

CURRICULUM VITAE

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Education and Training

1987 Diploma in Biology (Dipl. Biol.) University of Stuttgart, Stuttgart, Germany
1992 Ph.D. (Dr. rer. nat.) Biology, University of Stuttgart, Stuttgart, Germany; Mentor: Werner J. Schmidt
Thesis: "Verhaltenspharmakologische und neurochemische Charakterisierung der Funktion von Dopamin im medialen präfrontalen Cortex der Ratte"
1992-1994 Postdoctoral Fellow, Department of Neuropharmacology, University of Tübingen, Tübingen, Germany. Supervisor: Werner J. Schmidt
1994-1995 Postdoctoral fellow (van den Houten Foundation), Netherlands Institute for Brain Research, Amsterdam, The Netherlands. Supervisor: Matthijs G. P. Feenstra
1995 Postdoctoral Fellow, Department of Psychiatry, Yale University School of Medicine, New Haven, CT, U.S.A. Supervisor: Ariel Y. Deutch
1996 Postdoctoral Associate, Department of Psychiatry, Yale University School of Medicine, New Haven, CT, U.S.A. Supervisor: Ariel Y. Deutch
1996-2002 Research Fellow, Department of Psychiatry, Vanderbilt University School of Medicine, Nashville, TN, U.S.A. Supervisor: Ariel Y. Deutch

Academic Appointments

1985-1987 Teaching Assistant, University of Stuttgart, Biological Institute, PI Dr. Peter Kunze, Experimental course in Animal Physiology (for undergraduates)
1989-1994 Teaching Assistant, University of Tübingen, Division of Zoology, PI Dr Werner Schmidt, Experimental Course in Behavioural Pharmacology (for undergraduates)
2002-2009 Research Instructor, Department of Psychiatry, Vanderbilt University School of Medicine, Nashville, TN, U.S.A. Supervisor: Ariel Y. Deutch
2009-2011 Research Instructor, Department of Pharmacology, Vanderbilt University School of Medicine, Nashville, TN, U.S.A. Supervisors: P. Jeffrey Conn / Carrie K. Jones
2011-2014 Research Assistant Professor, Department of Pharmacology and Vanderbilt Center for Neuroscience Drug Discovery, Vanderbilt University School of Medicine, Nashville, TN, U.S.A. Supervisors: P. Jeffrey Conn / Carrie K. Jones
2015-2021 Research Assistant Professor, Department of Pharmacology and Vanderbilt Center for Neuroscience Drug Discovery, Vanderbilt University School of Medicine, Nashville, TN, U.S.A. Supervisor: Carrie K. Jones
2015-2023 Research Assistant Professor, Department of Pharmacology and Warren Center for Neuroscience Drug Discovery, Vanderbilt University School of Medicine, Nashville, TN, U.S.A. Supervisor: Carrie K. Jones

Professional Organizations

Deutsche Gesellschaft für Experimentelle und Klinische Pharmacologie und Toxicologie 1992-present

Reviewing Activities

Ad hoc reviewer for the following journals:

Archives Internationales de Pharmacodynamie et de Therapie, Behavioural Brain Research, Biological Psychiatry, Brain Research, CNS Drugs, European Journal of Pharmacology, Experimental Neurology, Frontiers in Systems Neuroscience, International Journal of Neuropsychopharmacology, Journal of Neural Transmission, Journal of Neurochemistry, Journal of Psychiatric Research, Neuropharmacology, Neuropsychopharmacology, Neuroscience, Pharmacological Reports, Progress in Neurobiology, Schizophrenia Bulletin, Scientific Reports, Synapse

Awards or Recognitions for Professional Activities

1988	Diploma thesis awarded with a prize by the "Friends and Alumni of the University of Stuttgart"
1990	Travel award by the European Science Foundation for attending the Annual Meeting of the European Neuroscience Association in Stockholm, Sweden
1994	Postdoctoral fellowship award (Van Den Houten Foundation), Amsterdam, The Netherlands
1997	Young Investigator Award, International Congress on Schizophrenia Research, Colorado Springs, CO, U.S.A.

Research Funding

1998-2000	Young Investigator Award, National Alliance for Research on Schizophrenia and Depression (NARSAD) 07/1998 - 06/2000
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Teaching Activities

University of Tübingen

1992-1994	University of Tübingen, Department of Neuropharmacology, PI Dr Werner Schmidt, Design and coordination of neurochemical research projects; advisor for neurochemical and behavioural research projects of graduate students
1992-1993	University of Tübingen, Faculty of Biology (winter semester 1992-1993) Graduate student seminar (weekly), "Intracerebral microdialysis and related techniques: theoretical aspects and application to neuroscience"

