

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 <i>Mechanisms of high fat-induced obesity in mice and premigration/prehibernation fattening in bats.</i>	August 2007
M.A. Neuroscience	Boston University, Program in Neuroscience (<i>opted in</i> 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
<u>Professional Positions</u>		
Associate Professor	Department of Neurological Surgery, The Ohio State University, College of Medicine (tenured; 100% research appt.)	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), Foods for Health (FFH), Biomedical Sciences Undergraduate Program, Comprehensive Cancer Center (CCC)	2020-present
Adjunct Associate Professor	University of Maine (unpaid honorary appt.)	Sept 2020-present
Associate Professor of Neurobiology, University of Maine	50:50 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	Graduate School of Biomedical Science and Engineering (GSBSE), University of Maine	Nov. 1, 2014-present
Adjunct, Joslin Diabetes Center	Adjunct Research Faculty	Nov. 1, 2014-present
<u>Other Positions</u>		
Visiting Faculty	<i>Children's Hospital, Harvard Medical School, Boston MA (Endocrinology division, Breault Lab)</i>	June 2013-present
Adjunct Faculty	<i>University of New England (UNE), Center for Excellence in the Neurosciences</i>	August 2015-present
Adjunct/Visiting Faculty	<i>Maine Medical Center Research Institute (MMCRI)</i>	August 2016-present

Cooperating Faculty	<i>Chemical and Biomedical Engineering Department, University of Maine</i>	Dec 2018-present
Cooperating Faculty	<i>School of Food and Agriculture (SFA), University of Maine</i>	April 2015-2020
Cooperating Faculty	<i>Department of Molecular and Biomedical Sciences (MBS), University of Maine</i>	April 2015-2020
Cooperating Faculty	<i>Women's, Gender and Sexuality Studies (WGS)</i>	2017-2020
Cooperating Faculty	<i>Margaret Chase Smith Policy Center, University of Maine (Faculty Fellows Program)</i>	April 2015-2020
Instructor	<i>Harvard Extension School</i>	Sept 2011-May 2014

Writing Positions

Freelance Writer/Contributing Editor, Zest Magazine	Freelance writer and Contributing Editor for Maine's premier food magazine, <i>ZEST (Features include science of food, appetite control)</i>	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

Director	Women in Medicine and Science (WIMS), College of Medicine, OSU (first director for WIMS in a new autonomous role in the College under the Vice Dean for Faculty Affairs); AAMC GWIMS institutional representative	Jan 2022-present
Board Member	Foundation for Peripheral Neuropathy, Board of Directors	2021-present
Chief Scientific Officer, Co-Founder, Co-Owner	Neuright, Inc.; biotech start-up and academic spin-out based in Maine/Ohio, focused on R&D of a new medical device for the sensitive and functional diagnosis of small fiber peripheral neuropathy. (Patent Pending, co-inventor)	2018-present
Founder, Lead	Women in Science, Technology, Engineering,	2016-2020

	Mathematics, and Medicine (WiSTEMM) at UMaine (an AWIS affiliate; UMaine funded)	
Secretary	Executive Board of Directors, Bioscience Association of Maine (BioME)	2018-2020
Board Member	Board of Directors, Bioscience Association of Maine (BioME) (serving on Development and Education subcommittees)	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 The Ohio State University (2020-present):

- Neuroscience Graduate Program (NGP): grad student onboarding committee (2020-present); DNS Diversity and Inclusion Committee (2020-2022)
- Davis Heart and Lung Research Institute (DHLRI): Education committee (2020-present)
- Neuroscience Research Institute (NRI): Translational research and cross-collaborations committee (2020-present)
- Resident Research Committee (Neurological Surgery): oversight and support for medical resident research program (2021-present)
- Member of the Institutional Research Integrity Standing Committee: appointed by the Vice President for Research; trained to serve on internal research misconduct cases; (2022-present)
- Internal Grant Reviewer (2021-present): for NRI Seed grants, College of Medicine Discovery grants, DHLRI Synergy grants

