Curriculum Vitae
Harvard Medical School

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Place of Birth: Pittsburgh, PA

Education

06/1974	B.S.	Speech Pathology	Pennsylvania State University
08/1975	M.S.	Speech Pathology	Pennsylvania State University
05/1980	Ph.D.	Speech Science	Purdue University

Faculty Academic Appointments

01/1980-08/1986	Assistant Professor	Communication Disorders	Boston University
09/1981-08/1992	Assistant Research Professor	Otolaryngology	Boston University Medical School
09/1986-08/1992	Associate Professor	Communication Disorders	Boston University
09/1992-06/2004	Associate Professor	Otology and Laryngology	Harvard Medical School
09/1992-08/1995	Adjunct Associate Professor	Communication Disorders	Boston University
09/1996-present	Professor (non-voting)	Graduate Program for Communication Sciences and Disorders	MGH Institute of Health Professions
09/1996-08/2005	Affiliated Faculty	Doctoral Program in Speech and Hearing Sciences	Harvard-MIT Division of Health Sciences and Technology
07/2004-present	Associate Professor	Surgery	Harvard Medical School
09/2005-6/2012	Associate Professor	Speech and Hearing Bioscience and Technology	Harvard-MIT Division of Health Sciences and Technology
10/2008-	Graduate Faculty,	Biomedical Engineering	Purdue University

09/2013	Special Appointment		
4/2012-present	Adjunct Professor	Speech, Language and Hearing Sciences	Boston University
6/2012-present	Professor	Surgery	Harvard Medical School
6/2012-present	Adjunct Professor	Graduate Program for Communication Sciences and Disorders	MGH Institute of Health Professions

Appointments at Hospitals/Affiliated Institutions

09/1975-08/1976	Speech-Language Pathologist	Speech-Language Pathology	Clinton Hospital
09/1982-08/1992	Special Science Staff (Voice Science)	Otolaryngology	University Hospital
05/1989-08/1992	Speech-Language Pathologist	Otolaryngology	University Hospital
09/1992-06/2004	Speech-Language Pathologist	Otolaryngology	Massachusetts Eye and Ear Infirmary
07/2004-02/2007	Associate Physiologist/ Speech-Language Pathologist	Surgery	Massachusetts General Hospital
03/2007-present	Investigator/ Speech-Language Pathologist	Surgery	Massachusetts General Hospital

Other Professional Positions

09/1981-present	Research Affiliate, Speech Communication Group, Research Laboratory of Electronics	Massachusetts Institute of Technology
09/1984-08/1991	Research Affiliate, Department of Audiology and Speech Pathology	Boston Veterans Administration Medical Center
09/1984-08/1991	Research Consultant	Veterans Administration Cooperative Studies Program (Hines, Illinois)
09/1991-08/2004	Research Consultant, Department of Audiology and Speech Pathology	Boston Veterans Administration Medical Center

Major Administrative Leadership Positions

Local

09/1992-06/2004	Director, Voice and Speech Laboratory	Massachusetts Eye and Ear Infirmary
1995	Co-Director CME Course: Phonosurgery and Voice Disorders	Harvard Medical School
09/1995-08/1999	Director, Graduate Program in Communication Sciences and Disorders	MGH Institute of Health Professions
06/1994-06/2004	Director, Voice Disorders Center, Department of Otology and Laryngology	Harvard Medical School

01/1997-06/2004	Director, Voice Neural Prosthesis Project	W.M. Keck Neural Prosthesis Research Center, Massachusetts Eye and Ear Infirmary/MIT/Draper Laboratory
10/1999-06/2004	Director, Clinical and Research Programs in Speech Pathology	Massachusetts Eye and Ear Infirmary
09/2000-08/2016	Coordinator, Clinical Track in Speech-Language Pathology for HST Doctoral Students and MGH-IHP Graduate Program in Communication Sciences and Disorders	Harvard-MIT Division of Health Sciences and Technology and the MGH Institute of Health Professions
09/2000-present	Chair, Area of Concentration in Speech Pathology, Speech and Hearing Sciences Doctoral Program	Harvard-MIT Division of Health Sciences and Technology
2002	Co-Director CME Course: Voice Surgery	Harvard Medical School
07/2004-present	Co-Director/Research Director, Center for Laryngeal Surgery and Voice Rehabilitation	Massachusetts General Hospital
2005	Co-Director CME Course: Laryngeal Surgery and Voice Rehabilitation	Harvard Medical School
08/2007-07/2008	Interim Academic Dean	MGH Institute of Health Professions
07/2008-12/2008	Special Assistant to the Provost for Research	MGH Institute of Health Professions
01/2009-6/2012	Associate Provost for Research	MGH Institute of Health Professions
2010	Co-Director CME Course: Laryngology and Voice Surgery	Harvard Medical School
6/2012-6/2018	Director of Research Programs	MGH Institute of Health Professions
6/2012-present	Director of PhD Program in Rehabilitation Sciences	MGH Institute of Health Professions

National and International

01/1985-12/1991	Director, Central Speech Laboratory for VA Cooperative Study, "A New Strategy to Preserve the Larynx in Treatment of Advanced Laryngeal Cancer"	Veterans Administration Cooperative Studies Program (Hines, Illinois) Lab located at Boston University

Committee Service

Local

1981-1983	Merit and Equity Allocation Committee 1981-1983	Sargent College: Boston University Chair
1983	Search Committee for Dean of Sargent College 1983	Boston University Member
1984	Computing Issues Task Force 1984	Boston University Member
1986	Undergraduate Education Committee 1986	Sargent College: Boston University Chair

1984-1988	Committee on the Use of Human Subjects 1984-1988	Sargent College: Boston University Member
1984-1990	Faculty Council 1984-1990	Sargent College: Boston University Member
1987	Promotion and Tenure Committee 1987	Boston University Member
1990-1992	Committee on Promotion and Tenure 1990-1992	Sargent College: Boston University Chair
1995-2004	Research Committee 1995-2004	Massachusetts Eye and Ear Infirmary Member
1995-1996	Search Committee for Director of the Harris Peyton Mosher Laryngological Research Laboratory 1995-1996	Massachusetts Eye and Ear Infirmary Chair
1995-2004	Neural Prosthesis Research Center Executive Committee 1995-2004	Massachusetts Eye and Ear Infirmary Member
1995-1999	Administrative Advisory Council 1995-1999	MGH Institute of Health Professions Member
1995-1999	Academic Advisory Council 1995-1999	MGH Institute of Health Professions Member
1997-2004	Resident Research Review Committee 1997-2004	Massachusetts Eye and Ear Infirmary Member
1997-1999	Long Range Planning Committee 1997-1999	MGH Institute of Health Professions Member
2000-2001	Search Committee for the Director of Audiology 2000-2001	Massachusetts Eye and Ear Infirmary Member
2000-2001	Search Committee for Director of Clinical Investigation 2000-2001	MGH Institute of Health Professions Program Chair
2000-present	Admissions Committee, Speech and Hearing Biosciences Technology Doctoral Program 2000-present	Harvard-MIT Division of Health Sciences and Technology Member
2003-2006	Planning Committee for PhD Program in Rehabilitation Sciences 2003-2006	MGH Institute of Health Professions Chair
2004-2006	Research Initiatives Committee, Speech and Hearing Biosciences and Technology 2004-2006	Harvard-MIT Division of Health Sciences and Technology Member
2005	Qualifying Exam Committee, Speech and Hearing Biosciences and Technology 2005 and 2008-present	Harvard-MIT Division of Health Sciences and Technology Member
2005-2013	Research Operations Committee, Department of Surgery 2005-present	Massachusetts General Hospital Member
2006-2007	Student Recruitment Committee, Speech	Harvard-MIT Division of Health Sciences

	and Hearing Biosciences and Technology Doctoral Program	and Technology
	2006-2007	Faculty Representative
2007-2008	Search Committee for Provost and Vice President for Academic Affairs	MGH Institute of Health Professions
	2007-2008	Chair
2008-2016	Provost's Committee on Research and Scholarship	MGH Institute of Health Professions
	2008-present	Chair
2012-present	Executive Committee – PhD Program	MGH Institute of Health Professions
	2012-present	Chair
2014-2018	Research Operations Committee	MGH Institute of Health Professions
	2014-2018	Chair