Vanderbilt University School of Medicine

1999	Neuropharmacology section of the pharmacology course for graduate students "Animal behavioural models of neurological and neuropsychiatric disorders"
2009	Short Course: An Organ Systems Approach to Experimental Targeting of the Metabolic Syndrome
2011	Short Course: An Organ Systems Approach to Experimental Targeting of the Metabolic Syndrome
2011	PHAR 327 Modern Drug Discovery: In vivo pharmacology
2012	Short Course: An Organ Systems Approach to Experimental Targeting of the Metabolic Syndrome

Research Supervision

Postdoctoral Fellows

2002-2009	Hui-Dong Wang
2009-2011	Kera Lawson
2013-2014	Russell Amato

2014-2019	Robert W. Gould
2016-2017	Barak W. Gunter
2021-present	Shalonda M Ingram

Graduate Students

2004-2009	Bonnie Garcia
2004-2009	Sheila Kusnoor
2005-2006	Jennifer Madison
2006-2008	Brian Mathur
2010-2016	Michael D. Grannan
2011-2014	Michael Nedelcovych
2018	Kris Abney
2018-2023	Laura Teal
2019-2023	Jason Russell
2019-2022	Kayla Shumate
2023-present	Raleigh Jonscher

Vanderbilt Undergraduate Student Researchers

2002-2004	Sheila Kusnoor
2010-2011	Nikhila Reddy
2010-2013	Rachael Saporito
2013-2016	Xuwen Gong
2015-2016	Caroline Bertsch
2016-2018	Lee S. Schmidt
2018-2019	Richard Fu
2019-2020	Stephen Nandzo
2019-present	Edith Duncan
2021-2022	Julie Minjin Choi
2021-2023	Arthur Yu
2021-2023	Mary Wilson Screws
2022-present	Laura Wan
2022-present	Tigist Tilahun
2022-present	Matthew Antkowiak

Vanderbilt Summer Student Researchers

	Charee Stanley
	Tabitha Jarman
2021	Ereny Morcos

Research Staff Scientists

2003-2005	Tamara Geraci
2009-2013	Rebekah Lambert
2009-2013	Sarah Jo Howard
2010-2015	Jermaine Wilson
2011-2015	Weimin Peng
2013-2014	Grant Muller
2013-2014	Rafael Perez
2014-2016	Josh Luffman
2016-2017	Xuwen Gong
2017-2019	Rebecca Sale
2018-2019	Hudson Robb

2019-2020	Davin Bryant
2019-2020	Avi Prajapati
2019-2021	Madeline Ragland
2020-2021	Melanie Couch
2022-2023	Derek Rios

Bibliography

Bibliometrics (based on Web of Knowledge Database)

- Total citations (1989-2023): 3815
- Total citations without self-citations (1989-2023): 3666
- Average citations per manuscript: 37.77
- h-index: 34

Bibliometrics (based on Google Scholar)

- Total citations (1989-2021): 5365
- h-index: 41
- i10-index: 66
- Total citations (2018-2023): 1761
- h-index: 25
- i10-index: 47

Primary Publications

1. Schmidt WJ, **Bubser M**. Anticataleptic effects of the N-methyl-D-aspartate antagonist MK-801 in rats. *Pharmacol Biochem Behav.* 1989. 32:621-623.
2. **Bubser M**, Schmidt WJ. 6-hydroxydopamine lesion of the rat prefrontal cortex increases locomotor activity, impairs acquisition of delayed alternation tasks but does not affect uninterrupted maze tasks. *Behav Brain Res.* 1990. 37:157-168.
3. Schmidt WJ, **Bubser M**, Hauber W. Excitatory amino acids and Parkinson's disease. *Trends Neurosci.* 1990. 13:46-47.
4. Schmidt WJ, **Bubser M**, Hauber W. Excitatory amino acid antagonists and Parkinson's disease - Reply. *Trends Neurosci.* 1990. 13:327.
5. **Bubser M**, Keseberg U, Notz PK, Schmidt, WJ. Differential behavioural and neurochemical effects of competitive and non-competitive NMDA receptor antagonists in rats. *Eur J Pharmacol.* 1992. 229:75-82.
6. Schmidt WJ, **Bubser M**, Hauber W. Behavioural pharmacology of glutamate in the basal ganglia. *J Neural Transm [Suppl].* 1992. 38:65-89.
7. **Bubser M**, Bartmann M. Effect of carbon in-line filters on the analysis of catecholamines by high-performance liquid chromatography with coulometric electrochemical detection. *J Chromatogr.* 1993. 615:339-342.
8. **Bubser M**. 6-Hydroxydopamine lesions of the medial prefrontal cortex of rats do not affect dopamine metabolism in the basal ganglia at short and long postsurgical intervals. *Neurochem Res.* 1994. 19:421-425.
9. **Bubser M**, Koch M. Prepulse inhibition of the acoustic startle response of rats is reduced by 6-hydroxydopamine lesions of the medial prefrontal cortex. *Psychopharmacology.* 1994. 113:487-492.