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 infographics 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/>
UMaine Today Article on SAB: <https://umainetoday.umaine.edu/features/2021/03/09/scientists-on-the-front-lines/>

Service and Outreach Activities

Local:

Anti-Racism Action Plan – Ohio State Medical Center; member of oversight committee (as WIMS Director)	Jan 2022-present
President and Provost’s Council on Women – at Ohio State; ex officio member as Director of WIMS; member of task force on Senior Leadership	Jan 2022-Aug 2023
Organizer/Founder – NeuroMetabolism Research Symposia; OSU Dept. Neurological Surgery inaugural national meeting host	April 2023
Co-Organizer, annual research symposium for Center for Preventative Health of Adipose Tissue (PHAT), DHLRI at OSU	April 2022-onward
Organizing Committee, NRI Neuroimmunology symposia	Fall 2022-spg 23
Women in Oncology Steering Committee, CCC	Jan 2023-present
Judge - Student Abstracts; IGP Symposium, OSU	Spring 2021
Co-created education content, spoke to classrooms via Zoom (BioME Bioscience Day 2020) https://www.youtube.com/watch?v=z-oKe3-k8il	Oct 2020
Mentor – Women’s Leadership and Development Program (OSU; undergraduate)	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 <u>Cell Cell Cell</u> (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)	2018-2021
Engineering Expo (neuroscience demos)	Feb 2018
Brain Awareness Week & related outreach events (Hardy Girls, Bangor Montessori School, 4H Science Saturday, 14 th Street School Bangor)	2017-2020
Advancing Women in Academia; Workshop Leader, Bangor ME	2017
Maine Science Festival Pop-Up Event: <i>Humanity Needs Dreamers</i>	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
 <u>National and International</u>	
American Heart Association, Awardee Engagement Program Oversight Advisory Committee (invited member)	2022-present
Career Panel – Midwest Aging Consortium (MAC) Symposium	April 1, 2022
Education committee member, iBANGS	2022-present
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), international behavioural and neural genetics society (iBANGS)

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)
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)
The FEBS Journal (2021-present)
Biomedical Microdevices (2022-present)
Glia (2022-present)
Molecular Metabolism (2022-present)
Neurobiology of Aging (2022-present)
Journal of Molecular Cell Biology (2022-present)

Journal of Lipid Research (2022-present)
 Life Sciences (2022-present)
 Neuroscience Letters (2023-present)

(List is not updated/current)

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, 2022 (CSA)
- Medical Research Council (MRC; U.K.) – 2018, 201, 2021
- 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)
- NIH MCE Study Section (Reviewer, 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)
- NIH CMAD Study Section (Reviewer, 2021)
- NSF Neural Systems Cluster review panel, Sept 2021
- French Foundation for Medical Research, Mar 2022
- Harvard School of Public Health, postdoctoral grant, Nov 2022

Honors and Prizes

Board of Directors	Foundation for Peripheral Neuropathy	May 2021-present
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) (Executive Board, Secretary 2018-20)	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
	Edward C. and Grace A. Cutting Merit	2002

Scholarship	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	2001
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, submitted Dec 23, 2023, 63/434,979 "Synaptic protein shedding as a biomarker for peripheral neuropathy"

Provisional patent (63/022,258 "Methods and Devices For Treatment of Neuropathy") submitted in May 2020 and a full patent (PCT/US21/31337) submitted in May 2021. UMaine/Neuright, Inc. (Patent attorney: Choate, Hall & Steward LLP, Boston MA). Nationalization initiated May 2021. Countries: US, UK, Brazil, Ireland, Mexico, Canada, Australia, Germany, India, Japan

Commercialization and Entrepreneurial Training and Awards:

- Equalize program participant (2023 cohort)
- Rev1 Engagement (2020-current)
- Maine Center for Entrepreneurship – Leadership program (2021)
- Maine Center for Entrepreneurship – Biotech Startup program (2021)
- NSF STTR/SBIR Venturewell – Beat the Odds Bootcamp (2021)
- NSF Venturewell – Dawnbreaker Commercialization Program (2021)
- NSF Venturewell – iCORP Program (Winter 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)

