

I. PERSONAL DATA**TERESA E. LEVER, Ph.D.**

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II. EDUCATION

- 2002 - 2008 Ph.D. Communication Sciences and Disorders
East Carolina University, North Carolina
Concentration: Neurogenic Dysphagia
Dissertation: *Investigating the SOD1-G93A transgenic mouse model of ALS for evidence of dysphagia*
Advisor: Alexander Murashov, Ph.D., Physiology Department, Brody School of Medicine
- 1989 - 1991 M.S. Communicative Disorders; Premed Minor
University of Redlands, California
- 1985 - 1989 B.S. Communication Disorders
University of New Hampshire

III. RESEARCH AND PROFESSIONAL EXPERIENCE

- 2013 - Assistant Professor, Department of Otolaryngology - Head and Neck Surgery, School of Medicine, University of Missouri
- 2013 - Adjunct Faculty, Department of Communication Science and Disorders, School of Health Professions, University of Missouri
- 2010 - 2013 Assistant Professor, Department of Communication Science and Disorders, School of Health Professions, University of Missouri
- 2010 - Adjunct Faculty, Department of Biomedical Sciences, College of Veterinary Medicine, University of Missouri
- 2008 - 2009 Postdoctoral Fellow, Vestibular Evoked Potential Lab (Advisor: Sherri Jones, Ph.D.), Department of Communication Sciences and Disorders, East Carolina University, Greenville, NC
- 2002 - 2006 Graduate Research and Teaching Assistant while enrolled as a doctoral student/candidate, Department of Communication Sciences and Disorders, East Carolina University, Greenville, NC
- 1997 - 2002 Lead Medical Speech-Language Pathologist and Clinical Fellow Supervisor, Arroyo Grande Community Hospital, Arroyo Grande, California
- 1994 - 1997 Medical Speech-Language Pathologist, Private Practice, Arroyo Grande, California

- 1993 - 1994 Medical Speech-Language Pathologist,
St. Joseph's Hospital, Tacoma, Washington
- 1992 - 1993 Medical Speech-Language Pathologist,
St. Jude Medical Center, Fullerton, California
- 1991 - 1992 Clinical Fellowship in Medical Speech-Language Pathology,
St. Jude Medical Center, Fullerton, California

IV. PROFESSIONAL AFFILIATIONS

- 2010 - Missouri Board of Speech and Language Pathologists License
- 2002 - 2010 North Carolina Board of Speech and Language Pathologists License
- 2007 - Dysphagia Research Society
- 1992 Certificate of Clinical Competence in Speech-Language Pathology from the
American Speech-Language-Hearing Association (ASHA)
- 1992 - 2006 California Board of Speech and Language Pathologists License
- 2005 - Society for Neuroscience
- 2005 - ASHA Special Interest Group 2 (Neurophysiology and Neurogenic Speech and
Language Disorders)
- 2000 - ASHA Special Interest Group 13 (Swallowing and Swallowing Disorders)

V. HONORS AND AWARDS

- 2017 **Coulter Award Ceremony, Guest of Honor**, October 18, 2017. Awarded \$104,000 to
develop a mobile health app for early detection and monitoring of speech and
swallowing disorders.
- 2017 **Featured Researcher at the Innovation & Entrepreneurial Recognition Dinner**,
University of Missouri, October 12, 2017. Recognition: serial entrepreneur
- 2017 **Featured Researcher at the Missouri Tech Expo Road Show**, St. Louis, MO, August
8, 2017. Innovation: New diagnostic tool for early detection and monitoring of equine
laryngeal paralysis
- 2017 **MU Top Faculty Achievers Award** for receiving prestigious grants within the past year
- 2017 **Invited to attend Coulter Boot Camp** at the University of Missouri, 1/16/17 - 6/9/17.
Goal: develop a pitch deck proposal for Coulter funding to address an unmet clinical
need.
- 2017 **Invited to attend the NSF iCorps Boot Camp** at the University of Missouri, 1/26/17 -
2/16/17. Goal: determine product-market fit and develop a proposal for NSF funding to
address an unmet clinical need.
- 2017 **2nd Place Poster Award**, Phi Zeta Research Day, May 5th, 2017. "Exploration of tongue
muscle pathology in canine degenerative myelopathy" (Recipient: Victoria Landreth;
Mentors: Lever & Coates)
- 2017 **2nd Place Poster Award for 2nd and 3rd Year Graduate Students**, Cardiovascular
Research Day, University of Missouri, May 5, 2017. "Intraoperative vagal nerve
stimulation improves vocal fold mobility in a mouse model of recurrent laryngeal nerve
injury" (Recipient: Megan Haney, DVM; Mentor: Lever)
- 2017 **Scientifically Outstanding Poster in the Social and Behavioral Sciences Group**, MU Life
Sciences Week, April 13, 2017. "Tongue CTB-saporin (CTB-SAP) injections mimic

- aspects of amyotrophic lateral sclerosis (ALS) related to dysphagia” (Recipients: Lori Lind & Erika Murphy; Mentors: Lever & Nichols)
- 2017 *Honorable Mention for Outstanding Graduate Technical Session*, Missouri Speech-Language-Hearing Association Annual Convention, April 8, 2017. “Characterization of dysphagia onset in a mouse model of ALS” (Recipient: Kaitlin Flynn; Mentor: Lever)
- 2017 *1st Place Award for Outstanding Undergraduate Technical Session*, Missouri Speech-Language-Hearing Association Annual Convention, April 7, 2017. “Chronic laryngeal nerve stimulation to improve swallow function” (Recipient: Ian Deninger; Mentor: Lever)
- 2017 *1st Place Oral Presentation Award in Health Sciences, Medicine, & Veterinary Medicine Research*, Research and Creative Activities Forum, University of Missouri, March 13, 2017. “Intraoperative vagal nerve stimulation improves vocal fold mobility in a mouse model of recurrent laryngeal nerve injury” (Recipient: Megan Haney, DVM; Mentor: Lever)
- 2017 *2nd Place Poster Award*, One Health Conference, September 30, 2017. “The effects of tongue injection of CTB-SAP on ventral hypoglossal motor neurons: a novel model of ALS.” (Recipient: Lori Lind; Mentors: Lever & Nichols)
- 2016 ***Excellence in Research Mentoring of Trainees Award***, University of Missouri School of Medicine
- 2016 ***Featured Researcher at the Missouri Tech Expo***, Columbia, MO, October 13, 2016. Innovation: New diagnostic tool for early detection of upper airway disorders
- 2016 ***Coulter Award Ceremony, Guest of Honor***, October 11, 2016. Awarded \$133,200 to develop a new clinical tool to facilitate prediction and prevention of aspiration
- 2016 ***Invited to attend Coulter Boot Camp*** at the University of Missouri, 1/11/16 - 6/17/16. Goal: develop a pitch deck proposal for Coulter funding to address an unmet clinical need
- 2016 *1st Place Oral Presentation Award in Health Sciences, Medicine, & Veterinary Medicine Research*; Research and Creative Activities Forum, University of Missouri, March 2, 2016. “Fiberoptic endoscopic evaluation of swallowing (FEES) in mice” (Recipient: Megan Haney, DVM; Mentor: Lever)
- 2016 *2nd Place Poster Award in Animal Welfare, Training, and 3Rs Section*; National AALAS Meeting, October 30 - November 3, 2016. “Creation of epoxy mouse skulls to reduce animal numbers for stereotactic surgery practice” (Recipient: Megan Haney, DVM; Mentor: Lever)
- 2016 ***Honored at the Innovation & Entrepreneurial Recognition Dinner***, University of Missouri, October 13, 2016. Recognition: patent awarded for a new diagnostic tool for upper airway disorders in companion animals.
- 2016 ***Selected by the Mizzou Advantage to represent the University of Missouri at Apple Headquarters in Cupertino***, CA, May 18 - 21, 2016. Purpose: develop a collaborative mobile health app agenda between MU and Apple
- 2016 *2nd Place Oral Presentation Award*, Dysphagia Research Society Annual Meeting, February 25-27, 2016, Tucson, AZ. “Endoscopic evaluation of swallowing in mouse models of dysphagia” (Recipient: Abigail Rovnak; Mentor: Lever)
- 2015 *1st place Poster Award for Basic Science Research*; MU Health Science Research Day, November 12, 2015. “A surgical mouse model of iatrogenic laryngeal nerve injury” (Recipient: Jakob Allen; Mentor: Lever)

