Kristy L. Townsend, Ph.D.

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Place of Birth: Boothbay Harbor, ME (USA)

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OSUMC website : https://medicine.osu.edu/find-faculty/clinical/neurosurgery/kristy-townsend-phd

UMaine GSBSE Profile: http://gsbse.umaine.edu/people/profile/kristy_townsend

Linked In: http://www.linkedin.com/pub/kristy-townsend/9/135/289

Research Gate: https://www.researchgate.net/profile/Kristy_Townsend3

Education

Ph.D. Neuroscience	Boston University Program in Neuroscience; Thesis advisor: Prof. Eric P. Widmaier *Mechanisms of high fat-induced obesity in mice and premigration/prehibernation fattening in bats.*	August 2007
M.A. Neuroscience	Boston University, Program in Neuroscience (*opted in* as part of Ph.D. program)	2005
B.S. Biochemistry	University of Maine; 'Highest Honors' (Honors Program)	May 2002

Postdoctoral Training/Junior Faculty Positions

Instructor in Medicine	Department of Medicine; Harvard Medical School, Boston MA	Jan 2013-Oct 2014
Research Associate	Integrative Physiology and Metabolism; Joslin Diabetes Center, Boston MA	Jan 2013-Oct 2014
Postdoctoral Research Fellow	Integrative Physiology and Metabolism (PI: Dr. Yu-Hua Tseng), Joslin Diabetes Center, Boston MA	May 2009-Jan 2013

Fellow	Department of Medicine, Harvard Medical School, Boston, MA	May 2009- Jan 2013
Postdoctoral Research Fellow	Obesity and Metabolic Medicine Laboratory (PI: Dr. Jane K. Howard, co-mentor: Dr. Graham Lord), King's College London, U.K. (Guy's Hospital & St. Thomas Hospital)	Oct. 2007-May 2009

Professional Positions

Associate Professor	Department of Neurological Surgery, The Ohio State University, Wexner Medical School (tenured)	Aug 1, 2020-present
Cooperating Faculty (The Ohio State University)	David Heart and Lung Research Institute (DHLRI), Diabetes and Metabolism Research Center (DMRC), Neuroscience Graduate Program (NGP), Neuroscience Research Institute (NRI), Molecular, Cellular and Developmental Biology graduate program (MCDB), Biomedical Sciences Graduate Program (BGSP), Biomedical Sciences Undergraduate Program	2020-present
Adjunct Faculty		Sept 2020-present
Associate Professor of Neurobiology, University of Maine	University of Maine 50% research:teaching appointment; tenured 2019, School of Biology & Ecology	Sept. 1, 2019 – Aug 31, 2020
Assistant Professor of Neurobiology, School of Biology and Ecology (SBE), University of Maine	Tenure-track, 9mo hard money, 50:50 research:teaching appointment (submitted tenure package Oct 2018)	Nov. 1, 2014 – Aug. 2019
Graduate Faculty		
Adjunct, Joslin Diabetes Center	Graduate School of Biomedical Science and Engineering (GSBSE), University of Maine	Nov. 1, 2014-present
	Adjunct Research Faculty	Nov. 1, 2014-present

Other Positions

Visiting Faculty	*Children's Hospital, Harvard Medical School, Boston MA (Endocrinology division, Breault Lab)*	June 2013-present
Adjunct Faculty	*University of New England (UNE), Center for Excellence in the Neurosciences*	August 2015-present
Adjunct/Visiting Faculty	*Maine Medical Center Research Institute (MMCRI)*	August 2016-present

Cooperating Faculty	*Chemical and Biomedical Engineering Department, University of Maine*	Dec 2018-present
Cooperating Faculty	*School of Food and Agriculture (SFA), University of Maine*	April 2015-present
Cooperating Faculty	*Department of Molecular and Biomedical Sciences (MBS), University of Maine*	April 2015-present
Cooperating Faculty	*Women's, Gender and Sexuality Studies (WGS)*	2017-present
Cooperating Faculty	*Margaret Chase Smith Policy Center, University of Maine (Faculty Fellows Program)*	April 2015-present
Instructor	*Harvard Extension School*	Sept 2011-May 2014

Writing Positions

Freelance Writer/Contributing Editor, Zest Magazine	Freelance writer and Contributing Editor for Maine's premier food magazine, *ZEST (Features include science of food, appetite control)*	2015-2019
Reporter, Penobscot Times	Old Town, Maine; Approximately 100 articles published, including science writing. Also put together weekly "Inquiring Photographer" feature. Supervisor: Chuck McKay, Editor.	2000-2002
Reporter, Maine Campus	Wrote numerous articles, Student Newspaper of University of Maine	2000-2002

Major Administrative Leadership Positions

Local

Founder, Lead	Women in Science, Technology, Engineering, Mathematics, and Medicine (WiSTEMM) at UMaine (an AWIS affiliate; UMaine funded)	2016-2020
Secretary	Executive Board of Directors, Bioscience Association of Maine (BioME)	2018-2020
Board Member	Board of Directors, Bioscience Association of Maine (BioME)	2018-present
Secretary	Maine Society for Neuroscience	2017-2020
Treasurer	Fellows Council, Joslin Diabetes Center	2013-2014
Vice President	Graduate Student Organization, Boston University	2005-6

Secretary and Recruitment Officer	Graduate Student Organization, Boston University	2003-5

Committee and Other Service

Current and Previous Committee Service at Ohio State:

- Neuroscience Graduate Program (NGP): grad student onboarding committee (2020-present); DNS Diversity and Inclusion Committee (2020-present)
- Davis Heart and Lung Research Institute (DHLRI): Education committee (2020-present)
- Neuroscience Research Institute (NRI): Translational research and cross-collaborations committee (2020-present)

Previous Committee Service at UMaine: SBE Grad Committee (2014-15), SBE Health Professions Committee (2015-2020 – wrote over 10 medical school composite letters for student applications; reviewed internal health professions scholarship applications), SBE Assessment Committee (2015-2017), SBE developmental biologist faculty search committee (2017-18), SFA Animal Health Faculty Search Committee (2015-16), SBE Plant Geneticist Faculty Search Committee (2016), MBS Bioinformaticist Faculty Search Committee (2016), animal facility manager search committee (2018, 2019), office of research administration staff search committee (2019), Hitchner Shared Space Committee – Chair (2016-2019), Provost's Council on Advancing Women Faculty (2016-2019) became the Provost's Advisory Council on Equity (member 2019-2020), Rising Tide Oversight Committee (2016-2020), SBE Curriculum committee (2018-2020), WiSTEMM graduate and undergraduate faculty advisor (2019-2020), Postdoc and Soft Money Research Faculty Group (faculty lead, 2019-2020), Faculty Senate Research and Scholarship committee (2018-2020), College of NSFA Life Science building committee (2019-2020), College of NSFA Administrative Pilot committee (2019-2020), President's R&D Strategic Council (2018-2020), UMaine Medicine Steering Committee (2019-2020), SBE Peer Committee (2019-2020), Advanced Research Computing Advisory Board (2020-2020)

COVID-19 Related Service Activities (UMaine):

- ***Lead Organizer*** – Preparing science/medicine research and literature COVID-19 updates every few days to Bangor Public health and area hospitals, with a team of UMaine faculty, graduate students and undergraduate students. (March 2020-August 2020) All bulletins and inforgraphics were published publicly here:

  https://umaine.edu/coronavirus/umaine-science-and-medicine-updates/

- ***Vice President for Research's Research Continuity Task Force*** – one of 4 faculty representatives approving essential research and guiding plans to ramp-up research re-opening at UMaine (April 2020-August 2020) https://umaine.edu/research-compliance/covid-19-research-continuity-task-force/

- ***Chancellor/UMaine System's Science Advisory Board (SAB)*** **–** one of 5 faculty across the UMaine system (7 campuses) selected to provide scientific advice to the Chancellor's re-opening committees (April 2020-current). Presented to UMaine faculty union (AFUM), faculty senate, Chancellor and UMaine President, and Maine state legislature. https://umaine.edu/president/science-advisory-board/

  SAB Podcast: https://umaine.edu/podcasts/2020/06/25/s2e16-what-can-we-learn-from-ums-experts-about-coronavirus/

Service and Outreach Activities

Local:

