PLoS One.* 2013;8(4):e60314. doi: 10.1371/journal.pone.0060314. Epub 2013 Apr 2. PMID: 23565223 [PubMed - in process]
62. Slusar JE, Cairns EA, Szczesniak AM, **Bradshaw HB**, Di Polo A, Kelly ME. The fatty acid amide hydrolase inhibitor, URB597, promotes retinal ganglion cell neuroprotection in a rat model of optic nerve axotomy. *Neuropharmacology.* 2013 May 2. doi:p11: S0028-3908(13)00164-0. 0.1016/j.neuropharm.2013.04.018. PMID: 23643752
63. Guindon J, Lai Y, Takacs SM, **Bradshaw HB**, Hohmann AG. Alterations in endocannabinoid tone following chemotherapy-induced peripheral neuropathy: Effects of endocannabinoid deactivation inhibitors targeting fatty-acid amide hydrolase and monoacylglycerol lipase in comparison to reference analgesics following cisplatin treatment. *Pharmacol Res.* 2013 Jan;67(1):94-109. doi: 10.1016/j.phrs.2012.10.013. Epub 2012 Nov 2.
64. McHugh D, Wager-Miller J, Page J, and **Bradshaw HB**. siRNA knockdown of GPR18 receptors in BV-2 microglia attenuates N-arachidonoyl glycine induced cell migration. *J Mol Signal.* 2012 Jul 26;7(1):10. [Epub ahead of print]

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65. Ho JM, Smith NS, Adams SA, **Bradshaw HB**, Demas GE. Photoperiodic changes in endocannabinoid levels and energetic responses to altered signaling at CB1 receptors in Siberian hamsters. *J Neuroendocrinol.* 2012 July; 24(7):1030-9
66. Berlanga O, **Bradshaw HB**, Vilella-Mitjana F, Garrido-Gómez T, Simón C. How endometrial secretomics can help in predicting implantation. *Placenta* 2011 Jun 21.
67. **Bradshaw HB** and Allard CM. Endogenous cannabinoid production in the rat female reproductive tract is regulated by changes in the hormonal milieu. *Pharmaceuticals* 2011, 4, 933-949;
68. McHugh D, Page J, Dunn E, **Bradshaw HB**. $\Delta(9)$ -THC and N-arachidonoyl glycine are full agonists at GPR18 and cause migration in the human endometrial cell line, HEC-1B. *Br J Pharmacol* 2012 Apr;165(8):2414-24. doi: 10.1111/j.14765381.2011.01497.x. PMID: 21595653.
69. Rimmerman N, Juknat A, Kozela E, Levy R, **Bradshaw HB**, Vogel Z. The NonPsychoactive Plant Cannabinoid, Cannabidiol Affects Cholesterol Metabolism Related Genes in Microglial Cells. *Cell Mol Neurobiol* 2011 Apr 30. [Epub ahead of print] PubMed PMID: 21533611. PMCID:
70. Rimmerman N, **Bradshaw HB**, Kozela E, Levy R, Juknat A, Vogel Z. Compartmentalization of endocannabinoids into lipid rafts in a microglial cell line, which is devoid of caveolin-1. *Br J Pharmacol* 2011 Mar 30.
71. Lee SH, Raboune S, Walker JM, **Bradshaw HB**. Distribution of endogenous farnesyl pyrophosphate and four species of lysophosphatidic acid in rodent brain. *Int J Mol Sci* 2010 Oct 15;11(10):3965-76
72. Schicho R, Bashashati M, Bawa M, McHugh D, Saur D, Hu H-M, Zimmer A, Lutz B, Mackie, K, **Bradshaw HB**, McCafferty D-M, Sharkey KA, Storr, M. The atypical cannabinoid O-1602 protects against experimental colitis and inhibits neutrophil recruitment. *Inflammatory Bowel Disease* 2010 Nov 15 [Epub ahead of print]
73. Sun X, Xie H, Yang J, Wang H, **Bradshaw HB**, Dey SK. Endocannabinoid signaling directs trophoblast stem cell fate and differentiation to placental development. *Proc Natl Acad Sci U S A* 2010 Sep 28;107(39):16887-92. Epub 2010 Sep 13.
74. Smoum R, Bar A, Tan B, Milman G, Attar-Namdar M, Ofek O, Stuart JM, Tam J, Kram V, O'Dell D, Walker MJ, **Bradshaw HB**, Bab I, Mechoulam R. Oleoyl serine, an endogenous N-acyl amide, modulates bone remodeling and mass. *Proc Natl Acad Sci U S A* 2010 Oct 12.
75. McHugh D, Hu S S-J, Rimmerman N, Vogil Z., Walker JM, **Bradshaw HB**. N-arachidonoyl glycine, an abundant endogenous lipid, potently drives directed cellular migration through GPR18, the putative abnormal cannabidiol receptor. *BMC Neurosci* 2010 Mar 26;11:44.
76. Hirota Y, Daikoku T, Tranguch S, Xie H, **Bradshaw HB**, Dey SK. Uterine-specific p53 deficiency confers premature uterine senescence and promotes preterm birth in mice. *J Clin Invest* 2010 Mar 1;120(3):803-15
77. Hu S S-J, **Bradshaw HB**, S-C C J, Huang SM, Minassi A, Bisogno T, Masuda K, Roskosk R, Cravatt BF, Di Marzo V, and Walker JM. The biosynthesis of N-arachidonoyl dopamine (NADA), a putative endocannabinoid and endovanilloid, via