- 2015 ***Invited to attend Coulter Boot Camp*** at the University of Missouri, 1/12/15 - 6/15/15. Goal: develop a pitch deck proposal for Coulter funding to address an unmet clinical need.
- 2014 ***Featured MU Researcher during the One Health, One Medicine Invitational Forum: Curiosity Cured the Cat: Genetic Research at MU***. Learn how our team's discoveries are impacting the future of patient care. September 12, 2014
- 2013 ***Featured Researcher at the Missouri Tech Expo***, Columbia, MO, September 19, 2013. Innovation: K9 Observation Kennel
- 2013 ***Nominated for the President's Award for Early Career Excellence***
- 2012 School of Health Professions *Research Mentorship Award*. "Using the laryngeal adductor reflex to investigate swallowing" (Recipient: Megan Sell; Mentor: Lever)
- 2012 School of Health Professions *Research Mentorship Award*. "Screening existing mouse models of neurological diseases for evidence of dysphagia" (Recipient: Lisa Freeman; Mentor: Lever)
- 2012 ***Award for Continuing Education***, awarded by the Continuing Education Board of the American Speech-Language-Hearing Association for earning 7 ASHA CEUs in a 3 year period.
- 2011 School of Health Professions *Research Mentorship Award*. "The effects of menthol on swallowing function in healthy mice" (Recipient: Ryan Brooks; Mentor: Lever)
- 2011 School of Health Professions *Research Mentorship Award*. "Identifying dysphagia onset in a mouse model of ALS" (Recipient: Lydia Housley; Mentor: Lever)
- 2011 ***Invited participant of the 9th Annual Lessons for Success Research Conference in Communication Sciences and Disorders: Developing the Emerging Scientist***, Rockville, MD, April 27-29, 2011.
- 2010 ***Sigma Xi Helms Award*** for published dissertation research, presented by the East Carolina Chapter of Sigma Xi (The Scientific Research Society), May 19, 2010.
- 2009 *Certificate of Appreciation in Recognition of Valuable Contributions to the American Speech-Language-Hearing Association*, awarded by Special Interest Group 13 (Swallowing and Swallowing Disorders)
- 2007 *Dysphagia Research Society New Investigator Award* for poster presentation: "Development of a mouse model for studying dysphagia in ALS," *Dysphagia Research Society 15th Annual Meeting*, March 2007, Vancouver, Canada
- 2004 *ASHA Travel Award* for student technical podium presentation: "The role of speech-language pathologists in esophageal dysphagia and gastric reflux," American Speech-Language-Hearing Association (ASHA) Convention, November 2004, Chicago, IL

VI. GRANTS AND CONTRACTS

Current Support

Coulter Bridge Grant	(PI: Lever)	7/1/2017 - 6/30/2018
Coulter Translational Partnership Program		\$104,000
Mobile Health App for early detection and monitoring of dysphagia and dysarthria		
Submitted 4/18/2017		
T32 2T32OD011126-38 REVISED		7/15/2017 - 6/30/2021
NIH Office of the Director-T32 OD011126	(PI: Franklin)	\$210,282
Postdoctoral Training in Comparative Medicine (Role: Co-I)		

CURRICULUM VITAE: Teresa E. Lever, Ph.D.

T32 Biomedical Big Data Science Pre-Doctoral Training Program 4/1/2016 - 3/31/2021
NIH (PI: Shyu) \$1,500,000
Massive and Complex Data Analytics Pre-Doctoral Training in One Health (Role: Co-I)

Excellence in Electron Microscopy Award (PI: Lever) 5/8/2017 - 9/7/2017
University of Missouri Electron Microscopy Core \$2,500
Establishing TEM markers of laryngeal nerve injury in a translational mouse model

MU I-Corps (PI: Lever) 2/1/2017 - 1/31/2018
National Science Foundation \$3,000
Down the Hatch Solutions: Product-Market Fit

Sears Trust Award (PI: Lever) 1/1/2017 - 12/31/2017
University of Missouri \$15,000
Standardizing thickened liquids to reduce aspiration risk for pediatric patients with dysphagia

MU School of Medicine Bridge Funding (PI: Lever) 1/1/2017 - 12/31/2017
University of Missouri \$25,500
Feasibility of intraoperative vagal nerve stimulation as a safe and effective treatment for laryngeal dysfunction caused by iatrogenic laryngeal nerve injury

Mizzou Advantage Undergraduate Research Team Award 1/25/2016 - 5/30/2017
University of Missouri (PI: Lever) \$20,000
Early detection of dysphagia in patients with ALS and Parkinson's disease

MU Research Board (PI: Nichols) 12/28/2016 - 12/27/2017
University of Missouri \$49,663
Plasticity in a novel dysphagia model that mimics ALS

MU School of Medicine Bridge Funding (PI: Lever) 10/1/2016 - 9/30/2017
University of Missouri \$50,000
Feasibility of tongue exercise as a safe and effective treatment for dysphagia in ALS

Coulter Bridge Grant (PI: Lever) 6/1/2016 - 9/30/2017
Coulter Translational Partnership Program \$133,200
Down the Hatch Solutions: A clinical tool to facilitate prediction and prevention of aspiration pneumonia in patients with dysphagia

Submitted Applications – Pending Review

R21 (PI: Lever) 04/1/2018 - 3/31/2020
NIH/NIDCD \$275,000
Intraoperative Vagal Nerve Stimulation as a Potential Therapeutic for Recurrent Laryngeal Nerve Injury in Advanced Age
Submitted 6/16/17

T32
NIH-National Institute on Aging (PI: Parker-Oliver) 7/1/2018 - 6/30/2023
Aging and Team Science Training in Intervention Research \$209,320
Submitted 5/25/2017 (Role: Co-I)

NSF-NCS (PI: Takahashi) 10/1/17 - 9/30/2021
Integrative Strategies for Understanding Neural and Cognitive Systems
Characterization of layer specific neural representation of feeding behavior
Submitted 2/6/2017, currently under review (Role: Co-I) \$367,631 (subcontract)

CURRICULUM VITAE: Teresa E. Lever, Ph.D.

R21 (PI: Lever) 04/1/2018 - 3/31/2020
NIH/NIDCD \$275,000

Impact of serotonin deficiency on speech and swallow function in a mouse model of Amyotrophic Lateral Sclerosis (ALS)

Submitted 6/15/16 Percentile Rank: 14

A1 submitted 3/14/17 Percentile Rank: 12

Council Review on 9/15/17, currently pending funding decision

Interdisciplinary Pilot Studies in Translational Science and Biomedical Innovation

University of Missouri (PI: Lever) 7/1/17 - 6/30/2018

Intraoperative vagal nerve stimulation as a potential \$50,000

therapeutic for laryngeal nerve injury during anterior neck surgical approaches

Submitted 1/20/2017

Mizzou Advantage Interdisciplinary Research Grant

University of Missouri (PI: Lever) 9/1/17 - 8/31/18

Tongue exercise for preservation of upper airway functions \$50,000

and extended survival in Amyotrophic Lateral Sclerosis (ALS) – A preclinical feasibility study

Submitted Applications - Not Funded

R01 (PI: Lever) 04/1/2017 - 03/31/2022
NIH/NIDCD \$2,324,357

Impact of tongue exercise on speech, swallowing, and survival in amyotrophic lateral sclerosis

Submitted 6/5/2016 Percentile Rank: 46

A1 submitted 8/16/2016 Percentile Rank: 31

New R01 submission planned for 2/6/18

VA Merit Award (PI: Lever) 04/1/2017 - 3/31/2021
Veteran's Administration \$648,020

Pathophysiology of iatrogenic laryngeal nerve injury and neuroplasticity in a surgical mouse model of dysphagia

Submitted 9/7/2015 Not Discussed

A1 submitted 9/6/2016 Not Discussed

A2 submission planned for 1/6/2018

R21 (PI: Lever) 07/1/2016 - 6/30/2018
NIH/NINDS \$275,000

Pathophysiology of presbyphagia & treatment effect mechanisms of menthol in a mouse model

Submitted 10/9/2015 Not Discussed

Department of Defense: ALS Research Program, Therapeutic Idea Award

Pre-application submitted on 5/25/11 (PI: Baines) \$290,000

Targeting programmed necrosis for the treatment of ALS

Submitted 8/24/11 (Role: Co-I) Not Discussed

Investigator-Initiated Research Grant Program

ALS Association (PI: Lever) \$240,000

Characterization of dysphagia in a canine disease model of ALS

Submitted 1/8/2013

Roger S. Williams Endowment (PI: Lever) \$13,640

University of Missouri School of Health Professions

Creating a clinician-friendly test for use by speech-language pathologists to evaluate adults with neurological disorders: the Missouri Comprehensive Communication Assessment (MCCA)
Submitted 12/3/2012

F31	(PI: Lever)	1/1/2007 - 12/31/2008
NIH/NIDCD		
Neuropathology of Swallowing in a Mouse Model of Amyotrophic Lateral Sclerosis		
Submitted 8/7/2006	Not Discussed	

Past Support

MU Interdisciplinary Center on Aging	(PI: Lever)	7/1/2015 - 6/30/2017
University of Missouri		\$10,000
Creating a mouse model of aspiration for translational dysphagia research		