Co-created education content, spoke to classrooms via Zoom (BioME Bioscience Day 2020)	Oct 2020
Mentor – Women's Leadership and Development Program (OSU)	2020-present
Speaker – Olympia Snowe Women Leadership program (high school girls from Maine)	April 2020
Judge – BioGENEius and Student Expo (BioME)	April 2020
Faculty Advisor – Partners For World Health (Student Group UMaine)	2019-2020
Expanding Your Horizons – presenter	October 2019
Judge – BioME Student Showcase (& BioGENEius)	2019 & 2020
Co-coordinator, UMaine Medicine Seminar Series	2019-2020
Moderator – Science on Tap (Maine Science Festival) – CRISPR	March 2019
Advisory Board – Hancock County Technical Center Biomedical Science	2018-present
Judge – UMaine Student Symposium	2015, -16, -19
Grad School Workshop and Panel Discussion (created professional workshop as part of NSF-CAREER Broader Impacts), **Southern Maine Community College**	November 2018
Research Featured at start of *Cell Cell Cell* (Emera Planetarium, UMaine)	Fall 2018
Featured Speaker "healthy fats" – Double Z Ranch, Farm Dinner	August 2018
Open House (Jackson Laboratory) – Led two workshops on careers in biomedical science with Andrea Tilbury (Colby College)	May 2018
Moderator: Women in Bioscience Discussion (Bioscience Maine)	2018-2019
Engineering Expo (neuroscience demos)	Feb 2018
Brain Awareness Week & related outreach events (Hardy Girls, Bangor Montessori School, 4H Science Saturday, 14th Street School Bangor)	2017-2020
Advancing Women in Academia; Workshop Leader, Bangor ME	2017
Maine Science Festival Pop-Up Event: *Humanity Needs Dreamers*	2017
Future Women in STEM – Panel; Challenger Center, Bangor ME	2017

How to write and publish a manuscript in the biomedical sciences; professional development talk for PhD students in GSBSE (UMaine)	2017
Co-coordinator, School of Biology and Ecology Seminar Series	2016-2017
Participant, Legislative Bus Tour	2017
4H@UMaine Cooperative Extension Hands-On Science Event	2016-2019
Brain Awareness Week 'Optical Illusions' at Maine Science Festival	2016
Creation of UMaine Neuro Journal Club and undergrad Student Neuro Club	2015-2016
Judge, Maine State Science Fair	2015
Panel Member, ADA Tour de Cure Kickoff Event, Kennebunkport, ME	2014
Committee Member, Joslin Fellows Council, Joslin Diabetes Center	2012-2014
LABBB hands-on science day (Lexington, MA; volunteer for the day in a special needs classroom at Lexington High School; presented curriculum I developed on Cells and DNA)	2013
Judge (volunteer), Massachusetts State Science Fair	2010 and 2012
Volunteer for Cambridge Science Festival, Cambridge MA	2010
Committee member and event organizer, Graduate Women in Science and Engineering, Boston University	2006-7
Graduate Student Representative, Dean Search Committee for School of Arts and Sciences, Boston University	2006-7
Committee Member, Women in Biology, Boston University	2005-7
BGSA Biology Outreach Course volunteer, Boston University	2006
CityLab, Curriculum volunteer, Boston University	2004-5
Student Committee Representative, Program in Neuroscience, Boston University	2003-4
Student Committee Representative, College of Natural Sciences, Forestry and Agriculture, University of Maine	2001-2

National and International

Featured scientist in '*You're the Expert*' podcast/public radio show at Maine Science Festival	2017
Early Career Committee, The Obesity Society	2017-2019

Oral Poster Tour Guide, American Diabetes Association Annual Meeting, 2010
Orlando FL

Volunteer for NYAS Scientists Without Borders 2007

Professional Societies

Boston Nutrition and Obesity Research Center (BNORC), Boston Area Neuroscience Group (BANG), The Obesity Society (TOS), Society for Endocrinology (ENDO), Women in Endocrinology (WE), Society for Neuroscience (SfN), American Diabetes Association (ADA), American Heart Association (AHA), National Science Teachers Association (NSTA), New York Academy of Sciences (NYAS), Sigma Xi, American Association for the Advancement of Science (AAAS)

Editorial Activities

Ad-Hoc Journal Reviewer for:
Diabetes (2012-present)
Scientific Reports (2012-present)
Lipids in Health and Disease (2013-present)
FASEB Journal (2014-present)
Journal of Comparative Physiology – B (2014-present)
Diabetologia (2015-present)
Genes and Disease (2015-present)
Adipocyte (2015-present)
Current Diabetes Reports (2016-present)
BBA – Molecular Cell Research (2016-present)
Cell Proliferation (2016-present)
Brain, Behavior and Immunity (2016-present)
Cell Mol Life Science (2017-present)
PLOS One (2017-present)
International Journal of Environmental Research and Public Health (2017-present)
Life Sciences (2017-present)
Somatosensory and Motor Research (2017-present)
Aging Cell (2017-present)
Endocrine, Metabolic & Immune Disorders - Drug Targets (2018-present)
Molecular and Cellular Endocrinology (2018-present)
Clinical Science (2019-present)
Frontiers (2019-present)
ACS Applied Biomaterials (2019-present)
PLOS One (2019-present)
Cell Reports (2020-present)
Cell Proliferation (2020-present)
Scientific Reports (2020-present)
ACS Omega (2020-present)
Life Sciences (2020—resent)
Trends in Endocrinology and Metabolism (2020-present)
Science (AAAS) (2020-present)

Grant Reviewer Activities

- The Netherlands Organisation for Scientific Research (NWO) – 2015
- Early Career Reviewer (ECR) at NIH (IPOD Study Section) – 2016
- Department of Defense (DOD), Diabetes Grants (two separate review panels) – 2016

- Italian Ministry of Health - 2016-2017; 2020
- American Diabetes Association (ADA) Research Grant Review Committee – 2017-2019
- American Institute of Biological Sciences (reviewing for NIH INBRE program) – 2018
- American Heart Association – 2018, 2019, 2020 (CSA)
- Medical Research Council (MRC; U.K.) – 2018, 2019
- BNORC P&F (2018)
- NIH CSR Program Evaluation Study (2018)
- Internal (UMaine): CUGR undergraduate research grants (2019); RWJF (2019), Grand Challenge (UMaine system/chancellor), Pew Biomedical Research Scholars Program (2020)
- MCE, NIH, Study Section (2019)
- Wellcome Trust (2020)
- NIH HEAL Biomarker for Pain review panel, Spring 2020
- Czech Science Foundation, Summer 2020
- NIH Blueprint for Neuroscience Research: Functional Neural Circuits of Interoception Special Emphasis Panel (Reviewer, 2021)

Honors and Prizes

Focus Maine Biopharma Advisory Team	Invited to sit on the Advisory Team to build Biopharma in Maine	July 2020-present
Presidential Faculty Fellow	Chosen as one of 3 campus-wide faculty for inaugural Presidential Fellow program ("Research Learning" initiative) https://umaine.edu/news/blog/2020/05/08/four-inaugural-presidential-fellows-named/	Feb 2020-present
Board Member – Maine Technology Institute	Tech Board Member https://www.mainetechnology.org/who-is-mti/technology-boards/	2020-present
UMaine Faculty Mentor Impact Award	Nominated by my graduate and undergraduate students	March 2019
Invited to University of Maine System Board of Trustees Dinner; Legislative Bus Tour	2016 bus tour attendee; 2017 dinner attendee; 2019 dinner presenter	2017; 2019
NIDDK meeting – invited presentation	Autonomic Nervous System: role in the regulation of metabolism and the pathophysiology of metabolic disease (one of less than 10 invited posters)	Sept. 2018
Research Leaders Academy	American Heart Association (invitation only)	2018-20
Board of Directors	Bioscience Association of Maine (BioMe) (also Executive Board, Secretary)	March 2018-present

MIRTA Program	Part of the inaugural accelerator program for commercialization at UMaine; semester-long intensive trainings	Jan-May 2018
Scientific Session Chair (Invited)	Joint Keystone Symposia on Obeisty and NAFLD/Bioenergetics and Metabolic Disease, Keystone Colorado	January 2018
CUGR Faculty Fellows	Selected as Faculty Fellow for UMaine's Center for Undergraduate Research (CUGR)	2018
Center on Aging – Associate	Selected for Associate status in UMaine's Center on Aging	2017-current
ADVANCE-Rising Tide Professorship	Selected for inaugural College of Natural Sciences, Forestry, and Agriculture Rising Tide Professorship	2016-2018
Fellow	University of Maine's Blue Sky Faculty Fellows Program	2015-18
Travel Award	Bank of America Faculty Development Fund	2015
High-Scoring Abstract Award	American Diabetes Association, Annual Meeting, Chicago	2014
Young Investigator Award	Women in Endocrinology	2012
Travel Award	Seahorse Bioscience, for oral presentation and poster at Keystone Symposia, Santa Fe, NM	2012
Trainee Day Award and Travel Award	Endocrine Society Annual Meeting	2011
Travel Award	Joint Steering Committee on Public Policy, Scientists on Capitol Hill Day	2004
Scholarship	Edward C. and Grace A. Cutting Merit Scholarship, University of Maine	2002
Travel Award	Provost's Office Student Academic Conference Travel Fund, University of Maine, for travel to present poster at SICB, Anaheim CA	2002
Scholarships	College of Natural Sciences, University of Maine	2001
Research Award	College of Natural Sciences, University of Maine	2001
Research Award	Honors Program, University of Maine	2001