Heather B Bradshaw: CV

- conjugation of arachidonic acid with dopamine. Prostaglandins Leukot Essent Fatty Acids 2009 Oct;81(4):291-301.
78. Dowie MJ, **Bradshaw HB**, Howard ML, Nicholson LF, Faull RL, Hannan AJ, Glass M. Altered CB1 receptor and endocannabinoid levels precede motor symptom onset in a transgenic mouse model of Huntington's disease. Neuroscience 2009 Jun 10 Epub
79. **Bradshaw HB**, Rimmerman N, Hu S S-J, Benton VM, Stuart JM, Masuda K, Cravatt BF, O'Dell DK, Walker JM. The endocannabinoid anandamide is a precursor for the signaling lipid, N-arachidonoyl glycine through two distinct pathways. BMC Biochem 2009, 10:14
80. **Bradshaw HB**, Rimmerman N, Hu S S-J, Burstien S, and Walker JM. Novel endogenous N-acyl glycines: Identification and Characterization. Vitam Horm 2009; 81:191-205
81. Koppel J, **Bradshaw H**, Goldberg TE, Khalili H, Marambaud P, Walker JM, Pazos M, Gordon ML, Christen E and Davies P. Endocannabinoids in Alzheimer's disease and their impact on normative cognitive performance: A case-control and cohort study. Lipids Health Dis, 2009 Jan 14;8:2
82. Rimmerman N, **Bradshaw HB**, Basnet A., Tan B. Widlanski, TS. Walker JM. Microsomal omega-hydroxylated metabolites of N-arachidonoyl dopamine are active at recombinant human TRPV1 receptors. Prostaglandins Other Lipid Mediat 2009 Jan;88(1-2):10-7. Epub 2008 Sep 2.
83. Huang SM, Lee h, Chung M-K, Yu YY, **Bradshaw HB**, Coulombe PA, Walker JM, Caterina MJ. Overexpressed transient receptor potential vanilloid 3 ion channels in skin keratinocyte modulate pain sensitivity via prostaglandin E2. J Neurosci 2008 Dec 17;28(51):13727-37
84. Rimmerman N, **Bradshaw HB**, Hughes HV, Chen JS-C, Hu SS-J, McHugh D, Vefring E, Jahnsen JA, Thompson EL, Masuda K, Cravatt BF, Burstein S, Vasko MR, Prieto AL, Walker JM. N-palmitoyl glycine, a novel endogenous lipid that acts as a modulator of calcium influx and nitric oxide production in sensory neurons. Mol Pharm 2008 Jul;74(1):213-24 (e-pub April 18).
85. Hu S S-J, **Bradshaw HB**, Chen J S-C, Tan B, Walker JM. Prostaglandin E2 glycerol ester, an endogenous COX-2 metabolite of 2-arachidonoylglycerol, induces hyperalgesia and modulates NFkappaB activity Br J Pharmacol 2008 Apr;153(7):153849.
86. Rimmerman N, Hughes HV, **Bradshaw HB**, Pazos MX, Mackie K, Prieto AL, Walker JM. Compartmentalization of endocannabinoids into lipid rafts in a dorsal root ganglion cell line. Br J Pharmacol 2007 Oct 29
87. Rubio M, McHugh D, Fernández-Ruiz J, **Bradshaw H**, Walker JM. Short-term exposure to alcohol in rats affects brain levels of anandamide, other Nacylethanolamines and 2-arachidonoyl-glycerol. Neurosci Lett 2007 Jun 29;421(3):270-4. Epub 2007 Jun 2
88. Burstein SH, Adams JK, **Bradshaw HB**, Fraioli C, Rossetti RG, Salmonsén RA, Shaw

