

Department of Psychiatry, Indiana University School of Medicine
Stark Neuroscience Research Institute
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EDUCATION & RESEARCH EXPERIENCE

2022-	Indiana University School of Medicine, Indianapolis, Indiana, USA Associate Professor of Psychiatry (with tenure) Department of Psychiatry; Stark Neuroscience Research Institute
2021-2022	Purdue University, West Lafayette, Indiana, USA Associate Professor of Neuroscience & Behavior (with tenure) Department of Psychological Sciences; Purdue Institute for Integrative Neuroscience
2014-2021	Purdue University, West Lafayette, Indiana, USA Assistant Professor of Neuroscience & Behavior Department of Psychological Sciences; Purdue Institute for Integrative Neuroscience
2013	University of Saskatchewan, Saskatoon, Canada Research Scientist, Physiology; <i>Mentor: Dr. John Howland</i>
2009-2012	Ernest Gallo Clinic & Research Center, University of California at San Francisco Postdoctoral Fellow, Neuroscience; <i>Mentor: Dr. Patricia Janak</i>
2005-2009	Westfälische Wilhelms Universität Münster, Germany (10/2005-04/2009) Otto-von-Guericke Universität, Magdeburg, Germany (01/2005-09/2005) Postdoctoral Fellow, Neurophysiology; <i>Mentor: Dr. Hans-Christian Pape</i>
2000-2005	University of Calgary, Canada Doctorate, Neuroscience; <i>Mentor: Dr. Ken Lukowiak</i> Thesis: Consolidation, Reconsolidation, Extinction and Forgetting in <i>Lymnaea stagnalis</i>
1998-2000	University of British Columbia, Vancouver, Canada Laboratory technician, Psychology; <i>Mentor: Dr. Catharine Rankin</i>
1994-1998	University of British Columbia, Vancouver, Canada Bachelor of Science (Behavioural Neuroscience)

RESEARCH INTERESTS

My research using animal models focuses on the neurobiological mechanisms underlying memory formation, with an emphasis on neural circuits of emotion. This work is both significant and timely to research on sex differences in stress-associated disorders and substance misuse. The objectives of my research program are to tease apart the complex and integrative circuit mediating discrimination of cues signifying safety, fear or reward. These are being accomplished using a multi-pronged approach to correlate (*in vivo* single unit electrophysiology; calcium imaging) and manipulate (chemogenetics; optogenetics) neural activity during awake behaviors.

RESEARCH SUPPORT

- NIMH R01 Research Grant (R01MH110425)
Sangha, Susan
Neural circuitry of safety, fear and reward cue discrimination
04/01/2018-12/31/2023 **Role: PI**

- NIAAA K99 Pathway to Independence Award (K99AA028265)
Timme, Nicholas
Identify how alcohol-evoked changes in neural firing affect systems level computations during decision-making
3/8/2021-2/28/2026 Role: Co-Mentor
- Feodor Lynen Return Fellowship, Alexander von Humboldt Foundation
Müller, Iris
Fear and safety processing in the brain – activation of brain regions and specific neuronal subpopulations
09/01/2019-08/31/2020 Role: Co-Mentor
- Bilsland Dissertation Fellowship, Purdue University
Ng, Ka
Neuronal correlates of safety-cue elicited fear suppression in the prefrontal cortex
08/12/2019-05/17/2020 Role: Mentor
- Purdue Doctoral Fellowship, Purdue University
Escobedo, Abraham
08/14/2017-05/10/2019 Role: Mentor
- Feodor Lynen Research Fellowship, Alexander von Humboldt Foundation
Müller, Iris
The impact of stress on different neuronal subpopulations in the basal amygdala
05/01/2017-04/30/2019 Role: Mentor
- Purdue Research Foundation Research Grant Award, Purdue University
Sangha, Susan (PI)
Neuronal encoding of fear, safety, and reward cue discrimination in the prefrontal cortex
01/01/2018-12/31/2018 **Role: PI**
- Purdue Institute for Integrative Neuroscience Seed Grant
A new method for manipulating specific neural pathways during learning
07/01/2016-06/30/2017 **Role: PI**