Elected to Alpha Zeta National Honor Fraternity	University of Maine	1999
Elected to Alpha Lambda Delta National Honor Society	University of Maine	1998

Record of Commercialization and IP Activities

Intellectual Property (IP):

Provisional Patent (application submitted May 2020): UMaine/Neuright, Inc. (Patent attorney: Choate, Hall & Steward LLP, Boston MA) Title: “Peripheral Neuropathy Device”

Commercialization and Entrepreneurial Training and Awards:

- NSF STTR/SBIR Venturewell – Beat the Odds Bootcamp (2021)
- NSF Venturewell – Dawnbreaker Commercialization Program (2021)
- NSF Venturewell – iCORP Program (2021)
- Maine Top Gun (selected for 15wk entrepreneur training program, run by Maine Center for Entrepreneurs), completed 2018-2019 (Neuright, Inc. won the David Shaw Grand Prize at the statewide Top Gun pitch competition in 2019)
- Vermont I-TREP, selected for participation, completed Summer 2018
- UMaine Maine Innovation, Research, and Technology Accelerator (MIRTA) program, selected for inaugural class – completed Spring 2018
- Co-Founder, Chief Scientific Officer (CSO): Neuright, Inc. (2018 incorporation; neurightlabs.com)
- Neuright, Inc won the state-wide David Shaw $25,000 grand prize in the Top Gun pitch competition (2019)
- Maine Technology Institute – Seed Grant (2019), TAP assistance program (2018-19)
- Harvard Medical School, Mini MBA (2012)

Report of Funded and Unfunded Projects

Funding Information

Current

NIH DIACOMP	$100,000 (2020-21) Pilot & Feasibility Program. Title: "Pre-clinical therapy delivery and imaging of nerve recovery in diabetic peripheral neuropathy of adipose and skin."
NSF STTR	$225,000 (2020-21) Awarded to Neuright, Inc. Role: CSO at Neuright, Inc.; Award # 2014779; Title: STTR Phase I: Optimization of a device for peripheral nerve recordings to diagnose neuropathy

$1 million; 7/1/2018-6/30/2023; *Novel Mechanisms for Adult Neurogenesis*

NSF-CAREER	(Role: PI)
NIH- R01	$712,960; 7/1/2018-6/30/2020; *Peripheral Neurotrophic Factors and Neural Plasticity in the Regulation of Adipose Tissue Energy Expenditure* (Role: PI)
American Heart Association Collaborative Grant	$750,000 7/1/2018-6/30/2021; Neurovascular interactions in adipose tissue and effects on cardiometabolic health (role: PI; collaborative with Dr. David Harrison, Jackson Laboratory – full funds to Townsend/UMaine)
NIH (MDIBL) COBRE	Subaward; PI: Prof Rosemary Smith; $60,000. A novel medical device for early detection of neuropathy (Award # 5P20GM104318-07; NCE through 2021) Role: Collaborator

Major Pending

Competitive renewal of R01; New R01; and Collaborative R01 for 2020-21 Submission dates

Past

NSF MRI	$497,479; Co-PI (lead PI: Clarissa Henry; Co-PIs: Kristy Townsend, Robert Wheeler, Leif Oxburgh); *Acquisition of a digital light sheet microscope Leica TCS SP8* (awarded 2017)
University of Maine System Research Reinvestment Fund Grand Challenge	One of three collaborative projects awarded funds for $1 Million Grand Challenge (2020). Part of (PI: Ben King, Project co-leads: Rob Wheeler, Kristy Townsend, Nishad Jayasundara). Title: UMaine Medicine: Addressing Renal Disease, Metabolic Disorders, and Infectious Diseases Among Isolated Populations in Rural Maine
UMaine Medicine Infrastructure Award	$100,000 Leveraging the Power of Diffuse Optical Imaging (Co-PI with Karissa Tilbury, Andre Khalil)
UMaine Medicine Seed Grant	Design and in vivo Testing of an Additively Manufactured, Percutaneous Surgical Implant that is Modified to Incorporate Negative Pressure Wound Therapy (PI: James Weber, Co-PIs: Kristy Townsend, David Neivandt, Ian Dickey, Anne Lichtenwalner) $40,000
UMaine Medicine Seed Grant	Role of Anthocyanin and Phenolic Acid Extracts from Wild Blueberries on Wound Healing as related to Diabetes, Ischemic conditions and Tissue Regeneration (PI: Dorothy Klimis-Zacaz, Co-PIs: Kristy Townsend, James Weber) $40,000
NSFA Biomedical Research Grant	Funds to recruit a new graduate student for a translational research project in our lab; UMaine internal award (2019-2020) $17,000 https://mainecampus.com/2019/09/six-professors-awarded-new-biomedical-science-grants/
FIG-MLA Faculty	NSF-funded program at UMaine (awarded by internal competition),

Incentive Grants	provides stipend for two Maine Learning Assistants (MLAs) per semester to support Active Learning activities in the classroom; provides stipend for faculty to collect and analyze data on learning outcomes (Funded 2016-current)
NIH (MMCRI) COBRE	$225,000 (direct; sub-award) 9/1/2017-8/31/2020; *Mesenchymal and Neural Regulation of Metabolic Networks*; co-investigator with Dr. Katie Motyl; COBRE PIs: Lucy Liaw and Cliff Rosen at MMCRI, Scarborough, ME
MTI Seed	Seed grant for development of a new biomedical device for peripheral neuropathy (7/1/2018-6/30/2019); $25,000 (awarded to our company, Neuright, Inc.) NEURIGHT: Developing a Theragnostic: Treatment and Diagnostic Platform & Start-up Company to Make Peripheral Neuropathy Right (Award ID SG5751)
UMaine Research Reinvestment Funds (RRF)	Two awards (total of $12,000) covered 1yr for obtaining preliminary data and support of undergraduate students in the design/fabrication of a device to measure peripheral neuropathy through the skin (2017-18). Additional award ($25,000) via RRF Accelerator program to pursue commercialization for this medical device (2018)
INBRE Small Grant	Awarded to obtain FACS-sorted cells at Jackson Laboratory through their Research Core (2017)
NIH MDIBL COBRE Pilot Funding	One year at $40,000 to collect pilot data on our project with Sandra Rieger at Mount Desert Island Biological Laboratory (MDIBL), investigating the role of MMP13 in diabetic peripheral neuropathy, including in adipose (ended 6/30/2018)
American Diabetes Association (ADA), Junior Faculty Award	$444,000; *Novel mechanisms for brain-adipose communication in the regulation of energy balance*; January 2014-December 2016 (awarded). Grant transferred to UMaine Nov. 1, 2014; NCE continued to Dec 2017
American Diabetes Association (ADA), Minority Undergraduate Fellowship	$3000; Jan. 1, 2016-Dec. 31, 2016; *Involvement of Bone Morphogenetic Protein (BMP) signaling in the Function of Hypothalamic Tanycytes.* This award supports an undergraduate minority student in the laboratory for one year.
BNORC Small Grant	$3000 to utilize BNORC Adipose Tissue Core Facility (2015)
INBRE Core Grant	$1500 to utilize FACS core at Jackson Laboratory (2015)
Boston Area Diabetes Endocrinology Research Center (BADERC), Pilot and Feasibility Research Grant Award	$60,000 for 2 yrs starting Apr. 1, 2014; Mechanisms of Fatty Acid Sensing and Uptake by Brown Adipocytes. http://www.baderc.org/feasibility/2014grants.html
Boston Nutrition Obesity Research Center (BNORC); Pilot and	$50,000 for 2yrs starting; Novel role for hemojuvelin in brown adipocyte energy expenditure.