Leadership Training (academic)

Faculty Advancement, Mentoring and Engagement (FAME) Unites Emerging Leaders (FUEL), inaugural cohort (6mo program; OSU; 2022)

Business of Science, graduate of 3-day intensive program offered by the Center for Clinical and Translational Science, OSU (Oct 2022)

Report of Funded and Unfunded Projects

Current

W.M. Keck Foundation Award

\$1,200,000 (Jan 2023-Dec 2025) “Uncovering the feedback loop between the central nervous system and adipose tissue”

Lisa Dean Moseley Foundation

\$250,000 (2021-23) Role: PI “Telomerase reverse transcriptase (TERT) as a novel and unique marker for quiescent adult brain stem cells: Determining translational potential for human brain stem cell therapy.

PRE-Catalyst

One of two teams awarded the most prestigious OSU internal research award, Jan-Dec 2023, \$200,000; project titled: Aging of Metabolic Plasticity of Adipose Tissue. Role: Co-PI (PI Stanford)

NSF-CAREER

\$1 million; 7/1/2018-6/30/2023; *Novel Mechanisms for Adult Neurogenesis* (Role: PI)

Agilent ACT-UR

\$82,752 (Seahorse products, cash award, 2021-22); plus 1yr usage of Seahorse XF HS Mini in my laboratory for project titled: “Optimization of adult brain stem cell mitochondrial measures and determination of changes with stem cell activation and differentiation.” Role: PI

DHLRI Synergy Seed Award

\$20,000 (plus \$16,000 match from Dept. Internal Medicine and Dept Neurol. Surgery) – Role: Co-PI with Kymberly Gowdy, title: “Novel role of macrophage CD163 in obesity.” May 2021-April 2022 (NCE to 2023).

NRI Seed Grant

\$25,000 (Role: Co-PI with William David Arnold), title: Aging of the peripheral nervous sytem and loss of synaptic fidelity at the adipocyte and muscle. June 2021-May 2022.

CBI Pilot Grant

\$25,000 (Role: Co-PI with Andrea Tedeschi and Debasish Roy), title: Normalizing adipose tissue homeostasis promotes recovery following CNS trauma. (2022-2023)

COM Dean’s Discovery Pilot Grant

\$50,000 (Role: Co-PI with John McGregor), title: Establishment of a mouse model and mechanistic preliminary data for obesity-induced intracranial

hypertension (IIH). (2022-23)

T32 Mentor

Postdoctoral training in Cardiometabolic Science (Role: Mentor; PIs: Willa Hsueh and Sakima Smith)

Past

NIH- R01

\$712,960; 7/1/2018-6/30/2020 (NCE through 2022); *Peripheral Neurotrophic Factors and Neural Plasticity in the Regulation of Adipose Tissue Energy Expenditure* (Role: PI)

NIH DIACOMP

\$100,000 (2021-22) Pilot & Feasibility Program. Title: "Pre-clinical therapy delivery and imaging of nerve recovery in diabetic peripheral neuropathy of adipose and skin."

NSF STTR Ph1

\$225,000 (2020-21; NCE through 2022) 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

American Heart Association Collaborative Grant

\$750,000 7/1/2018-6/30/2021 (NCE through 2022); Neurovascular interactions in adipose tissue and effects on cardiometabolic health (role: PI; collaborative with Dr. David Harrison, Jackson Laboratory – full funds to Townsend/UMaine/OSU)

REU Mentor

University of Maine, sensors REU

REU Mentor, INBRE Mentor

MDI Biological Laboratory, REU and MDI Biological Laboratory NIH INBRE

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

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

One of three collaborative projects awarded funds for \$1 Million Grand Challenge (2020). Part of (PI: Ben King, Project co-leads: Rob Wheeler,