Mizzou Advantage Seed Funding	(PI: Lever)	5/16/2014 - 5/15/2017
University of Missouri		\$69,300
Investigating animal disease models of dysphagia using a novel protocol: implications for companion animals & people		

Richard Wallace Faculty Incentive Grant	(PI: Nichols)	4/1/2016 - 3/31/2017
Mizzou Alumni Association		\$4,000
A novel model of dysphagia following tongue CTB-saporin injections to mimic aspects of ALS related to swallowing function (Role: Co-I)		

MU CVM COR Grant	(PI: Nichols)	4/1/2016 - 3/31/2017
University of Missouri College of Veterinary Medicine		\$18,000
A novel model of dysphagia following tongue CTB-saporin injections to mimic aspects of ALS related to swallowing function (Role: Co-I)		

SBIR 1R43DC015192-01	(PIs: Lever/Khodaparast)	9/17/2015 - 3/31/2017
NIH/NIDCD		\$175,000
Superior laryngeal nerve stimulation for the treatment of neurogenic dysphagia in an animal model of Amyotrophic Lateral Sclerosis (ALS)		

Mizzou Advantage Undergraduate Research Team Award		1/20/2015 - 12/18/2015
Clinicopathological biomarkers for	(PI: Lever)	\$15,000
early detection of dysphagia in animal models of ALS		

Mizzou Advantage Seed Funding	(PI: Lever)	12/1/2012 - 11/30/2014
University of Missouri		\$25,000
Voice, Swallow and Airway Center		

R21 (1R21NS084870-01)	(PI: Pavlath)	8/1/2013 - 7/31/2014
NIH/NINDS		\$41,645 (subcontract)
A knockin mouse model of oculopharyngeal muscular dystrophy (Role: Co-I)		

Muscular Dystrophy Association	(PI: Pavlath)	8/1/2013 - 7/31/2014
A knockin mouse model of oculopharyngeal muscular dystrophy		\$16,875 (subcontract)

Mizzou Advantage Undergraduate Research Team Award		7/1/2013 - 6/30/2014
University of Missouri	(PI: Lever)	\$11,700
Clinical application of a new videofluoroscopic swallow test for dogs		

R03 (1R03DC010895-01)	(PI: Lever)	7/1/2010 - 6/30/2014
NIH/NIDCD		\$393,148

Development of swallow evoked potentials as a novel tool to investigate swallowing function in healthy mice and a mouse model of ALS

MU Research Council Award (PI: Gopalaratnam) 6/1/2012 - 5/31/2014
University of Missouri \$7,425

Development of a noninvasive digital system for monitoring and characterizing the swallowing mechanism (Role: Co-I)

MU Interdisciplinary Center on Aging (PI: Lever) 6/1/2012 - 5/31/2014
University of Missouri \$10,000

Age-related dysphagia: the role of muscle stem cells in swallow pathology and dysfunction

College of Veterinary Medicine Faculty Research Award 2/1/2012 - 1/31/2013
University of Missouri (PI: Coates) \$18,000

Functional and pathological characterization of the motor unit in canine degenerative myelopathy: a spontaneous disease model of ALS (Role: Co-I)

Mizzou Advantage Undergraduate Research Team Award 1/17/2012 - 12/16/2012
University of Missouri (PI: Lever) \$7,800

Characterization of dysphagia in a potential canine model of ALS

SHP Catalyst Award (PI: Lever) 2/11/11 - 2/10/12
University of Missouri, School of Health Professions \$5,000

Does sensory pathology contribute to dysphagia in humans with ALS?

VII. BIBLIOGRAPHY

Peer-Reviewed Journal Publications

1. Harris RA, Grobman ME, Allen MJ, Schachtel J, Rawson NE, Bennett B, Ledyayev J, Hopewell B, Coates JR, Reinero CR, **Lever TE**. Standardization of videofluoroscopic swallow study protocol to investigate dysphagia in dogs. *J Vet Intern Med*. **2017**, Mar;31(2):383-393. PMID:28240398
2. Haney MM, Hinkel C, Thiessen A, Allen J, Deninger I, Ohlhausen D, **Lever T**. Creation of resin rodent skulls to reduce animal numbers for stereotactic surgery practice. *Lab Anim*. **2017**, Jan 20;46(2):41-42. PMID:28106872
3. Hinkel CJ, Sharma R, Thakkar MM, Takahashi K, Hopewell BL, **Lever TE**. Neural mechanisms contributing to dysphagia in mouse models. *Otolaryngology - Head and Neck Surgery*. **2016**, Aug;155(2):303-306. PMID:27048676
4. Mhlanga-Mutangadura T, Johnson GS, Schnabel RD, Taylor JF, Johnson GC, Katz ML, Shelton GD, **Lever TE**, Giuliano E, Granger N, Shomper J, O'Brien DP. A mutation in the Warburg syndrome gene, RAB3GAP1, causes a similar syndrome with polyneuropathy and neuronal vacuolation in Black Russian Terrier dogs. *Neurobiol Dis*. **2016**, Feb;86:75-85. PMID:26607784
5. Best MD, Nakamura Y, Kijak NA, Allen MJ, **Lever TE**, Hatsopoulos NG, Ross CF, Takahashi K. Semiautomatic marker tracking of tongue positions captured by videofluoroscopy during primate feeding. *Conf Proc IEEE Eng Med Biol Soc*. **2015**, Aug;5347-50. PMID:26737499
6. **Lever TE**, Brooks RT, Thombs LA, Littrell LL, Harris RA, Allen MJ, Kadosh MD, Robbins KA. Videofluoroscopic validation of a translational murine model of presbyphagia. *Dysphagia*. **2015**, Jun;30(3): 328-342. PMID:25783697

7. Vijayakumar S, **Lever TE**, Pierce J, Zhao X, Bergstrom D, Lundberg YW, Jones TA, Jones SM. Vestibular dysfunction, altered macular structure and trait localization in A/J inbred mice. *Mamm Genome*. **2015**, Apr;26(3-4):154-72. PMID:25645995
8. Shock LA, Gallemore BC, Hinkel CJ, Szewczyk MM, Hopewell BL, Allen MJ, Thombs LA, **Lever TE**. Improving the utility of laryngeal adductor reflex testing: A translational tale of mice and men. *Otolaryngology - Head and Neck Surgery*. **2015**, Apr;53(1):94-101. PMID:25832829
9. **Lever TE**, Braun SM, Brooks RT, Harris RA, Littrell LL, Neff RM, Hinkel CJ, Allen MJ, Ulsas MA. Adapting human videofluoroscopic swallow study methods to detect and characterize dysphagia in murine disease models. *J Vis Exp*. **2015**, March;97. PMID:25866882
10. Nekl CG, Rees-Lintzenich C, Leng X, **Lever T**, Butler SG. Effects of effortful swallow on esophageal function in healthy adults, *Neurogastroenterology, and Motility*. **2012**, Mar;24(3):252-6. PMID:22316290
11. **Lever TE**, Simon ES, Cox KA, Capra NF, O'Brien KF, Hough MS, Murashov AK. A mouse model of pharyngeal dysphagia in amyotrophic lateral sclerosis, *Dysphagia*. **2010**, Jun;25(2):112-26. PMID:19495873
12. Dunham MW, James SE, **Lever TE**, Lu Q, Carrion-Jones MJ. Methodology to obtain a mixed sural nerve recording in mice, *American Journal of Physical Medicine & Rehabilitation*. **2009**, Jul;88(7):542-6. PMID:19325459
13. **Lever TE**, Gorsek A, Cox KT, O'Brien KF, Capra NF, Hough MS, Murashov AK. An animal model of oral dysphagia in amyotrophic lateral sclerosis, *Dysphagia*. **2009**, Jun;24(2):180-95. PMID:19107538
14. **Lever TE**, Cox KT, Holbert D, Shahrier M, Hough M, Kelley-Salamon K. The effect of an effortful swallow on the normal adult esophagus. *Dysphagia*. **2007**, Oct; 22(4): 312-325. PMID:17694407
15. Murashov AK, Chintalgattu V, Islamov RR, **Lever TE**, Pak ES, Sierpinski PL, Katwa LC, Van Scott MR. RNAi pathway is functional in peripheral nerve axons. *FASEB Journal*. **2007**, Mar; 21(3): 656-670. PMID:17209129
16. Weathers MD, Kitsantas P, **Lever T**, O'Brien P, Campbell S, Rastatter M. Recognition accuracy and reaction time of vocal expressions of emotion by African-American and Euro-American college women. *Percept Mot Skills*. **2004**, Oct;99(2):662-8.