10. **Bubser M**, Schmidt WJ. Injection of apomorphine into the medial prefrontal cortex of the rat increases haloperidol-induced catalepsy. *Biol Psychiatry*. 1994. 36:64-67.
11. Hauber W, **Bubser M**, Schmidt WJ. 6-hydroxydopamine lesion of the rat prefrontal cortex impairs motor initiation but not motor execution. *Exp Brain Res*. 1994. 99:524-528.
12. Koch M, **Bubser M**. Deficient sensorimotor gating after 6-hydroxydopamine lesion of the rat medial prefrontal cortex is reversed by haloperidol. *Eur J Neurosci*. 1994. 6:1837-1845.
13. **Bubser M**, Tzschentke T, Hauber W. Behavioural and neurochemical interactions of the AMPA antagonist GYKI 52466 and the non-competitive NMDA antagonist dizicilpine in rats. *J Neural Transm (Gen Sect)*. 1995. 101:115-126.
14. Kretschmer BD, **Bubser M**, Schmidt WJ. Behavioral and neurochemical aspects of the strychnine-insensitive glycine receptor antagonist 7-chlorokynurenate in rats. *Eur J Pharmacol*. 1995. 280:37-45.
15. **Bubser M**, Feenstra MGP, Erdtsieck-Ernste, EBHW, Botterblom MHA, van Uum HFM, Pool, CW. Modulatory role of catecholamines in the transsynaptic expression of c-fos in the rat medial prefrontal cortex induced by disinhibition of the mediodorsal thalamus: a study employing microdialysis and immunohistochemistry. *Brain Res*. 1997. 749:214-225.
16. **Bubser M**, Zadow B, Kronthaler UO, Felsheim U, Rückert NGH Schmidt WJ. Behavioural pharmacology of the non-competitive NMDA antagonists dextrorphan and ADCI: relations between locomotor stimulation, anticataleptic potential and forebrain dopamine metabolism. *Naunyn-Schmiedeberg's Arch Pharmacol*. 1997. 355:767-773.
17. Feenstra M, **Bubser M**, Erdtsieck-Ernste E, van der Wal A, Botterblom M, van Uum H. Neuronal activation visualized by Fos expression after intracerebral microdialysis of drugs. In: Teelken and Korf (eds) *Neurochemistry: Cellular, molecular, and clinical aspects*, Plenum Press, New York, 1997. 1161-1166.
18. Rückert NGH, **Bubser M**, Schmidt WJ. 6-hydroxydopamine lesions of locus coeruleus and the antiparkinsonian potential of NMDA-receptor antagonists. *J Neural Transm*. 1997. 104: 363-377.
19. **Bubser M**, Deutch AY. Thalamic paraventricular nucleus neurons collateralize to innervate the prefrontal cortex and nucleus accumbens. *Brain Res*. 1998. 787:304-310.
20. **Bubser M**, de Brabander JM, Timmerman W, Feenstra MGP, Erdtsieck-Ernste EBHW, Rinkens A, van Uum JFM, Westerink BHC. Disinhibition of the mediodorsal thalamus induces Fos-like immunoreactivity in both pyramidal and GABA-containing neurons in the medial prefrontal cortex of rats, but does not affect prefrontal extracellular GABA levels. *Synapse*. 1998. 30:156-165.
21. Deutch AY, **Bubser M**, Young CD. Psychostimulant-induced Fos expression in the thalamic paraventricular nucleus. *J Neurosci*. 1998. 18:10680-10687.
22. Abi-Saab WM, **Bubser M**, Roth RH, Deutch AY. 5-HT₂ receptor regulation of extracellular GABA levels in the prefrontal cortex. *Neuropsychopharmacology*. 1999. 20:92-96.
23. **Bubser M**, Deutch AY. Stress induces Fos expression in neurons of the thalamic paraventricular nucleus that innervate limbic forebrain sites. *Synapse*. 1999. 32:13-22.
24. Young CD, **Bubser M**, Meltzer HY, Deutch AY. Clozapine pretreatment modifies haloperidol-elicited Fos induction: a regionally-specific double dissociation. *Psychopharmacology*. 1999. 144:255-263.
25. **Bubser M**, Scruggs JL, Young CD, Deutch AY. The distribution and origin of the calretinin-containing innervation of the nucleus accumbens of the rat. *Eur J Neurosci*. 2000. 12:1591-1598.
26. Scruggs JL, Patel S, **Bubser M**, Deutch AY. DOI-induced activation of the cortex: dependence on 5-HT_{2A} heteroreceptors on thalamocortical glutamatergic neurons. *J Neurosci*. 2000. 20:8846-8852.

