

Estelle Spear Bishop, PhD

(previously *Estelle Trego Spear*)

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FACULTY APPOINTMENTS

- 2022-present **Assistant Professor**
Education Scholar Pathway
Department of Neurological Sciences
University of Vermont Larner College of Medicine
- Jan 2025-26 **Visiting Winter Term Faculty**
Middlebury College
Department of Neuroscience
NSCI 1014; Enteric Neurobiology

EDUCATION

- 2017-2022 **Postdoctoral Scholar**
Department of Medicine
Division of Gastroenterology & Hepatology
Stanford University
Mentors: Aida Habtezion, MD, MSc (2017-2020), Laren Becker, MD, PhD (2021-2022)
- 2012-2017 **PhD in Neuroscience**
Department of Neurological Sciences
University of Vermont Larner College of Medicine
Mentor: Gary Mawe, PhD
- 2008-2012 **BS with Honors in Neuroscience**
Minor in Spanish
Allegheny College
Mentor: Lee Coates, PhD

PUBLICATIONS

- 2025 Khatib, M., Zhao, T., Wei, S., Abramson, A., **Bishop, E.S.**, Chen, C-H., Thomas, A-L., Xu, C., Park, J., Lee, Y., Hamnett, R., Yu, W., Root, S.E., Yuan, L., Chaktoura, D.H.N., Kim, K.K., Zhong, D., Nishio, Y., Zhao, C., Wu, C., Salimi-Jazi, F., Rafeeqi, T.A., Tok, J.B., Chen, X., Kaltschmidt, J.A., Dunn, J.C.Y., Bao, Z. High-Density Multimodal Soft Bioelectronic Fibers. *Nature*.
- 2025 Robertson, K., Hahn, O., Robinson, B., Faruk, A.T., Janakiraman, M., Namkoong, H., Kim, K., Ye, D., **Bishop, E.S.**, Hall, R.A., Wyss-Coray, T., Becker, L.S., Kaltschmidt, J. Gpr37 contributes to enteric reactive gliosis and inflammation- induced gastrointestinal dysmotility. *iScience*.
- 2025 **Bishop, E.S.**, Morely, L., Janakiraman, M., Vikram, A., Namkoong, H., Becker, L. Altered BMP2 signaling causes age-dependent decline in gut motility independent of muscularis macrophages. *Gastro Hep Advances*.
- 2022 [§]**Bishop, E.S.**, [§]Namkoong, H., Aurelian, Aurelian, L., McCarthy, M., Nallagatla, P., Zhou, W., Neshatian, L., Gurland, B., ^{*}Habtezion, A., ^{*}Becker, L. Enteric nervous system macrophages have microglia disease-associated properties that define age-dependent decline in gut motility. *Gastro Hep Advances*. PMID: 36908772. [§]Co-first authors ^{*}Co-senior authors
- 2022 Li, J., Liu, Y., Zhang, B., **Bishop, E.S.**, Wang, K., Tang, J., Zheng, Y., Niu, S., Beker, L., Xu, W., Li, T.L., Chen, G., Tok, J.B.H., Cui, Yi., Habtezion, A., Chen, X., Bao, Z. NeuroString: A tissue-like neurochemical sensor for interfacing with brain and gut. *Nature*. PMID: 35650358

- 2021 Gubatan, J., Zikos, T., **Bishop, E.S.**, Wu, J., Gottfried, A., Becker, L., Habtezion., A., Neshatian, L. Gastrointestinal Symptoms and Healthcare Utilization Have Increased Among Patients with Functional Gastrointestinal and Motility Disorders During the COVID-19 Pandemic. *Neurogastroenterology and Motility*. PMID: PMC8420203
- 2020 Sinha, S.R., Haileselassie, Y., Nguyen, L.P., Tropini, C., Wang, M., Becker, L.S., Sim, D., Jarr, K., **Spear, E.T.**, Namkoong, H., Bittinger, K., Sonnenberg, J.L., Habtezion, A. (2020). Dysbiosis-induced Secondary Bile Acid Deficiency Promotes Intestinal Inflammation. *Cell, Host, Microbe*. PMID: 32101703
- 2019 **Spear, E.T.** and Mawe, G.M. (2019). Enteric neuroplasticity and dysmotility in inflammatory disease: key players and possible therapeutic targets. *American Journal of Physiology*. PMID: 31604034
- 2018 Becker, L., **Spear, E.T.**, Sinha, S.R., Lee, J., Zhao, C., Bittinger, K., Haileselassie, Y., Habtezion, A. (2018). Age-related changes in gut microbiota alter phenotype of muscularis macrophages and disrupt gastrointestinal motility. *CMGH*. PMID: 30585161
- 2018 **Spear, E.T.**, Holt, E., Joyce, E.J., Haag, M.M., Mawe, S.M., Hennig, G., Lavoie, B., Applebee, A., Teuscher, C., Mawe, G.M. (2018). Altered gastrointestinal motility in the experimental autoimmune encephalomyelitis model of multiple sclerosis. *Neurogastroenterology & Motility*. PMID: 29644797