SALARY FELLOWSHIPS

- Human Frontier Science Program Long-term Postdoctoral Fellowship (International), 2005-2008
- Alexander von Humboldt Postdoctoral Fellowship (Germany), 2005
- Natural Sciences and Engineering Research Council of Canada-Postdoctoral Fellowship, 2004
- Canadian Institutes of Health Research's Canadian Graduate Scholarship-Doctoral Award, 2004
- Natural Sciences & Engineering Research Council of Canada-Postgraduate Scholarship B, 2002-04
- University of Calgary's Faculty of Graduate Studies Award (Canada), 2002
- University of Calgary's Graduate Assistantship (Teaching) (Canada), 2002
- Alberta Heritage Masters Scholarship (Canada), 2001
- University of Calgary's Graduate Research Scholarship (Canada), 2001

AWARDS & HONORS

- Fellow, International Behavioral Neuroscience Society, 2023
- Pavlovian Research Award, Pavlovian Society, 2022
- Distinguished Speaker, Women in Learning at Annual Meeting of Pavlovian Society, 2022
- Purdue University Seed for Success Award for Excellence in Research, 2018
- University of Calgary's Hotchkiss Brain Institute 2018 Alumnus of the Year, 2018
- International Travel Grant, Purdue Research Foundation, 2016
- Invited participation in the 5th Bonn Humboldt Award Winners' Forum, 'Frontiers in Neuroscience: Multi-scale Analysis of the Nervous System – From Molecules to Circuits', 2015
- Invited participation in the 57th Meeting of Nobel Laureates in Lindau, Germany, 2007
- Canadian Institutes of Health Research's Brain Star Award, 2006

- University of Calgary's Chancellor's Graduate Medal - Doctoral Level, 2005
- Finalist, Lindsley Prize for most outstanding dissertation in Behavioral Neuroscience (international competition), 2005
- Canadian Institutes of Health Research's Brain Star Award, 2004
- University of Calgary's Dean's Research Excellence Award, 2004
- Society for Neuroscience Chapters/Eli Lilly Graduate Student Travel Award, 2003
- University of Calgary's Graduate Travel Award, 2003
- University of Calgary's Dean's Research Excellence Award, 2003
- University of Calgary's Faculty of Graduate Studies Award, 2002
- University of Calgary's Graduate Assistantship (Teaching), 2002
- Company of Biologists' Travel Fellowship (for collaboration between Canada & Japan), 2002
- University of Calgary's Dean's Research Excellence Award, 2002
- Alberta Heritage Masters Scholarship (Canada), 2001
- University of Calgary's Graduate Research Scholarship, 2001
- University of Calgary's Dr. Keith Cooper Award, 2001

PROFESSIONAL & ACADEMIC SERVICES

- *Ad hoc reviewer:*

Behavioral Neuroscience	Behavioural Brain Research
Biological Psychiatry	BioMed Central Research Notes
eLife	eNeuro
European Journal of Neuroscience	Frontiers Behavioral Neuroscience
Journal of Comparative Psychology	Journal of Neuroscience
Learning & Memory	Molecular Psychiatry
Nature Communications	Neurobiology of Learning & Memory
Neuron	Neuropsychopharmacology
Psychoneuroendocrinology	Science Advances
Scientific Reports	Trends in Cognitive Science
- *Grant reviewer:*
 - NIH Study Section Biobehavioral Regulation, Learning, and Ethology (BRLE) (Standing Member 07/2023-06/2027; 10/2022)
 - Indiana Traumatic Spinal Cord & Brain Injury Research Grant Program (02/2023, 01/2016)
 - NIH Study Section Behavioral Neuroscience Fellowship (03/2022, 10/2021, 10/2020, 06/2020)
 - Discovery Grants Program, Natural Sciences and Engineering Research Council of Canada (2022)
 - Austrian Science Foundation (2020)
 - NIH Study Section Neurobiology of Learning & Memory (LAM) (10/2019)
 - Human Frontiers Science Program, Career Development Award (2015)
- *Associate Editor/Editorial Board Member:*
 - Neurobiology of Learning & Memory (2023-)
 - Frontiers Behavioral Neuroscience: Learning and Memory (2019-2022)
 - Frontiers Behavioral Neuroscience: Emotion Regulation and Processing (2019-2022)
 - Scientific Reports (2019-2021)
- *Stark Neuroscience Research Institute:*
 - Chair, Women in Neuroscience Committee (2022-)
 - Chair, SNRI Seminar Committee (2022-)
 - SNRI Executive Committee (2022-)
 - Diversity, Equity, Inclusion & Wellness Committee (2022-)
 - Teaching Advisory Committee (2023-)
- *Pavlovian Society.* President (2023-2024). President-Elect (2022-2023).
- *International Behavioral Neuroscience Society:*
 - Ethics & Diversity Committee (2019-2022). Chair, 2021-2022. Co-Chair, 2020-2021.