National and International

1982	Scientific Program Committee for the Annual Meeting of the American Speech-Language-Hearing Association	The American Speech-Language-Hearing Association
	1982	Member
1984-1991	Planning and Executive Committees for "A New Strategy to Preserve the Larynx in Treatment of Advanced Laryngeal Cancer"	Veterans Administration Cooperative Studies Program
	1984-1991	Member
1989-1992	Educational Standards Board	American Speech-Language-Hearing Association
	1989-1992	Site Visitor
1992	Working Group on Research Training Needs of Graduate Programs in the Communication Sciences and Disorders	National Institute on Deafness and Other Communication Disorders/National Institutes of Health
	1992	Member
1994	Scientific Program Committee for the Annual Meeting of the American Speech-Language-Hearing Association	American Speech-Language-Hearing Association
	1994	Member
1995	Subgroup on Normal Voice Production, Expert Panel on Voice and Voice Disorders to update the National Strategic Plan	National Institute on Deafness and Other Communication Disorders/National Institutes of Health
	1995	Chair
1995	Scientific Program Committee for the Annual Meeting of the American Speech-Language-Hearing Association	The American Speech-Language-Hearing Association
	1995	Member
1996-1998	Committee to Organize Consensus Conferences and Draft Guidelines for Voice Assessment, Special Interest Subdivision for Voice Disorders	The American Speech-Language-Hearing Association
	1996-1998	Member
	2000-present	Member
2006-2007	Voice, Resonance, and Alaryngeal Speech	The American Speech-Language-Hearing

	Subcommittee, Program Committee for the 2007 Annual Meeting of the American Speech-Language-Hearing Association	Association
	2006-2007	Chair
2007-2009	Steering Committee for the Voice and Voice Disorders Special Interest Division	The American Speech-Language-Hearing Association
	2007-2009	Member
2007-present	Working Group on Clinical Voice Assessment	The American Speech-Language-Hearing Association
	2007-present	Chair
2011-present	Leadership Team for the Clinical Research Mentoring Network (8 members chosen from the field of speech and hearing clinical research)	The American Speech-Language-Hearing Association
	2011-present	Member
2012-2013	Health Care Economics Committee	The American Speech-Language-Hearing Association
		Member

Professional Societies

1975-present	The American Speech-Language-Hearing Association	Member
1975-present	Phi Kappa Phi Honorary Society	Member
1976-1995	Acoustical Society of America	Member
1997-present	American Laryngological Association	Associate Member
2018-present	American Bronchoesophalogical Association	Associate Member

Grant Review Activities

1986-1998	Program Project Review and Site Visit Committee	National Cancer Institute/National Institutes of Health
	1986-1998	Ad hoc Member
1995	Communications Disorders and Research Centers	National Institute on Deafness and Other Communication Disorders/National Institutes of Health
	1995	Ad hoc Member
1995	Combined Neurosciences Review Groups	Center for Scientific Review/National Institutes of Health
	1995	Ad hoc member
2000-present	Special Emphasis Panels (Review of R01, R03, R15, R21 grants)	Center for Scientific Review/National Institutes of Health
	2000-present	Ad hoc Member
2001	Clinical Trials Review Committee	Center for Scientific Review/National

		Institutes of Health
	2001	Ad hoc member
2005-2010	Motor Function and Speech Rehabilitation Study Section (Review of R01, R03, R15, R21 grants)	Center for Scientific Review/National Institutes of Health
	2005-2010	Permanent Member
2018-2022	Advisory Council	National Institute for Deafness and Other Communication Disorders

Editorial Activities

Ad hoc Reviewer

Journal of Speech-Language-Hearing Research
Journal of Acoustical Society of America
Journal of Speech and Hearing Disorders
Ann Otol Rhinol Laryngol.

Other Editorial Roles

1997-2000	Associate Editor	Phonoscope
2000-2003	International Associate Editor	Logopedics, Phoniatrics, Vocology
2001-2003	Associate Editor	Voice Disorders in Adults, MIT Encyclopedia of Communication Sciences and Disorders
2008-2012	Associate Editor	Journal of Speech-Language-Hearing Research
2010-2012	Associate Editor	Phonoscope - online

Honors and Prizes

1974	Ernest B. McCoy Award	Pennsylvania State University	Awarded annually to the outstanding senior scholar-athlete at the Pennsylvania State University
1975	Elected to Phi Kappa Phi Honorary Society	Phi Kappa Phi Honorary Society	
1983	Nominee for the Metcalf Award for Excellence in Teaching	Boston University	
1986	Academic Tenure	Boston University	
1991	Certificate of Appreciation	VA Cooperative Studies Program, Department of Veterans Affairs	
1992	Award of Merit	Faculty of Sargent College, Boston University	
1996	Editor's Award	Journal of Speech and Hearing Research, The American Speech-Langauge-Hearing Association	Awarded annually for the best article in speech research (senior author)
1997	Elected Associate Fellow	American Laryngological Association	One of only six non-MDs to receive the award.
1997	Elected Fellow	The American Speech-Language-	

		Hearing Association	
1998	Casselberry Award	American Laryngological Association	Given for outstanding manuscripts or accomplishments in Laryngology (senior author)
2000	Partners in Excellence Awards (3)	Partners Healthcare System	For accomplishments at the MGH Institute of health Professions
2007	Nominated for the Thomas A. McMahon Mentoring Award	Harvard-MIT Division of Health Sciences and Technology	
2008	Alumni Fellow Award	Pennsylvania State University	Given by the President of the University to select alumni who are recognized leaders in their professions.
2010	Broyles-Maloney Award	American Bronchoesophalogical Association	Awarded annually for outstanding accomplishments in advancing the art and science of bronco-esophagology and closely related subjects (co-author)
2010	Manuel Garcia Prize	International Association of Logopedics and Phoniatrics	For outstanding scientific contributions to the official journal of IALP and to the field of communication and disorders (senior author)
2011	Willard R. Zemlin Lecture and Award	American Speech-Language-Hearing Association Special Interest Division for Speech Science	To recognize an outstanding speech scientist who, like Dr. Zemlin, has "demonstrated a record of outstanding contributions to the broad spectrum of issues concerning speech science."
2011	Honors of the American Speech-Language-Hearing Association	American Speech-Language-Hearing Association	The highest honors that the Association can bestow to "recognize individuals whose contributions have been of such excellence that they have enhanced or altered the course of the Professions."
2013	Certificate of Achievement	Voice Foundation	Awarded after giving the invited keynote address at the May 2013 Annual

			Conference.
2015	Distinguished Alumni Award	Pennsylvania State University	The highest award given to an individual alumnus by the Board of Trustees of the Pennsylvania State University.
2017	Broyles-Maloney Award	American Bronchoesophalogical Association	Awarded annually for outstanding accomplishments in advancing the art and science of bronco-esophagology and closely related subjects (co-author)
2018	Chevalier Jackson Lecture	American Bronchoesophalogical Association	Presented at the annual meeting.
2019	Kawana Award	American Speech-Language-Hearing Association (ASHA)	Lifetime Achievement in Publications. Authorship of ASHA journal articles that are meritorious in terms of educational, scientific, or clinical value, and thus contributed significantly to the discipline.

Report of Funded and Unfunded Projects

Funding Information

Past

1980 Objective Assessment of Vocal Function
Boston University
PI ($1,500)
The major goal of this pilot project was to develop quantitative measures of laryngeal voice production mechanisms.

1981 Source Characteristics of Esophageal Speech
American Speech-Language-Hearing Foundation
PI ($1,000)
This pilot project was designed to develop methods for measuring the voicing mechanisms associated with esophageal speech produced by laryngectomy patients.

1982 Aerodynamic, Anatomical and Morphological Determinants of Esophageal Voice
University Hospital Biomedical Research Program
PI ($4,320)
This pilot project was designed to provide new information about the voicing mechanisms associated with esophageal speech produced by laryngectomy patients.