Reinvestment Fund Grand Challenge	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 Incentive Grants	NSF-funded program at UMaine (awarded by internal competition), 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; <i>Mesenchymal and Neural Regulation of Metabolic Networks</i> ; 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; <i>Novel mechanisms for brain-adipose communication in the regulation of energy balance</i> ; 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; <i>Involvement of Bone Morphogenetic Protein (BMP) signaling in the Function of Hypothalamic Tanycytes</i> . 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; <i>Mechanisms of Fatty Acid Sensing and Uptake by Brown Adipocytes</i> . http://www.baderc.org/feasibility/2014grants.html
Boston Nutrition Obesity Research Center (BNORC); Pilot and Feasibility Grant	\$50,000 for 2yrs starting; <i>Novel role for hemojuvelin in brown adipocyte energy expenditure</i> .
ADVANCE/Rising Tide Research Seed Grant	\$7,500 grant (2015); <i>Connecting Neurotrophic Factors and Neuropathy in the Regulation of Energy Balance</i> .
American Heart Association (AHA), Scientist Development Grant	\$307,000 (National Affiliate, 4yrs. & Founders, 3yrs both awarded 2014); <i>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)</i>
NIH individual F32 NRSA	Individual postdoctoral fellowship from NIH: <i>BMP7 and the Regulation of Central and Peripheral Energy Balance</i> , 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 (<i>Myotis lucifugus</i>), at Boston University.
American Association for University Women	Awarded 2 years stipend and supplies, but only able to accept one year stipend before graduation (2006-7)

(AAUW) Predoctoral Fellowship

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

- Guest Lecture; Biomedical Engineering OSU** (course director Dr. Daniel Gallego-Perez), topic: plasticity of the neuroimmune system Fall 2022
- Guest Lecture, Physiology 8102 OSU** (course director Dr. Kristin Stanford), topic: adipose tissue innervation and metabolic health; obesity stigma Spring 2022
- Guest Lecture, Nutrition OSU** (course directors Drs. Ziouzenkova/Belury), topic: brain-adipose neural communication in the regulation of energy balance Spring 2022
- Graduate Physiology (6wk module), BMS 628, UMaine;** Graduate School of Biomedical Science and Engineering (GSBSE). Developed and taught new interactive, discussion-based curriculum via Zoom for 12 PhD students across 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. Spring 2020
- 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) -- 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.	2016-2020
BIO 307 Intro to Neuroscience/ Interdisciplinary Neuroscience (University of Maine) -- 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.	2015-2018
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 8 th 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 Biology & 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 4 doctoral students (Willows, Gunsch, Mishra, Tao), 2 postdoctoral fellow/Research Scientists (Alves, Blaszkiewicz), 4 research staff, 7 undergraduate students 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 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 2014-2020

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.** “Impacts of the nervous system on adipose tissue function and whole body metabolic health.” Department of Nutrition, Human Nutrition Seminar Series, OSU, April 15, 2022.
2. **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.
3. **Townsend, KL.** “Neural plasticity, adipose peripheral nerves, and metabolic health.” Neurosurgery Grand Rounds, OSU, Jan 7, 2021.
4. **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.
5. **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>
6. **Townsend, KL.** Neuropathy, Adipose Tissue, Aging and Metabolic Health. University of New England, Portland Campus. October 28, 2019.
7. **Townsend, KL.** Investigating the nervous system to better understand metabolic health. University of Southern Maine, Oct 3, 2019.
8. **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.
9. **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.
10. **Townsend, KL.** and Blaszkiewicz M. *MIRTA Program Overview: Neuright, Inc.* (UMaine Board of Trustees Meeting, Jan. 2019)
11. **Townsend, KL.** Remodeling our brain and nervous system: connections to obesity and diabetes. Emera Planetarium Public Science Lecture Series; Dec 20, 2018.
12. **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.
13. **Townsend, KL.** Neurovascular interactions in adipose tissue. Cardiometabolic Young Investigators Forum. Maine Medical Center, June 22, 2018.
14. **Townsend, KL.** Investigating adipose tissue neural innervation: plasticity and neuropathy. Maine Biomedical and Molecular Science Symposium (MBMSS), April 2018, at MDI

Biological Laboratory.