27. **Bubser M**, Backstrom JR, Sanders-Bush E, Roth BL, Deutch AY. Distribution of serotonin 5-HT_{2A} receptors in afferents of the rat striatum. *Synapse*. 2001. 39:297-304.
28. Roth-Härer A, Lilienthal H, **Bubser M**, Kronthaler U, Mundy WR, Ward TR, Schmidt W, Winterhoff H, Winneke G. Neurotransmitter concentrations and binding at dopamine receptors in rats after maternal exposure to 3,4,3',4'-tetrachlorobiphenyl: the role of reduced thyroid hormone concentrations. *Environ Toxicol Pharmacol*. 2001. 9:103-115.
29. **Bubser M**, Deutch AY. Differential effects of typical and atypical antipsychotic drugs on striosome and matrix compartments of the striatum. *Eur J Neurosci*. 2002. 15:713-720.
30. Fadel J, **Bubser M**, Deutch AY. Differential activation of orexin neurons by antipsychotic drugs associated with weight gain. *J Neurosci*. 2002. 22: 6742-6746.
31. Petrie KA, **Bubser M**, Casey CD, Davis MD, Roth BL, Deutch AY. The neurotensin agonist PD 149163 increases Fos expression in the prefrontal cortex of the rat. *Neuropsychopharmacology*. 2004. 29:1878-1888.
32. Petrie KA, Schmidt D, **Bubser M**, Fadel J, Carraway RE, Deutch AY. Neurotensin activates GABAergic interneurons in the prefrontal cortex. *J Neurosci*. 2004. 25: 1629-1936.
33. **Bubser M**, Fadel JR, Jackson LL, Meador-Woodruff JH, Jing D, Deutch AY. Dopaminergic regulation of orexin neurons. *Eur J Neurosci*. 2005. 11: 2993-3001.
34. Deutch AY, Fadel J, **Bubser M**. Dopamine - hypocretin/orexin interactions: The prefrontal cortex and schizophrenia. In: de Lecea, L., Sutcliffe J.G. (Eds.) *Hypocretins - Integrators of Physiological Functions*. Springer, New York, U.S.A. 2005. 339-351.
35. de Lecea L, Jones BE, Boutrel B, Borgland SL, Nishino S, **Bubser M**, DiLeone R. Addiction and arousal: Alternative roles of hypothalamic peptides. *J Neurosci*. 2006. 26: 10372-10375.
36. Deutch AY, **Bubser M**. The orexins/hypocretins and schizophrenia. *Schizophr Bull*. 2007. 1277-1283.
37. Jones CK, Brady AE, Davis AA, Xiang Z, **Bubser M**, Tantawy MN, Kane AS, Bridges TM, Kennedy JP, Bradley SR, Peterson TE, Ansari MS, Baldwin RM, Kessler RM, Deutch AY, Lah JJ, Levey AI, Lindsley CW, Conn PJ. Novel selective allosteric activator of the M1 muscarinic acetylcholine receptor regulates amyloid processing and produces antipsychotic-like activity in rats. *J Neurosci*. 2008. 28:10422-10433.
38. Nayyar T, **Bubser M**, Ferguson MC, Neely MD, Goodwin JS, Montine TJ, Deutch AY, Ansah TA. Cortical serotonin and norepinephrine denervation in parkinsonism: Preferential loss of the beaded serotonin innervation. *Eur J Neurosci*. 2009. 30:207-216.
39. Gustin RM, Bichell TJ, **Bubser M**, Daily J, Filonova I, Mreshavili D, Deutch AY, Colbran RJ, Weeber EJ, Haas KF. Tissue-specific variation of Ube3a protein expression in rodents and in a mouse model of Angelman syndrome. *Neurobiol Dis*. 2010. 39:283-291.
40. **Bubser M**, Byun N, Wood MR, Jones CK. Muscarinic receptor pharmacology and circuitry for the modulation of cognition. *Handbook of Experimental Pharmacology*. 2012. 208:121-166.
41. Digby GJ, Noetzel MJ, **Bubser M**, Utley TJ, Walker AG, Byun NE, Lebois EP, Xiang Z, Sheffler DJ, Cho HP, Davis AA, Nemirovski NE, Mannenga SE, Camp BW, Bimonte-Nelson HA, Bode J, Italiano K, Morrison R, Daniels JS, Niswender CM, Olive MF, Lindsley CW, Jones CK, Conn PJ. Novel allosteric agonists of M1 muscarinic acetylcholine receptors induce brain region-specific responses that correspond with behavioral effects in animal models. *J Neurosci*. 2012. 32:8532-8544.
42. Herman EJ, **Bubser M**, Conn PJ, Jones CK. Metabotropic glutamate receptors for new treatments in schizophrenia. *Handbook of Experimental Pharmacology*. 2012. 213:297-365.
43. Jones CK, **Bubser M**, Thompson AD, Dickerson JW, Turle-Lorenzo N, Amalric M, Blobaum AL, Bridges TM, Morrison RD, Jadhav S, Engers DW, Italiano K, Bode J, Daniels JS, Lindsley CW, Hopkins