Education & Training Committee (2019-2022).

- *Pavlovian Society Executive Committee* (2017-2021). Elected officer.
- *Greater Indiana Society for Neuroscience Chapter Executive Committee* (2016-2019). Lead Organizer, 2018.
- *Purdue University, Purdue Faculty Association, Co-Chair* (2014-2015).
- *News and Views writer* (2004-2007), *Journal of Experimental Biology, Neurophysiology/ Neuroethology*; Editor: Dr. Kathryn Phillips

PUBLICATIONS *corresponding author h-index 26

• **JOURNAL ARTICLES**

- Ng K, Pollock M, Escobedo A, Bachman B, Miyazaki N, Bartlett EL, **Sangha S*** (2023). Suppressing fear in the presence of a safety cue requires infralimbic cortical signaling to central amygdala. *Neuropsychopharmacology*, doi: 10.1030/s41386-023-01598-0. [Link](#)
- Fitzgerald J*, Webb EK, **Sangha S** (2023). Psychological and physiological correlates of stimulus discrimination in adults. *Psychophysiology*, e14327. doi: 10.1111/psyp.14327. [Link](#)
- Ng KH, **Sangha S*** (2023). Encoding of conditioned inhibitors of fear in the infralimbic cortex. *Cereb Cortex*, 33: 5658-5670. [Link](#)
- Hackleman A, Ibrahim M, Shim K, **Sangha S*** (2023). Interaction of stress and alcohol on discriminating fear from safety and reward in male and female rats. *Psychopharmacology*, 240: 609-621. [Link](#)
- Sangha S*** (2021). Elevated dopamine in the amygdala disrupts infant's approach to mother: Implications for development of neurotypical social behaviors and networks. *Neuron*, 109(24): 3900-3902. [Link](#)
- Meyer HC*, **Sangha S**, Radley JJ, LaLumiere RT, and Baratta MV (2021). Environmental Certainty Influences the Neural Systems Regulating Responses to Threat and Stress. *Neurosci Biobehav Rev*, 131: 1037-1055. [Link](#)
- Müller I*, Adams DD, **Sangha S**, Chester JA (2021). Juvenile stress facilitates safety learning in male and female high alcohol preferring mice. *Behavioural Brain Research*, 400: 113006. [Link](#)
- Krueger JN*, **Sangha S*** (2021). On the basis of sex: Differences in safety discrimination vs. conditioned inhibition. *Behavioural Brain Research*, 400: 113024. [Link](#)
- Woon E, Seibert T, Urbanczyk P, Ng KH, **Sangha S*** (2020). Differential effects of prior stress on conditioned inhibition of fear and fear extinction. *Behavioural Brain Research*, 381: 112414. [Link](#)
- Sangha S***, Diehl M, Bergstrom H, Drew M (2020). Know Safety, No Fear. *Neurosci Biobehav Rev*, 108: 218-230. [Link](#)
- Greiner EM, Müller I, Norris MR, Ng KH, **Sangha S*** (2019). Sex differences in fear regulation and reward seeking behaviors in a fear-safety-reward discrimination task. *Behavioural Brain Research*, 368: 111903. [Link](#)
- Müller I*, Brinkman AL, Sowinski EM, **Sangha S*** (2018). Adolescent conditioning affects rate of adult fear, safety and reward learning during discriminative conditioning. *Scientific Reports*, 8:17315. [Link](#)
- Ng K, Pollock MW, Urbanczyk PJ, **Sangha S*** (2018). Altering D1 receptor activity in the basolateral amygdala impairs fear suppression during a safety cue. *Neurobiol Learn Mem*, 147:26. [Link](#)
- Sangha S*** (2015). Plasticity of fear and safety neurons of the amygdala in response to fear extinction. *Front Behav Neurosci*, 9:354. [Link](#)
- Sangha S***, Greba Q, Robinson PD, Ballendine SA, Howland JG* (2014). Heightened fear in response to a safety cue and extinguished fear cue in a rat model of maternal immune activation. *Front Behav Neurosci*, 8:168. [Link](#)
- Sangha S***, Robinson PD, Davies DA, Greba Q, Howland JG* (2014). Alterations in reward, fear and safety cue discrimination after inactivation of the prelimbic and infralimbic cortices. *Neuropsychopharm*, 39:2405-2413. [Link](#)
- Sangha S***, Chadick JZ, Janak PH* (2013). Safety encoding in the basal amygdala. *J Neurosci*, 33: 3744-3751. [Link](#) ['Featured Article: Systems/Circuits'](#)