Heather B Bradshaw: CV

- JW, Walker JM, Zipkin RE, Zurier RB. Potential anti-inflammatory actions of the elmiric (lipoamino) acids. *Bioorg Med Chem* 2007 May 15;15(10):3345-55. Epub 2007 Mar 13.
89. Tan B, **Bradshaw HB**, Rimmerman N, Hughes HV, Yu YW, Krey JF, Monn FM, , Chen J, Hu S S-J, O'Dell DK, and Walker JM. Targeted Lipidomics: Discovery of New Fatty Acyl Amides. *AAPS J.* 2006 Jul 14;8(3):E461-5.
90. **Bradshaw HB**, Rimmerman N, Krey JF, Walker JM. Sex and hormonal cycle differences in brain levels of pain-related cannabimimetic lipid mediators. *Am J Physiol Regul Integr Comp Physiol.* 2006 Aug;291(2):R349-58. Epub 2006 Mar 23 61. Walker JM, Krey JF, Chen JS, Vefring E, Jahnsen JA, **Bradshaw H**, Huang SM. Targeted lipidomics: fatty acid amides and pain modulation. *Prostaglandins Other Lipid Mediat.* 2005 Sep;77(1-4):35-45. Epub 2004 Nov 24.
91. Fernandez-Rodriguez CM, Romero J, Petros TJ, **Bradshaw H**, Gasalla JM, Gutierrez ML, Lledo JL, Santander C, Fernandez TP, Tomas E, Cacho G, Walker JM. Circulating endogenous cannabinoid anandamide and portal, systemic and renal hemodynamics in cirrhosis. *Liver Int.* 2004 Oct;24(5):477-83.
92. **Bradshaw HB**, Berkley KJ The influence of ovariectomy with or without estrogen replacement on responses of rat gracile nucleus neurons to stimulation of hindquarter skin and pelvic viscera. *Brain Res.* 2003 Oct 3;986(1-2):82-90.
93. **Bradshaw HB**, Berkley KJ. Estrogen replacement reverses ovariectomy-induced vaginal hyperalgesia in the rat. *Maturitas* 2002 41:157-165.
94. Berkley KJ, Cason A, Jacobs H, **Bradshaw H**, Wood E. Vaginal hyperalgesia in a rat model of endometriosis. *Neurosci Lett.* 2001 Jun 29;306(3):185-8.
95. **Bradshaw HB**, Berkley KJ. Estrous changes in responses of rat gracile nucleus neurons to stimulation of skin and pelvic viscera. *J Neurosci.* 2000 Oct 15;20(20):7722-7727.
96. **Bradshaw H**, Miller J, Ling Q, Malsnee K, Ruda MA. Sex differences and phases of the estrous cycle alter the response of spinal cord dynorphin neurons to peripheral inflammation and hyperalgesia. *Pain.* 2000 Mar;85(1-2):93-9.
97. Temple JL, **Bradshaw HB**, Wood E Berkley KJ. Effects of hypogastric neurectomies on escape responses to uterine distention in the rat. *Pain.* 1999 Aug;Suppl 6:S13-20.
98. **Bradshaw, HB**, Temple, JL, Wood, E, Berkley KJ. Estrous variations in behavioral responses to vaginal and uterine distention in the rat. *Pain.* 1999 Aug;82(2):187-97.

Review articles

1. Piscitelli F and **Bradshaw HB**. Endocannabinoid analytical methodologies: techniques that drive discoveries that drive techniques *Adv Pharmacol.* 2017;80:1-30. doi: 10.1016/bs.apha.2017.04.003. Epub 2017 Jul 3.
2. Meccariello R, Battista N, **Bradshaw HB** and Wang H. Updates in reproduction coming from the endocannabinoid system. *Int J Endocrinol.* 2014;2014:378069. doi: 10.1155/2014/378069. Epub 2014 Jan 20. No abstract available.
3. Leishman E, Kokesh KJ, and **Bradshaw HB** Three classes of lipids and their roles in the neurophysiology of addiction: how sex steroids, prostaglandins, and

Heather B Bradshaw: CV

- endocannabinoids shape maladaptive behavior. *Ann N Y Acad Sci.* 2013 Apr;1282(1):25-38. doi: 10.1111/nyas.12081. Epub 2013 Mar 19. PMID: 23510307
4. **Bradshaw, HB**, Raboune S, and Hollis JL. Opportunistic activation of TRP receptors by endogenous lipids: Exploiting lipidomics to understand TRP receptor cellular communication. *Life Sci.* 2012 Nov 20. doi:pii: S0024-3205(12)00688-1. 10.1016/j.lfs.2012.11.008. [Epub ahead of print]
 5. Bab, I; Smoum, R; **Bradshaw, H**; Mechoulam, R. Skeletal Lipidomics: Regulation of Bone Metabolism by Fatty Acid Amide Family. *Br J Pharmacol* 2011 Aug;163(7):1441-6.
 6. **Bradshaw HB**, Lee SH, McHugh D. Orphan endogenous lipids and orphan GPCRs: a good match. *Prostaglandins Other Lipid Mediat* 2009 Apr 18 Epub.
 7. **Bradshaw HB**, Walker JM. The expanding field of cannabimimetic and related lipid mediators. *Br J Pharmacol.* 2005 Feb;144(4):459-65. Review.