Total Cites: 130 (According to Scopus as of 04/24/17)

h-Index: 5 (According to Scopus as of 04/24/17)

Manuscripts under Review

1. Daghlis I, Leary E, **Lever TE**. A retrospective investigation of the relationship between baseline covariates and rate of ALSFRS-R decline in ALS clinical trials, *Amyotrophic Lateral Sclerosis and Frontotemporal Degeneration*.
2. Haney MM, Allen J, Al-Zubaidi L, Bunyak F, Deninger I, Ballenger B, Ohlhausen D, Leary E, Hopewell BL, Goldstein CL, **Lever TE**, Vagal Nerve Stimulation Improves Vocal Fold Mobility in a Mouse Model of Laryngeal Nerve Injury, *Otolaryngology - Head and Neck Surgery*

3. Haney MM, Rovnak A, Szewczyk M, Mok A, Hopewell B, **Lever TE**, Development of a Protocol for Murine Endoscopic Evaluation of Swallowing, *Otolaryngology - Head and Neck Surgery*

Manuscripts in Preparation

*In preparation implies that all data has been collected, analyzed and writing has commenced

1. Lind L, Murphy E, **Lever TE**, Nichols N. Impact of tongue injection of cholera toxin B conjugated to saporin (CTB-SAP) on hypoglossal motor neuron survival and tongue morphology in a novel rat model of dysphagia. To be submitted to *Experimental Neurology*.
2. Hopewell BL, Ovaitt A, Szewczyk M, Vandell C, Deninger I, Blake B, Thombs L, Page MP, Kedigh D, Bunyak Ersoy F, **Lever TE**. Automated, objective endoscopic evaluation of laryngeal function. To be submitted to *Laryngoscope*.
3. **Lever TE**, Haney MM, Szewczyk M, Rovnak A. Transoral endoscopic approach for longitudinal investigations of the rodent aerodigestive tract. To be submitted to the *Journal of Visualized Experiments*.
4. **Lever TE**, Littrell L, Caywood V, Braun SM, Mok A, Flynn K, Thombs LA, Osman KA. Videofluoroscopy is differentially diagnostic of disease conditions in mouse models: translational implications for human clinical practice. To be submitted to *Dysphagia*.
5. Osman KA, Flynn K, Daghlis I, Kadosh M, Ferreira AJ, Collins M, Braun SM, Brooks RT, Bearce E, Mok A, **Lever TE**. Effect of gene copy number on dysphagia phenotype in *SOD1* transgenic mice. *Amyotrophic Lateral Sclerosis and Frontotemporal Degeneration*.
6. Littrell L, Osman KA, Caywood V, Smith R, Ferreira A, **Lever TE**. Menthol ingestion significantly improves swallowing function in a mouse model of presbyphagia. To be submitted to *Dysphagia*.
7. Mok L, Allen J, Deninger I, Ballenger B, Ohlhausen D, Neill B, Newberry CI, Hopewell BL, Leary E, **Lever TE**. A mouse model of laryngeal nerve injury develops dysphagia and laryngeal dysfunction. To be submitted to *Dysphagia*.

Published Conference Proceedings

Lever T, Coates R, Allen M, Gaiser V. A new clinical protocol for contrast videofluoroscopic assessment of dysphagia in freely behaving dogs. 2014 American College of Veterinary Internal Medicine (ACVIM) Forum Proceedings **2014**.

Coates R, **Lever T**, Clinicopathologic study of dysphagia in canine degenerative myelopathy. 2014 American College of Veterinary Internal Medicine (ACVIM) Forum Proceedings **2014**.

Published Abstracts

Harris RA, Grobman M, Allen M, Schachtel J, Rawson NE, Bennett B, Ledyayev J, Hopewell B, Coates JR, Reinero CR, **Lever TE**. A standardized, freely-behaving canine videofluoroscopic swallow study protocol. *Dysphagia*. **2017**, doi:10.1007/s00455-017-9805-3.

Mok A, Haney M, Allen J, Deninger I, Ballenger B, Ohlhausen D, Caywood V, Robbins K, **Lever TE**. The effect of laryngeal nerve transection on swallowing function in a mouse model. *Dysphagia*. **2017**, doi:10.1007/s00455-017-9805-3.

Haney M, Allen J, Deninger I, Ohlhausen D, Ballenger B, Robbins K, **Lever TE**. Intraoperative vagal nerve stimulation as a potential therapeutic after recurrent laryngeal nerve injury in a mouse model. *Dysphagia*. **2017**, doi:10.1007/s00455-017-9805-3.

Flynn K, Caywood V, Ballenger B, Mok A, Robbins K, Haney M, **Lever TE**. Characterization of dysphagia onset and progression in a mouse model of amyotrophic lateral sclerosis (ALS). *Dysphagia*. **2017**, doi:10.1007/s00455-017-9805-3.

Littrell L, Ballenger B, Caywood V, Flynn K, Robbins K, **Lever TE**. Utility of VFSS for differential diagnosis and quantification of treatment effects in mouse models. *Dysphagia*. **2017**, doi:10.1007/s00455-017-9805-3.

Ovatt A, Szewczyk M, Al-Zubaidi L, Deninger I, Hopewell B, Takahashi K, Bunyak F, **Lever TE**. Objective, quantitative video analysis of laryngeal function. *Dysphagia*. **2017**, doi:10.1007/s00455-017-9805-3.

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Intellectual Property

Patents		Status
US 9,107,385 B2	Animal kennel for scientific examination	Issued 8/18/2016
US 2016/0081591 A1	System and Method for Laryngeal Reflex Examination	Published 3/24/2016
US Provisional App. 62/481,946	Detecting and Monitoring Bulbar Dysfunction	Filed 4/5/2016

Disclosures		Filing Date
17UMC-CR011	Data Management and Mining for Laryngeal Endoscopic Function Testing	1/30/2017
17UMC-CR010	Vocal Fold and Glottal Gap Motion Tracking Software	1/30/2017
17UMC060	Objective Quantification of Upper Airway Function Pathology Using Brainstem Evoked Potentials in Humans and Animals	1/23/2017
17UMC-CR004	Automated Oral Motor Skills Assessment Software App	12/1/2016
16UMC018	Veterinary Diagnostic Test Kit for Videofluoroscopic Swallow Studies	10/5/2015

VIII. PRESENTATIONS (*Oral and #Poster Presentations)

International

- 2017 American College of Veterinary Internal Medicine Forum, June 7-10, 2017, Washington, DC
1. *Videofluoroscopic swallow study (VFSS) features of obstructive lower esophageal sphincter (LES) disorders in dogs: LES achalasia-like syndrome and LES dyssynchrony (Megan Grobman, DVM; Mentors: Lever & Reinero)
 2. *Discrimination between cough and non-cough behaviors using acoustic wave recordings (Megan Grobman, DVM; Mentors: Lever & Reinero)
- 2017 Dysphagia Research Society Annual Meeting, March 2-4, 2017, Portland, OR.
1. *A standardized, freely-behaving canine videofluoroscopic study protocol (Rebecca Harris; Mentor: Lever)
 2. *Intraoperative vagal nerve stimulation as a potential therapeutic after recurrent laryngeal nerve injury in a mouse model (Megan Haney, DVM; Mentor: Lever)
 3. *The effect of laryngeal nerve transection on swallowing function in a mouse model (Alexis Mok; Mentor: Lever)
 4. #Utility of VFSS for differential diagnosis and quantification of treatment effects (Loren Littrell; Mentor: Lever)
 5. #Objective, quantitative video analysis of laryngeal function (Alyssa Ovaite; Mentor: Lever)
 6. #Development of a rat model for studying the relationship between oral environmental changes and alterations in mastication/swallowing patterns (Kazutaka Takahashi, collaborator)
- 2016 Society for Neuroscience Annual Meeting, October 17-21, 2016, San Diego, CA.
- #Chronic laryngeal nerve stimulation to improve swallow function and survival in an ALS mouse model (Megan Haney, DVM; Mentor: Lever)