- CR, Conn PJ, Niswender CM (2012) The mGlu4 positive allosteric modulator VU0364770 produces efficacy alone and in combination with L-DOPA or an adenosine A2A antagonist in preclinical rodent models of Parkinson's disease. *J Pharmacol Exp Ther.* 340:404-421.
44. Jones CK, Byun N, **Bubser M**. Muscarinic and nicotinic acetylcholine receptor agonists and allosteric modulators for the treatment of schizophrenia. *Neuropsychopharmacology.* 2012. 37:16-42.
45. Kusnoor SV, **Bubser M**, Deutch AY. The effects of nigrostriatal dopamine depletion on the thalamic parafascicular nucleus. *Brain Res.* 2012. 1446:46-55.
46. Johnson KA, Jones CK, Tantawy MN, **Bubser M**, Marvanova M, Ansari MS, Baldwin RM, Conn PJ, Niswender CM. (2013) The metabotropic glutamate receptor 8 agonist (S)-3,4-DCPG reverses motor deficits in prolonged but not acute models of Parkinson's disease. *Neuropharmacology.* 2013. 66:187-195.
47. Engers DW, Jones CK, **Bubser M**, Thompson AD, Blobaum AL, Sheffler DJ, Zamorano R, Carrington SJS, Bridges TM, Morrison RD, Daniels JS, Conn PJ, Lindsley CW, Niswender CM, Hopkins CR. Discovery of a novel metabotropic glutamate receptor 4 (mGlu4) positive allosteric modulator (PAM) extended probe: Characterization of ML292, a potent and selective mGlu4 PAM which produces efficacy alone or in combination with L-DOPA in preclinical rodent models of Parkinson's disease. 2012 Apr 2 [Updated 2013 Feb 25]. In: Probe Reports from the NIH Molecular Libraries Program [Internet]. Bethesda (MD): National Center for Biotechnology Information (US); 2012. Available from: <http://www.ncbi.nlm.nih.gov/books/NBK133426/>.
48. Berry CG, **Bubser M**, Jones CK, Hayes JP, Wepy JA, Locuson C, Daniels JS, Lindsley CW, Hopkins CR. Discovery and characterization of ML398, a potent and selective antagonist of the D4 receptor with in vivo activity. *ACS Med Chem Lett.* 2014. 5: 1060-1064.
49. **Bubser M**, Bridges TM, Dencker D, Gould RW, Grannan M, Noetzel MJ, Lamsal A, Niswender CM, Daniels JS, Poslusney MS, Melancon BJ, Tarr JC, Byers FW, Wess J, Duggan ME, Dunlop J, Wood MW, Wood MR, Lindsley CW, Conn PJ, Jones CK. Positive Allosteric Modulation of M4 Muscarinic Acetylcholine Receptors Reverses MK-801-induced Behavioral Impairments and Enhances Associative Learning in Rodents. *ACS Chem Neurosci.* 2014. 5: 920-942.
50. Byun NE, Grannan M, **Bubser M**, Barry RL, Thompson A, Rosanelli J, Gowrishankar R, Kelm NS, Damon S, Bridges T, Melancon BJ, Tarr JC, Brogan JT, Avison MJ, Deutch A, Wess J, Wood MR, Lindsley CR, Gore JC, Conn PJ, Jones CK. Antipsychotic-like and cognitive enhancing effects of the selective M4 muscarinic acetylcholine receptor positive allosteric modulator VU0152100. *Neuropsychopharmacology.* 2014. 39: 1578-1593.
51. Cho HP, Garcia-Barrantes PM, Brogan JT, Hopkins CR, Niswender CM, Rodriguez AL, Venable DF, Morrison RD, **Bubser M**, Daniels JS, Jones CK, Conn PJ, Lindsley CW. Chemical modulation of mutant mGlu1 receptors derived from deleterious GRM1 mutations found in schizophrenics. *ACS Chem Biol.* 2014. 9: 2234-2346.
52. Nedelcovych MT, Gould RW, Zhan X, **Bubser M**, Gong X, Grannan M, Thompson AT, Ivarsson M, Lindsley CW, Conn PJ, Jones CK. A Rodent Model of Traumatic Stress Induces Lasting Sleep and Quantitative Electroencephalographic Disturbances. *ACS Chem Neurosci.* 2015. 6: 485-493.
53. Iderberg H, Maslava N, Thompson AD, **Bubser M**, Niswender CM, Hopkins CR, Lindsley CW, Conn PJ, Jones CK, Cenci MA. Pharmacological stimulation of metabotropic glutamate receptor type 4 in a rat model of Parkinson's disease and L-DOPA-induced dyskinesia: Comparison between a positive allosteric modulator and an orthosteric agonist. *Neuropharmacology.* 2015. 95: 121-129.
54. Rook JM, Xiang Z, Lv X, Ghoshal A, Dickerson JW, Bridges TM, Johnson KA, Foster DJ, Gregory KJ, Vinson PN, Thompson AD, Byun N., Collier RL, **Bubser M**, Nedelcovych MT, Gould RW, Stauffer SR, Daniels JS, Niswender CM, Lavreysen H, Mackie C, Conde-Ceide S, Alcazar J, Bartolomé-Nebrada JM, Macdonald GJ, Talpos JC, Steckler T, Jones CK, Lindsley CW, Conn PJ. Biased mGlu5 positive