1982-1983 Objective Assessment of Vocal Hyperfunction

The Voice Foundation
PI ($12,400)
The major goal of this project was to further develop and use quantitative measures of voice production to provide objective descriptions of vocal hyperfunction, a condition that is implicated in many common voice disorders but is poorly understood.

1984-1988 Objective Assessment of Vocal Hyperfunction
NIH-NINCDS/ R01 DC00266-01
PI ($365,445)
The major goal of this project was to further develop and use quantitative measures of voice production to provide objective descriptions of vocal hyperfunction, a condition that is implicated in many common voice disorders but is poorly understood.

1985-1991 Central Voice and Speech Laboratory for "A New Strategy to Preserve the Larynx in Treatment of Advanced Laryngeal Cancer"
Veterans Administration Cooperative Studies Program
Site PI ($184,888)
This central laboratory facility received and analyzed functional voice, speech and swallowing data from 15 VA hospitals (332 patients) participating in a randomized trial of two treatment modalities for advanced laryngeal cancer over the six-year duration of the study.

1985-1988 Objective Assessment of Voice Hyperfunction: Supplemental Funding
NIH-NINCDS/ R01 DC00266
PI ($18,308)
The major goal of this project was to further develop and use quantitative measures of voice production to provide objective descriptions of vocal hyperfunction, a condition that is implicated in many common voice disorders but is poorly understood.

1988-1991 Objective Assessment of Vocal Hyperfunction: Competing Continuation
NIH-NINCDS/ R01 DC00266-05
PI ($808,348)
The major goal of this project was to further develop and use quantitative measures of voice production to provide objective descriptions of vocal hyperfunction, a condition that is implicated in many common voice disorders but is poorly understood.

1991-1995 Objective Assessment of Vocal Hyperfunction: Competing Continuation
NIH-NIDCD/ R01 DC00266-08
PI ($1,160,000)
The major goal of this project was to further develop and use quantitative measures of voice production to provide objective descriptions of vocal hyperfunction, a condition that is implicated in many common voice disorders but is poorly understood.

1996-1998 Software for Characterizing Laryngeal Dynamics: Subcontract to STAR Technology
NIH-SBIR-NIDCD
Site PI ($121,901)
This project was designed to develop an automated computer-implemented system for assessing voice disorders using algorithms based on chaos theory to analyze acoustic recordings.

1995-2000 Objective Assessment of Vocal Hyperfunction: Competing Continuation
NIH-NIDCD/ R01 DC00266-11
PI ($1,284,108)
The major goal of this project was to further develop and use quantitative measures of voice production to provide objective descriptions of vocal hyperfunction, a condition that

is implicated in many common voice disorders but is poorly understood.

1997-2000 Voice Project: Neural Prosthesis Research Center
W.M. Keck Foundation
Project PI ($1,035,000)
The long-term goal of this project was to provide patients who have lost the ability to produce voice and speech because of laryngeal cancer or trauma with a substantially improved artificial larynx. These improved devices will more closely approximate normal voice and speech production than currently available EL devices that suffer from several limitations (e.g., non-human sounding, reduced loudness and intelligibility).

1997-2000 Thyroplasty Implant: Subcontract from Boston Medical
NIH-SBIR-NIDCD
Site PI ($226,705)
This project was designed to develop and clinically test a new prefabricated prosthesis for medializing a paralyzed vocal fold to restore voice function.

1998-2000 Portable Voice Accumulator: Subcontract from Sensimetrics Corp.
NIH-SBIR-NIDCD/ R21HD41004 (Phase I and II)
Site PI ($131,735)
This project was aimed at developing a prototype wearable voice monitoring and biofeedback system.

1999-2002 Development of an Improved Electrolarynx: Communication System: Subcontract from Boston VA Medical Center
Veterans Administration: Division of Rehabilitation Research and Development
Site PI ($499,500)
The long-term goal of this project was to provide patients who have lost the ability to produce voice and speech because of laryngeal cancer or trauma with a substantially improved artificial larynx. These improved devices will more closely approximate normal voice and speech production than currently available EL devices that suffer from several limitations (e.g., non-human sounding, reduced loudness and intelligibility).

2001-2003 Physiological Constraints in the Modeling of Prosody: Subcontract from Sensimetrics Corp.
NIH-SBIR-NIDCD
Site PI ($75,000)
This project was aimed at characterizing the way in which physiological mechanisms constrain prosody variation (intonation, syllable stress, etc.) during normal speech production as a basis for developing more accurate models that can be used to improve speech synthesis.

2001-2005 Development of a Portable Voice Monitor with Biofeedback
NIH-NIDCD/ R21HD41004
PI ($616,080)
This project is aimed at developing an ambulatory monitoring and feedback system for evaluating and treating voice disorders that can: (1) reliably and unobtrusively provide long-term, continuous tracking of important parameters of vocal function, and (2) provide feedback to the user when voice parameters exceed 'safe' limits and/or target phonatory behaviors are not maintained.

2002-2003 Automated Psychoacoustics-Based Voice-Quality Assessment: Subcontract from Kay Elementrics Corporation (Phase I)
NIH-STTR-NIDCD/ R41 DC005678
PI ($50,391)

The primary aim of this project was to develop an improved (automated) method for objectively measuring the perceptually salient noise in the human voice, that can be implemented on existing clinical instrumentation. The new method will be based on an innovative combination of well established principals of human psychoacoustics, and recent advances in signal compression technology.

2002-2005 Laryngeal Endoscope with Calibrated Sizing Function: Subcontract from Physical Sciences Incorporated
NIH-SBIR-NIDCD/ R44DC004533 (Phase I and II)
Site PI ($205,224)
The goal of this study was to assess the clinical performance and accuracy of the laryngeal endoscope with calibrated sizing function for obtaining static measurements of the dimensions of laryngeal lesions.

2004-2009 Development of Voice Neural Prosthesis Technology
NIH-NIDCD/ R01DC006449
PI ($1,800,000)
This project is aimed at developing an improved electrolarynx-based communication system (with a neural interface) that more closely approximates normal voice and speech production for patients who have lost laryngeal function.

2004-2007 Automated Psychoacoustics-Based Voice-Quality Assessment: Subcontract from Kay-Pentax Corporation (Phase II)
NIH-STTR-NIDCD/ R41 DC005678
Site PI ($562,652)
The primary aim of this project was to develop an improved (automated) method for objectively measuring the perceptually salient noise in the human voice, that can be implemented on existing clinical instrumentation. The new method will be based on an innovative combination of well established principals of human psychoacoustics, and recent advances in signal compression technology.

2007-2009 Acoustic Processing of Speech to Improve Electrolarynx Communication: Subcontract from Sensimetrics Corporation
NIH-STTR-NIDCD/ R41 DC008722
Site PI ($58,992)
This project will develop real-time speech processing technology to improve electrolarynx (EL) communication for laryngectomy patients. Efforts are being directed at adding natural pitch variation to EL speech, as a way to improve speech quality and to more effectively transmit suprasegmental information (eg., intonation, syllabic stress, etc.), and the correction of additional EL speech acoustic deficits (eg., spectral zones, narrowing of formant bandwidths, etc.).

2001-2011 Voice Restoration Subsequent to Vocal Fold Scarring
Institute of Laryngolgy and Voice Restoration
Co-PI ($7,500,000)
This project is aimed at developing and clinically testing new procedures for restoring vocal function to patients who have sustained vocal fold scarring, including the development of a bio-implant.

2011 - 2012 Ambulatory monitoring of vocal function to improve voice disorder assessment
NIH-NIDCD/ R21 DC011588 (funding for R33 phase contingent on success of R21 phase)
PI ($263,638)
The overall goal of the proposed project is to develop accelerometer-based ambulatory monitoring of vocal function into a valid, reliable, and cost-effective clinical tool that can

be used to accurately identify and differentiate patterns of voice use that are associated with hyperfunctional voice disorders. Achieving this goal will: 1) greatly improve clinical assessment of these commonly-occurring types of voice disorders, 2) enable voice therapy to more accurately target specific hyperfunctional behaviors for individual patients, and 3) provide the basis for future efforts to develop ambulatory biofeedback approaches that have the potential to facilitate more efficient and effective behavioral treatment of these disorders.