Invited Commentaries

1. Meccariello R, Battista N, **Bradshaw HB** and Wang H. Endocannabinoids and Reproduction. Guest editorial by Guest Editors of the special topics issue of the *Int J Endocrinol.* 2014;2014:412354. doi: 10.1155/2014/412354. Epub 2014 Jan 16. Review. PMID:24550985
2. **Bradshaw, HB.** CB1-induced side effects of specific COX-2 inhibitors: A feature, not a bug. *Pain.* 2010 Jan;148(1):5.

Book Chapters

1. **Bradshaw HB** and Leishman E. Lipidomics: A corrective lens for enzyme myopia. *Methods Enzymol.* 2017;593:123-141. doi: 10.1016/bs.mie.2017.06.024. Epub 2017 Jul 13. PMID: 28750800
2. Stuart JM, Leishman E, and **Bradshaw HB.** Cannabinoids and Reproduction: the ups and downs and ins and out. In *Handbook of Cannabis*, Springer 2014
3. McHugh D and **Bradshaw HB.** GPR18 and NAGly signaling: New members of the endocannabinoid family or distant cousins? In *CANNABINOIDS: Actions at NonCB1/CB2 Cannabinoid Receptors*, Springer 2012
4. **Bradshaw HB.** Chapter 4: Other cannabimimetic lipid signaling molecules. In *Cannabinoids and the Brain*, Springer 2008

Teaching Experience (Annual teaching commitment ~280-320 contact hours)

P155: Introduction to Psychological and Brain Sciences; 3cr hrs; ~80 contact hours This core course for majors provides an overview of the history and fundamentals of neuroscience, as well as cognitive and social psychology. Emphasis is placed on how each branch of the sciences is integrated and is understood more fully only in the context of their overlaps. 2007, 2008, 2009, 2011 (Spring and Fall), 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021(Honors only)

Heather B Bradshaw: CV

H299: Honors Discussion for P155; 1cr hr; ~25 contact hours. This is a weekly one-hour course that is a supplement to the P155 Introduction course that is aimed at engaging 25 students in discussions on how to evaluate scientific literature and to generate active teaching modules for the larger lecture course. 2015, 2016, 2017, 2018, 2019, 2020

P346 Neuroscience, 3cr hrs; ~80 contact hours, This core course for majors is focused on the structure and function of the nervous system, molecular interactions of ligands and receptors on neurons and glia, and how neurobiology plays a key role in all aspects of behavior. 2015, 2016, 2017, 2019

P457: Cannabinoid Neurobiology, ~100 contact hours: senior-level course aimed at understanding the molecular basis for how cannabinoid drugs drive changes in the body through the engagement of the endogenous cannabinoid system. 2019, 2020, 2021

P457: Neuroscience Literacy; ~80 contact hours: senior-level course aimed at guiding students through the primary and secondary literature. Students read 4 books by authors like Robert Sapolsky, Angela Duckworth, Lisa Barrett, and Malcolm Gladwell. Topics in the books are evaluated with the primary literature. 2020, 2021

P456: Reproductive Neuroscience, ~100 contact hours: senior-level undergraduate and graduate level course aimed at providing the molecular basis for understanding how hormones shape neuronal development and reproductive function throughout the lifespan. Spring 2008, 2010, 2012, 2013, 2014, 2015, 2016 (Fall and Spring), 2018, Summer 2021

P357: Science of Sexuality; ~80 contact hours -upper level course aimed at critically evaluating research on human sexuality. This is a project-based course in which each student develops an independent topic and reports on the Psychological, Social, and Biological aspects of that topic culminating in a final article on how each of these branches of science and society drive both experimental designs and outcomes. 2012, 2013, 2014, 2015, 2016

N501: Human Neuroanatomy; ~40 contact hours: This course a traditional anatomy course using human brains harvested from the medical school cadavers each year. These brains are then scanned using the in-house MRI creating an MRI data set that is used for learning anatomical structures in this format as well as use in locating structures during in-class dissections of these brains. 2011, 2012, 2013, 2014

N650: Neuroscience Colloquium series, ~20 contact hours: Fall 2008, 2009, 2010, 2011, 2012, 2013 and Spring 2009, 2010, 2011, 2012, 2013, 2014. This course is the required seminar series for all Program in Neuroscience graduate students. I scheduled and coordinated weekly seminar talks for the Program in Neuroscience graduate program. I coordinated both the internal speakers (students and faculty) and external (~50% of the talks were from outside speakers). I coordinated a pre-SFN poster session the week before SFN each year for graduate students. In the Spring students had multiple weeks of "data blitz" type talks with written feedback from their peers.

Medical Human Neuroanatomy Laboratory Lead Instructor for Florida State University: Fall 1995, 1996.