Feasibility Grant

ADVANCE/Rising Tide Research Seed Grant	$7,500 grant (2015); Connecting Neurotrophic Factors and Neuropathy in the Regulation of Energy Balance.
American Heart Association (AHA), Scientist Development Grant	$307,000 (National Affiliate, 4yrs. & Founders, 3yrs both awarded 2014); Novel Mechanisms for brain-adipose communication in the regulation of energy balance *(both awards were relinquished due to scientific overlap with the ADA Junior Faculty award in 2014)*
NIH individual F32 NRSA	Individual postdoctoral fellowship from NIH: *BMP7 and the Regulation of Central and Peripheral Energy Balance,* co-mentored by Dr. Yu-Hua Tseng and Dr. Ronald Kahn (National Academy Member), 2011-2013.
NIH postdoctoral NRSA T32 training grant	Joslin Diabetes Center (awarded by internal competition), 2009-11
Wellcome Trust Postdoctoral Fellowship	Named postdoctoral fellow on grant awarded to PI Jane Howard, King's College London, 2008-9
National Science Foundation (NSF) Doctoral Dissertation Improvement Grant (DDIG)	$12,000 for laboratory supplies to support my research project investigating changes in hypothalamic gene expression in the fattening period prior to hibernation in the little brown bat (*Myotis lucifugus*), at Boston University.
American Association for University Women (AAUW) Predoctoral Fellowship	Awarded 2 years stipend and supplies, but only able to accept one year stipend before graduation (2006-7)
National Science Foundation (NSF) GK-12 Program Fellow	Covered one year stipend – see Teaching section for additional details, 2005-6
National Institutes of Health (NIH) T32 Institutional Training Grant predoctoral fellow	Program in Neuroscience, Boston University (awarded by internal competition), 2002-3
National Science Foundation (NSF) Research Experience for Undergraduates (REU)	Mount Desert Island Biological Laboratory, laboratory of Dr. David Towle, Summer

Report of Local Teaching and Training

Teaching of Students in Courses

Graduate Physiology (6wk module), BMS 628; Graduate School of Biomedical Science and Engineering (GSBSE). Developed and taught new interactive, discussion-based curriculum via Zoom for 12 PhD students across — Spring 2020

5 research sites in Maine. Focused on pedagogical skills for future teaching careers while probing current research in the field of physiology, pathophysiology and the relation to biomedical research, and critical analyses of lay science and primary research articles.

Guest Lecture for BIO122 (Bio for non-majors at UMaine): How & Why Our Brains 'Talk' to Our Fat Tissues — 2019

Guest Lecture for NFA 117 (first year Bio majors course at UMaine): Undergraduate Research Perspectives — 2018

"Molecular Mechanisms of Fatty Liver" – developed and taught a week-long immersive biomedical laboratory research course with Southern Maine Community College (SMCC) students, taught at MDI Biological Lab in January as part of INBRE program) — 2017 & 2018

Guest Lecture: Utilization of Animal Models for Biomedical Research (School of Food and Agriculture at UMaine; for Prof. Pauline Kamath's pre-veterinary course) — 2017 - 2019

BIO 480/483 and 580/583 Cell Biology w/ Lab (University of Maine) — 2016-2020
-- Active learning approach to lecture (up to 50 students) and lab (2 sections of 12 students each), with a focus on future science and health careers. Laboratory investigations encompass cell culture and related techniques with a focus on inquiry-based independent research design at the conclusion. Course is cross-listed for graduate credit and Capstone credit. Original curriculum developed by me, lab manual self-published.

BIO 307 Intro to Neuroscience/ Interdisciplinary Neuroscience (University of Maine) — 2015-2018
-- Active learning approach to lecture (up to 80 students) with a focus on current and landmark studies in neuroscience and a connection to real research, data analysis, writing skills, current laboratory techniques, and understanding of primary research literature. Original curriculum developed by me; became course director for Adjunct faculty Fall 2017-18.

BIOS E-161 ***Obesity and Body Weight Regulation*** (created new course for undergraduates and graduates, Harvard Extension School). Original curriculum developed by me, active learning approach to clinical/societal, biochemical, physiological, metabolic, and other aspects of obesity. — 2011-2014

BIOT E-200 ***Graduate Research Methods and Scholarly Writing in Biotechnology*** (pro-seminar instructor at Harvard Extension School; including distance education beyond 2015) — 2010-2014

Nanocourse - Bone and Joint: Development and Disease (Jonathan Lowery, organizer), Harvard Dental School: "Interaction between the skeleton, adipose tissue, and the brain" March 25, 2013 — 2013

Biology Lab Teaching Fellow, Simmons College — 2010

Clinical Endocrinology (discussion section leader), King's College London — 2008

National Science Foundation GK12 Fellow (one year in an under-served 8th grade Biology classroom; developed and implemented inquiry-based curriculum based on MA state science standards)	2005-06
Biology Department Teaching Fellowships – four semesters (Biology, Genetics, Physiology), Boston University	2003-05
Course Instructor/Curriculum Developer, developed and taught 8 unique hands-on courses for Kindergarten to Middle School age kids, Museum of Science, Boston MA	2003-07
Chemistry and Photography Instructor, Upward Bound Summer Program	Summer 2000 & 2002
Tutor and Science Tutor Coordinator with Tutoring Program at Univ. of Maine	1999-2002
Photography course assistant, resident assistant, Nurturing Nature and Numbers (math and science camp for middle school girls in Limestone, ME)	Summer 1999

Selected Pedagogical/Instructional Professional Development Activities and Training

- National Science Foundation – Vision and Change (School of Biology and Ecology multi-day workshop, summer 2016)
- School of Biology Teaching and Learning Journal Club, participant (2015-16)
- Attended Active Learning training session, Society for Neuroscience 2017
- Recipient – Maine Learning Assistant undergraduate support in BIO307 and BIO480/483, as part of Fig-MLA program
- T3: Train the Trainer, bioinformatics (MDIBL, Summer 2018), week long course as part of IDEA state initiatives
- Attended day-long symposium organized by the Research in STEM Education (RiSE) center, summer 2018
- Presented numerous years at first year student orientation at Schoodic Institute (School of Biolgoy & Ecology, August)
- SAALT
- Summer Institute on Evidence Based Teaching (HHMI) – week long course Summer 2018
- CITL courses/workshops: Group Work, Questioning Strategies, Cultivating Curiosity in the Classroom, Seeing the Syllabus through your Students Eyes,

Laboratory and Other Research Supervisory and Training Responsibilities

Ohio State: Mentored 3 doctoral students, 1 postdoctoral fellow, 3 research staff	2020-present
UMaine: Mentored 10 graduate students (3 doctoral, 7 Masters), 2 postdoctoral fellows, 2 full time laboratory technicians, numerous undergraduate research assistants, Honors Thesis Students and Capstone Thesis Students in my lab at University of Maine (see Past/Current Trainees for complete list – to date, I have mentored more than 50 undergraduates in	2014-2020

my lab since 2015); serving on numerous thesis committees for graduates and undergraduates; mentored EPSCoR high school students summers 2016-19, INBRE students summers 2017-2020, NSF-REU students summers 2018-20, and Upward Bound high school student summer 2018

Joslin Diabetes Center/Harvard Medical School: Mentored 10 undergraduate and medical students in the laboratory; co-mentored postdoc Mentored Masters student from Harvard Extension School	2009-2014
Mentored Independent Study student from Harvard Extension School	2013-2014
Science Team Biology Coach at Boston University Academy, Boston MA	2006-07
Mentored 7 undergraduate and research assistants in the laboratory while at Boston University	2003-07

Report of Regional, National and International Invited Teaching and Presentations

Invited (ORAL) Presentations and Courses

Local/Regional

1. **Townsend, KL.** "Plasticity and remodeling in the nervous system: implications for energy balance and metabolic health." Research in Review, College of Medicine Administrators Meeting, OSU, Feb 11, 2021.

2. **Townsend, KL.** "Neural plasticity, adipose peripheral nerves, and metabolic health." Neurosurgery Grand Rounds, OSU, Jan 7, 2021.

3. **Townsend, KL.** "Functional Roles for Peripheral Nerves in Adipose Tissues: Previous Knowledge and Current Perspectives." Davis Heart and Lung Research Institute (DHLRI) Seminar Series, The Ohio State University (OSU), Sept 25, 2020.

4. **Townsend, KL.** "Communicating science in the time of COVID-19." Northern Light Health, Safe Return to Business series. Presenter for Week 8: A Focused Discussion: Considerations for reducing risk for COVID-19 and youth anxiety in schools and youth serving organizations. July 30, 2020 (by Zoom). https://northernlighthealth.org/Locations/Sebasticook-Valley-Hospital/News-Events/News/2020/Week-8-Safe-Return-to-Business-A-Focused-Discussio

5. **Townsend, KL.** Neuropathy, Adipose Tissue, Aging and Metabolic Health. University of New England, Portland Campus. October 28, 2019.

6. **Townsend, KL.** Investigating the nervous system to better understand metabolic health. University of Southern Maine, Oct 3, 2019.

7. **Townsend KL.** How our brain and nervous system affect our metabolic health and body weight. Mount Desert Island Biological Laboratory (MDIBL) Science Café series, June 10, 2019.

8. **Townsend, KL.** Keynote: How our brain works with us, and against us, in the fight against obesity and diabetes. 4th Annual Eastern Maine Medical Center (now Northern Light) Research Expo, June 3, 2019.

9. **Townsend, KL.** and Blaszkiewicz M. *MIRTA Program Overview: Neuright, Inc.* (UMaine Board of Trustees Meeting, Jan. 2019)

10. **Townsend, KL.** Remodeling our brain and nervous system: connections to obesity and diabetes. Emera Planetarium Public Science Lecture Series; Dec 20, 2018.