- 2016 American Academy of Otolaryngology - Head and Neck Surgery Annual Meeting, September 10-13, 2016, San Diego, CA.
1. *Chronic superior laryngeal nerve stimulation to treat dysphagia (Aaron Thiessen, MD; Mentor: Lever)
 2. *A simple method to objectively evaluate the laryngeal adductor reflex (Bridget Hopewell, MD; Mentor: Lever)
 3. *A surgical mouse model of iatrogenic laryngeal nerve injury (Jakob Allen; Mentor: Lever)
 4. *Exploring the effects of serotonin deficiency on swallowing (Joseph Sinnott; Mentor: Lever)
- 2016 American College of Veterinary Radiology (ACVR) Annual Meeting, October 19-22, 2016, Orlando, FL. *Videofluoroscopic swallow study (VFSS) protocol identifies possible link between canine lower esophageal achalasia/dyssynchrony and megaesophagus (Megan Grobman, DVM; Mentors: Lever & Reinero)
- 2016 Dysphagia Research Society Annual Meeting, February 25-27, 2016, Tucson, AZ.
1. *A surgical mouse model of iatrogenic laryngeal nerve injury
 2. *Endoscopic evaluation of swallowing in mouse models of dysphagia (Abigail Rovnak; Mentor: Lever)
 3. *Menthol improves swallowing function in a mouse model of presbyphagia (Loren Littrell; Mentor: Lever)
 4. #Improving palatability of oral contrast agents for canine swallow studies (Rebecca Harris; Mentor: Lever)
- 2015 International Symposium on ALS/MND, December 11-13, 2015, Orlando, FL.
1. #Effect of gene copy number on dysphagia onset in *SOD1-G93A* transgenic mice (Iyas Daghlis; Mentor: Lever)
 2. #Low copy number *SOD1-G93A* mice are better suited for dysphagia research compared to the high copy number model (Kate Osman; Mentor: Lever)
- 2015 Society for Neuroscience Annual Meeting, October 17-21, 2015, Chicago, IL.
1. *In search of functional neural biomarkers of dysphagia to quantify treatment effects in mouse models
 2. *Dysphagia assays are differentially diagnostic of aging & ALS in mouse models
- 2015 American Academy of Otolaryngology - Head and Neck Surgery Annual Meeting, September 27-30, 2015, Dallas, TX.
1. *Endoscopic evaluation of swallowing in mouse models of dysphagia
 2. *Improving the utility of laryngeal sensory testing (Bridget Hopewell, MD; Mentor: Lever)
 3. *A Mouse Model of Aspiration for Translational Dysphagia Research (Bridget Hopewell, MD; Mentor: Lever)
 4. *Neural mechanisms contributing to dysphagia in mouse models (Cameron Hinkel; Mentor: Lever)
 5. *Variable patterns of laryngeal innervation and dysfunction (Marlena Szewczyk; Mentor: Lever)
- 2015 Dysphagia Research Society Annual Meeting, March 12-14, 2015, Chicago, IL.
1. *In search of clinicopathological biomarkers for early detection of dysphagia in amyotrophic lateral sclerosis (Iyas Daghlis; Mentor: Lever)
 2. *Videofluoroscopic investigation of dysphagia in dogs with neurological diseases (Rebecca Harris; Mentor: Lever)

3. *Videofluoroscopic validation of a mouse model of presbyphagia (Loren Littrell; Mentor: Lever)
 4. #Improving the utility of laryngeal adductor reflex testing – insights from rodent research
 5. #Standardization of iohexol for videofluoroscopic swallow studies (Mitchell Allen; Mentor: Lever)
 6. #A novel lingual task to aid early detection of dysphagia (Anna Grantham; Mentor: Lever)
- 2014 Society for Neuroscience Annual Meeting, November 15-19, 2014, Washington, DC.
1. #Characterizing the laryngeal adductor reflex across multiple species: Implications for human and veterinary medicine
 2. #Adapting human videofluoroscopic swallow study (VFSS) methods to characterize dysphagia in animal models of human diseases (Mitchell Allen; Mentor: Lever)
- 2014 American Academy of Otolaryngology - Head and Neck Surgery Annual Meeting, September 21- 24, 2014, Orlando, FL. *Detection and Characterization of Laryngeal Reflex Pathology in Mouse Models of Human Diseases (Leslie Shock; Mentor: Lever)
- 2014 American College of Veterinary Internal Medicine (ACVIM) Forum, June 4-7, 2014, Gaylord Opryland Resort and Convention Center, Nashville, TN. *Contrast videofluoroscopic assessment of dysphagia in freely behaving dogs
- 2014 Dysphagia Research Society Annual Meeting, March 5-8, 2014, Nashville, TN.
1. *A new mouse model of presbyphagia and the effect of menthol
 2. *Advantages of iohexol as an oral contrast agent for videofluoroscopy in freely behaving animals: implications for translational research to humans (Vanessa Mitchell Allen; Mentor: Lever)
 3. *Characterization of dysphagia in a canine model of late infantile neuronal ceroid lipofuscinosis (Vanessa Gaiser; Mentor: Lever)
 4. #Videofluoroscopic characterization of swallowing impairment in mouse models of ALS in advanced aging (Ryan Brooks; Mentor: Lever)
 5. #Developing a prototype system to investigate the LAR in mice
- 2013 International Symposium on ALS/MND, December 2012, Chicago, IL. #A comparative study of biomarkers for dysphagia in amyotrophic lateral sclerosis (Elizabeth Bearce; Mentor: Lever)
- 2013 Dysphagia Research Society Annual Meeting, March 14-16, 2013, Seattle, WA. #Using the laryngeal adductor reflex to investigate swallowing (Megan Sell; Mentor: Lever)
- 2012 Society for Neuroscience Annual Meeting, October 13-17, 2012, New Orleans, LA. #Dysphagia assays for comparative study of neurodegenerative diseases (Elizabeth Bearce; Mentor: Lever)
- 2012 Dysphagia Research Society Annual Meeting, March 8-10, 2012, Toronto, Canada.
1. #Identification of dysphagia onset in a mouse model of ALS (Michelle Collins; Mentor: Lever)
 2. #Investigating a canine model of degenerative myelopathy for histopathological evidence of dysphagia (Abbie Pinnegar; Mentor: Lever)
- 2011 Dysphagia Research Society Annual Meeting, March 3-5, 2011, San Antonio, TX. *Effects of effortful swallow on esophageal peristalsis in healthy adults (Susan Butler, collaborator)

- 2010 International Symposium of ALS/MND, December 11-13, 2010, Orlando, FL.
#Development of swallow evoked potentials to investigate dysphagia in ALS
- 2007 Dysphagia Research Society Annual Meeting, March 8-7, Vancouver, British Columbia, Canada. #Development of a mouse model for studying dysphagia in ALS
- 2006 Society for Neuroscience Annual Meeting, October 14-18, Atlanta, GA, #Investigating the SOD1-G93A transgenic mouse model of ALS for evidence of dysphagia
- 2005 Society for Neuroscience Annual Meeting, November 12-16, Washington, DC.
#Evidence of RNAi in mammalian axons

National (*Oral Presentations and #Posters)

- 2016 American Association of Laboratory Animal Science (AALAS) National Meeting, October 30 - November 3, 2016, Charlotte, NC. #Creation of epoxy mouse skulls to reduce animal numbers for stereotactic surgery practice (Megan Haney, DVM; Mentor: Lever)
- 2005 American Speech-Language-Hearing Association (ASHA) Convention, November 18-20, San Diego, CA. *The effect of an effortful swallow on the normal adult esophagus
- 2005 Keystone Symposium – Diverse Roles of RNA in Gene Regulation, January 8-14, Breckenridge, CO. #RNA interference in mammalian axons
- 2004 American Speech-Language-Hearing Association (ASHA) Convention, November 18-20, 2004, Philadelphia, PA. *The role of speech-language pathologists in esophageal dysphagia

State

- 2017 Missouri Speech-Language-Hearing Association Convention, April 6-9, 2017
1. *Chronic laryngeal nerve stimulation to improve swallow function (Ian Deninger; Mentor: Lever)
 2. *The effects of laryngeal nerve transection on swallowing function (Alexis Mok; Mentor: Lever)
 3. *Developing a clinical tool for early detection of bulbar dysfunction (Elise Henn; Mentor: Lever)
 4. *Characterization of dysphagia onset in a mouse model of ALS (Kaitlin Flynn; Mentor: Lever)
 5. *Thickening liquids for dysphasic infants: achieving and maintaining safe viscosities (Elizabeth Bier; Mentor: Lever)
- 2016 Missouri Speech-Language-Hearing Association Convention, April 9, 2016
*Improving clinical practice and education through translational dysphagia research (4-hour seminar)
- 2016 The American College of Physicians (Missouri Chapter) Conference, September 17, 2016, Jefferson City, MO. #Translational endoscopic approaches for longitudinal investigations of the aerodigestive tract in mice (Marlena Szewczyk; Mentor: Lever)
- 2014 Mid-Missouri Parkinson's Disease Patient and Caregiver Conference, Columbia, MO, August 23, 2014. *Swallowing and Parkinson's Disease
- 2014 Missouri Speech-Language-Hearing Association Convention, April 9, 2016
1. #Adapting human videofluoroscopic swallow study (VFSS) methods to characterize dysphagia in animal models of human diseases (Mitchell Allen; Mentor: Lever)
 2. #Characterization of dysphagia in a canine model of late infantile Batten disease (Rebecca Harris & Loren Littrell; Mentor: Lever)