Invited Lectures:

- 1 "Cannabinoid exposure during lactation significantly changes the lipid content of breastmilk including the endocannabinoids Anandamide and 2-AG" International Cannabinoid Research Society, Online conference, 20 June 2021
- 2 "The multiplication of endocannabinoids and their siblings" British Pharmacological Society. Online conference. 14 Dec 2020
- 3 "GPR55 activity regulates CNS prostaglandins: mounting evidence for the interplay between cannabinoids and prostaglandins" Carolina Cannabinoid Conference, University of Virginia, Nov 9, 2019.
- 4 "GPR55 activity regulates CNS prostaglandins: mounting evidence for the interplay between cannabinoids and prostaglandins" Conference on Bioactive Lipids in Cancer, Inflammation, and related Diseases. St. Petersburg, FL Oct 20-23, 2019
- 5 "Investigating the lipoamine lipidome: effects of enzymes, receptors, and cannabinoid pharmacology" Big 10 Academic Alliance-Lipids Conference, University of Minnesota Sept 27, 2019.
- 6 "Elevated Levels of Arachidonic Acid-Derived Lipids, including Prostaglandins and Endocannabinoids, are Present Throughout ABHD12 KO Brains: Novel Insights into the Neurodegenerative Phenotype" Gordon Research Conference on Cannabinoid in the CNS. July 21, 2019
- 7 "Cannabinoid background and basics" Cannabinoid working group for clinicians, July 16th, 2019
- 8 "Investigations into the CNS lipidome: novel avenues for understanding cellular communication in neurological disorders and pharmacology" Florida State University, Department of Psychology. 12 April 2019
- 9 "Cannabinoid background and basics" Cannabinoids and Medicine CME, Los Angeles, CA. April 28th, 2018
- 10 "Lipoamines: an emerging class of novel signaling lipids" Big 10 Academic Alliance-Lipids Conference, Purdue University Feb 15-16, 2018.
- 11 "Traumatic brain injury drives novel changes in the CNS lipidome" 15th Conference on Bioactive Lipids in Cancer, Inflammation, and related Diseases. Puerto Vallarta Oct 22-26, 2017.
- 12 "Lipoamines: An Emerging Class of Novel Lipid Signaling Molecules" Gordon Research Conference on Molecular and Cellular Biology of Lipids. Aug 4, 2017
- 13 "No endogenous lipid is an island: The dynamic lives of the endocannabinome beyond Anandamide" British Pharmacological Society, London, England. 15 Dec, 2016.
- 14 "Brain lipidomics after Sativex-like treatment in chemotherapeutic pain model" Carolina Cannabinoid Collaborative 11th annual meeting. Temple University, 29-31 Oct, 2016.
- 15 "Lipidomics: tools for understanding how lipid signaling molecules play novel roles in cellular communication" American Chemical Society CERM, Cincinnati OH, 20 May 2016.

Heather B Bradshaw: CV

- 16 "New frontiers in lipidomics: tools for understanding how lipid signaling molecules play novel roles in cellular communication" University of Minnesota Neuroscience Colloquium, 8 Jan 2016
- 17 "Steroid Use: Why are Men and Women Judged Differently?" The Poynter Center of Ethics Indiana University, 4 Sept 2015
- 18 "Combination of *N*-acyl ethanol amines have higher efficacy than individual lipids at TRPV1 receptors: More like life? 25th Annual ICRS meeting. 29 June, 2015
- 19 "Lipidomics of endogenous *N*-acyl amides provide a rich set of tools for TRP receptor deorphanization", Neuroscience colloquium, University of West Virginia Morgantown. 21 Jan 2015.
- 20 "Lipidomics of endogenous *N*-acyl amides provide a rich set of tools for TRP receptor deorphanization", Stark Neuroscience center colloquium, IUPUI 4 Dec 2014.
- 21 "Lipidomics of endogenous *N*-acyl amides provide a rich set of tools for TRP receptor deorphanization"; Colloquium at the Center for Substance Abuse Research, Temple University School of Medicine. 11 Nov 2014.
- 22 "Lipidomics of endogenous *N*-acyl amides provide a rich set of tools for TRP receptor deorphanization"; Colloquium at the Center for Translational Neuromedicine, University of Rochester. 4 Nov 2014.
- 23 "Overexpression of TRPV1 in HEK cells drives dramatic changes in basal endocannabinoids and related lipids, which are potentiated by capsaicin" at the 24th Annual ICRS meeting, June 30th 2014, Baveno Italy.
- 24 "13th Conference on Bioactive Lipids in Cancer, Inflammation, and related Diseases. San Juan, PR Nov 3-6 2013
- 25 "The impact of ABHD12, MGL, or CB2 deletion on the endocannabinoid-related lipidome: implications for TRPV signaling", Cannabinoid functions in the CNS (GRC), Waterville Valley Aug 6, 2013.
- 26 "Encouraging autonomy through structure: frameworks and fun" Cannabinoid functions in the CNS (GRS), Waterville Valley NH Aug 4, 2013
- 27 "21 Novel *N*-acyl amides, including *N*-docosahexaenoyl-ethanolamine, have activity at TRPV1-4-the putative Ionotropic Cannabinoid receptors" ICRS annual meeting, Freiburg Gemany 25 July 2012
- 28 "The role of novel signaling lipids and TRP channels in pain and inflammation" Tel Aviv University, Tel Aviv, Israel. Department of Pharmacology 18 July 2012.
- 29 "Novel endogenous *N*-acyl amides activate TRPV receptors and are regulated in an acute model of inflammation" LIPID MAPS Annual Meeting 2012:
Lipidomics Impact on Cell Biology, Metabolomics and Translational Medicine May 7-8, 2012, La Jolla, CA
- 30 "Activity profile of *N*-acyl amides at TRPV1-4 and lipidomics of active compounds in a model of acute inflammation" Carolina Cannabinoid Society NIDA-sponsored symposium: "Lipid ligands, Receptors and TRPs". 28-30 Oct. 2011