11. **Townsend, KL.** Remodeling our nervous system: why neural plasticity in adulthood is important for our brain and our health. Southern Maine Community College seminar series, November 2018.

12. **Townsend, KL.** Neurovascular interactions in adipose tissue. Cardiometabolic Young Investigators Forum. Maine Medical Center, June 22, 2018.

13. **Townsend, KL.** Investigating adipose tissue neural innervation: plasticity and neuropathy. Maine Biomedical and Molecular Science Symposium (MBMSS), April 2018, at MDI Biological Laboratory.

14. Blaszkiewicz M and **KL Townsend**. Exploring the role of neurotrophic factors in adipose tissue: effects on innervation and consequent metabolic parameters. Maine Society for Neuroscience Annual Meeting, Bar Harbor, ME, Oct. 22, 2016.

15. **Townsend, KL.** Adipose Tissue Innervation and Neural Activation in the Regulation of Energy Expenditure. Invited Seminar Speaker, MDIBL, Bar Harbor, ME, April 26, 2016.

16. **Townsend, KL.** Novel role for hemojuvelin in brown adipocyte energy expenditure. BNORC Annual Meeting, Boston, MA, July 24, 2015.

17. **Townsend, KL.** Bone Morphogenetic Proteins in the Regulation of Energy Balance by the CNS and Brown Adipose Tissue. Maine Medical Center Research Institute (MMCRI), June 30, 2015.

18. **Townsend, KL.** Bone Morphogenetic Proteins in the Regulation of Energy Balance by the CNS and Brown Adipose Tissue. Jackson Laboratory Genetic Interest Group (GIG) seminar series, May 29, 2015.

19. **Townsend, KL.** Regulation of Appetite and Brown Adipose Tissue Activation by Centrally-Acting Bone Morphogenetic Proteins (BMPs). Center for Excellence in the Neurosciences, University of New England, May 14, 2015.

20. **Townsend, KL**. What can I do with my science degree? Presentation for the UMaine Biology Club, April 2015.

21. **Townsend, KL.,** M. Blaszkiewicz, YH Tseng. Regulation of Energy Balance by the Bone Morphogenetic Proteins (BMPs). Maine Biological and Biomedical Sciences Symposium (MBMSS), MDIBL April 2015.

22. **Townsend, KL.** Bone Morphogenetic Proteins in the Regulation of Energy Balance, Joslin Diabetes Center Seminar Series; Oct 2014.

23. **Townsend, KL.** Central Regulation of Appetite and Energy Expenditure by the Bone Morphogenetic Proteins (BMPs), Joslin Diabetes Center Seminar Series; May 2012.

24. **Townsend, KL.** Obesity, SOCS3 and Leptin Resistance. Diabetes Symposium, King's College Hospital, Denmark Hill London, 2008.

25. **Townsend, KL.** Obesity, SOCS3 and Leptin Resistance, Tommy's The Baby Charity, 3 Centre Conference, Manchester U.K, 2008.

26. **Townsend, KL** and DW Towle. Crustacean Hyperglycemic Hormone: A Possible Role in Osmoregulation by Euryhaline Crabs. Joint Meeting of the Mount Desert Island Biological Laboratory and Jackson Laboratory *Future Scientists*. Salisbury Cove, ME. August 2001.

National/International

1. **Townsend, KL.** "How fat talks to your brain: neural innervation of adipose in the regulation of metabolic health" Neurobiology/Cell Biology Seminar Series, University of Nevada, Reno. Oct 14, 2020.

2. Gabriel Jensen, **KL Townsend.** The meninges and choroid plexus are prominent telomerase reverse transcriptase-expressing stem cell niches in the mouse brain. Keystone Symposia: Cerebral flow and function – lymphatics, glymphatics and the choroid plexus. Santa Fe, NM, Feb 2020.

3. **Townsend, K.L.** Implicating subcutaneous adipose tissue in peripheral neuropathy. Universite Laval Research Chair in Obesity, 22nd International Symposium, Quebec. Invited keynote. Nov 21, 2019.

4. **Townsend, K.L.** The regulation of energy balance through brain-adipose communication. University of Michigan, departmental seminar (Neurology), November 2019. https://medicine.umich.edu/dept/neurology/events/201911/neurologyneuroscience-research-seminar-presented-dr-kristy-townsend-associate-professor-neurobiology

5. **Townsend, K.L.** Innervation of Adipose Tissue and Implications for Aging Research. University of New England, October 29, 2019.

6. **Townsend, K.L.** Assessing the Regulation and Function of Adipose Nerves. Adipose and Metabolic Tissue Study Group Seminar (BNORC), Boston University Medical School, October 8, 2019.

7. **Townsend, K.L.** Brain Adipose Connections with Aging. Monday Seminar Series, Jean Mayer USDA Human Nutrition Research Center on Aging at Tufts. May 6, 2019.

8. **Townsend, K.L.** Remodeling the Adult Brain: Impacts on Appetite and Calorie Burning, Bowdoin College Biology Seminar Series, Apr. 11, 2019.

9. Johnson, C. and **K.L. Townsend.** Sending Signals: Adipose Sensory Nerves May Communicate with the Brain via Lipid Metabolites. Oral Presentation at Keystone Symposia on Lipidomics and Functional Metabolic Pathways in Disease (Steamboat Springs, CO, April 2019).

10. **Townsend, K.L.** Maintaining a Healthy Metabolism Through Brain-Adipose Communication, Jackson Laboratory seminar series, Feb. 28, 2019.

11. **Townsend, KL.** Visualizing and investigating adipose depot innervation. Diabetes, Obesity and Metabolism Institute (DOMI) seminar series, Icahn School of Medicine at Mount Sinai. September 2018.

12. **Townsend, K.L.** Adipose tissue neurovascular interactions. Experimental Biology Annual

Meeting 2018 (April; San Diego, CA); invited oral session presentation.

13. **Townsend, KL.** Evidence for a new adult neural stem cell marker and niche. Brown University, October 13, 2017.

14. **Townsend, KL.** Growth Factors and Brain-Adipose Communication in the Regulation of Energy Balance. Ohio State DHLRI seminar series, Jan 20, 2017.

15. **Townsend, KL.** Growth Factors Regulating Both Arms of Energy Balance: Appetite and Energy Expenditure. Scholar Rock internal seminar series, Dec. 13, 2016.

16. Leiria L(*), Magdalena Blaszkiewicz (*), Wenjie Chen, Sarah Lessard, Nicholas Cutter, Ruidan Xue, TianLian Huang, Laurie J Goodyear, Jodie L Babitt, Herbert Y. Lin, **Kristy L. Townsend (#)**, Yu-Hua Tseng (#) *Equal First Authors # Equal Contributing Authors. Loss of BMP co-receptor hemojuvelin (HJV) leads to increased brown adipogenesis in mice. Oral Presentation at 11th International BMP Conference, Boston, MA 2016.

17. **Townsend KL**, Lynes MD, Colburn J, Pritchard E, Kwon YM, Huang TL, Kaplan DL, Tseng Y-H. Silk-Mediated Sustained Delivery of Bone Morphogenetic Protein 7 (BMP7) to Subcutaneous White Adipose Depot Leads to Browning and Reversal of Obesity. Oral Presentation (and high-scoring abstract award), ADA Annual Meeting, 2014.

18. Zhang H., Guan M., Huang T.-L., **Townsend K.L.,** An D., Schulz T., Winnay J., Mori M., Goodyear L.J, Tsang J., Tseng Y.-H. MicroRNA Determines Brown Fat Differentiation and Thermogenic Function. Oral Presentation, ADA Annual Meeting, 2013.

19. **Townsend KL,** Huang TL, McDougall LE, Diakow M, Mishina Y, and YH Tseng. Deletion of Bone Morphogenetic Protein Receptor 1a (BMPR1a) in POMC Neurons Results in Hyperphagia and Increased Sympathetic Outflow to Brown and White Adipose Tissues. Oral Presentation, Keystone Symposia, Santa Fe, NM, 2012.

20. Schulz TJ, McDougall LE, Huang TL, Lee K, **Townsend KL**, Zhang H, Schrier D, Falb D, and YH Tseng. Effect of Brown Adipogenic Factor BMP7 on Systemic Energy Metabolism in Diet-Induced Obesity. Oral Presentation, ADA Annual Meeting, Orlando, FL. June 25-29, 2010.

21. **Townsend KL**, Kokkotou E, Suzuki R, Jing E, Espinoza DO, Schulz TJ, Lee K, Huang TL, McDougall LE, and YH Tseng. A hypothalamic role for BMP signaling in the regulation of appetite and metabolism. Oral Presentation, ADA Annual Meeting, Orlando, FL, June 25-29, 2010.