15. 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.
16. **Townsend, KL**. Adipose Tissue Innervation and Neural Activation in the Regulation of Energy Expenditure. Invited Seminar Speaker, MDIBL, Bar Harbor, ME, April 26, 2016.
17. **Townsend, KL**. Novel role for hemojuvelin in brown adipocyte energy expenditure. BNORC Annual Meeting, Boston, MA, July 24, 2015.
18. **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.
19. **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.
20. **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.
21. **Townsend, KL**. What can I do with my science degree? Presentation for the UMaine Biology Club, April 2015.
22. **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.
23. **Townsend, KL**. Bone Morphogenetic Proteins in the Regulation of Energy Balance, Joslin Diabetes Center Seminar Series; Oct 2014.
24. **Townsend, KL**. Central Regulation of Appetite and Energy Expenditure by the Bone Morphogenetic Proteins (BMPs), Joslin Diabetes Center Seminar Series; May 2012.
25. **Townsend, KL**. Obesity, SOCS3 and Leptin Resistance. Diabetes Symposium, King's College Hospital, Denmark Hill London, 2008.
26. **Townsend, KL**. Obesity, SOCS3 and Leptin Resistance, Tommy's The Baby Charity, 3 Centre Conference, Manchester U.K, 2008.
27. **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**. "The power of communication: neuroendocrine regulation of adipose metabolism." Key Lecture, The Obesity Society Annual Meeting, San Diego, CA Nov 3, 2022.
2. **Townsend, KL**. "Peripheral nerves in the regulation of adipose tissue functions and health." CPH BAT (Copenhagen Brown Adipose Tissue) Annual Meeting, invited short talk, June 2,

2022.

3. **Townsend, KL.** “How our brain and nervous system affect metabolic health and body weight.” Maine Rotary, Mar 22, 2022.
4. **Townsend, KL.** “Vetting Medical Claims.” Webinar for the Foundation for Peripheral Neuropathy (Mar 18, 2022) and the Washington DC Neuropathy Patient Group (Oct 1, 2022)
5. **Townsend, KL.** “Adipose tissue nerves in the regulation of metabolic health.” King’s College London Diabetes Seminar Series, Mar 16, 2022.
6. **Townsend, KL.** “Brain-adipose neural communication in the regulation of metabolic health” Tufts Neuroscience Seminar Series, Mar 9, 2022.
7. **Townsend, KL.** “Biomedical Research 101.” Webinar for Foundation for Peripheral Neuropathy, November 2021.
8. **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.
9. 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.
10. **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.
11. **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>
12. **Townsend, K.L.** Innervation of Adipose Tissue and Implications for Aging Research. University of New England, October 29, 2019.
13. **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.
14. **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.
15. **Townsend, K.L.** Remodeling the Adult Brain: Impacts on Appetite and Calorie Burning, Bowdoin College Biology Seminar Series, Apr. 11, 2019.
16. 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).

17. **Townsend, K.L.** Maintaining a Healthy Metabolism Through Brain-Adipose Communication, Jackson Laboratory seminar series, Feb. 28, 2019.
18. **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.
19. **Townsend, K.L.** Adipose tissue neurovascular interactions. Experimental Biology Annual Meeting 2018 (April; San Diego, CA); invited oral session presentation.
20. **Townsend, KL.** Evidence for a new adult neural stem cell marker and niche. Brown University, October 13, 2017.
21. **Townsend, KL.** Growth Factors and Brain-Adipose Communication in the Regulation of Energy Balance. Ohio State DHLRI seminar series, Jan 20, 2017.
22. **Townsend, KL.** Growth Factors Regulating Both Arms of Energy Balance: Appetite and Energy Expenditure. Scholar Rock internal seminar series, Dec. 13, 2016.
23. Leiria L(*), Magdalena Blaszkiwicz (*), 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.
24. **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.
25. 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.
26. **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.
27. 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.
28. **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.
29. **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/1Da4eoNHhfzQv/bibliography/public/>