Heather B Bradshaw: CV

- 31 "Multiple outcomes for FAAH inhibition: up and down". NIDA-ICRS Workshop on Endocannabinoid Metabolic Enzymes, 10 July 2011.
- 32 "Endogenous cannabinoid regulation of uterine physiology" at the Cannabinoids in Biology and Medicine Conference, Jerusalem, 31 Oct-4 Nov. 2010.
- 33 "The Endogenous Cannabinoid System and Reproduction " at the Sixth National Clinical Conference on Cannabis Therapeutics, 15-17 April, 2010 Providence, RI.
- 34 "Endocannabinoids and Reproductive Pain" Cincinnati Children's Hospital, Cincinnati, OH June 2009.
- 35 "Endocannabinoids and Reproductive Pain" Hebrew University Jerusalem, Israel; Department of Pharmacology, March 2009.
- 36 "Endocannabinoid involvement in uterine contractility" University of Surrey, UK; Biochemistry Department Colloquium. June 2008.
- 37 "*Designing and Implementing Sex Difference and Hormonal Cycle Research*" National Institutes of Health Gender and Pain Conference, Bethesda, Maryland, April 1998.
- 38 "*Influence of Sex Steroids on Visceral Pain*" The Annual International Pelvic Pain Society Meeting, Denver, Colorado March 1998.

Service: Academic-Graduate Thesis committees

Active:

Vishakh Iyer
Clare Johnson
Michelle Murphy
Taryn Bosquez

Completed:

John Orczyk, PhD
Wan Hung Lee, PhD
Natalia Murataeva, PhD
Kendra Burner, PhD
Siham Raboune, PhD
Jenelle Dorner, PhD
Liting Ding, PhD
Valery Benton, MS
Sarah Pickens, MS
Meera Manchanda, MS
Emma Leishman, PhD
Richard Slivicki, PhD
Laurence Carry, PhD

Service: Academic-Undergraduate Honors Thesis Mentor

Heather B Bradshaw: CV

Emily Dunn (Honors Thesis in Neuroscience 2010)
Cassandra Allard (Honors Thesis in Neuroscience 2010)
Cortney Wright (Honors Thesis in Neuroscience 2011)
Jordyn Stuart (Honors Thesis in Biology 2011)
Sara Tackacs (Honors Thesis in Neuroscience 2012)
Kristin Hines (Honors Thesis in Biology 2012)
Dan Rosowski (Honors Thesis in Neuroscience 2013)
Emma Leishman (Honors Thesis in Neuroscience 2013)
Evan Jameyfield (Honors Thesis in Neuroscience 2014)
Sally Miller (Honors Thesis in Neuroscience 2014)
Meera Manchanda (Honors Thesis in Neuroscience 2015)
Kishan Sangani (Honors Thesis in Neuroscience 2016)
Bridget VerVaet (Honors Thesis in Biology 2018)

Service: Academic-Department

2011-2016, 2018-present	Department of Psych and Brain Sciences (PBS) Graduate Programing and Curriculum Committee.
2011-2013, 2017-2018- 2017	PBS Undergraduate Curriculum Committee Search committee chair for Kinsey Institute-PBS Assistant Professor
2014-2016, 2018-present	Area Spokesperson for the PBS Graduate Training Area of “Molecular and Systems Neuroscience”
2018	Naus Chair in Addiction research search committee
2010-2014	Search committee Chair for Gill Professors of Neuroscience
2013-present	Program in Neuroscience curriculum committee
2010-2016	Area Spokesperson for the PBS Graduate Training Area of “Brain, Behavior, and Neuroscience”
2010-2011	Search committee member “Evolutionary Psychology” Assistant Professor position in PBS.
2009-2011	Search committee member “Social Neuroscience” Assistant Professor position in PBS
2007-2013	PBS Student Awards committee

Service: Academic-University

2017-2020	College Policy Committee Representative for Natural Sciences and Mathematics area (3-Year position; one of 9 members). <u><i>This is the only elected governance body for the College.</i></u>
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Heather B Bradshaw: CV

- 2016-present Director of the Indiana University STARS (Science, Technology, and Research Scholars) undergraduate research program.
- 2010-present Application evaluator for STARS
- 2010-present Mentor for IU STARS scholars. I have mentored 4 students through this program, which is typically for the entire 4 years of their IU career.
- 2011-present Mentor for IU Minority Serving Institutions STEM summer research program. I have mentored 10 minority undergraduate research students through this program.
- 2010-present Mentor for COX Research Scholars program serving low-income students with full scholarships tied to training in a laboratory. I have mentored 6 students in this program.