allosteric modulators provide in vivo efficacy without potentiating mGlu5 modulation of NMDAR currents. *Neuron*. 2015. 86: 1029-1040.

55. Gould RW, Dencker D, Grannan M, **Bubser M**, Zhan X, Wess J, Xiang Z, Locuson C, Lindsley CW, Conn PJ, Jones CK. (2015) Role for the M1 Muscarinic Acetylcholine Receptor in Top-Down Cognitive Processing Using a Touchscreen Visual Discrimination Task in Mice. *ACS Chem Neurosci*. 2015. 6: 1683-1695.
56. Gould RW, Amato RJ, **Bubser M**, Joffe ME, Nedelcovych MT, Thompson AD, Nickols HH, Yuh JP, Zhan X, Felts AS, Rodriguez AL, Morrison RD, Byers FW, Rook JM, Daniels JS, Niswender CM, Conn PJ, Emmitte KA, Lindsley CW, Jones CK. Partial mGlu5 Negative Allosteric Modulators Attenuate Cocaine-Mediated Behaviors and Lack Psychotomimetic-Like Effects. *Neuropsychopharmacology*. 2016. 41: 1166-1178.
57. Gould RW, Nedelcovych MT, Gong X, Tsai E, **Bubser M**, Bridges TM, Wood MR, Duggan ME, Brandon NJ, Dunlop J, Wood MW, Ivarsson M, Noetzel MJ, Daniels JS, Niswender CM, Lindsley CW, Conn PJ, Jones CK. State-dependent alterations in sleep/wake architecture elicited by the M4 PAM VU0467154 – Relation to antipsychotic drug-like effects. *Neuropharmacology*. 2016. 102: 244-253.
58. Grannan MD, Mielnik CA, Moran SP, Gould RW, Ball J, Lu Z, **Bubser M**, Ramsey AJ, Abe M, Cho HP, Nance KD, Blobaum AL, Niswender CM, Conn PJ, Lindsley CW, Jones CK Prefrontal cortex-mediated impairments in a genetic model of NMDA receptor hypofunction are reversed by the novel M1 PAM VU6004256. *ACS Chem Neurosci*. 2016. 7: 1706-1716.
59. Nickols HH, Yuh JP, Gregory KJ, Morrison RD, Bates BS, Stauffer SR, Emmitte KA, **Bubser M**, Peng W, Nedelcovych MT, Thompson A, Lv X, Xiang Z, Daniels JS, Niswender CM, Lindsley CW, Jones CK, Conn PJ. VU0477573: Partial negative allosteric modulator of the subtype 5 metabotropic glutamate receptor with in vivo efficacy. *J Pharmacol Exp Ther*. 2016. 356: 123-136.
60. Niswender CM, Jones CK, Lin X, **Bubser M**, Thompson Gray A, Blobaum AL, Engers DW, Rodriguez AL, Loch MT, Daniels JS, Lindsley CW, Hopkins CR, Javitch JA, Conn PJ. Development and antiparkinsonian activity of VU0418506, a selective positive allosteric modulator of metabotropic glutamate receptor 4 homomers without activity at mGlu2/4 heteromers. *ACS Chem Neurosci*. 2016. 7: 1201-1211.
61. White MG, Cody PA, **Bubser M**, Wang HD, Deutch AY, Mathur BN. Cortical hierarchy governs rat claustrrocortical circuit organization. *J Comp Neurol*. 2016. 525: 1347-1362.
62. Wood MR, Noetzel MJ, Engers JL, Bollinger KA, Melancon BJ, Tarr JC, Han C, West M, Gregro AR, Lamsal A, Chang S, Ajmera S, Smith E, Chase P, Hodder PS, **Bubser M**, Jones CK, Hopkins CR, Emmitte KA, Niswender CM, Wood MW, Duggan ME, Conn PJ, Bridges TM, Lindsley CW. Discovery and optimization of a novel series of highly CNS penetrant M4 PAMs based on a 5,6-dimethyl-4-(piperidin-1-yl)thieno[2,3-d]pyrimidine core. *Bioorg Med Chem Lett*. 2016. 26: 3029-3033.
63. Wood MR, Noetzel MJ, Poslusney MS, Melancon BJ, Tarr JC, Lamsal A, Chang S, Luscombe VB, Weiner RL, Cho HP, **Bubser M**, Jones CK, Niswender CM, Wood MW, Engers DW, Brandon NJ, Duggan ME, Conn PJ, Bridges TM, Lindsley CW. Challenges in the development of an M4 PAM in vivo tool compound: The discovery of VU0467154 and unexpected DMPK profiles of close analogs. *Bioorg& Med Chem Lett*. 2017. 27: 171-175
64. Wood MR, Noetzel MJ, Melancon BJ, Poslusney MS, Nance KD, Hurtado MA, Luscombe VB, Weiner RL, Rodriguez AL, Lamsal A, Chang S, **Bubser M**, Blobaum AL, Engers DW, Niswender CM, Jones CK, Brandon NJ, Wood MW, Duggan ME, Conn PJ, Bridges TM, Lindsley CW. Discovery of VU0467485/AZ13713945: An M4 PAM evaluated as a preclinical candidate for the treatment of schizophrenia. *ACS Medl Chem Lett*. 2017. 8: 233-238.
65. Melancon BJ, Wood MR, Noetzel MJ, Nance KD, Engelberg EM, Han C, Lamsal A, Chang S, Cho HP, Byers FW, **Bubser M**, Jones CK, Niswender CM, Wood MW, Engers DW, Wu D, Brandon NJ, Duggan