2011 - 2013 Voice Restoration Subsequent to Vocal Fold Scarring
Piramal Foundation
C0-PI ($1,150,000)
This project is aimed at developing and clinically testing new procedures for restoring vocal function to patients who have sustained vocal fold scarring, including the development of a bio-implant.

2007-2013 Efficacy of Laryngeal High-Speed Videoendoscopy: Subcontract from the University of South Carolina (transferred to Cincinnati Children's Hospital)
NIH-NIDCD/ R01 DC007640
Site PI ($939,031)
This project will develop improved high-speed video-based (HSV) methods for the visualization and automatic measurement of vocal fold vibratory characteristics that will facilitate the clinical and research use of this technology, and to begin establishing the clinical validity, practicality, and relevance of HSV in the functional evaluation of vocal fold pathology.

2010 - 2015 Voice Preservation in the Treatment of Early Glottic (Laryngeal) Cancer
V Foundation
Co-PI ($500,000)
The main goal of this project is to more definitively determine the effectiveness of using current photoangiolytic laser technology to treat VF cancer while preserving or restoring voice function. This will entail treating larger cohorts of patients with VF cancer, obtaining longer-term follow up of treated patients, and obtaining more detailed evaluation of the impact of treatment on phonatory mechanisms.

2012 - 2017 NIH-NIDCD/ R33 DC011588
PI ($2,415,383)
The overall goal of the proposed project is to develop accelerometer-based ambulatory monitoring of vocal function into a valid, reliable, and cost-effective clinical tool that can be used to accurately identify and differentiate patterns of voice use that are associated with hyperfunctional voice disorders. Achieving this goal will: 1) greatly improve clinical assessment of these commonly-occurring types of voice disorders, 2) enable voice therapy to more accurately target specific hyperfunctional behaviors for individual patients, and 3) provide the basis for future efforts to develop ambulatory biofeedback approaches that have the potential to facilitate more efficient and effective behavioral treatment of these disorders.

Current

2013-2021 Laryngeal Research Program
Voice Health Institute
C0-PI ($25,000,000)
This research program is comprised of the following four main projects:

1. Laryngeal Paralysis Project: To create an intrinsic/indwelling biocompatible system that reestablishes abductory-adductory (opening and closing) motion to paralyzed vocal cords for respiratory and phonatory (voice) function.
2. Vocal Cord Biogel Implant Project: To create a biocompatible material that can be placed beneath the epithelium of the larynx to create or enhance a phonatory sound source (voice production) by restoring mucosal mechanical vibratory properties.
3. Recurrent Respiratory Papillomatosis (RRP) Project: To continue to improve treatment strategies for children and adults with recurrent respiratory papillomatosis (RRP) of the larynx. This effort will focus on laser-based (photoangiolytic) and drug-based (antiangiogenesis) treatments to increase efficacy of disease remission while preserving and/or restoring the voices of the patients treated.
4. Aortic Homograft Soft-Tissue Transplantation Project: To continue developing cryo-preserved cadaveric blood vessels (e.g. aorta homograft) as a new soft-tissue transplantation substrate for the aerodigestive tract, the genito-urinary systems and complex wounds. Exploration of the vascular soft-tissue substrate will also be done utilizing it as a patch and reformulated as an injectable paste for soft-tissue expansion. There is substantial potential to utilize the vascular soft-tissue substrate as a unique injectable to treat vocal cord paralysis.

2017-2022 NIH-NIDCD P50DC015446-01A1
PD/PI ($11,305,665)
Clinical Research Center for the Improved Prevention, Diagnosis, and Treatment of Hyperfunctional Voice Disorders (Received fundable score – pending NIDCD Council Meeting in January 2017)
This primary site for this Clinical Research Center is the Massachusetts General Hospital (MGH Voice Center). It brings together a multidisciplinary team of experienced investigators across four institutions (MGH, Boston University, MIT, Universidad Técnica Federico de Santa María-Chile) to pursue a comprehensive program of research (organized in three major projects) focused on voice disorders caused by vocal hyperfunction (VH). The central theme of the Center is that the clinical management of hyperfunctional voice disorders can be significantly improved by attaining a better understanding of the etiology and pathophysiology of these disorders and then translating this knowledge into new, more effective methods for prevention, diagnosis, and treatment. The three main research projects will focus on investigating mechanisms that are hypothesized to play primary roles in causing and/or maintaining VH. **Project 1** will use an innovative combination of ambulatory biosensors, in-clinic/laboratory studies, and tracking of treatment-related effects to gain new insights into behavioral (daily voice use), environmental (noise levels), emotional (psychological stress/arousal), and physiological (phonatory function) factors related to the etiology and pathophysiology of VH. **Project 2** will use classic model-driven experimental approaches from speech motor control research to test hypotheses concerning the potential role that disordered sensorimotor mechanisms play in VH (auditory-motor integration for feedforward and feedback control will be examined). Finally, **Project 3** will develop and use physical and numerical modeling to provide unique insights into the underlying biomechanical, aero-acoustic, and muscle activation mechanisms that contribute to the pathophysiology of VH, providing direct links between model outputs and real clinical data with direct application to the ambulatory assessment of vocal function.

Report of Local Teaching and Training

Teaching of Students in Courses

1980	Neuromotor Speech Disorders Graduate Students in Speech-Language Pathology	Boston University Course was taught 1 time – level of effort was approximately 40 hours over a 15-week period
1980-1985	Anatomy and Physiology of the Speech Mechanism Graduate and Undergraduate Students in Speech-Language Pathology	Boston University Course was taught 5 times – level of effort per course was approximately 40 hours over a 15-week period
1980-1985	Phonetics and Speech Acoustics Graduate and Undergraduate Students in Speech-Language Pathology	Boston University Course was taught 5 times – level of effort per course was approximately 40 hours over a 15-week period
1980-1992	Oro-Facial Disorders Graduate Students in Speech-Language Pathology	Boston University Course was taught 12 times – level of effort per course was approximately 40 hours over a 15-week period
1980-1992	Research Methods in Speech and Hearing Graduate Students in Speech-Language Pathology	Boston University Course was taught 12 times – level of effort per course was approximately 40 hours over a 15-week period
1981-1995	Voice Disorders Graduate Students in Speech-Language Pathology	Boston University Course was taught 14 times – level of effort per course was approximately 40 hours over a 15-week period
1981-1991	Physiology, Acoustics, and Perception of Speech Graduate Students in Speech-Language Pathology	Boston University Course was taught 10 times – level of effort per course was approximately 40 hours over a 15-week period
1987	Experimental Phonetics Doctoral Students in Communication Disorders	Boston University Course was taught 1 time – level of effort per course was approximately 40 hours over a 15-week period
1993-present	Clinical Aspects of Speech and Hearing Doctoral Students in the Speech and Hearing Bioscience and Technology concentration	Harvard-MIT Division of Health Sciences and Technology 3 hours per year
1993-present	Laboratory Visit Doctoral Students in the Speech and Hearing Bioscience and Technology concentration	Harvard-MIT Division of Health Sciences and Technology 2 hours per year
2012-present	Advanced Seminar in Voice Disorders Graduate Students in the Speech-Language Pathology	MGH Institute of Health Professions 3 hours per year

2012	Introduction to Rehabilitation Sciences PhD Students in Rehabilitation Sciences	MGH Institute of Health Professions 50 hours per year (course coordinator and grader)
2012-present	Research Seminar in Rehabilitation Sciences PhD Students in Rehabilitation Sciences	MGH Institute of Health Professions 60 hours per year (course organizer and facilitator)

Formal Teaching of Residents, Clinical Fellows and Research Fellows (post-docs)

1983	The Role of Dentition in Speech Production Post-Doctoral Fellows in Orthodontics	Harvard School of Dentistry 1 6-hour course
1992-2004	Voice Rounds Residents/Fellows (clinical case review)	Massachusetts Eye and Ear Infirmary 2 meetings per week – level of effort was approximately 144 hours per year
1995-2004	Advanced Basic Sciences Course in Otolaryngology (Assessment of Voice) Residents in Otolaryngology	HMS-Massachusetts Eye and Ear Infirmary 3 hours per year