BOOK CHAPTERS

- 2020 **Spear, E.T.** and Becker, L. "Stem cell transplantation for gastroparesis." *Gastroparesis*, edited by McCallum, R., Parkman, H., Clarke, J., & Kuo, B., Elsevier, 2020.

PODCASTS

- 2018 Farmer, A., Mawe, G.M., **Spear, E.T.** Characterizing GI dysmotility in the experimental autoimmune encephalomyelitis mouse model of MS. *Neurogastroenterology & Motility*. September 1, 2018.

ABSTRACTS

- 2026 Safri, H. & Bishop, E.S. Virtual reality simulation of patient-specific visual perimetry data using VARID plugin. Poster for Neuroscience, Behavior, & Health Research forum at UVM.
- 2024 Faruka, A., Robertson, K., Ye, D., Kim, K., **Bishop, E.S.**, Han, O., Hall, R., Robinson, B., Namkoong, H., Janakiraman, M., Becker, L., Wyss-Coray, T., Kaltschmidt, J. Gpr37 Modulates the Severity of Inflammation-induced GI Dysmotility by Regulating Enteric Reactive Gliosis. ABRCMS 2024. Pittsburgh, PA, November 1, 2024.
- 2024 Krueger, R. & **Bishop, E.S.** RubaVision: Innovative Research Software for Cortical Vision Impairment Rehabilitation. May 23, 2024. Poster presentation at Knight Initiative Symposium: Brain Resilience Research Showcase at Stanford University.
- 2023 **Bishop, E.S.**, Sadler, J., Hasel, M., Ruden, E., Angeles, M., Habelow, B., & Srivastava, S. Feasibility and perception of virtual reality for anatomy education in the high school classroom. Snow Season Education Retreat, UVM Larner College of Medicine. Burlington, VT, Jan 2023.
- 2022 **Bishop, E.S.** and Becker, L.S. Macrophage CD36 expression regulates colonic dysmotility in a mouse model of diet-induced obesity. DDW, 2022. *Selected for oral presentation.
- 2021 **Bishop, E.S.**, Zhou, W., Habtezion, A., Becker, L. Microglial genes expressed in muscularis macrophages regulate age-dependent decline in gut motility. Virtual poster, ESNM 2021. *Awarded Poster of Distinction.
- 2021 Gubatan, J., Zikos, T., **Spear, E.T.**, Wu, J., Gottfried, A., Becker, L., Habtezion., A., Neshatian, L. COVID-19 pandemic increased healthcare utilization among patients with functional gastrointestinal disorders. Virtual poster, DDW 2021.
- 2020 Becker, L., **Spear, E.T.**, Habtezion, A. Changes in aged ENS induces a microglial-like disease state in muscularis macrophages that is dependent on the CD36 scavenger receptor. Poster presentation at Digestive Disease Week., Chicago, IL, May 2020.

