OMB No. 3145-0279 (Expiration Date 10/31/2026)

NIH BIOGRAPHICAL SKETCH COMMON FORM

Name: Rupprecht, Laura

Persistent Identifier (PID) of the Senior/Key Person: https://orcid.org/0000-0001-7031-3940

Position Title: Assistant Professor

Organization and Location: University of North Carolina Chapel Hill, Chapel Hill, North Carolina, United States

PROFESSIONAL PREPARATION

INSTITUTION AND LOCATION	DEGREE	Start Date	Completion Date	FIELD OF STUDY
Duke University, Durham, North Carolina, United States	Postdoctoral Fellow	08/2018	03/2023	Gastroenterology
Yale University, New Haven, Connecticut, United States	Postdoctoral Fellow	08/2017	08/2018	Molecular Psychiatry
University of Pittsburgh, Pittsburgh, Pennsylvania, United States	Doctor of Philosophy (PHD)	08/2012	08/2017	Neuroscience
Juniata College, Huntingdon, Pennsylvania, United States	Bachelor of Science (BS)	08/2006	05/2010	Biology with Psychology minor

Appointments and Positions

2025 - present Assistant Professor, University of North Carolina Chapel Hill, Chapel Hill, North Carolina, United States
2025 - present Adjuct Assistant Professor, Duke University, Durham, North Carolina, United States
2024 - 2025 Assistant Professor, Duke University, Durham, North Carolina, United States

Products

Products Closely Related to the Proposed Project

1. Liu WW, Reicher N, Alway E, Rupprecht LE, Weng P, Schaefgen C, Klein ME, Villalobos JA, Puerto-Hernandez C, Kiesling Altún YG, Carbajal A, Aguayo-Guerrero JA, Coss A, Sahasrabudhe A, Anikeeva P, de Araujo A, Bali A, de Lartigue G, Gil-Lievana E, Gutierrez R, Miao EA, Rawls JF, Kaelberer MM, Bohórquez DV. A gut sense for a microbial pattern regulates feeding. Nature. 2025 Sep;645(8081):729-736. PubMed Central PMCID: PMC12443592.
2. Sahasrabudhe A, Rupprecht LE, Orguc S, Khudiyev T, Tanaka T, Sands J, Zhu W, Tabet A, Manthey M, Allen H, Loke G, Antonini MJ, Rosenfeld D, Park J, Garwood IC, Yan W, Niroui F, Fink Y, Chandrakasan A, Bohórquez DV, Anikeeva P. Multifunctional microelectronic fibers enable wireless modulation of gut and brain neural circuits. Nat Biotechnol. 2024 Jun;42(6):892-904. PubMed Central PMCID: PMC11180606.
3. Buchanan KL, Rupprecht LE, Kaelberer MM, Sahasrabudhe A, Klein ME, Villalobos JA, Liu WW, Yang A, Gelman J, Park S, Anikeeva P, Bohórquez DV. The preference for sugar over sweetener depends on a gut sensor cell. Nat Neurosci. 2022 Feb;25(2):191-200. PubMed Central PMCID: PMC8825280.
4. Rupprecht LE, Bohórquez DV. The nerve not taken. Cell Metab. 2021 Mar 2;33(3):466-467. PubMed PMID:33657390.
5. Rupprecht LE, Kreisler AD, Spierling SR, de Guglielmo G, Kallupi M, George O, Donny EC, Zorrilla EP, Sved AF. Self-administered nicotine increases fat metabolism and suppresses weight gain in male rats. Psychopharmacology (Berl). 2018 Apr;235(4):1131-1140. PubMed Central PMCID: PMC8162771.