22. **Townsend, KL** and EP Widmaier. Diet induced obesity in mice with and without hyperleptinemia. Oral Presentation, Endocrine Society's 88th Annual Meeting, Boston MA, 2006.

Report of Scholarship

Publications

Complete List of Published Work in MyBibliography:
https://www.ncbi.nlm.nih.gov/myncbi/1Da4eoNHhzfQv/bibliography/public/

Peer reviewed publications in print or other media

(a) Original Research Publications

1. Lynes MD, DL Carlone, **KL Townsend**, DT Breault, Y-H Tseng. Telomerase reverse transcriptase expression marks a population of rare adipose tissue stem cells. Science Advances (*2021, under review*).
2. Harling M, J Juybari, CP Johnson, **KL Townsend**, A Khalil, K Tilbury. Wavelet-based characterization of the spatial relationship of nerve and collagen in neuropathic adipose tissue. SPIE digital library, Feb 20, 2020, Proceedings Volume 11245, Three-Dimensional and Multidimensional Microscopy: Image Acquisition and Processing XXVII; 112450R (2020) https://doi.org/10.1117/12.2546918
3. Blaszkiewicz M., Wood E., Koizar S., Willows J., Anderson R., Tseng Y-H., Godwin J., **Townsend K.L.*** The Involvement of Neuroimmune Cells in Adipose Innervation (Accepted and In Press at **Molecular Medicine** 26, Article number: 126 (2020)) **Corresponding Author*
4. Willows J.W., Blaszkiewicz M., Lamore A., Borer S., Dubois A., Garner E., Breeding P., Tilbury K., Khalil A., **Townsend K.L.*** Visualization and analysis of whole depot adipose tissue innervation. (2019) BIORXIV/2019/788885 (Under revised re-submission to iScience) **Corresponding Author*
5. **Townsend KL#**, Colburn J, Pritchard E, Lynes MD, Blaszkiewicz M, Kwon YM, Kaplan DL, Tseng YH#. Silk-mediated delivery of BMP7 to white adipose tissue promotes browning and increases energy expenditure. *Under Submission # Co-corresponding authors.*
6. Blaszkiewicz M, Willows JW, Dubois AL, Waible S, DiBello K, Lyons LL, Johnson C., Paradie E., Banks N., Motyl K., Merilla M., Harrison B., **Townsend K.L.*** (2019) Neuropathy and neural plasticity in the subcutaneous white adipose depot. PLoS .ONE 14(9): e0221766. https://doi.org/10.1371/journal.pone.0221766 **Corresponding Author*
7. Breeding PW, M Blaszkiewicz, **K Townsend**, A Khalil, KB Tilbury. Exploratory Investigations of the spatial relationships of collagen and nerves in subcutaneous white adipose tissue (scWAT) using 2-photon microscopy. SPIE Digital Library, Proceedings Volume 10882, Multiphoton Microscopy in the Biomedical Sciences XIX; 1088218 (2019) https://doi.org/10.1117/12.2510753
8. Miller J#, M Blaszkiewicz#, C. Beaton, CP Johnson, S Waible, A Dubois, A Klemmer, M Kiebish, **KL Townsend*.** A peroxidized omega-3-enriched polyunsaturated diet leads to adipose and metabolic dysfunction. (2019) **J Nutr Biochem**. (64): 50-60. **Corresponding Author; #* Equal contributing first authors
9. **Townsend KL*,** Madden C, Blaszkiewicz M, McDougall LM, Tupone D, Lynes DM, Yu P, Morrison S,Tseng YH*. Re-Establishment of energy balance in a male mouse model with POMC neuron deletion of BMPR1A. (2017) ***Endocrinology*** *158(12): 4233-4245. *Co-Corresponding Author.*
10. Asalone K. and **KL Townsend***. The importance of social sciences in biomedical education and doctor-patient interactions. (2017) *Accepted with revisions at* **Journal of Young Investigators**. **Corresponding Author*
11. AL Waldron, Schroder PA, KL Bourgon, JK Bolduc, JL Miller, AD Pellegrini, AL Dubois, M Blaszkiewicz, **KL Townsend**, S Rieger. Oxidative stress-dependent MMP-13 activity underlies glucose neurotoxicity. (2017) ***J Diabetes Complications****, 32(3):249-257.*
12. An D, **Townsend KL**, Lee MY, Getchell KM, Tseng YH, Hirshman MF, and Goodyear LJ. Akt2 Deficient Mice Have Altered Energy Metabolism and Mitochondrial Function in Brown Adipose Tissue. *Under re-submission.*
13. Williams J, Rosner BA, **Townsend KL***, Effects of Intermittent Fasting on Body Weight and Dyslipidemia: A Meta-Analysis of Studies Conducted Through 2013. *Under re-submission. *Corresponding Author.*
14. Zhang H, Guan M, Huang TL., **Townsend KL,** An D, Schulz T, Winnay J, Mori M, Goodyear LJ, Tsang J, Tseng YH. MicroRNA Determines Brown Fat Differentiation and Thermogenic Function. (2015) **EMBO reports**. 16(10):1378-9.
15. Xue R, Lynes MD, Dreyfuss J, Shamsi F, Schulz TJ, Zhang H, Huang TL, **Townsend KL**, Li Y,

Takahashi H, Weiner LS, White AP, Lynes MS, Rubin LL, Goodyear LJ, Cypess AM, Tseng Y-H. Clonal Analysis and Gene Profiling Identify Genetic Biomarkers of the Thermogenic Potential of Human Brown and White Preadipocytes. (2015) **Nature Medicine** 21(7), 760-8. PMID: 26076036

16. Stanford KI, Middelbeek RJW, **Townsend KL**, Lee M-Y, Takahashi H, So Kawai, Hitchcox KM, Markan KR, Hellbach K, Hirshman MF, Tseng Y-H, Goodyear LJ. A Novel Role for Subcutaneous Adipose Tissue in Exercise-Induced Improvements in Glucose Homeostasis. ***Diabetes****. 64(6), 2014. PMID* 25605808.
17. Schulz TJ, Huang P, Huang TL, McDougall LE, **Townsend KL**, Cypess AM, Mishina Y, Gussini E, Y.-H.Tseng. Impaired Development of Constitutive Brown Adipocytes Due to Loss of BMP Signaling Induces Compensatory Browning of White Adipose Tissue. (2013) ***Nature*** Mar 21; 495(7441): 379-83. PMID: 23485971
18. Stanford KI, Middelbeek RJW, **Townsend KL**, An D, Hitchcox KM, Markan KR, Nakano K, Nygaard EB, Jung DY, Lee Y, Kim JK, Hirshman MF, Tseng YH, and Goodyear LJ. Brown Adipose Tissue Regulates Glucose Homeostasis and Insulin Sensitivity. (2013) ***J Clin Invest.*** Jan 2; 123(1):215-23. PMID: 23221344
19. Liew CW, Boucher J, Cheong JK, Vernochet C, Koh HJ, Mallol C, **Townsend K**, Langin D, Kawamori D, Hu J, Tseng Y-H, Hellerstein MK, Farmer SR, Goodyear L, Doria A, Bluher M, Hsu SIH, Kulkarni RN. Ablation of TRIP-Br2, a novel regulator of fat lipolysis, thermogenesis and oxidative metabolism, prevents diet-induced obesity and insulin resistance. (2013) ***Nat Med.*** Feb;19(2):217-26. PMID: 23291629
20. **Townsend KL**, An D, Lynes MD, Huang TL, Goodyear LJ, and Tseng YH. Increased Mitochondrial Activity in BMP7-treated Brown Adipocytes, Due to Increased CPT1- and CD36-mediated Fatty Acid Uptake. (2012) ***Antioxidants & Redox Signaling.*** 19(3), 243-57. PMID: 22938691
21. **Townsend KL*,** Suzuki R*, Huang TL, Jing E, Schulz T, Lee K, Taniguchi CM, Espinoza DO, McDougall LE, He TC, Kokkotou E, and Tseng YH. Bone Morphogenetic Protein 7 (BMP7) Reverses Obesity and Regulates Appetite Through a Central mTOR Pathway. (2012). ***FASEB J****,* 26(5): 2187-96. (* co-first authors) PMCID: PMC3336788
22. Schulz TJ, Huang TL, Tran TT, Zhang H, **Townsend KL**, Shadrach JL, Cerletti M, McDougall L, Giorgadze N, Tchkonia T, Schrier D, Falb D, Kirkland JL, Wagers AJ, and Tseng YH. Identification of Inducible Brown Adipocyte Progenitors Residing in Skeletal Muscle and White Fat. (2011). ***Proc Natl Acad Sci U.S.A.***, 108(1): 143-8. PMCID: PMC3017184
23. **Townsend KL,** Kunz TH, and Widmaier EP. Changes in body mass, serum leptin, and mRNA levels of leptin receptor isoforms during the premigratory period in Myotis lucifugus. (2008) ***J Comp Physiol [B].*** 178(2): 217-23. PMID: 17962952
24. **Townsend KL,** Lorenzi MM, and Widmaier EP. High-fat diet-induced changes in body mass and hypothalamic gene expression in wild-type and leptin-deficient mice. (2008) ***Endocrine***, 33(2):176-88. PMID: 18483882
25. Schulz LC, **Townsend KL**, Kunz TH, and Widmaier EP. Inhibition of Myotis lucifugus trophoblast invasiveness in vitro by immunoneutralization of leptin. (2007) ***General and Comp Endo***, 150(1): 59-65. PMID: 16938297
26. Zhao J, **Townsend KL**, Schulz LC, Kunz TH, Li C, and Widmaier EP. Leptin receptor expression increases in placenta, but not hypothalamus, during gestation in Mus musculus and Myotis lucifigus. (2004) ***Placenta***, 25: (8-9). PMID: 15450389