- Christianson JP, Fernando ABP, Kazama AM, Jovanovic T, Ostroff LE, **Sangha S** (2012). Inhibition of fear by learned safety signals: minisymposium review. *J Neurosci*, 32:14118-14124. [Link](#)
- Sangha S***, Ilenseer J, Sosulina L, Lesting J, Pape H-C (2012). Differential regulation of glutamic acid decarboxylase gene expression after extinction of a recent memory versus intermediate memory. *Learn Mem*, 19:194-200. [Link](#)
- Lesting J, Narayanan RT, Seidenbecher T, Kluge C, **Sangha S**, Pape H-C (2011). Patterns of coupled theta activity in amygdala-hippocampal-prefrontal cortical circuits during fear extinction. *PLoS One*, 6:e21714. [Link](#)
- Sangha S**, Narayanan RT, Bergado-Acosta JR, Stork O, Seidenbecher T, Pape H-C (2009). Deficiency of the 65-kDa isoform of glutamic acid decarboxylase impairs extinction of cued but not contextual fear memory. *J Neurosci*, 29:15713-15720. [Link](#)
- Jüngling K, Seidenbecher T, Sosulina L, Lesting J, **Sangha S**, Clark SD, Okamura N, Duangdao DM, Xu Y-L, Reinscheid RK, Pape H-C (2008). Neuropeptide S: reduced expression and facilitated extinction of fear through control of intercalated GABAergic neurons in the amygdala. *Neuron*, 59:298-310. [Link](#)
- Bergado-Acosta JR, **Sangha S**, Narayanan RT, Obata K, Pape H-C, Stork O (2008). Critical role of the 65kD isoform of glutamic acid decarboxylase in consolidation and generalization of Pavlovian fear memory. *Learn Mem*, 15:163-171. [Link](#)
- Narayanan RT, Seidenbecher T, **Sangha S**, Stork O, Pape H-C (2007). Theta re-synchronization during reconsolidation of remote contextual fear memory. *Neuroreport*, 18:1107-11. [Link](#)
- Lukowiak K, Martens K, Orr M, Parvez K, Rosenegger D, **Sangha S** (2006). Modulation of aerial respiratory behaviour in a pond snail. *Respir Physiol Neurobiol*, 154: 61-72. [Link](#)
- Rose JK#, **Sangha S**#, Rai S#, Norman KR, Rankin CH (2005). Decreased sensory stimulation reduces behavioral responding, retards development and alters neuronal connectivity in *Caenorhabditis elegans*. *J Neurosci*, 25:7159-7168. # contributed equally [Link](#)
- Sangha S**, Scheibenstock A, Martens K, Varshney N, Cooke R, Lukowiak K (2005). Impairing forgetting by preventing new learning and memory. *Behav Neurosci*, 119:787-796. [Link](#)
- Parvez K, Stewart O, **Sangha S**, Lukowiak K (2005). Boosting intermediate-term into long-term memory. *J Exp Biol*, 208:1525-1536. [Link](#)
- Sangha S**, Varshney N, Frasn M, Smyth K, Rosenegger D, Parvez K, Sadamoto H, Lukowiak K (2004). Memory, reconsolidation and extinction in *Lymnaea* require the soma of RPeD1. *Adv Exp Med Biol*, 551:311-8. [Link](#)
- Sangha S**, Scheibenstock A, Morrow R, Lukowiak K (2003). Extinction requires new RNA and protein synthesis and the soma of the cell RPeD1 in *Lymnaea stagnalis*. *J Neurosci*, 23:9842-9851. [Link](#)
- Sangha S**, Scheibenstock A, Lukowiak K (2003). Reconsolidation of a long-term memory in *Lymnaea* requires new protein and RNA synthesis and the soma of RPeD1. *J Neurosci*, 23:8034-8040. [Link](#)
- Sangha S**, Morrow R, Smyth K, Cooke R, Lukowiak K (2003). Cooling blocks ITM and LTM formation and preserves memory. *Neurobiol Learn Mem* 80:130-139. [Link](#)
- Sangha S**#, McComb C#, Lukowiak K (2003). Forgetting and the extension of memory in *Lymnaea*. *J Exp Biol* 206:71-77. # contributed equally [Link](#)
- Sangha S**, Scheibenstock A, McComb C, Lukowiak K (2003). Intermediate and long-term memories of associative learning are differentially affected by transcription vs. translation blockers in *Lymnaea*. *J Exp Biol* 206:1605-1613. [Link](#)
- Lukowiak K, Haque Z, Spencer G, Varshay N, **Sangha S**, Syed N (2003). Long-term memory survives nerve injury and the subsequent regeneration process. *Learn Mem* 10:44-54. [Link](#)
- Lukowiak K, **Sangha S**, Scheibenstock A, Parvez K, McComb C, Rosenegger D, Varshney N, Sadamoto H (2003). Molluscan model systems: In search for the engram. *J Physiol Paris*, 97:69-76. [Link](#)
- Lukowiak K, **Sangha S**, McComb C, Varshney N, Rosenegger D, Sadamoto H, Scheibenstock A (2003). Associative learning and memory in *Lymnaea stagnalis*: how well do they remember? *J Exp Biol* 206: 2097-2103. [Link](#)
- McComb C#, **Sangha S**#, Quadry S, Yue J, Scheibenstock A, Lukowiak K (2002). Context extinction and concurrent context associative learning in *Lymnaea*. *Neurobiol Learn Mem* 78:23-34. # contributed equally. [Link](#)