Service: Professional

Scientific Society Committee and Administration

- 2016-2019 President for the International Cannabinoid Research Society (3-year commitment of 2016-2017 President elect, 2017-2018 President, 2018-2019 Past President. Each year I serve on the Board of Directors and work with the Executive directors to do the business of the ICRS society. In 2017-2018 I developed and ran the annual ICRS meeting in Leiden, Netherlands)
- 2010-present International Cannabinoid Research Society Scientific Program Committee
- 2013 Awards committee Chair. Recruited judges for trainee awards, analyzed scores, and presented awards.
- 2009-2019 International Cannabinoid Research Society Trainee presentation judge
- 2019-present ICRS liaison and Associate Editor for *Cannabis and Cannabinoid Research*

Editor duties

- 2019-present Associate Editor: Cannabis and Cannabinoid Research
- 2012-2016 Associate editor: British Journal of Pharmacology: Attended New Editors training Dec 2012, London England
- 2018-present Associate editor: Lipids and fatty acid research, Frontiers in Physiology and Frontiers in Nutrition
- 2007-present: *Guest reviewer for the following journals:* Behavioral Brain Research, Biological Psychology, Bioorganic and Medicinal Chemistry, Brain Research Bulletin, British Journal of Pharmacology, European Journal of Lipid Science and Technology, European Journal of Pharmacology, Journal of Neurophysiology, Molecular Pharmacology, Nature Neuroscience, Neurochemistry International,

Heather B Bradshaw: CV

Psychopharmacology, Scandinavian Journal of Clinical & Laboratory Investigation,
Life sciences

Science Advisory Board

- 2015-present Scientific advisor to the pharmaceutical company, PhytECS.
2019-present Scientific advisor to the pharmaceutical company, Medicane.

Grant reviews

- Ad-hoc member: MDCN-N02 Special emphasis panel review, 6 October 2011
Ad-hoc study section member: ICER 17 December 2013
Ad-hoc study section member NHLBI 14 October 2014
External expert, Netherlands October 2016
Ad-hoc study section member MNPS 12 December 2019
SEP member NIH AREA R15 reviews; March 2020, June 2020, March 2021,
SEP

Conference Organization/Chair

- 30 June-4 July 2018 Conference organizer and President of the International Cannabinoid
Research Society meeting in Leiden, Netherlands.
15 Dec 2016 Co-Chair and Organizer of the British Pharmacological Society 2016
annual meeting of a session called “Fatty acid amides (*aka* lipoamines) beyond
cannabinoids”
30 June, 2016 Co-Chair for 2016 ICRS annual meeting session on “Endocannabinoid
Metabolism”
29 June 2015 Co-Chair for 2015 ICRS annual meeting session on “Endocannabinoid
Transport and Metabolism”
7 August, 2012 Chair for 2013 GRC: Cannabinoids and CNS functioning-signal
trafficking session.
24 July, 2012 Co-Chair for 2012 ICRS annual meeting session on “Receptor
Signaling”.
14 Sept 2012 Chair for 2012 TRiP to Spain meeting on TRP receptors for Session 4

Broadcast interviews

<http://wfhb.org/news/big-talk-w-michael-glab-heather-bradshaw/>

Fellowships and Grants:

ACTIVE

NIH-RO1, MPI Olivier Manzoni (PI), INSERM, Marseille, France, Ken Mackie (PI) and Heather Bradshaw (Co-I) IU Bloomington. 1 Aug 2017-31 May 2022

“Sex-specific critical periods determine the effects of cannabinoids on the mesocorticolimbic system”

The major goals of this project are to determine the modulation of the endogenous cannabinoid system changes as a function of sex and development in the mesocorticolimbic system.

NIH-R01DA041208, MPI Atsushi Kamiya and Mikhail Pletnikov Johns Hopkins University, Bradshaw Co-I. Sept 2016-Aug 2021

“Genetic alterations in astrocytes exacerbate cognitive effects of adolescent cannabis exposure”

The major goals of this project is to understand that role of THC and eCB signaling in astrocytes plays in the signaling of DISC-1 that contributes to schizophrenia.

Welcome Trust 223279: PI Dan Brierley, University College London; Bradshaw Co-I 1 Jan 2022-Dec 2025

“Functional mapping of gut-brain neurocircuitry in health and obesity”

The major goal of the project for the Bradshaw lab is to perform lipidomics analysis on gut and brain tissue in animals with either low-fat or high-fat diets to determine the effect on endogenous signal lipids.