Clinical Supervisory and Training Responsibilities

1980-1992	Clinical Practicum in Speech-Language Pathology /Boston University	2 hours per week
1980-1992	Academic Advisor for 72 Masters Degree Students and 5 PhD Students/Boston University	1 hour per week
1992-2004	Clinical Practicum in Speech-Language Pathology/Massachusetts Eye and Ear Infirmary	2 hours per week
1996-1998	Academic Advisor for 20 Masters Degree Students/MGH Institute	1 hour per week
2004-present	Clinical Practicum in Speech-Language Pathology/MGH (Voice Center)	1 hour per week
2004-present	Voice Clinic (Clinical Fellows in Laryngology)/MGH (Voice Center)	4 hours per week

Laboratory and Other Research Supervisory and Training Responsibilities

1980-1992	Supervision of graduate student research projects including theses (Masters Degrees)) and dissertations (PhD Degrees)/Boston University	4-8 hours per week
1992-2004	Supervision of research projects for Research Fellows in Otolaryngology	1 hour per week
1995-present	Serving on research, academic advising and examination committees for PhD students in the Harvard-MIT Division of Health	4 hours per week

Sciences and Technology and PhD students
in Rehabilitation Sciences at the MGH
Institute

Formally Supervised Trainees

1986 Gail Ramsberger, ScD from Boston University/Chair of Speech, Language and Hearing Science, University of Colorado.
Academic and dissertation advisor: Published a manuscript in Brain and Language and received a New Investigator Award from the American Speech-Hearing-Language Association.

1992 Lisa Newman, ScD from Boston University/Chief, Speech Pathology section, Army Audiology and Speech Center, Walter Reed Army Medical Center.
Academic advisor and dissertation supervisor: Publication in Investigative Radiology and given a combined clinical and research position at the University of Tennessee.

1992 Carla Gress, ScD from Boston University/Private Practice.
Academic advisor and dissertation supervisor: Given a combined clinical and research position at the University of California at San Francisco (UCSF) Medical Center.

1992 Elizabeth Sperry, ScD from Boston University/Private Practice.
Academic advisor and dissertation supervisor: Publication in Journal of Medical Speech-Language Pathology and given a tenure-track position at Nova Southeastern University.

1999 Claudio Milstein, PhD from University of Arizona/Senior Voice Center Staff at the Cleveland Clinic and Associate Professor in the Department of Surgery of the Cleveland Clinic Lerner College of Medicine of Case Western Reserve University.
Dissertation and Clinical Fellowship supervisor: Publication in the Journal of the Acoustical Society of America and given a tenure-track position at Indiana University.

2002 Harold Cheyne, PhD from MIT (HST)/ Technology Director, Bioacoustics Research Program, Cornell Lab of Ornithology, Cornell University.
Dissertation co-supervisor: Publication in the Journal of Speech-Language-Hearing Research, Research Associate Position at the Massachusetts Eye and Ear Infirmary and appointment as an Instructor at Harvard Medical School.

2003 Geoffrey Meltzner, PhD from MIT (HST)/ Section Lead, Biological, Audio, and Speech Signal Processing-BAE Systems, Inc.
Dissertation co-supervisor: Publications in the Journal of the Acoustical Society of America and the Journal of Speech-Language-Hearing Research, and Research Scientist position at BAE Systems, Inc.

2009 Cara Stepp, PhD from MIT (HST)/ Postdoctoral Research Associate, Departments of Computer Science & Engineering and Rehabilitation Medicine, University of Washington.
Research projects and dissertation co-supervisor: Ten publications in leading speech research journals and a Postdoctoral Fellowship at University of Washington.

2009 Yoko Saikachi, PhD from MIT (HST)/Research Staff, RIKEN Brain Science Institute, Japan.
Dissertation co-supervisor: Publication in the Journal of Speech-Language-Hearing Research and Staff Scientist position at RIKEN Brain Science Institute, Japan.

2009 Asako Masaki-Wehner, PhD from MIT (HST)/Clinical Fellow in Speech-Language Pathology at Boston Children's Hospital.
Dissertation supervisor: Publication in Ann Otol Rhinol Laryngol. and Clinical Fellowship position at Boston Children's Hospital.

2010	Daryush Mehta, PhD from MIT (HST)/Postdoctoral Fellow, Electrical Engineering, Harvard University and MGH Voice Center. Dissertation co-supervisor: Three publications in peer-reviewed journals and three in other professional sources. Postdoctoral Fellowships at Harvard and MGH.
2016	Jarrad VanStan, PhD student in Rehabilitation Sciences at the MGH Institute of Health Professions

Formal Teaching of Peers (e.g., CME and other continuing education courses)

1995	Physiology and acoustics of voice production Phonosurgery and Voice Disorders (Harvard Medical School)	1 lecture Boston, MA
1999	Pre-operative assessment and evaluation. The role of speech pathology in managing the phonosurgery patient. Voice Surgery (Harvard Medical School)	2 lectures New Orleans, LA
2000	Pre-operative assessment and evaluation. The role of speech pathology in managing the phonosurgery patient. Voice Surgery (Harvard Medical School)	2 lectures Washington, DC
2002	Anatomy and physiology of phonation. The role of speech pathology & objective measures of vocal function. Voice Surgery (Harvard Medical School)	2 lectures. San Diego, CA
2005	Anatomy and physiology of phonation. The role of speech pathology & objective measures of vocal function. New Techniques for assessment and behavioral treatment of voice disorders. Laryngeal Surgery and Voice Rehabilitation (Harvard Medical School)	3 lectures Cambridge, MA
2006	Office-based equipment setup Office-Based Laryngeal Surgery (Harvard Medical School)	1 lecture Boston, MA
2007	The role of speech pathology in workup and management of patients with paralytic dysphonia Laryngeal Framework Voice Surgery (Harvard Medical School)	1 lecture Boston, MA
2010	Innovations in voice assessment Laryngology and Voice Surgery (Harvard Medical School)	1 lecture Boston, MA

Local Invited Presentations

1982	New Developments in the Instrumental Analysis of Vocal Function Boston University-Tufts University Combined Otolaryngology Lecture Series
1987	Functional Voice Disorders: An Objective Approach to Assessment and Treatment Boston University Communication Disorders Annual Conference

1994	Objective Assessment of Pediatric Voice Massachusetts General Hospital Seminar Series in Speech-Language Pathology
2000	Development of an Improved Electrolarynx Communication System Harvard-MIT Health Sciences and Technology Combined Seminar at MIT
1992-2004	Grand Rounds in Otolaryngology: Residents and Fellows (5 one-hour lectures between 1992-2004) Massachusetts Eye and Ear Infirmary
2004	Current Research in Vocal Rehabilitation at the MGH Voice Center Spaulding Rehabilitation Hospital
2006	Current Research at the MGH Voice Center MGH Institute of Health Professions Research Breakfast
2007	Developing New Technologies for Diagnosing and Treating Voice Disorders: Interdisciplinary Clinical Research at the MGH Voice Center Keynote Address at the 8th Annual Research Day, MGH Institute of Health Professions
2008	Research and Scholarship at the MGH Institute of Health Professions Address given at the President's Inauguration Colloquium, MGH Institute of Health Professions

Report of Regional, National and International Invited Teaching and Presentations

Invited Presentations and Courses

Regional

1984	Instrumental Analysis of Vocal Function (invited lecture) Conference on Interdisciplinary Assessment and Management of Voice Disorders, Massachusetts Eye and Ear Infirmary
1985	Instrumental Assessment of Laryngeal and Alaryngeal Voice Production (invited lecture) Lawrence General Hospital Lecture Series
1986	Vocal Hyperfunction: Objective Assessment and Treatment (invited lecture) State Convention of the Massachusetts Speech and Hearing Association
1991	Objective Assessment of Voice Disorders (invited lecture) Massachusetts General Hospital Seminar Series in Speech-Language Pathology
1996	Appropriate Clinical Use of Objective Voice Measures (invited lecture) Two-Day Course: "Focus on Voice Therapy" at Beth Israel Hospital
2003	Current Research at the MEEI Voice and Speech Laboratory (invited lecture) MIT Speech Communication Group Seminar
2004	Improving the Assessment and Treatment of Voice Disorders: Emerging Technologies – From Sound to Sense, Fifty+ Years of Discoveries in Speech Communication (invited lecture) MIT International Symposium to Honor Professor Kenneth N. Stevens, Cambridge, MA