- ME, Conn PJ, Bridges TM, Lindsley CW. Optimization of M4 positive allosteric modulators (PAMs): The discovery of VU0476406, a non-human primate in vivo tool compound for translational pharmacology. *Bioorg Med Chem Lett*. 2017. 27: 2296-2301.
66. Zike ID, Chohan MO, Kopelman JM, Krasnow EN, Flicker D, Nautiyal KM, **Bubser M**, Kellendonk C, Jones CK, Stanwood G, Tanaka KF, Moore H, Ahmari SE, Veenstra-VanderWeele J. OCD candidate gene SLC1A1/EAAT3 impacts basal ganglia-mediated activity and stereotypic behavior. *Proc Natl Acad Sci USA*. 2017. 114: 5719-5724.
67. Bollinger KA, Felts AS, Brassard CJ, Engers JL, Rodriguez AL, Weiner RL, Cho HP, Chang S, **Bubser M**, Jones CK, Blobaum AL, Niswender CM, Conn PJ, Emmitte KA, Lindsley CW. Design and synthesis of mGlu2 NAMs with Improved Potency and CNS Penetration Based on a Truncated Picolinamide Core. *ACS Med Chem Lett*. 2017. 8: 919-924.
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89. Jones C, Gould R, Gunter B, **Bubser M**, Matthews R, Teal L, Robb H, Ragland M, Bridges T, Garrison A, Winder D, Lindsley C. 2019. Development of selective M5 muscarinic acetylcholine receptor negative allosteric modulators for the prevention of opioid misuse and relapse. *Neuropsychopharmacology* 44 (Suppl 1) 470-471.
90. Russell JK, Gould RW, **Bubser M**, Fu RJ, Norman N, Nader MA, Newhouse PA, Lindsley CW, Conn PJ, Jones CK (2019) Circadian rhythm-dependent effects of M1 muscarinic acetylcholine receptor positive allosteric modulators on arousal and cognition. *Alzheimer's & Dementia: The Journal of the Alzheimer's Association* 15:P596-P597.
91. Teal L, Gould RW, **Bubser M**, Duncan E, Matthews RT, Winder DG, Lindsley CW, Jones CK. Shortacting M5 negative allosteric modulator VU6008667 attenuates response to oxycodone in rats. June 15th-19th, 2019, 81st The College on Problems of Drug Dependence Annual Scientific Meeting, San Antonio, TX.
92. Russell JK, **Bubser M**, Newhouse PA, Lindsley CW Jones CK. Age and Circadian Rhythm-Dependent Effects of M1 Muscarinic Acetylcholine Receptor Positive Allosteric Modulators and Donepezil on Sleep/Wake Architecture and Arousal. 2021 Alzheimer's Association International Conference, Virtual Poster.
93. Teal L, Gould RW, **Bubser M**, Duncan E, Matthews RT, Winder DG, Lindsley CW, Jones CK. Shortacting M5 negative allosteric modulator VU6008667 attenuates response to oxycodone in rats. June 15th-19th, 2019, 81st The College on Problems of Drug Dependence Annual Scientific Meeting, San Antonio, TX.
94. Teal L, Gould RW, **Bubser M**, Duncan E, Matthews RT, Winder DG, Lindsley CW, Jones CK. Therapeutic Index Assessment of the M5 Negative Allosteric Modulator VU6008667 for Attenuation of Opioid Seeking Behaviors in Rodents. 2021 51st Annual Society for Neuroscience Meeting, Virtual Poster.
95. Russell JK, **Bubser M**, Ingram S, Newhouse PA, Lindsley CW, Jones CK. The M1 Muscarinic Acetylcholine Receptor Positive Allosteric Modulator VU0453595 and M4 PAM VU0467154 Normalize Sleep-Wake Architecture Deficits in Aged Mice. July 31st-August 4th, 2022 Alzheimer's Association International Conference, San Diego, CA.
96. Teal L, Duncan E, **Bubser M**, Lindsley CW, Jones CK. Chronic Administration of M5 Negative Allosteric Modulator VU6008667 Prevents Opioid, but Not Food-Maintained Self-Administration. June 11th-15th, 2022, 84th The College on Problems of Drug Dependence Annual Scientific Meeting, Minneapolis, MN.
97. Teal L, Duncan E, **Bubser M**, Lindsley CW, Jones CK. Attenuation of Oxycodone Seeking in Rats without Effects on Motor or Cognitive Function with the M5 Negative Allosteric Modulator VU6008667. May 31st-June 03, 2022, Annual American Society of Clinical Psychopharmacology, Scottsdale, AZ.
98. **Bubser M**, Teal LB, Thomas M, Bridges TM, Lindsley CW, Jones CK. The Selective M1 Muscarinic Acetylcholine Receptor Antagonist VU0255035 Attenuates Opioid Drug Seeking Behaviors in Rats. 2022 Society for Biological Psychiatry Meeting, New Orleans, LA.