Other Significant Products Highlighting Contributions to Science

1. Rupprecht LE, Smith TT, Donny EC, Sved AF. Self-administered nicotine differentially impacts body weight gain in obesity-prone and obesity-resistant rats. Physiol Behav. 2017 Jul 1;176:71-75. PubMed Central PMCID: PMC6044443.
2. Rupprecht LE, Koopmeiners JS, Dermody SS, Oliver JA, al'Absi M, Benowitz NL, Denlinger-Apte R, Drobes DJ, Hatsukami D, McClernon FJ, Pacek LR, Smith TT, Sved AF, Tidey J, Vandrey R, Donny EC. Reducing nicotine exposure results in weight gain in smokers randomised to very low nicotine content cigarettes. Tob Control. 2017 Mar;26(e1):e43-e48. PubMed Central PMCID: PMC5428392.

3. Rupprecht LE, Smith TT, Donny EC, Sved AF. Self-Administered Nicotine Suppresses Body Weight Gain Independent of Food Intake in Male Rats. Nicotine Tob Res. 2016 Sep;18(9):1869-1876. PubMed Central PMCID: PMC4978984.
4. Rupprecht LE, Smith TT, Schassburger RL, Donny EC, Sved AF. Effects of nicotine on reward varying in palatability and caloric value: Implications for e-cigarette flavoring. Tobacco regulatory science. 2016; 2(4):343-351.
5. Rupprecht LE, Mietlicki-Baase EG, Zimmer DJ, McGrath LE, Olivos DR, Hayes MR. Hindbrain GLP-1 receptor-mediated suppression of food intake requires a PI3K-dependent decrease in phosphorylation of membrane-bound Akt. Am J Physiol Endocrinol Metab. 2013 Sep 15;305(6):E751-9. PubMed Central PMCID: PMC3761195.

Certification:

I certify that the information provided is current, accurate, and complete. This includes, but is not limited to, information related to current, pending, and other support (both foreign and domestic) as defined in 42 U.S.C. § 6605.

In accordance with Section 10632 of the CHIPS and Science Act of 2022 (42 U.S.C. § 19232), each individual identified as a senior/key person must certify that they are not a party to a malign foreign talent recruitment program.

Research Security Training Requirement for Federal Award Personnel: In accordance with Section 10634 of the CHIPS and Science Act of 2022 (42 U.S.C. § 19234), each individual identified as a senior/key person must certify that they have completed the requisite research security training that meets the requirements specified in Item 2 of Important Notice No. 149 within 12 months prior to proposal submission.

Misrepresentations and/or omissions may be subject to prosecution and liability pursuant to, but not limited to, 18 U.S.C. §§287, 1001, 1031 and 31 U.S.C. §§3729-3733 and 3802.

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NIH BIOGRAPHICAL SKETCH SUPPLEMENT

Name: Rupprecht, Laura

Persistent Identifier (PID) of the Senior/Key Person: https://orcid.org/0000-0001-7031-3940

Position Title: Assistant Professor

Organization and Location: University of North Carolina Chapel Hill, Chapel Hill, North Carolina, United States

Personal Statement

My scientific passion is to delineate the physiologic processes that link what we consume with how we behave, and how disruptions in these systems contribute to disease. My training in gastroenterology, neuroscience, energy balance, and addictions supports a comprehensive approach to studying the gut-brain biology of alcohol intake. I am new to the field of alcohol research, and this application to the Katz R01 positions my expertise in intestinal and vagal biology in the neurobiology of alcohol intake. My post-baccalaureate work with Dr. Matthew Hayes at the University of Pennsylvania focused on the effects of glucagon-like peptide 1 signaling on homeostatic and hedonic food intake. For graduate training, my work with Drs. Alan Sved and Eric Donny defined the relationship between nicotine reward and energy balance in human smokers and rodents. My postdoctoral work focused on uncovering the gut-brain circuit controlling sugar preference. My work (Nature Neuroscience 2022) defined that specialized sensory cells in the gut, neuropod cells, recognize sugars and non-caloric sweeteners using distinct molecular receptors. Information about the presence of these nutrients is rapidly conveyed to non-overlapping vagal neuron populations using different neurotransmitters. Using novel multifunctional gut fibers in collaboration with Dr. Polina Anikeeva, we created tools to manipulate feeding behavior from the gut in real-time (Nature Biotechnology 2024). Using flexible fiberoptics in the gut, I discovered that neuropod cells are necessary and sufficient for sugar intake in mice. The overarching goal of my laboratory is that measuring and manipulating the gut-brain connection can lead to novel therapies for disorders of overconsumption, ranging from obesity to alcohol use disorder.