National

1991	Aerodynamic Assessment of Vocal Function: Current Issues and Future Directions (invited lecture) Sweet Briar Meetings on Voice Assessment, Sweet Briar, VA
1996	Vocal Aerodynamics (invited lecture) Combined Meeting of the International Association of Phonosurgeons and the Voice

Foundation 25th Annual Symposium: Care of the Professional Voice, Philadelphia, PA

1996 Assessment: Minimally Altered Vocal Fold Tissues (invited lecture)
4th Biennial Phonosurgery Symposium, Madison, WI

1996 Integrated Systems Control of the Larynx (session chair)
American Speech-Language-Hearing Association Annual Meeting, Boston, MA

1999 Research in Laryngectomy Speech Rehabilitation (invited lecture)
American Speech-Language-Hearing Association National Headquarters for the National Institute of Dental and Craniofacial Research (National Institutes of Health,) Rockville, MD

2000 Harvard-MIT Speech and Hearing Sciences Doctoral Program: An Overview (invited lecture)
American Speech-Language-Hearing Association Annual Meeting, Washington, DC

2003 Overview of the Consensus Auditory – Perceptual Evaluation of Voice (CAPE-V) Instrument Developed by ASHA Special Interest Division 3 (invited lecture)
Annual Symposium on Care of the Professional Voice, The Voice Foundation, Philadelphia, PA

2003 A New Hands-Free Artificial Electrolarynx (invited lecture)
Keynote Address at the Annual Meeting of the International Association of Laryngectomees, Atlanta, GA

2005 Technological Advance in Voice Science: A 2020 Vision of Improved Laryngological Practice (invited lecture)
American Broncho-Esophageal Association, Palm Beach, FL

2005 Ambulatory Monitoring of Disordered Voices (invited seminar)
Annual Meeting of the American Speech-Language-Hearing Association, San Diego, CA

2005 Electrolaryngeal Speech Enhancement: The State-of-the-Art (session chair and lecture)
Annual Meeting of the American Speech-Language-Hearing Association, San Diego, CA

2006 Voice Accumulator: Measuring Vocal Load Contributing to Laryngeal Injury (invited lecture)
9th Biennial Phonosurgery Symposium, University of Wisconsin

2006 A Novel Approach to Alaryngeal Speech (invited lecture)
9th Biennial Phonosurgery Symposium, University of Wisconsin

2006 Emerging Technologies in the Assessment and Treatment of Voice Disorders (invited lecture)
Annual Meeting of the American Speech-Language-Hearing Association, Miami, FL

2006 Laryngeal Imaging: Seeing Is Believing (Stroboscopy Ultra High Speed and Kymography) (invited lecture in 1 day course)
American Speech-Language-Hearing Association, Miami, FL

2008 Emerging Technologies in the Assessment and Treatment of Voice Disorders (invited lecture)
Boston University's Sargent College of Health and Rehabilitation Sciences "Health and Technology" conference

2008 Using Ambulatory Biofeedback to Treat Voice Disorders (invited lecture)
10th Biennial Phonosurgery Symposium, University of Wisconsin

2008 Series of 3 Lectures in Voice Production and Disorders to undergraduate and graduate students in Communication Disorders (invited lectures)
Pennsylvania State University (as part of receiving the 2008 PSU Alumni Fellow Award)

2008 Use of Acoustic Measures to Assess Voice Disorders: State-of-the-Art and Future Directions (Invited Lecture)

1st International Symposium on Audible Acoustics in Medicine and Physiology, Purdue University, West Lafayette, IN

2010 Occupational Voice Disorders: Current Trends in Research, Diagnosis and Treatment (invited seminar)
Annual Meeting of the American Speech-Language-Hearing Association, Philadelphia, PA.

2011 Clinical Assessment of Voice Disorders: Current Trends and Future Directions.
New Treatments for Voice Disorders. (invited lectures)
2011 American Speech-Language-Hearing Association Health Care Conference/Business Institute

2011 Willard Zemlin Lecture in Speech Science: Assessing the Human Voice (invited lecture)
2011 American Speech-Language-Hearing Association Annual Convention, San Diego, CA

2011 Emerging Technologies in Voice Assessment (invited lecture)
2011 American Speech-Language-Hearing Association Annual Convention, San Diego, CA

2011 New Approaches for Diagnosing and Treating Voice Disorders (invited lecture)
Distinguished Speakers Series – College of Health and Human Development – Pennsylvania State University

International

1997 Vocal Nodules in Females: Research Update (invited lecture)
2nd Scandinavian Conference on Phonosurgery and Voice Disorders – Stockholm, Sweden

1997 Assessing the Efficacy of Voice Therapy Treatment (Key Note Speech)
Conference on Respiration in Voice Production, Royal Institute of Technology, Stockholm, Sweden

1998 Demonstrating Benefit in the Treatment of Vocal Abuse (invited lecture)
British Voice Association, Nottingham, England

1998 Clinical Use of Aerodynamic Measures (invited lecture)
Conference on Respiration in Voice Production, Royal Institute of Technology, Stockholm, Sweden

1998 Voice Therapy for Vocal Nodules: Impact on Speech Breathing and Voice Quality (invited lecture)
Conference on Respiration in Voice Production, Royal Institute of Technology, Stockholm, Sweden

1999 Voice Therapy: A Conceptual Framework Based on Underlying Principals of Voice Function (invited lecture)
Conference on The Practice of Voice Therapy: Therapy Skills and Treatment Efficacy, Newcastle, England

1999 Assessment of Vocal Function and Treatment Efficacy (invited lecture)
Conference on The Practice of Voice Therapy: Therapy Skills and Treatment Efficacy, Newcastle, England

2001 Breathing and Phonation (Faculty Opponent – 2.5 hour presentation and interrogation)
Dissertation defense for Jenny Iwanson, Ph.D., Royal Institute of Technology, Stockholm, Sweden

2005 Emerging Technologies in the Diagnosis and Treatment of Voice Disorders (invited lecture)
Pan-European Conference & British Voice Association, London, England

2008 Endoscopic Imaging of the Larynx: Past, Present, and Future (keynote address)
International Meeting on Advances in Quantitative Laryngology, Stockholm, Sweden

2008 Ambulatory Monitoring and Biofeedback for Voice Disorders (invited lecture)
Karolinska University Hospital, Huddinge, Sweden

2008 Novel Approaches for Improving Electrolarynx Speech (invited lecture)
Memorial Symposium for Jan Gauffin, KTH Royal Institute of Technology, Stockholm, Sweden

2009 Monitoring Daily Voice Use (invited lecture)
Occupational Voice Symposium 2009, London, England

2009 Treating Voice Disorders with Ambulatory Feedback (invited lecture)
Occupational Voice Symposium 2009, University College London, London, England

2009 Current Trends in the Assessment of Patients with Voice Disorders (invited lecture)
Taiwan Voice Association, Taichung, Taiwan

2009 Emerging Technologies in the Diagnosis and Treatment of Voice Disorders (invited lecture)
National Taipei College, Taipei, Taiwan

2011 Ambulatory Monitoring of Voice: Past, Present, and Future (invited lecture)
The Occupational Voice Symposium 2011, University College London, London, England

2013 New development in ambulatory monitoring of voice (invited lecture)
The Occupational Voice Symposium 2013, University College London, London, England

2013 The way forward in clinical voice assessment (invited keynote address)
Voice Foundation 2013 Annual Conference , Philadelphia

2013 Future directions in ambulatory monitoring for clinical voice assessment (invited talk)
International Conference on Advances in Quantitative Laryngology, Cincinnati, Ohio

2014 Relationships between the Cepstral-Spectral Index of Dysphonia and vocal fold vibratory function during phonation.
43rd Annual Symposium of the Voice Foundation: Care of the Professional Voice, Philadelphia, PA.