3. #In search of human correlates for lick rate (Anna Grantham; Mentor: Lever)
 4. #Characterization of dysphagia onset in the low copy number *SOD1-G93A* mouse model of ALS (Sabrina Braun; Mentor: Lever)
- 2013 Missouri Speech-Language-Hearing Association Convention, April 4-7, 2013
1. #Adapting videofluoroscopic swallow study methods for use with dogs (Mitchell Allen; Mentor: Lever)
 2. #Dysphagia in a Dachshund model of late-infantile Batten disease (Vanessa Gaiser; Mentor: Lever)
 3. #A mouse model of age-related swallowing impairment (Laura Powell; Mentor: Lever)
 4. #In search of human correlates for lick rate (Anna Grantham; Mentor: Lever)
 5. #Videofluoroscopic assessment of swallowing in a mouse model of ALS (Ryan Brooks; Mentor: Lever)
- 2012 Missouri Speech-Language-Hearing Association Convention, April 13-15, 2013
1. #Standardizing a videofluoroscopic swallow test for dogs (Laila Al-Khashti; Mentor: Lever)
 2. #Histological investigation of dysphagia in humans with ALS (Meghann Konczal; Mentor: Lever)

Intramural/Local

- 2017 Phi Zeta Research Day, MU College of Veterinary Medicine, May 5, 2017
1. #Tongue CTB-saporin (CTB-SAP) injections mimic aspects of ALS related to swallowing deficits (Lori Lind; Mentors: Lever & Nichols)
 2. #Exploration of tongue muscle pathology in canine degenerative myelopathy (Victoria Landreth; Mentor: Lever & Coates)
 3. #Intraoperative vagal nerve stimulation improves vocal fold mobility in a mouse model of recurrent laryngeal nerve injury (Megan Haney, DVM; Mentor: Lever)
- 2017 Cardiovascular Research Day, University of Missouri, May 5, 2017. #Intraoperative vagal nerve stimulation improves vocal fold mobility in a mouse model of recurrent laryngeal nerve injury (Megan Haney, DVM; Mentor: Lever)
- 2017 MU Life Sciences Week, University of Missouri, April 10-15, 2017. #Tongue CTB-saporin (CTB-SAP) injections mimic aspects of ALS related to dysphagia (Lori Lind & Erika Murphy; Mentor: Lever)
- 2017 Research and Creative Activities Forum, University of Missouri, March 11, 2017. *Intraoperative vagal nerve stimulation improves vocal fold mobility in a mouse model of recurrent laryngeal nerve injury (Megan Haney, DVM; Mentor: Lever)
- 2017 Comparative Medicine Program Seminar Series at Discovery Ridge, MU College of Veterinary Medicine, February 10, 2017. *Intraoperative vagal nerve stimulation as a potential therapeutic for recurrent laryngeal nerve injury (Megan Haney, DVM; Mentor: Lever)
- 2017 Equine House Officer Rounds, MU College of Veterinary Medicine, January 25, 2017. *From bench to bedside...to the Kentucky Derby
- 2016 MU School of Medicine STEP (Senior Teacher Educator Partnership) Program; November 18, 2016. *The water swallow challenge: come take the plunge!
- 2016 Health Sciences Research Day, University of Missouri, November 17, 2016
1. #Chronic laryngeal nerve stimulation to improve swallow function and survival in an ALS mouse model (Zachary Treat; Mentor: Lever)

2. #A surgical mouse model of iatrogenic laryngeal transection injury
(Aaron Thiessen; Mentor: Lever)
- 2016 Missouri Tech Expo, Columbia, MO, October 13, 2016. *Swallowing disorder analysis device
- 2016 Caring for the Frail and Elderly Conference, Columbia MO, August 19, 2016
 1. *Swallowing disorders in the elderly
 2. #Effects of menthol on swallowing function in a mouse model of presbyphagia (Loren Littrell; Mentor: Lever)
 3. #Exploring the effects of serotonin deficiency on swallowing (Joseph Sinnott; Mentor: Lever)
 4. #Developing a clinical tool for early detection and monitoring of speech and swallowing deficits (Elise Henn; Mentor: Lever)
- 2016 Equine House Officer Rounds, MU College of Veterinary Medicine, June 20, 2016. *Equine laryngeal paralysis
- 2016 MU Undergraduate Research Day, April 26, 2016
 1. #Developing a clinical tool for early detection and monitoring of speech and swallowing deficits (Elise Henn; Mentor: Lever)
 2. #Thickening fluids for pediatric patients with dysphagia; the challenge of achieving safe viscosities (Elizabeth Bier; Mentor: Lever)
 3. #Characterization of a new method for laryngeal adductor reflex testing (Brett Blake; Mentor: Lever)
- 2016 MU Life Sciences Week, April 18-23, 2016. #Iatrogenic laryngeal nerve injury in a surgical mouse model: transection versus crush (Brett Neill; Mentor: Lever)
- 2016 Research and Creative Activities Forum, University of Missouri, March 12, 2016. *Fiberoptic endoscopic evaluation of swallowing (FEES) in mice
- 2015 Phi Zeta Research Day, MU College of Veterinary Medicine, May 8, 2015. #Histopathological evidence of dysphagia in canine degenerative myelopathy (Shelby Mancini; Mentors: Lever & Coates)
- 2015 Caring for the Frail and Elderly Conference, Columbia MO, August 14, 2015. #A mouse model of age-related swallowing dysfunction (Loren Littrell; Mentor: Lever)
- 2015 MU Interdisciplinary Center on Aging, School of Medicine. April 7, 2015. *Presbyphagia
- 2015 Health Sciences Research Day, University of Missouri, November 12, 2015
 1. #A surgical mouse model of iatrogenic laryngeal nerve injury (Jakob Allen; Mentor: Lever)
 2. #A mouse model of aspiration for translation dysphagia research (Murphy Mastin; Mentor: Lever)
 3. #Exploring the effects of serotonin deficiency on swallowing (Joseph Sinnott; Mentor: Lever)
- 2015 Seminars in Translational Neuroscience – A forum for collaborations, MU Center for Translational Neuroscience, April 6, 2015. *Adapting dysphagia diagnostics for translational research with mouse models of neurological conditions
- 2014 Parkinson's Disease Support Group - Lake of the Ozarks Chapter, October 16, 2014. *Swallowing and Parkinson's Disease
- 2014 Equine House Officer Rounds, MU College of Veterinary Medicine, August 14, 2014. *Equine laryngeal paralysis

- 2014 Parkinson's Disease Support Group - Columbia, Missouri Chapter, Lenoir Community Center, May 1, 2014. *Swallowing and Parkinson's Disease
- 2014 MU Undergraduate Research Day, March 4, 2014. #Adapting histological methods for stereology (Iyas Daghlis; Mentor: Lever)
- 2013 MU Institute for Clinical and Translational Science (iCATS) Seminar Series, December 10, 2013. *Impaired swallowing: more than a meal time problem
- 2014 Phi Zeta Research Day, MU College of Veterinary Medicine, May 9, 2014
1. #Freely-behaving videofluoroscopic characterization of dysphagia in canine degenerative myelopathy (Lisa Anderson; Mentors: Lever & Coates)
 2. #Establishing immunohistochemistry staining patterns for canine degenerative myelopathy (Sarah Weiss; Mentors: Lever & Coates)
- 2013 Biomedical Sciences Fall Seminar Series, MU College of Veterinary Medicine, October 24, 2013. *Developing assays for comparative study of dysphagia in neurological diseases and typical aging
- 2013 Missouri Tech Expo, Columbia, MO, September 19, 2013. *K9 observation kennel
- 2013 Veterinary Medicine Seminar, MU College of Veterinary Medicine, June 13, 2013. *Canine videofluoroscopic swallow study
- 2013 Phi Zeta Research Day, MU College of Veterinary Medicine, May 3, 2013
1. #Histopathological evidence of dysphagia in canine degenerative myelopathy (Yaira Rivera; Mentors: Lever & Coates)
 2. #Videofluoroscopic assessment of swallowing impairment in canine degenerative myelopathy (Elena Rodriguez; Mentors: Lever & Coates)
- 2011 MU Cardiovascular Research Day, February 15, 2011. *The role of swallowing in cardiorespiratory research
- 2011 MU Interdisciplinary Center on Aging, School of Medicine. March 1, 2011. *Critical passages: speaking, breathing, and swallowing in old age

Invited Seminars (other institutions)

- 2016 George Washington University Institute for Neuroscience, Department of Pharmacology & Physiology, December 8, 2016. Guest of Laura Ball, Ph.D. *Adapting dysphagia diagnostics for translational research with animal models.
- 2015 1st Annual Central Missouri Symposium on Medical Speech Pathology, sponsored by Rusk Rehabilitation Center, Columbia, MO, August 16, 2015. *Improving clinical practice through translational dysphagia research (3-hour seminar)
- 2014 University of Kansas Medical Center Neuromuscular Conference, Kansas City, MO, September 3, 2014. *Translational biomarkers of dysphagia in ALS.
- 2013 Radiology Department, North Carolina State College of Veterinary Medicine, July 29, 2013. *Canine videofluoroscopy
- 2012 Physiology Department Seminar Series, East Carolina University Brody School of Medicine, October 23, 2012. *Establishing dysphagia as a cross-species biomarker to measure treatment efficacy for neurological diseases