- Sangha S#**, McComb C#, Scheibenstock A, Johannes C, Lukowiak K (2002). The effects of continuous vs. partial reinforcement schedules on associative learning, memory and extinction in *Lymnaea*. J Exp Biol 205:1171-1178. # contributed equally. [Link](#)
- Smyth K, **Sangha S**, Lukowiak K (2002). Gone but not forgotten: The lingering effects of intermediate term memory on the persistence of LTM. J Exp Biol 205:131-140. [Link](#)

• **EDITED BOOK**

- Sangha, S.***, Foti, D.* (2018). *Neurobiology of Abnormal Emotion and Motivated Behaviors: Integrating Animal and Human Research*. 1st edition. Cambridge, Massachusetts: Academic Press. [Link](#) *Nominated for a Prose Award for Excellence in Reference Works by the Association of American Publishers.*

• **COMMENTARIES**

- Sangha S*** (2007). Erasing Memories. J Exp Biol 210(23): v-a. [Link](#)
- Sangha S*** (2007). Neurons vie for Recruitment. J Exp Biol 210(17): v [Link](#)
- Sangha S*** (2007). Keeping the Memory Alive. J Exp Biol 210(11): vii. [Link](#)
- Sangha S*** (2007). Unlocking Learning. J Exp Biol 210(3): v. [Link](#)
- Sangha S*** (2006). I Feel Your Pain. J Exp Biol 209(21): iv. [Link](#)
- Sangha S*** (2006). Hopping for Wheaties. J Exp Biol 209(15): vi. [Link](#)
- Sangha S*** (2006). First and only love. J Exp Biol 209(9): v-a. [Link](#)
- Sangha S*** (2006). Less studying, better memory? J Exp Biol 209(3): vii. [Link](#)
- Sangha S*** (2005). Moving without dopamine. J Exp Biol 208 (21), v. [Link](#)
- Sangha S*** (2005). Pass the remote please. J Exp Biol 208(15), v. [Link](#)
- Sangha S*** (2005). The synapse that lost the battle. J Exp Biol 208(8), vi. [Link](#)
- Sangha S*** (2005). Competing memories. J Exp Biol 208(3), vi. [Link](#)