2014 Comparison of vocal-fold vibratory features visualized via videostroboscopy, high-speed videoendoscopy, and stroboscopic simulation derived from high-speed videoendoscopy
Proceedings of the International Conference on Voice Physiology and Biomechanics, Salt Lake City, UT.

2014 Subglottal ambulatory monitoring of vocal function to improve voice disorder assessment
Fall 2014 Acoustical Society of America meeting, Indianapolis, Indiana, 27–31 October 2014.

2014 Mimicking Vocal Hyperfunction using a Numerical Model of Speech Production with a Posterior Glottal Opening
ICVPB 2014, Salt Lake City, USA, April 2014.

2014 Effect of ambulatory biofeedback on vocal motor behavior in daily life: A pilot study.
Annual Convention of the American Speech-Language-Hearing Association 2014; Orlando, FL.

2014 Relative fundamental frequency estimation via neck skin acceleration in healthy and disordered voices.
Annual Convention of the American Speech-Language-Hearing Association 2014; Orlando, FL.

2015 Validation of stroboscopy derived from high-speed videoendoscopy.
Proceedings of the 11th International Conference on Advances in Quantitative Laryngology, Voice and Speech Research 2015; London, England.

2015	Automated algorithms for estimation of relative fundamental frequency in individuals with and without voice disorders. Proceedings of the 11th International Conference on Advances in Quantitative Laryngology, Voice and Speech Research 2015; London, England.
2015	Development of a two-dimensional virtual environment to study variability in vocal motor learning. Proceedings of the 11th International Conference on Advances in Quantitative Laryngology, Voice and Speech Research 2015; London, England.
2015	Ambulatory monitoring of hyperfunctional voice disorders: Update and future directions Proceedings of the 11th International Conference on Advances in Quantitative Laryngology, Voice and Speech Research 2015; London, England.
2015	The development of flexible ambulatory biofeedback schedules for vocal motor learning. Proceedings of the 4th International Occupational Voice Symposium 2015; London, England.
2015	Average ambulatory measures of sound pressure level, fundamental frequency, and vocal dose do not differ between adult females with phonotraumatic lesions and matched control subjects. American Broncho-Esophagological Association 2015; Boston, MA.
2015	Comparison of videostroboscopy to stroboscopy derived from high-speed videoendoscopy for evaluating patients with vocal fold mass lesion. Proceedings of the Voice Foundation Symposium 2015; Philadelphia, PA.

Report of Clinical Activities and Innovations

Current Licensure and Certification

1976	Certificate of Clinical Competence in Speech Language Pathology: American Speech Language Hearing Association
1984	Massachusetts License Registration in Speech Language Pathology

Practice Activities

1975-1976	Speech-Language Pathologist	Clinton Hospital, Clinton, MA	5 days per week
1989-1992	Speech-Language Pathologist (Voice Disorders Specialist)	University Hospital, Boston, MA	1 day per week
1992-2004	Speech-Language Pathologist (Director – Voice and Speech)	Massachusetts Eye and Ear Infirmary, Boston, MA	2 days per week
2004-present	Speech-Language Pathologist (Co-director - Voice Center)	Massachusetts General Hospital, Boston, MA	2 days per week

Clinical Innovations

Computerized Clinical Voice Assessment System at Massachusetts Eye and Ear Infirmary (1992-2004)	Design and implementation of a computer-based voice assessment system that integrates the collection, analysis and standard reporting (including comparisons with normative data) of case history information and clinical observations with results from endoscopic, acoustic, and aerodynamic measures of vocal function. The system (now implemented at the MGH Voice Center) readily enables the longitudinal tracking of patient outcomes throughout the treatment process and serves as a basis for conducting clinical research. Other Voice Centers have

attempted to replicate aspects of this assessment system.

Report of Technological and Other Scientific Innovations

Ambulatory Phonation Monitor (APM)	I conceived of this device and worked with a local research company (Sensimetrics) to develop prototypes using NIH-SBIR funding. I also secured additional NIH funding (R21) to do the initial clinical testing of the APM. This device provides ambulatory monitoring and feedback for evaluating and treating voice disorders that can: (1) reliably and unobtrusively provide long-term, continuous tracking of important parameters of vocal function, and (2) provide feedback to the user when voice parameters exceed 'safe' limits and/or target phonatory behaviors are not maintained. The APM is now marketed and sold internationally to voice clinicians and researchers by KayPentax, Inc. It is the first commercially-available device of its kind for the ambulatory assessment and treatment of voice disorders. One patent has been filed for a new impedance-based vocal system model that will be tested in future versions of the monitoring system.
Voice Prosthesis with Neural Interface	I lead the team that developed this first-ever neural prosthesis for voice (using VA and NIH funding). This device was designed to more closely approximate normal voice and speech production for laryngectomy patients. The latest version of the device senses and processes neck surface electromyographic (EMG) signals to turn the artificial electrolarynx (held against the neck with a brace) on and off and to modulate its pitch making the device hands-free and more human sounding that previous devices. Our group has recently secured NIH-STTR funding in collaboration with a small electrolarynx manufacturer to produce a more commercially-viable version of our voice neural prosthesis (e.g, utilizing wireless EMG electrodes).
Vocal Fold Implant (VocalGel)	I am one of four inventors of a synthetic implant that is designed to be injected beneath the epithelium of a damaged (scarred) vocal fold to restore its vibratory function for voice production. Damage/loss of the sub-epithelial layer (superficial lamina propria) of the vocal fold is the leading cause of voice disorders so a remedy for this condition would have a very significant impact on patient care. We expect to be in human trials in 2011. Two patents have been filed.
Evaluating Vocal Function Using an Impedance-Based Inverse Filtering of Neck Surface Acceleration	I am one five inventors of an approach for processing signals from a neck-placed accelerometer to assess vocal function. This system utilizes a complete vocal system model to estimate air flow at the glottis which will enable the expansion of measures that can be obtained during ambulatory monitoring of voice for clinical assessment. A patent was filed for this approach: M. Zañartu, G. R. Wodicka, J. C. Ho, R. E. Hillman, and D. D. Mehta, "System and Methods for Evaluating Vocal Function Using an Impedance-Based Inverse Filtering of Neck Surface Acceleration", U.S./Europe Patent WO/2012/112985, filing date Feb-20-2012, date issued Aug-24-2012. Link

Report of Education of Patients and Service to the Community

Activities

No activities below were sponsored by outside entities.

2003	International Association of Laryngectomees, Atlanta, GA (patient organization) Keynote Address at the Annual Meeting: "A New Hands-Free Artificial Electrolarynx" (invited lecture)
2009-2012	Boston Food Bank, Boston, MA. Volunteer 3 hours per month to sort and pack donated food.

Report of Scholarship

Publications

Peer reviewed publications in print or other media

1. **Hillman RE**, Gilbert, JR. Voice onset time of voiceless stop consonants in the fluent readings of stutterers and non-stutterers. J Acoust Soc Am. 1977;61:610-11.

2. **Hillman RE**, Weinberg B. A new procedure for venting a reflectionless tube. J Acoust Soc Am. 1981;69(5):1449-51.

3. **Hillman RE**, Weinberg B. Estimation of Glottal Volume Velocity Waveform Properties: A Review and Study of Some Methodological Assumptions. In: Lass N, editor. Speech and Language: Advances in Basic Research and Practice. New York: Academic Press; 1981. p. 411-73.

4. **Hillman RE**, Osterle E, Feth LL. Characteristics of the glottal turbulent noise source. J Acoust Soc Am. 1983;74(3):691-94.

5. Ramsberger G, **Hillman RE**. Temporal Speech characteristics associated with anterior left hemisphere lesions. Brain Lang. 1985;95(10):1251-54.

6. **Hillman RE**, Holmberg E, Walsh M, Vaughan C. Aerodynamic assessment of the Henley-Cohn Tracheoesophageal Prosthesis. Laryngoscope. 1985;95(10):1251-54.