Peer reviewed publications in print or other media

(a) Original Research Publications

1. Willows JW, M Robinson, Z Alshahal, SK Morrison, G Mishra, H Cyr, M Blaszkiewicz, S DiPietro, E Paradie, L Liaw, PC Reifsnyder, D Harrison, **KL Townsend***. Age-related changes to adipose tissue and peripheral neuropathy differ by mouse sex and genetic background, and are not mitigated by rapamycin longevity treatment. (Accepted and in press **Aging Cell**, 2023).
**Corresponding Author*
2. Blaszkiewicz M, G Gunsch, J Willows, M Gardner, A Sas, **KL Townsend***. Adipose tissue myeloid-lineage neuroimmune cells express genes important for neural plasticity and regulate adipose innervation. (2022) **Frontiers in Endocrinology** 13:864925
3. **Townsend KL***, E Pritchard, JM Coburn, YM Kwon, M Blaszkiewicz, MD Lynes, DL Kaplan, YH Tseng*. Silk hydrogel-mediated delivery of bone morphogenetic protein 7 directly to subcutaneous white adipose tissue increases browning and energy expenditure. (2022) **Front Bioeng Biotechnol.** 10:884601. * co-corresponding authors
4. Willows JW, M Blaszkiewicz and **KL Townsend***. STAR Protocols: A clearing-free protocol for imaging intact whole adipose tissue innervation in mice. **Cell Press, STAR Protocols.** (2022, Vol 3(1), 101109) **Corresponding Author*
5. Jensen G, **KL Townsend***. Lineage tracing of adult stem cells in the mouse brain. (2022) **JOVE**, April 2022. **Corresponding Author*
6. Willows JW, G Gunsch, E Paradie, M Blaszkiewicz, **KL Townsend***. The presence of myelinated nerves and Schwann cells in adipose tissues, and changing Schwann cell phenotypes across metabolic states. (2023) Accepted and in press, **iScience** (also on BioRxiv Sept 8, 2022)
**Corresponding Author*
7. G Jensen[^], Beaulieu, A[^], Carolyn Curtis, Magdalena Blaszkiewicz, Joshua Passarelli, Lydia Caron, Seth Thomas, Trevor Morin, Chris Aniapam, Ciara Brennan, Cameron Ford, Olivia Stevenson, Matthew Lynes, Diana Carlone, David Breault, **Kristy Townsend***. Telomerase reverse transcriptase (TERT) as a novel and unique marker for quiescent stem cells in the adult mouse brain. (2022) Under Revised Resubmission; [^]equal contributing first authors; **Corresponding Author*
8. Johnson CP, D Taplin ML Gardner, MA Freitas, **Kristy L. Townsend***. Cold-induced adaptations to the proteome of mouse subcutaneous white adipose tissue (scWAT) reveals proteins relevant for tissue remodeling and plasticity. (2022) *Under revised re-submission.* **Corresponding Author*
9. Lynes MD, DL Carlone, **KL Townsend**, DT Breault, Y-H Tseng. Telomerase reverse transcriptase expression marks a population of rare adipose tissue stem cells. **Stem Cells** (2022), 40(1), 102-111.
10. 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>
11. 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 (**Molecular Medicine** 26, Article number: 126 (2020)) **Corresponding Author*
12. 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.

- (2021) **iScience** Volume 24, Issue 10, 22 October 2021, 103127 *Corresponding Author
13. 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
 14. 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>
 15. 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
 16. **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.
 17. 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
 18. 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.
 19. 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.*
 20. 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.
 21. 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.
 22. 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
 23. 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.
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 25. 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
 26. 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

27. **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
28. **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) PMID: PMC3336788
29. Schulz TJ, Huang TL, Tran TT, Zhang H, **Townsend KL**, Shadrach JL, Cerletti M, McDougall L, Giorgadze N, Tchkonja 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. PMID: PMC3017184
30. **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
31. **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
32. 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
33. 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 lucifugus*. (2004) **Placenta**, 25: (8-9). PMID: 15450389