Journal Reviews

Medical Devices: Evidence and Research
Physiology & Behavior
Dysphagia

Parkinson's Disease
Physical Medicine & Rehabilitation
Archives of Physical Medicine and Rehabilitation
Language, Speech, and Hearing Services in Schools

IX. TEACHING ACTIVITIES

Courses

Graduate Level

Course Title	Credit Hours	% of Course	Dates
<i>ENT Resident Research Didactics Seminar</i>	n/a	100	Quarterly 2014 - 2017 1-hour seminar (8-10 ENT Residents)
ABS 6661 <i>Surgery Research Elective</i>	n/a	100	Annually (Fall) 2013 - 2016 (1-2 medical students)
CSD 8200 <i>Motor Speech Disorders</i>	3	100	Annually (Spring) 2010 - 2013 (12-20 graduate students)
CSD 8030 <i>Acquired Language Disorders</i>	3	100	Annually (Fall) 2010 - 2012 (16-22 graduate students)
CSD 8230 <i>Dysphagia</i>	3	100	Annually (Fall) 2011 - 2013 (15-20 graduate students)
V BSCI 8420 <i>Veterinary Physiology</i>	5	1	Annually (Fall) 2010 - 2016 (1 discussion session, 4-16 graduate students)
V PBIO 9090 <i>Area Vet Pathobiology Dissertation</i>	5	100	Summer 2016 & 2017 Fall 2016 (1 doctoral student)
CSD 8960 <i>Directed Readings</i>	3	100	Summer 2010, 2011, 2012 Fall 2011 Spring 2012 (1-3 graduate students)
CSD 8050/8090 <i>Research in CSD</i>	3	100	Fall 2010 - 2016 Spring 2011 - 2017 Summer 2011 - 2017 (1-6 graduate students)
CSD 8085 <i>Problems in CSD</i>	3	100	Fall 2013 (1 graduate student)
<i>Voice and Voice Disorders</i> (East Carolina University)	3	n/a	Guest lecturer 2005 (2 lectures, 3 hours each) 2008 (3 lectures, 3 hours each)
<i>Dysphagia</i> (East Carolina University)	3	n/a	Guest lecturer 2004 (4 lectures, 3 hours each) 2005 (5 lectures, 3 hours each) 2006 (7 lectures, 3 hours each)
<i>Craniofacial Anomalies</i> (East Carolina University)	3	n/a	Guest lecturer 2005 (4 lectures, 3 hours each)

Note: CSD = Communication Science and Disorders

Undergraduate Level

Course Title	Credit Hours	% of Course	Dates
CSD 4950 <i>Research Apprenticeship</i>	3	100	Fall 2010 - 2016 Spring 2011 - 2017 Summer 2011 & 2015 (1-7 students)
<i>Biomedical Engineering Honors Thesis</i>	3	100	Spring 2016 (1 student)
CSD 4990 <i>Honors Thesis</i>	3	100	Spring 2016 (1 student)
BIOMED 2940 <i>Internship</i>	3	100	Fall 2015 Spring 2014 & 2016 Summer 2015 (2-5 students)
CSD 1000 <i>Survey of Communication Science and Disorders</i>	3	n/a	Fall 2011 & 2012 1 lecture (1 hour) (25-30 students)
<i>Anatomy & Physiology of Speech and Hearing</i> (East Carolina University)	3	100	Annually 2005, 2006 On-campus & on-line sections (75 students)

Note: CSD = Communication Science and Disorders

Mentoring/Advising**Medical Student Research Mentor**

Year	Student	Project
2017 -	Connor Mullen	Development of a reproducible mouse recurrent laryngeal nerve crush device to assess the neuro-regenerative properties of intraoperative vagal nerve stimulation
	Lauren Welby	Establishing a mouse model of facial nerve injury for pre-clinical therapeutic investigations
	Connor Burkett	Translational surgical methods (Tulane University)
2016 -	Alexis Ruffolo	Neural mapping of laryngeal reflexes
2016 - 2017	Kate July	Mobile Health App for early detection and monitoring of speech and swallowing impairment
	Zachary Treat	Developing methodology for chronic stimulation of the superior laryngeal nerve in a mouse model of ALS
2014 - 2017	Cameron Hinkel	Characterization of the brainstem response to mechanical stimulation of the LAR in mice
	Marlena Szewczyk	Characterizing the laryngeal adductor reflex in dogs
2015 - 2016	Brett Neill	Developing a translational mouse model of laryngeal nerve injury
2015 -	Jakob Allen	Exploring superior laryngeal nerve stimulation to treat dysphagia in a mouse model of ALS
	Joseph Sinnott	Exploring the effect of serotonin deficiency on swallowing and other laryngeal reflexes
2015	Christopher Newberry	Developing a translational mouse model of laryngeal nerve injury

2015 - 2016	Murphy Mastin	Identifying harmful versus harmless thin liquids in a mouse model of aspiration
2014	Ryan Neff	Adapting videofluoroscopy to study dysphagia in mouse models
2013	Luke Small	Electrical stimulation of the superior laryngeal nerve to treat for dysphagia in a mouse model of ALS
2013 - 2015	Leslie Shock	Developing a protocol to measure brainstem evoked potentials of the LAR through applied natural stimuli

Veterinary Students – Veterinary Research Scholars Program (VRSP) Mentor

Year	Student	Project
2017 -	Blair Hobbs	Translational investigation of tongue muscle degeneration in aging versus ALS (co-mentor: Coates)
2016 -	Victoria Landreth	Exploration of tongue muscle pathology in canine degenerative myelopathy (co-mentor: Coates)
	Lori Lind	Impact of hypoglossal motor neuron death on swallowing behavior in a novel model of dysphagia (co-mentor: Nichols)
2014 - 2017	Shelby Mancini	Histopathological evidence of dysphagia in canine degenerative myelopathy (co-mentor: Coates)
2013 - 2014	Lisa Anderson	Videofluoroscopic assessment of swallowing impairment in canine degenerative myelopathy (co-mentor: Coates)
	Sarah Weiss	Histopathological evidence of dysphagia in canine degenerative myelopathy (co-mentor: Coates)
2012 - 2013	Yaira Rivera	Histopathological evidence of dysphagia in canine degenerative myelopathy (co-mentor: Coates)
	Elena Rodriguez	Videofluoroscopic assessment of swallowing impairment in canine degenerative myelopathy (co-mentor: Coates)

Master's Thesis Advisor

Year	Student	Dept	Thesis Title
2017 -	Ellyn Andel	CSD	Pre-clinical treatment studies in the low copy number mouse model of ALS
	Erika Murphy	CSD	Establishing a rat model of dysphagia for pre-clinical treatment studies in ALS (co-mentor: Nichols)
	Lori Lind	BMS	Impact of selective motor neuron death on hypoglossal motor neuron survival and tongue morphology in a novel model of dysphagia (Co-mentor: Nichols)
2016 -	Elizabeth Bier	CSD	Thickening fluids for pediatric patients: the challenge of achieving safe viscosity
	Elise Henn	CSD	Developing a clinical tool for early detection and monitoring of bulbar dysfunction
2015 - 2017	Kaitlin Flynn	CSD	Characterization of dysphagia onset in a mouse model of ALS
	Alexis Mok	CSD	The effect of laryngeal nerve transection on swallowing function in a mouse model
2014 - 2016	Rebecca Harris	CSD	Videofluoroscopic investigation of dysphagia in dogs with neurological diseases
	Loren Littrell	CSD	Videofluoroscopic validation of a mouse model of presbyphagia

2013 - 2015	Anna Grantham	CSD	Noninvasive clinical tools to aid early detection and monitoring of dysphagia in ALS: translating findings from mice to humans
	Sabrina Braun	CSD	Comparison of dysphagia in two mouse models of ALS
2012 - 2014	Ryan Brooks	CSD	Videofluoroscopic assessment of swallowing in the <i>SOD1-G93A</i> mouse model of ALS
	Vanessa Gaiser	CSD	Characterization of dysphagia in a canine disease model of late-infantile neuronal ceroid lipofuscinosis
2011 - 2013	Megan Sell	CSD	Using the laryngeal adductor reflex to investigate swallowing
2010 - 2012	Michelle Collins	CSD	Identification of dysphagia in a transgenic mouse model of amyotrophic lateral sclerosis
	Abbie Pinnegar	CSD	Investigating canine degenerative myelopathy as a disease model of ALS for histopathological evidence of dysphagia