- 2020 Axelrod, L., Axelrod, S., Navalgund,A., **Spear, E.T.**, Patel, A., Li, C., Triadafilopoulos, G., Habtezion, A. Wireless electrode patches show inpatient reproducibility in a longitudinal study of patients with Crohn's disease in remission. Poster presentation at Digestive Disease Week. Chicago, IL, May 2020.
- 2020 Axelrod, L., Axelrod, S., Navalgund,A., **Spear, E.T.**, Patel, A., Li, C., Triadafilopoulos, G., Habtezion, A. Wireless electrode patches show inpatient reproducibility in a longitudinal study of patients with Crohn's disease in remission. Poster presentation at Crohn's & Colitis Congress. Austin, TX, Jan. 2020.
- 2019 **Spear, E.T.**, Becker, L.S., Habtezion, A. Deletion of scavenger receptor protects against gastrointestinal dysmotility and muscularis inflammation. Poster presentation at DDW. San Diego, CA, May 2019.
- 2018 **Spear, E.T.**, Becker, L.S., Habtezion, A. Deletion of scavenger receptor protects against gastrointestinal dysmotility and muscularis inflammation. Poster presentation at FNM Conference. Amsterdam, Netherlands, August 2018.
- 2018 **Spear, E.T.**, Becker, L.S., Habtezion, A. CD36 scavenger receptor is involved in muscularis inflammation. Oral presentation at Little Brain Big Brain meeting. Kleve, Germany, August 2018.
- 2017 **Spear, E.T.**, Joyce, E.J., Holt, E.A., Haag, M.M., Hennig, G., Applebee, A., Teuscher, C., and Mawe, G.M. (2017). Auto-immunity targeting the enteric nervous system may cause constipation in multiple sclerosis. Oral presentation at Experimental Biology Conference. Chicago, IL, USA. May 2017.
- 2016 **Spear, E.T.**, Haag, M.M., Lavoie, B., Applebee, A., Teuscher, C., and Mawe, G.M. (2016). Autoantibodies targeting enteric ganglia may cause constipation in multiple sclerosis. Oral presentation at NeuroImmunoPhysiology of the Gastrointestinal Tract Meeting. Banff, Alberta, Canada. October 2016.
- 2016 **Spear, E.T.**, Haag, M.M., Lavoie, B., Applebee, A., Teuscher, C., and Mawe, G.M. (2016). Evidence for antibodies targeting the enteric nervous system in multiple sclerosis. Oral presentation at Federation of Neurogastroenterology and Motility Society Meeting. San Francisco, CA, USA. August 2016.
- 2015 **Spear, E.T.**, Lavoie, B., Applebee, A., Teuscher, C., and Mawe, G. (2015). Altered gastrointestinal motility in a mouse model of multiple sclerosis. Poster presentation at Experimental Biology. Boston, MA, USA. March 2015. *Awarded Poster of Distinction.

INVITED TALKS

- 2025 **Bishop, E.S.**, Namkoong, H., Aurelian, L., McCarthy, M., Nallagatla, P., Zhou, W., Neshatian, L., Gurland, B., Habtezion, A., Becker, L. Enteric nervous system macrophages exhibit functional decline and an age-dependent phenotype similar to disease-activated microglia. Neuroscience, Behavior & Health Research Forum. University of Vermont, February 1, 2025.
- 2024 **Bishop, E.S.** Muscularis macrophages express microglial genes and develop a disease activated microglial-like phenotype in aging. Invited speaker at American Physiological Society Annual Summit, 2024. Long Beach, CA.

MANUSCRIPT REVIEWER

- 2025 Neurogastroenterology & Motility
 2024 British Journal of Pharmacology
 2024 Medical Education Online

GRANTS AND FELLOWSHIPS

- 2024-2025 **Curriculum Grant**, Teaching Academy at UVM LCOM
Building empathy among medical educators to promote accessibility for visually impaired students
- 2023-2024 **Medical Education Fellowship Program**, UVM Larner College of Medicine

- 2022 **Katharine McCormick Postdoctoral Fellowship to Support Women in Academic Medicine**
Stanford Office of Postdoctoral Affairs
- 2021 **Loan Repayment Program (LRP)** (competitive renewal)
NIDDK, *G-Tech Motility Monitoring to Differentiate Disease Stages in Crohn's Disease Patients*
- 2019 **Loan Repayment Program (LRP)**
NIDDK, *G-Tech Motility Monitoring to Differentiate Disease Stages in Crohn's Disease Patients*
- 2018 **Post-Doctoral Training Fellowship (T32)**
NIAID, *Involvement of the CD36 macrophage receptor on fat-induced intestinal inflammation and dysmotility*, Stanford University, (5T32AI07290-33)
- 2016 **NRSA Pre-Doctoral Fellowship (F31)**
NIDDK, *Intestinal Dysmotility in Multiple Sclerosis*, (1F31DK108540-01A1), Impact Score: 10
- 2016 **Rodney L. Parsons Anatomy and Neurobiology Award**
Awarded to a UVM doctoral student who excels in neuroscience research and teaching in anatomical sciences, (\$3,500)
- 2011 **Allegheny College / Cleveland Clinic Foundation Neuroscience Internship**
Cerebrospinal Fluid Dynamics Research Laboratory (\$3,000)
Mentors: Stephen Dombrowski, PhD and Mark Luciano, MD, PhD