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

1. 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. Willows J, M Blaszkiewicz, **KL Townsend**. Sympathetic innervation of adipose tissue: regulation, function, and plasticity. (2023) **J Comprehensive Physiology** (invited review, accepted with revisions)
2. Jensen GS, NE Leon-Palmer, **KL Townsend***. Bone Morphogenetic Proteins (BMPs) in the Central Regulation of Energy Balance and Adult Neural Plasticity. Invited Review, **Metabolism** (2021), 123:154837. PMID: 34331962. **Corresponding Author*
3. Mishra G, **KL Townsend***. The Metabolic and Functional Significance of Sensory Nerves in Adipose Tissues. Invited Review, **Nature Metabolism**, Under revised resubmission 2023
4. G Gunsch, E Paradie, **KL Townsend***. Glial cell types of the peripheral nervous system, implications for metabolically important tissues. Invited Review, Trends in Endocrinology and Metabolism, In Prep.
5. Passarelli J, S Nimjee, **KL Townsend***. Stroke and Neurogenesis: Bridging Clinical Observations to New Mechanistic Insights From Animal Models. (Accepted and in press, **Translational Stroke**

Research, 2022)

6. **Townsend KL**. The re-emergence of adipose innervation as a research focus. Invited Commentary article for **Nature Reviews Endocrinology** 16, 127-128 (2020)
7. 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
8. **Townsend KL** (2016). The science of appetite. **Zest**, Summer 2016 issue.
9. 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
10. **Townsend KL** (2015). Brain eating: The science behind taste, hunger, and why we either love or hate certain foods. **Zest**, Summer 2015 issue.
11. **Townsend KL** and YH Tseng. (2015). Of Mice and Men: Novel Insights Regarding Constitutive and Recritable Brown Adipocytes. Invited Review for **International Journal of Obesity Supplements** 5. S15-20.
12. **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.
13. **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 (not current)

***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.mainsciencefestival.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>

OSU News Articles and Coverage:

1. <https://medicine.osu.edu/news/kristy-townsend-neural-plasticity-mental-health>
2. 2020 State of the Neurological Institute: <https://spark.adobe.com/page/E3hRcB7S1shW1/>
3. <https://news.osu.edu/a-nanomaterial-that-may-improve-insulins-effects-on-the-nervous-system/>
4. Keck Award: <https://medicine.osu.edu/news/townsend-keck-award>

UMaine News Articles and Coverage:

1. <https://www.umainealumni.com/category-alumni/this-bio-tech-company-is-innovating-maine/>
2. Neuright, Inc. STTR Funded: <https://umaine.edu/news/blog/2020/06/24/umaine-spinout-neuright-receives-225000-nsf-small-business-technology-transfer-award/>
3. Adipose neuropathy study: <https://umaine.edu/news/blog/2019/09/27/study-discovers-loss-of-innervation-in-fat-related-to-obesity-diabetes-aging/>
4. 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/>
5. Townsend Lab Graduate Student CEO of spin-off Company:
<https://umaine.edu/research/2019/03/01/blaskiewicz-ceo-biotech-startup/>

6. NSF-CAREER Awards (Research Office, Impact Magazine): <https://umaine.edu/research/2018/08/31/nsf-career-awards-recognize-umaine-early-career-faculty/>
7. NSF-CAREER – UMaine News: <https://umaine.edu/news/blog/2018/07/31/neurobiology-professor-aims-engage-biomedical-students-1m-nsf-career-award/>
8. NIH R01 – UMaine News: <https://umaine.edu/news/blog/2018/06/28/neurobiology-professor-awarded-nih-grant-study-communication-brain-fat-tissue/>
9. American Heart Association grant – UMaine News: <https://umaine.edu/news/blog/2018/05/14/townsend-awarded-750000-study-effects-aging-fat-tissue-cardiometabolic-health/>
10. Townsend featured on You're the Expert: <https://umaine.edu/news/blog/2018/02/08/youre-expert-podcast-spotlights-townsend/>
11. 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>
12. UMaine video about biomedical research in our lab: <https://www.youtube.com/watch?v=iEJOzMCAvow&feature=youtu.be>
13. UMaine Today article about Townsend Lab: <http://umainetoday.umaine.edu/archives/fallwinter-2015/brain-power/>