(b) Original Research Publications (*in preparation*)

1. Johnson CP, M Blaszkiewicz, AL Dubois, J Willows, S Rieger, **KL Townsend*.** MMP-13 inhibition reverses diabetic neuropathy in skin and underlying adipose. *In Preparation. *Corresponding Author*
2. Jensen GS, A Beaulieu, CD Curtis, M Blaszkiewicz, CW Greco, CJ Brennan, MD Lynes, D Breault, **KL Townsend*.** Mouse telomerase reverse transcriptase (mTERT) reveals a new niche

of quiescent adult neural stem cells in the murine choroid plexus. *In Preparation. *Corresponding Author*

3. Luiz Leiria*, Magdalena Blaszkiewicz*, Wenjie Chen, Sarah Lessard, TianLian Huang, Ruidan Xue, Laurie Goodyear, Herb Lin, Jodie Babitt, **Kristy Townsend[#],** Yu-Hua Tseng[#]. Novel role for Hemojuvelin in the regulation of brown adipogenesis. *Equal first-author contribution; *In Preparation. # Co-corresponding authors.*

(c) Reviews, Chapters, Commentaries, Lay press, Other Media

1. Townsend KL. The re-emergence of adipose innervation as a research focus. Invited Commentary article for **Nature Reviews Endocrinology** 16, 127-128 (2020)

2. G. Jensen, N. Leon-Palmer and **KL Townsend*.** Bone Morphogenetic Proteins (BMPs) in the regulation of energy balance. Invited review for ***Metabolism***, (2021) *Under Review. *Corresponding Author*

3. Blaszkiewicz M, C Johnson, J Willows, **KL Townsend*.** The Importance of Peripheral Nerves in Adipose Tissue for the Regulation of Energy Balance. (2019) (invited review article for "New Players in Adipocyte Biology" special issue of ***Biology*** 2019, *8*(1), 10; https://doi.org/10.3390/biology8010010 **Corresponding Author*

4. Townsend KL (2016). The science of appetite. ***Zest***, Summer 2016 issue.

5. Blaszkiewicz M, **KL Townsend*.** (2016) Adipose Tissue and Energy Expenditure: Central and Peripheral Neural Activation Pathways. ***Current Obesity Reports*** Jun;5(2):241-50. **Corresponding Author*

6. Townsend KL (2015). Brain eating: The science behind taste, hunger, and why we either love or hate certain foods. ***Zest***, Summer 2015 issue.

7. Townsend KL and YH Tseng. (2015). Of Mice and Men: Novel Insights Regarding Constitutive and Recuitable Brown Adipocytes. Invited Review for ***International Journal of Obesity Supplements 5***. S15-20.

8. Townsend KL and YH Tseng. (2014). Brown Fat Fuel Utilization and Thermogenesis. Invited Review for ***Trends in Endocrinology and Metabolism*** 25(4):168-177. **chosen by editorial board as Top 10 Best Articles of 2014 in TEM. * ranked as Science Direct top 25 most downloaded articles for Oct-Dec 2014.*

9. Townsend KL and YH Tseng. (2012). Brown Adipose Tissue: Recent Insights into Development, Metabolic Function, and Therapeutic Potential. Invited Review for inaugural issue of the new journal ***Adipocyte***, 2012 Jan 1(1) 13-24.

Abstracts, Poster Presentations, and Exhibits Presented at Professional Meetings

***Only First Author or Corresponding Author items at national/international meetings listed here**

1. Blaszkiewicz M, J Willows, C Johnson**, KL Townsend***. Neuroimmune interactions with Vascular and Lymphatic Systems in Adipose Tissue. Obesity Society Annual Meeting, Nashville TN, November 2018.

2. Blaszkiewicz M, Willows JW, Dubois A, Wood E, Anderson R, DiBello K, Koizar S,

Townsend KL. Remodeling of adipose tissue nerves through the action of a stromovascular-derived neurotrophic factor. Keystone Symposia, Keystone CO, January 2018.

3. Curtis, CD, **KL Townsend*.** Mouse telomerase reverse transcriptase (mTERT) reveals a new niche of quiescent adult neural stem cells in the murine choroid plexus. Cell Symposia, Big Questions in Neuroscience, Alexandria, VA, November 2017.

4. Blaszkiewicz M, AL Dubois, **KL Townsend*.** Regulation of Adipose Tissue Neuropathy and Neural Plasticity. The Obesity Society Annual Meeting, Washington DC, October 2017.

5. Blaszkiewicz M, JL Miller, C Beaton, **KL Townsend*.** Metabolic and Physiological Effects of Varying Dietary Fat Type and Amount. The Obesity Society Annual Meeting, New Orleans, LA, 2016.

6. Blaszkiewicz M, K Dibello, L Wood, N Cutter, S Koizar, J Willows, **KL Townsend***. Peripheral Neurotrophic Factors in the Regulation of Adipose Tissue Energy Expenditure. Society for Neuroscience Annual Meeting, San Diego, CA, 2016.

7. Blaszkiewicz M, M Hartmann, C Curtis, A Rosenwasser*, **KL Townsend***. Altered Energy Balance in Ethanol-Treated Animals. iBANGS Genes, Brains and Behavior Annual Meeting, Bar Harbor, ME, 2016.

8. **Townsend KL**, Madden C, McDougall L, Blaszkiewicz M, Tupone D, Lynes MD, Mishina Y, Yu P, Morrison S, Tseng Y-H. Hypothalamic bone morphogenetic protein receptor 1A (BMPR1A) regulates energy balance. Poster featured in audio tour at annual meeting of the American Diabetes Association, Boston, MA, 2015.

9. **Townsend KL**, Blaszkiewicz M, Chen W, Leiria L, Lessard S, Xue R, Huang TL, Goodyear LJ, Babitt JL, Lin HY, Tseng Y-H. Loss of BMP co-receptor hemojuvelin leads to increased brown adipogenesis in mice. Poster presentation at Keystone Symposia: Beige and Brown Fat: Basic Biology and Novel Therapeutics, Snow Bird, UT, 2015.

10. **Townsend KL**, Chen W, Lessard S, Huang TL, Goodyear LJ, Babitt JL, Lin HY, Tseng Y-H. Loss of BMP co-receptor hemojuvelin leads to increased brown adipogenesis in mice. Poster Presentation at ENDO annual meeting, Chicago, IL 2014.

11. **Townsend KL**, An D, Huang TL, Lynes, MD, Zhang H, Goodyear LJ, Y.-H. Tseng. Increased Mitochondrial Activity in BMP7-Treated Brown Adipocytes, Due to Increased CPT1- and CD36--Mediated Fatty Acid Uptake. Poster Presentation at ENDO annual meeting, Houston, TX, 2012.

12. **Townsend KL**, Huang TL, McDougall LM, Diakow M, Mishina Y, Tseng YH. Deletion of Bone Morphogenetic Protein Receptor 1a (BMPR1a) in POMC Neurons Results in Hyperphagia and Increased Sympathetic Outflow to Brown and White Adipose Tissues. Poster (and oral) Presentation at Keystone Symposia: Genetic and Molecular Basis of Obesity and Body Weight Regulation, Santa Fe, NM, 2012.

13. **Townsend KL,** Huang TL, McDougall L, Diakow M, Mishina Y, Tseng YH. The Bone Morphogenetic Protein (BMP) Receptor, BMPR1a, in POMC Neurons is Required for Proper Energy Balance. Poster Presentation at ENDO annual meeting, Boston MA, 2011.

14. **Townsend, K.L**. and E.P. Widmaier. Changes in hypothalamic gene expression induced by

chronic high fat diet in mice. Poster Presentation at Society for Neuroscience annual meeting, Atlanta, GA, 2006.