AWARDS AND ACHIEVEMENTS

- 2021 Poster of Distinction, European Society of Neurogastroenterology and Motility
- 2018 Helena Anna Henzl-Gabor Young Women in Science Fund, Stanford, (\$750)
- 2018 Lin Chang Travel Award, ANMS, (\$1,000)
- 2018 XVth Little Brain Big Brain Conference, Kleve, Germany
- 2017 Edith D. Hendley Award, UVM Women's Center, Burlington, VT
- 2016 Rodney L. Parsons Anatomy and Neurobiology Award, (\$3,500)
- 2016 Graduate Student Research Day, 2nd place, Larner College of Medicine, Burlington, VT
- 2016 Young Investigator Forum, ANMS, San Francisco, CA
- 2015 Poster of Distinction, APS GI & Liver Section, Experimental Biology, Boston, MA
- 2015 Graduate Student Oral Presentation Award, 1st place. UVM NBH Forum, Burlington, VT

TEACHING EXPERIENCE

** indicates cadaver-based instruction*

Teaching Practice

- 2023-26 *Course Director, Undergraduate Human Neuroanatomy NSCI 3250, UVM LCOM
- 2025-26 Visiting Winter Term Faculty, NSCI 1014, *Enteric Neurobiology*, Middlebury College
- 2024-present *Co-Director, Human Gross Anatomy, DPT and MMS Programs, UVM LCOM
- 2024 *Neurology Resident Review Session, *Brainstem and Spinal Cord Tracts & Nuclei*, UVM LCOM
- 2022-2024 *Faculty, Gross Anatomy, Foundations of Clinical Science (FoCS), MD Program, UVM LCOM
- 2024 Guest Lecturer, *Visual Systems*, Human Neuroanatomy DPT/OT Program, UVM LCOM
- 2014, 2022 *Instructor, Gross Anatomy Education for Personal Trainer/Yoga Instructors, UVM LCOM
- 2022 *Faculty, Human Gross Anatomy, DPT and MMS Programs, UVM LCOM
- 2022 *4H Neuroanatomy Day, UVM LCOM
- 2022 *Course Instructor, Human Anatomy and Sports Injuries of the Head and Neck, Stanford
- 2021-2022 *Course Instructor, Regional Study of Human Structure, Stanford
- 2021 *Course Instructor, Human Anatomy and Sports Injuries of the Torso and Limbs, Stanford
- 2021 *Guest Lecturer, Stanford Summer Community College Premed Program (SSCCPP), Stanford

- 2019-2021 *Course Instructor, Gross Anatomy for Bioengineering Students, Stanford
- 2019 Guest Lecturer, Principles of Clinical Medicine, Physician Assistant Program (MSPA), Stanford
- 2017 Guest Lecturer, Undergraduate Neuroscience, UVM
- 2017 *Guest Lecturer, Anatomy Outreach Day, Department of Neurological Sciences, UVM LCOM
- 2016 *Graduate Teaching Assistant, Human Neuroscience, DPT program, UVM LCOM
- 2015 *Graduate Teaching Assistant, Medical Neural Science, MD program, UVM LCOM
- 2014 *Graduate Teaching Assistant, Human Gross Anatomy, DPT program, UVM LCOM
- 2014 Graduate Teaching Assistant, Undergraduate Introductory Neuroscience, UVM LCOM

Teaching Certifications & Training

- 2023-2024 Medical Education Fellowship Program, UVM Larner College of Medicine
- 2020 Postdoctoral Teaching Certificate, Stanford University, Stanford, CA, (100 hours)
- 2018 Scientific Teaching Institute, Stanford University, Stanford, CA
- 2017 Graduate Teaching Certificate, UVM, Burlington, VT, (20 hours)
- 2017 Anatomy in Clay Professional Development Certificate, Denver, CO