Honors

2024	Best talk by junior scientist, Swiss Winter Meeting on Ingestion
2023	Conference Travel Award, Winter Conference on Brain Research
2023	Best Poster Award, Duke University GI Research Night
2022	STAT Wunderkind, STAT Magazine
2021 - 2024	F32 Postdoctoral NRSA, NIDDK
2019 - 2021	Hartwell Biomedical Research Fellowship, Hartwell Foundation
2017	F31 Predoctoral NRSA, NIDA
2016	Gerard P. Smith Award, Society for the Study of Ingestive Behavior
2016	New Investigator Travel Award, Society for the Study of Ingestive Behavior
2016	Predoctoral Fellowship, Andrew Mellon Foundation
2015	Conference Travel Award, Society for Research on Nicotine and Tobacco
2009	All Academic Team, United States Track & Field and Cross Country Coaches Association

Contributions to Science

1. **Hindbrain glucagon-like peptide 1 signaling in feeding behavior.** Glucagon-like peptide 1 (GLP-1) is a hormone produced invthe distal small intestine and nucleus tractus solitarius in the caudal brainstem that reduces food intake and increases insulin secretion. We documented intracellular signaling mechanisms through which long-acting GLP-1R agonists reduce homeostatic food intake (Rupprecht et al, 2013). It is clear, however, that feeding behavior is not only driven by the homeostatic need to replenish calories, but also by palatability or pleasure. We found that GLP-1 producing neurons project monosynpatically to mesolimbic reward-related brain regions and supports an endogenous role for GLP-1R signaling in palatable diet intake (Alhadeff et al, 2012).

2. **Nicotine and energy balance.** Nicotine is commonly believed to suppress appetite. But, smokers and non- smokers have equal daily calorie intake. To reconcile this gap in the literature, I studied weight gain in a rat model of smoking: nicotine self-administration. In nicotine self-administration, a rat makes a response to receive an intravenous infusion of nicotine. We found that when self-administered nicotine has no effect on food intake. But, self-administered nicotine suppresses body weight. Even low doses of nicotine, which are not reinforcing (i.e., "addictive"), limit weight gain (Rupprecht et al, 2016; Rupprecht et al, 2017). In human smokers, removing the reinforcing levels of nicotine in cigarettes caused weight gain (Rupprecht et al, 2017).This suggests separate sites of action for nicotine to promote addiction and to promote energy expenditure. Further study that nicotine suppresses weight gain due to increased fat metabolism (Rupprecht et al, 2018). This work supports the possibility of harnessing the weight-suppressant powers of nicotine as a pharmacotherapy for obesity.

3. **Rapid gut-brain communication from neuropod cells to the vagus nerve.** The neuropod cell is a specialized sensory gut epithelial cell that synapses onto the vagus nerve. Neuropod cells communicate to the vagus nerve within milliseconds using gluatamatergic synapses. The discovery of this gut wall to vagus synapse contributes to the emerging field of gut chemosensation and has important implications for nutrition and psychiatry. By developing novel flexible, multi-functional fibers, we can manipulate behaviors while stimulating or inhibiting neuropod cells in real-time in awake, behaving mice. We have recently discovered that neuropod cells express distinct luminal receptors for the transduction of caloric and non-caloric sugars onto the vagus nerve. Neuropod gluatamatergic signaling is essential for the choice of caloric sugar over non-caloric sugar.

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