15. **Townsend, K.L,** L.C. Schulz, and E.P. Widmaier. Prehibernatory changes in leptin receptor and signaling pathways in bat hypothalamus (conference proceedings). Journal of Experimental Zoology Vol. 305A, Number 2 (Feb 1, 2006), page 185. Poster presentation at International Conference on Comparative Endocrinology, Boston, MA, 2005.

16. **Townsend, K.L.**, Celine Spannings-Pierrot, Daniel K. Hartline, Shawna King, Raymond P. Henry, David W. Towle. Salinity-related changes in crustacean hyperglycemic hormone (CHH) mRNA in pericardial organs of the shore crab *Carcinus maenas.* Poster presentation at Society of Integrative and Comparative Biology Annual Meeting, Anaheim, CA, 2002.

Selected Press Coverage:

1. The Maine Question podcast; What Color is Your Fat (Townsend interview): https://umaine.edu/news/blog/2020/03/12/the-maine-question-podcast-looks-at-many-roles-of-fat/

2. Interviewed by Maine Science Festival: https://www.mainesciencefestival.org/meet-maine-scientist-kristy-townsend/

3. AP picked up NSF-CAREER press release: http://bangordailynews.com/2018/08/05/education/umaine-researcher-earns-1m-grant-to-study-the-adult-brain/

   https://umaine.edu/news/blog/2018/08/06/ap-reports-townsend-awarded-1m-grant-adult-brain-research/

4. AP picked up American Heart Association grant press release; covered on local news: https://www.usnews.com/news/best-states/maine/articles/2018-05-16/umaine-researcher-getting-750k-to-study-aging-fat-tissue

   https://www.wabi.tv/content/news/UMaine-professor-lands-large-grant-for-aging-research-483508811.html

   https://www.pressherald.com/2018/05/16/umaine-researcher-gets-grant-to-study-aging-fat-tissue/

5. Maine Innovation Research and Technology Accelerator (Townsend leads one of the funded projects): https://www.newscentermaine.com/article/news/education/umaine-innovations-look-to-help-state-business/97-560069301

6. Maine news feature on stem cell therapies: https://www.newscentermaine.com/article/news/local/i-didnt-think-it-was-going-to-work-maine-mom-says-stem-cells-changed-her-sons-life/97-586455600

UMaine News Articles and Coverage:

1. Neuright, Inc. STTR Funded: https://umaine.edu/news/blog/2020/06/24/umaine-spinout-neuright-receives-225000-nsf-small-business-technology-transfer-award/
2. Adipose neuropathy study: https://umaine.edu/news/blog/2019/09/27/study-discovers-loss-of-innervation-in-fat-related-to-obesity-diabetes-aging/
3. Omega-3 Peroxidation Study: https://umaine.edu/news/blog/2019/04/01/townsend-finds-mice-fed-

fish-supplements-lose-weight-but-sustain-fat-tissue-damage/

4. Townsend Lab Graduate Student CEO of spin-off Company: https://umaine.edu/research/2019/03/01/blaszkiewicz-ceo-biotech-startup/
5. NSF-CAREER Awards (Research Office, Impact Magazine): https://umaine.edu/research/2018/08/31/nsf-career-awards-recognize-umaine-early-career-faculty/
6. NSF-CAREER – UMaine News: https://umaine.edu/news/blog/2018/07/31/neurobiology-professor-aims-engage-biomedical-students-1m-nsf-career-award/
7. NIH R01 – UMaine News: https://umaine.edu/news/blog/2018/06/28/neurobiology-professor-awarded-nih-grant-study-communication-brain-fat-tissue/
8. American Heart Association grant – UMaine News: https://umaine.edu/news/blog/2018/05/14/townsend-awarded-750000-study-effects-aging-fat-tissue-cardiometabolic-health/
9. Townsend featured on You're the Expert: https://umaine.edu/news/blog/2018/02/08/youre-expert-podcast-spotlights-townsend/
10. Article in Minerva, UMaine Honors College Magazine (pg. 22-23): https://honors.umaine.edu/minerva/wp-content/uploads/sites/321/2017/03/Minerva-2016-17-Web.pdf
11. UMaine video about biomedical research in our lab: https://www.youtube.com/watch?v=iEJOzMCAvow&feature=youtu.be
12. UMaine Today article about Townsend Lab: http://umainetoday.umaine.edu/archives/fallwinter-2015/brain-power/

Townsend Narrative

Since 2001, I have been investigating various aspects of the control of energy balance by the brain and adipose tissues. In 2007 I received a Ph.D. in Neuroscience from Boston University and then completed two postdoctoral research positions, all of which involved neurobiology and metabolism research. As part of these years of work, I explored the role of central leptin resistance in both pathophysiological obesity in mice as well as physiological weight gain prior to migration/hibernation of wild bats (Ph.D. work), the role of STAT3 and SOCS3 signaling in central leptin resistance (postdoctoral at King's College), and the ability of the growth factor BMP7 to decrease appetite and increase energy expenditure by acting through CNS pathways and peripheral nerve activation (postdoctoral at Joslin). I have also led and co-authored numerous research studies and review articles related to the development and function of brown adipocytes, including the neural innervation of white and brown adipose tissues. More recently, my laboratory at University of Maine has been focusing on brain-adipose communication in the regulation of energy balance, including the role of neural plasticity, both in the CNS and of the peripheral nerves innervating adipose tissues. We investigate adipose neuropathy, aging adipose, and neuroimmune/neurovascular interactions (funded by an NIH R01 and an AHA Collaborative award). Furthermore separate projects in the lab focus on adult neural stem cells and neural plasticity in the regulation of energy balance, including the role of hypothalamic tanycytes (funded by an NSF-CAREER). I have built strong research collaborations with other investigators and integrate training of students across all projects in my laboratory.

I am a member of the Graduate School of Biomedical Sciences and Engineering (GSBSE), a multi-institutional graduate program comprised of approximately 150 faculty from University of Maine, University of New England, Jackson Laboratory, Mount Desert Island Biological Laboratory (MDIBL), and Maine Medical Center Research Institute (MMCRI). I am also a visiting scientist at Children's Hospital Boston (Breault Lab), adjunct faculty at Joslin Diabetes Center, adjunct faculty at University of New England's Center for Excellence in the Neurosciences, and adjunct/visiting faculty at MMCRI. Through these professional networks, I have obtained mentors, collaborators, and colleagues that serve to enhance my work and scientific culture.

I have been trained and have years of experience in numerous techniques relevant to our research focus, including but not limited to: stereotaxic brain surgery; central delivery of substances (i.c.v., or targeting a certain brain region); adipose tissue denervation (surgical, chemical, genetic); microinjections into brain or adipose tissue (including viral vectors); adipose tissue transplantations; mouse mating, genotyping, and husbandry (including providing and monitoring exercise in running-wheel cages); utilization of transgenic mouse lines including inducible lineage tracing or reporter strains; peripheral delivery of substances (i.v., i.p., s.c., i.m.); metabolic phenotyping including energy intake and energy expenditure (metabolic cages) and glucose/insulin regulation; transcardial perfusion and cryostat or microtome slicing; confocal and fluorescence microscopy with Image J quantification; tissue clearing and whole-mount microscopy; assessment of peripheral nerves (including spinal axons, NMJ); histological assessments and quantification of cell size; molecular techniques such as: immunostaining, western blotting, MACS or FACS-sorting of neural or adipose/SVF cells, qPCR, transfections/cloning, viral-mediated expression of transgenes (*in vitro* and *in vivo*); laser-capture microdissection; and *ex vivo* and *in vitro* culture techniques, including of neural cells, muscle cells, macrophages, and adipocytes. I have completed specialized training courses in stereotaxic surgery, mouse neurogenetic techniques, FACS, microscopy, statistics, and Image J.

In the laboratory, I have mentored numerous high school students, undergraduates, graduate students, medical students, postdocs and research assistants. I strongly feel that a comprehensive and supportive mentoring environment leads to productive and ethical research. While a postdoctoral fellow and then junior faculty member at Joslin Diabetes Center, I mentored 7 summer students (undergraduate, med students), co-mentored a Masters student and co-mentored a post-doctoral fellow. Currently, my laboratory at UMaine includes around 15-20 members in any given semester, spanning from part-time undergraduates in the lab to doctoral students, postdoctoral fellows and staff research assistants. We meet for weekly lab meetings, small-group data meetings, and individual meetings. We have also instituted an integrated and step-wise training plan for all new lab members, including rotating graduate students, with a tiered mentoring approach.

In total, these past research experiences, laboratory training, my technical expertise and previous work in the field of neuroscience, my extensive experience mentoring students, my enthusiasm and knowledge of the field of study, as well as my current collaborators and scientific environment, make me well-suited to carry out our work.