Invited Presentations

1. "Control of behaviour by dopaminergic activity of the rat prefrontal cortex", September 5th 1989, REGIO NEUREX (France, Germany, Switzerland) Meeting, Freiburg i. Br. Germany.
2. "The contribution of the cortico-striatal "cognitive" loop to the acquisition of maze performance in rats", September 1991, Annual Meeting of the European Neuroscience Association, Cambridge, U.K.
3. "Neuropharmakologische Untersuchungen zur Funktion von Dopamin im präfrontalen Cortex der Ratte", July 23rd 1992, TROPON, Cologne, Germany.
4. "Behavioural pharmacology of dopamine and glutamate in the basal ganglia", February 9th 1993, Hoffmann-La Roche, Basel, Switzerland.
5. "Behavioural functions of dopamine and glutamate in the prefrontal system", March 15th 1993, SANDOZ Research Institute, Berne, Switzerland.
6. "Untersuchungen zur Dopamin-Glutamat-Interaktion in den Basalganglien: Verhaltenspharmakologische und neurochemische Effekte von NMDA-Antagonisten", July 2nd 1993, Institute for Pharmacology, University of Mainz, Mainz, Germany.
7. "Behavioural and biochemical correlates of NMDA receptor antagonism", August 24th 1993, Third Congress on Amino Acids, Vienna, Austria.
8. "Behavioural functions of dopamine and glutamate in the basal ganglia", September 7th 1993, German-Polish Symposium on Psychopharmacology, Zakopane, Poland.
9. "Verhaltenspharmakologische und neurochemische Wirkungen von NMDA-Antagonisten", September 16th 1993, 2nd Meeting on Neuropharmacology and Toxicology, Dresden, Germany.
10. "Transsynaptic changes in the medial prefrontal cortex in response to thalamic stimulation", April 19th 1995, Department of Anatomy and Embryology, Free University, Amsterdam, The Netherlands.
11. "Zur Funktion von Dopamin im präfrontalen Cortex: Von der Verhaltenspharmakologie bis zur Gen-expression", June 7th 1995, Psychiatric Hospital, University of Mainz, Mainz, Germany.
12. "The paraventricular nucleus of the thalamus: anatomical and functional relations with the limbic forebrain", April 3rd, 1998, Department of Neuroscience, University of Pittsburgh, Pittsburgh, PA, U.S.A.
13. "Thalamic regulation of limbic structures", Mai 28th 1998, Department of Neuropharmacology, University of Tübingen, Tübingen, Germany.
14. "Thalamic interactions with the limbic forebrain: anatomical and functional studies", March 31st 1999, Department of Biomedical Sciences, Marquette University, Milwaukee, WI, U.S.A.
15. "Mechanisms of action of antipsychotic drugs as determined by immediate-early gene expression: focus on motor side effects and weight gain", May 17th 2002, Department of Pharmacal Sciences, Auburn University, Auburn, AL, U.S.A.
16. "Orexin-dopamine interactions", July 22nd 2005, International Symposium Orexins/Hypocretins, Düsseldorf / Cologne, Germany.

17. "Dopaminergic regulation of orexin", October 17th 2006, Symposium "Addiction and arousal: Alternative roles of hypothalamic peptides", 36th Annual Meeting of the Society for Neuroscience, Atlanta, GA, U.S.A.