Note: CSD = Communication Sciences and Disorders; BMS = Biomedical Sciences

Doctoral Program/Dissertation Advisor

Year	Student	Department/Program	Disposition
2016 -	Megan Haney, DVM	Area Pathobiology Program	ABD status May 22, 2017; Expected graduation: May 2019
2010-2012	Laura Powell, MHS	Communication Science and Disorders	Voluntary withdrawal from program prior to ABD status

Doctoral Program/Dissertation Committee Member

Year	Student	Department/Program	Advisor
2013 - 2017	Christine Sibigtroth, DVM	Interdisciplinary Neuroscience Program	Joan Coates, DVM
2016 -	Megan Grobman, DVM	Area Pathobiology Program	Carol Reinero, DVM, PhD

Veterinary Residents – Research Mentor

2013 - 2014 Robert Daniel, DVM, Veterinary Neurology Resident (Advisor: O'Brien)

Master's Thesis Committee Member

2016 - 2017 Jacob McKinley; Communication Science and Disorders
(Advisors: Kuruvilla-Dugdale & Dietrich)

Graduate Student Research Advisor (Master's Degree Program, non-thesis students)

2011 - 2012 Kelly Losson, Communication Science and Disorders
2010 - 2011 Karen Hecksel, Communication Science and Disorders

Undergraduate Research Mentor

Academic Program	Academic Year							
	2010	2011	2012	2013	2014	2015	2016	2017
Pre-SLP	8	14	14	16	12	16	10	1
Pre-Med	0	1	4	3	3	9	8	11
Pre-PA	0	0	0	0	1	2	1	1
Pre-Vet	0	0	0	0	0	1	1	0

BME	0	0	0	0	0	1	1	0
CS	0	0	0	0	0	3	2	1
Pre-Doctoral	0	1	0	0	0	1	1	1
TOTAL	8	14	14	19	16	33	24	15

Note: SLP = speech-language pathology; Med = medicine; PA = physician assistant; Vet = veterinary; BME = biomedical engineering; CS = computer science; Pre-doctoral = students applying for enrollment into a PhD program (i.e., academic career path)

Undergraduate (Senior) Capstone Research Program Advisor

2017 – 2018 Chandler Dejonge
Marc Trautmann
Shahadah Triche

Undergraduate Fellowship Program Advisor

NIH Initiative for Maximizing Student Diversity (IMSD) Program

2016 - 2017 Raven Riordan (MU freshman in biology)

Hughes Research Fellowship Program

2013 - 2014 Iyas Daghlaz (MU sophomore in biochemistry)

Hughes Research Apprenticeship Program

2012 - 2013 Iyas Daghlaz (MU freshman in biochemistry)
Devin Woods (MU freshman in biology)

ENT Residents – Research Mentor

2016 - Celsha Ukatu, MD
2015 - Aaron Thiessen, MD
2014 - 2016 Bridget Hopewell, MD

NIH F32 Mentor

2013 - 2015 Matthew Randolph, DVM, doctoral candidate at **Emory University** investigating stem cell therapy in a mouse model of oculopharyngeal muscular dystrophy.

X. PROFESSIONAL SERVICE

Department Level

2016 - Faculty mentor committee member for Nicole Nichols, Ph.D., junior faculty in Biomedical Sciences
2016 - Faculty Advisor for ENT Resident Physicians
2015 - Faculty Advisor for ENT Resident Grand Rounds
2015 - Faculty selection committee, Otolaryngology – Head and Neck Surgery
2014 - Resident selection committee, Otolaryngology – Head and Neck Surgery
2014 - Faculty Advisor for Resident Research Day, Otolaryngology – Head and Neck Surgery
2010 - 2013 Faculty search committee, Communication Science and Disorders
2010 - 2013 Academic advising of undergraduate and graduate students in the Department of Communication Sciences and Disorders

College Level

2017 - Research Council Member, School of Medicine (invited)

- 2012 - 2013 Participation in inter-professional exercises on Health Care Teams: Partners in Education...Partners in Care. Attendees (>100) included medical students, speech pathology graduate students, and accelerated nursing students who rotated through a 20-minute learning station on dysphagia.
- 2011 - Participation in College of Veterinary Medicine Faculty Searches by interviewing candidates as requested
- 2011 Participated in the School of Health Professions Summer Welcome event for parents of incoming freshman; gave a presentation about research and clinical practice opportunities in speech-language pathology.
- 2011 Participation in School of Health Professions search for a Grant Writer; individual interviews and written feedback.
- 2010 - Routinely provide clinical expertise in dysphagia to physicians and veterinarians at MU (clinical consults and inservices)

University Level

- 2017 - Committee for Animal Personnel Safety, Voting Member (invited)
- 2017 - Interdisciplinary Neuroscience Program, Faculty Member (invited)
- 2016 - Area Pathobiology Program, Faculty Member
- 2016 - MU Interdisciplinary Center on Aging Fellow (invited)
- 2016 - Poster Judge, MU Undergraduate Research and Creative Achievements Forum
- 2016 - Poster Judge, MU Health Sciences Research Day
- 2014 - Grant Reviewer, MU Spinal Cord Injury Research Program
- 2012 - Doctoral Faculty Member
- 2012 - Graduate Faculty Member
- 2012 - Grant Reviewer, MU Research Board Grant Applications
- 2010 - Co-Director/Founder of the MU Voice, Swallow and Airway Center

State / Regional Level

- 2014 - Voting member of the Subcommittee for Animal Studies, Harry S. Truman Memorial Veteran's Hospital, Columbia, MO

National / International Level

- 2017 Co-organizer of Society for Neuroscience Satellite Session: Neural Mechanisms of Feeding and their Applications to Neural Rehabilitation on Feeding and Swallowing, Washington, DC, November 10, 2017. Organization of event, programming speakers, fundraising, chairing session.
- 2016 Poster Judge, Dysphagia Research Society Annual Meeting, Tucson, AZ
- 2015 - 2016 Scientific Abstract Review Committee Member (invited) for the Dysphagia Research Society Annual Meeting (2016)
- 2015 Co-organizer of Society for Neuroscience Satellite Session: Neural Mechanisms of Feeding and their Applications to Neural Rehabilitation on Feeding and Swallowing, Chicago, IL, October 15, 2015. Organization of event, programming speakers, fundraising, chairing session.
- 2014 Society for Neuroscience Satellite Session Chair: Neural Mechanisms of Feeding and their Applications to Neural Rehabilitation on Feeding and Swallowing, Washington, DC, November 14, 2014.

2006 - 2011 Research Committee Member, ASHA Special Interest Division 13 (Swallowing and Swallowing Disorders)

Community Outreach & Broader Impacts

- 2017 Radio show guest: *The Columbia Morning Show with David Lile, January 30, 2017.*
Topic: Discussion of swallowing disorders and ongoing clinical research projects at MU.
- 2017 The Hitching Post (pg 10, Winter 2017) "[Collaboration results in treatment for canine megaesophagus.](#)"
- 2015 Radio show guest: *Doctor Radio -- The Otolaryngology Show on SiriusXM Satellite Radio*, one hour show with listener phone calls, June 3 & November 4, 2015. Topic: Dysphagia research update.
- 2015 Invited interview with [U.S. News and World Report](#) (5/28/15)
- 2015 MU news release "[New model could help identify root cause of swallowing disorder](#)" has appeared in more than 70 international, national and state media outlets, including:
 - 5/28/15 [Yahoo! News](#) (the #1 most visited news website)
 - 4/8/15 [Futurity.org](#) (AAU research news website, #17 most visited science news website)
 - 4/7/15 [Science Daily](#) (#2 most visited science news website)
 - 4/7/15 [EurekAlert!](#) (#8 most visited science news website and #43 most visited science blog)
 - 4/7/15 [eScienceNews](#) (#24 most visited science news website)
 - 4/7/15 [Medical Xpress](#)
- 2015 Press Release by Glenbrook Technologies for new x-ray machine to study swallowing disorders in mice. http://www.circuitnet.com/news/uploads/2/PressRelease_1_3_.pdf
- 2014 ALS Ice Bucket Challenge, September 6, 2014
- 2014 Walk to Defeat ALS; team organizer, September 6, 2014
<http://vetmed.missouri.edu/News/Coates2014C.html>
- 2010 *MU Archives Magazine* (June/July 2010). "Inspired to investigate: "real life experience leads lever to the lab."
- 2010 @Mizzou (e-newsletter sent to all Mizzou alumni), June 2010: "Swallowing Disorders."
- 2010 *MU News Bureau*, April 27, 2010. "MU researcher developing test for swallowing disorder treatments"
- 2010 *The Touchstone Magazine*, Spring 2010. "Hard to Swallow: Research Help for ALS"
- 2005 Featured researcher in the annual publication of East Carolina University's *EDGE Magazine of Research and Creative Activity*, "Getting down to the basics with swallowing disorders."