INVITED TALKS: EDUCATIONAL INSTITUTIONS & CONFERENCES

2023

- University of Colorado, Boulder. Neuroscience Seminar Series. Boulder, CO.
- Southern Methodist University. Biological Sciences Seminar Series. Dallas, TX.
- Leibniz-Institut für Neurobiologie Magdeburg, Germany.
- *International Conference on Learning & Memory*. Huntington Beach, CA.
- *Big 10 Neuroscience Meeting*. Indianapolis, IN
- *Gordon Research Conference: Amygdala Function in Emotion, Cognition & Disease*. Barcelona, Spain.

2022

- University of Cincinnati. Neuroscience Seminar Series. Cincinnati, OH.
- University of Texas, San Antonio. Neuroscience Seminar Series. San Antonio, TX.
- *Women in Learning Annual Luncheon*. Distinguished Speaker. Milwaukee WI.
- *Annual Meeting of the Pavlovian Society*. Women in Learning Keynote Speaker. Milwaukee WI.

2021

- University of Evansville, Department of Psychology. "Crick Lecture Series". Evansville IN.
- *Annual Meeting of the International Behavioral Neuroscience Society*. Puerto Vallarta, Mexico.

2019

- University of Wisconsin Milwaukee, Department of Psychology. Milwaukee WI.
- Indiana University School of Medicine, Stark Neuroscience Research Institute. Indianapolis IN.
- Boston College, Psychology Department. Boston MA.
- *Annual Fall Symposium of the Center for Research on Brain, Behavior, and NeuroRehabilitation*. West Lafayette IN.
- *Annual Meeting of the Society for Neuroscience*. Chicago IL.
- *Annual Meeting of the Pavlovian Society*. Vancouver Canada.

- *Gordon Research Conference: Amygdala function in emotion, cognition and disease*. Easton, MA.
- *Annual Meeting of the International Behavioral Neuroscience Society*. Cairns Australia.

2018

- University of Calgary, Hotchkiss Brain Institute. Calgary Canada. *Neuroscience Alumnus of the Year Award Talk*.
- University of Saskatchewan, Department of Physiology. Saskatoon Canada.
- Purdue University, Department of Biological Sciences. West Lafayette IN.
- Purdue University, Department of Psychological Sciences, Social Colloquium. West Lafayette IN.
- *Annual Meeting of the International Behavioral Neuroscience Society*. Boca Raton FL.
- *Annual Meeting of the Canadian Association of Neuroscience*. Vancouver Canada.
- *Annual Meeting of the Organization for the Study of Sex Differences*. Atlanta GA.
- *Winter Conference on the Neurobiology of Learning & Memory*. Park City UT.

2017

- Purdue University, Department of Psychological Sciences, Clinical Colloquium. West Lafayette IN.
- Purdue Institute for Integrative Neuroscience, Summer Seminars. West Lafayette IN.
- *Annual Meeting of the Pavlovian Society*. Philadelphia PA.
- *International Conference on Brain Plasticity linking Molecules, Cells & Behavior*. Magdeburg Germany.

2016

- Universität Tübingen, Centrum für Integrative Neurowissenschaften. Tübingen, Germany.
- Deutsches Zentrum für Neurodegenerative Erkrankungen. Bonn, Germany.
- Universität Münster, Institut für Neurophysiologie. Münster, Germany.
- *Annual Meeting of the Federation of the European Neuroscience Society*. Copenhagen Denmark.

2015

- *Annual Meeting of the International Behavioral Neuroscience Society*. Victoria Canada.

2014

- IUPUI, Alcohol Research Group. Indianapolis IN.
- Purdue University, Department of Psychological Sciences, Behavioral Neuroscience Colloquium. West Lafayette IN.
- IUPUI, Department of Psychology. Indianapolis IN.
- *Annual Meeting of the Indianapolis Society for Neuroscience*. Indianapolis IN.