PENDING

Indiana Spinal Cord & Brain Injury Research Fund
Heather Bradshaw (PI), Jonathan Crystal (Co-I)

Dec 2021-Nov 2023

“Lipid biomarker and behavioral analyses in a pre-clinical model for post-concussion syndrome and cannabidiol treatment for mTBI”

1R01DA056140-01 Heather Bradshaw (MPI), Andrea Hohman (MPI), Craig Ferris (MPI)
April 2022-March 2027

“Mechanisms of Cannabidiol-induced Analgesia”

1R01DA053106-01 Hui-Chen Lu (PI), Bradshaw Co-1

Heather B Bradshaw: CV

(scored 12th percentile, going to council Sept 2021)

Dec 2021-Nov 2026

Lasting behavioral impacts of perinatal phytocannabinoids and their treatment

COMPLETED

R01 DA006668 SK Dey (PI) Cincinnati Children's Hospital Medical Center-
H Bradshaw (Co-I) April 2015-March 2020
Endocannabinoid Signaling during Early Pregnancy \$25,000/year to Bradshaw

The major goals of this grant are to characterize the contribution of endogenous lipid signaling in the timing of implantation.

RO1 EY024625 (NEI) Straiker (PI) Bradshaw (Co-I) IU August 2014-July 2018
Harnessing endogenous cannabinoids for ocular health \$15,000/year to Bradshaw

The main goals of this study are to understand the role that lipid signaling molecules play in the pathophysiology of the eye.

Indiana Spinal Cord & Brain Injury Research Fund
J Hurley (PI) H Bradshaw (Co-I) July 2016-June 2018
Sensitization of the Trigeminovascular System after mTBI: a mechanism for posttraumatic migraine? \$15,000/year to Bradshaw

The major goal of this project is to characterize the role of TRP receptor activation and modulation of their endogenous lipid ligands in a model of migraine.

CTSI Core Pilot Grant: Bradshaw PI
"Transcriptome analysis on adolescent and adult brains after THC exposure"
1 Sept 2016 – 31 Aug 2018.
\$8,264

Indiana University Collaborative Research Grants
G Oxford/J Hurley (IUPUI)-H Bradshaw (IUB) April 2015-March 2016
\$66000 direct

"Induction and maintenance of chronic migraine: regulation of TPR channels by endogenous *N*-acyl amides"

The major goals of this project are to identify novel lipid signaling molecules and their functions in the trigeminal nerve in a model of chronic migraine.

Translational/Clinical Neuroscience Pilot Grant Steve Kinsey(WV)/Heather Bradshaw (IU)
Co-PIs June 2014-March 2016
\$50,000 direct

Heather B Bradshaw: CV

“Controlling arthritic pain and inflammation by enzyme blockade”

The major goals of this grant are to determine how the lipidome is involved in the mechanisms of action of enzyme blocking therapeutics in a rodent arthritic model.

(PI Bradshaw) 6/1/2011-5/31/2014
1R21DA032150-01A1 \$275,000 direct

“Microglial activation by *N*-arachidonyl glycine”

The major goals of this project are to examine the role of GPR18 activation by Narachidonoyl glycine in microglial migration.

(PI Straiker) Co-I 8/1/2011-7/30/2013 R21EY021831 \$275,000 direct

“GPR119: A novel means to lower intraocular pressure?”

The major goals of this project are to determine the signaling pathways of GPR119 and Noleoyl ethanolamine as it relates to intraocular pressure. My role in the project is to isolate and measure endogenous lipids from multiple areas of the eye.

(Co-PI Bradshaw) 9/1/2008-8/31/2012
US-Israel Binational Science Foundation \$54,000 direct

“Oleoyl-serine, an Endogenous Regulator of Skeletal Mass”

The major goals of this project are to characterize novel *N*-acyl amide lipid signaling molecules in bone.

(PI Walker 3/01/05-1/06/2008: PI Mackie 1/07/08-2/28/2011) \$1,300,000 direct
RO1 DA018224-01A1 3/01/05-2/28/2011
Role of Endogenous Vanilloids and Cannabinoids in Pain

The grant PI, J Michael Walker, died in Jan. 2008 and the administrative duties were transferred to Kenneth Mackie, whereas, the scientific content management was transferred to me, Heather Bradshaw. The goals of the project were to develop broad lipidomics techniques aimed at elucidating additional novel lipids that were structurally analogous to endogenous vanilloids and how these molecules played a role in pain.

(PI Bradshaw: JM Walker Advisor) 9/1/2002-8/31/2005
Ruth L. Kirschstein NRSA \$140,000
7F32DA016825-02 “Endocannabinoids in Reproductive Pain”

Heather B Bradshaw: CV

The major goals of this project were to characterize the role of endogenous cannabinoids on uterine contractility as well as examine the effects of changes in uterine hormones on endogenous cannabinoid production.