Research Mentorship

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|------|-------------------------|--|
| 2025 | Hamzah Safri | (Current: BS Candidate, Neuroscience, UVM) |
| 2024 | Elise Potter | (Current: BS Candidate, Public Health, UVM) |
| 2024 | Molly Fahey | (Current: BS Candidate, Public Health, UVM) |
| 2021 | Shelby Cherkas | (Current: Undergraduate at Duke University) |
| 2021 | Logan Morley | (Current: Undergraduate at Stanford University) |
| 2019 | Simon Stephanos, BS | (Current: MBA Candidate, The Wharton School) |
| 2017 | Emily Joyce, BS | (Current: PhD candidate at UVM) |
| 2016 | Emily Holt, BS | (Current: PhD candidate at UVM) |
| 2016 | Felix Torres, BS | (Current: Statistician at UCSD School of Medicine) |
| 2016 | Isabel Licata, BS | (Current: Medical student at UVM Larner College of Medicine) |
| 2015 | Melody Haag, BS, PharmD | (Current: Retail pharmacist) |

Thesis Committee Mentorship

- 2024-present Advisor, Undergraduate Senior Thesis, UVM Honor's College – Sydney Dawson
Synaptic Mechanism of Nicotine in Restless Leg Syndrome
- 2025 Chair, Undergraduate Senior Thesis, UVM Honor's College – Abby Tubridy
The Role of the Mediodorsal Nucleus of the Thalamus in Context-dependent Learning

SERVICE AND OUTREACH

- 2025-present Voting Member, Advancement Committee, UVM LCOM
- 2024-present Member, Graduate Faculty, UVM Graduate College
- 2024-present Chair, Oversight Committee, Anatomical Gift Program, UVM LCOM
- 2022-2025 Senator, Neurological Sciences, UVM Faculty Senate
- 2011-present Philanthropic Education Organization (PEO)
 - 2024 Planning Committee, Convocation of Thanks, Anatomical Gift Program, UVM
 - 2024 Planning Committee, Neurological Sciences Department Retreat, UVM
 - 2024 Poster Judge, Neuroscience Behavior & Health (NBH) Research Forum, UVM, Burlington, VT
 - 2023 Session Moderator, NEGEA Conference, AAMC, Burlington, VT
 - 2023 Visiting Lecturer, Cerebral Arteries & Strokes, Green Mountain Valley School, Waitsfield, VT
 - 2022 4H Neuroanatomy Day, UVM Larner College of Medicine
 - 2022 Educational Program on Gut-Brain-Microbiome Axis for PEO Chapter HE, Mountain View, CA

2021 Research Mentor, Stanford Institutes of Medicine Summer Research Program (SIMR)
2018-19 Stanford Science Penpals, Stanford University, CA
2016 National MS Society Patient Education Conference Research Panel, Stowe, VT
2016 Neuroscience Career Panel for Undergraduate Students, UVM
2015-16 Upper New England Neuroscience Graduate Student Retreat Coordinator, Burlington, VT
2015-16 UVM Neuroscience Blog Coordinator
2015-16 UVM Neurological Sciences Translational Journal Club Coordinator
2015-16 Bike MS: Green Mountain Getaway, Burlington, VT
2014-16 Brain Awareness Week Coordinator, UVM
2013-16 Annual Vermont 'Women-Can-Do' Fair, Vermont Technical College
2015 UVM College of Medicine Research Day: Student Coordinator
2015 Host for Burlington Tech Center Sports & Sciences student research immersion, Burlington, VT
2015 Neuroscience Upward Bound Instructor, UVM
2014-15 UVM Neuroscience Graduate Student Journal Club Leader
2014 Lyndon Institute Career Day, Lyndonville, VT
2009-12 President, Allegheny College Neuroscience Club, Meadville, PA
2008-12 Member, Allegheny College Neuroscience Journal Club, Meadville, PA
2011 Bike MS: Cook Forest River Ride, Cook Forest, PA
2009-11 Alpha Phi Omega (APO), Service Fraternity, Meadville, PA
2008-10 Allegheny College Pre-health Club, Meadville, PA

MEDICAL CERTIFICATIONS

2024 HeartCode® BLS certification, American Heart Association (Expires 03/31/2026)
2024 National Registry of Emergency Medical Technicians (NREMT) (Expires 04/2026)