7. Holmberg EB, **Hillman RE**, Perkell JS. Glottal airflow and transglottal air pressure measurements for male and female speakers in soft, normal and loud voice. J Acoust Soc Am. 1988;84:511-29.
8. Senior Author

9. **Hillman RE**, Holmberg EB, Perkell JS, Walsh M, Vaughan C. Objective assessment of vocal hyperfunction: An experimental framework and initial results. J Speech Hear Res. 1989;32:373-92.

10. Holmberg EB, **Hillman RE**, Perkell JS. Glottal airflow and transglottal air pressure measurements for male and female speakers in low, normal and high pitch. J Voice. 1989; 3(4):294-305.

11. **Hillman RE**, Holmberg EB, Perkell JS, Walsh M, Vaughan C. Phonatory function associated with hyperfunctionally related vocal fold lesions. J Voice. 1990; 4(1):52-63.

12. Perkell JS, Holmberg EB, **Hillman RE**. A system for signal processing and data extraction from aerodynamic, acoustic and electroglottographic signals in the study of voice. J Acoust Soc Am. 1991;89(4):1777-81.

13. The Department of Veterans Affairs Laryngeal Cancer Study Group. Induction Chemotherapy Plus Radiation Compared with Surgery Plus Radiation in Patients with Advanced Laryngeal Cancer. N Engl J Med. 1991 Jun 13;324(24):1685-90. (**RE Hillman** directed the Central Speech Laboratory for this project and was a member of the writing committee for this article.)

14. Newman L, Cleveland R, **Hillman RE**, Weber H. Videofluoroscopic analysis of infant swallow. Invest Radiol. 1992;26(10):870-73.

15. Sperry E, **Hillman RE**, Perkell JS. The use of inductance plethysmography to assess respiratory function in a patient with vocal nodules. J Med Speech Lang Pathol. 1994;2:137-145.

16. Holmberg EB, **Hillman RE**, Perkell JS, Gress C. Relationships between intra-speaker variation in aerodynamic measures of voice production and variation in SPL across repeated recordings. J Speech Hear Res. 1994;37:484-495.

17. Perkell JS, **Hillman RE**, Holmberg EB. Group differences in measures of voice production and revised values of maximum airflow declination rate. J Acoust Soc Am. 1994;96(2):695-698.

18. Holmberg EB, Perkell JS, **Hillman RE**, Gress C. Individual variation in measures of voice. Phonetica. 1994;51:30-37.

19. Montgomery WM, **Hillman RE**, Varvares MA. Combined thyroplasty type I and inferior constrictor myotomy. Ann Otol Rhinol Laryngol. 1994;103:858-862.

20. Varvares MA, Montgomery WW, **Hillman RE**. Teflon granuloma of the larynx: Etilogy, pathology, and management. Ann Otol Rhinol Laryngol. 1995;104:511-515.

21. Holmberg EB, **Hillman RE**, Perkell JS, Guiod PC, Goldman SL. Comparisons among aerodynamic, electroglottographic, and acoustic measures of female voice. J Speech Hear Res. 1995; 38:1212-1223.

22. Goldman SL, Hargrave J, **Hillman RE**, Holmberg EB, Gress G. Stress, anxiety, somatic complaints, and voice use in women with vocal nodules: Preliminary findings. Am J Speech Lang Pathol. 1996;5(1): 44-54.

23. Kass ES, **Hillman RE**, Zeitels SM. Vocal Fold Infusion Techniques in Phonomicrosurgery. Ann Otol Rhinol Laryngol. 1996;105(5): 341-347.

24. Zeitels SM, **Hillman RE**, Bunting GW, Vaughn T. Reinke's Edema: Phonatory Mechanisms and Management Strategies. Ann Otol Rhinol Laryngol. 1997;106(7): 533-543.

25. Kass ES, **Hillman RE**, Zeitels SM, Bhattacharyya AK. Vocal fold submucosal infusion technique in phonomicrosurgery. Indian J Otolaryngol Head Neck Surg. 1997 Jul;49(3):297. doi: 10.1007/BF02991299. PubMed PMID: 23119316; PubMed Central PMCID: PMC3450582.

26. Qi YY, **Hillman RE**. Temporal and Spectral Estimations of Harmonics-to-Noise Ratio in Human Voice Signals. J Acoust Soc Am. 1997;102(1): 537-543.

27. Kobler JB, **Hillman RE**, Kuo J, Zeitels SM. Assessment of Vocal Function Using Simultaneous Aerodynamic and Calibrated Videoendoscopic Measures. Ann Otol Rhinol Laryngol. 1998;107(6):477-485.

28. **Hillman RE**, Walsh MJ, Wolf GT, Fisher SG, Hong WK, Department of Veterans Affairs Laryngeal Cancer Study Group. Functional Outcomes Following Treatment for Advanced Laryngeal Cancer; Part I-Voice Preservation in Advanced Laryngeal Cancer; Part II-Laryngectomy Rehabilitation: The State of the Art in the VA System. Ann Otol Rhinol Laryngol. 1998;107(5 Suppl 172):1-27.

29. Zeitels SM, Hochman I, **Hillman RE**. Adduction Arytenopexy: A New Procedure for Paralytic Dysphonia and the Implications for Implant Medialization. Ann Otol Rhinol Laryngol. 1998;107(9 Suppl 173):1-24.

30. Hochman IL, Sataloff RT, **Hillman RE** & Zeitels SM. Ectasias and varices of the vocal fold: Clearing the striking zone. Ann Otol Rhinol Laryngol. 1999;108:10-16.

31. Qi Y, **Hillman RE**, Milstein C. The estimation of signal to noise ratio in continuous speech for disordered voices. J Acoust Soc Am. 1999;105(4):1008-112.

32. Zeitels SM, Desloge RB, **Hillman RE**, Bunting GA. Cricothyroid subluxation: A new innovation for enhancing the voice with laryngoplastic phonosurgery. Ann Otol Rhinol Laryngol. 1999;108(12):1126-1131.

33. Cheyne HA, Nuss RC, **Hillman RE**. Electroglottography in the Pediatric Population. Arch Otolaryngol Head Neck Surg. 1999;125:1105-1108.

34. McLean-Muse A, Montgomery WM, **Hillman RE**, Varvares M, Bunting G, Doyle P, Eng J. The Montgomery thyroplasty implant for vocal fold immobility: Phonatory outcomes. Ann Otol Rhinol Laryngol. 2000;109:393-400.

35. Heaton JT, Kobler JB, Goldstein EA, McMahon TA, Barry DT, **Hillman RE.** Recurrent laryngeal nerve transposition in the guinea pig. Ann Otol Rhinol Laryngol. 2000;109(10):972-980.

36. Colden, D., Zeitels, S.M., **Hillman, R.E.** Jarboe, J.K., Bunting, G., Spanou, K. Stroboscopic Assesment of Vocal Fold Keratosis and Glottic Cancer. Ann Otol Rhinol Laryngol. 2001;110:293-298.

37. Holmberg EB, **Hillman RE,** Hammarberg B, Sodersten M, Doyle P. Efficacy of behaviorally-based voice therapy for vocal nodules: Progressive changes in voice quality and vocal physiology. J Voice. 2001;15:395-412.

38. Holmberg EB, Doyle P, Perkell JS, Hammarberg B, **Hillman RE.** Aerodynamic and acoustic voice measures of patients with vocal nodules: Variation in baseline and changes across voice therapy. J Voice 2003;17(3):269-282.

39. Zeitels SM, **Hillman RE**, Desloge R, Mauri M, Doyle PB. Phonomicrosurgery in singers and performing artists: treatment outcomes, management theories, and future directions. Ann Otol Rhinol

Laryngol Suppl. 2002 Dec;190:21-40. PubMed PMID: 12498380.

40. Zeitels SM, **Hillman RE**, Franco RA, Bunting GW. Voice and treatment outcome from phonosurgical management of early glottic cancer. Ann Otol Rhinol Laryngol Suppl. 2002 Dec;190:3-20. PubMed PMID: 12498379.

41. Meltzner G, Kobler J, **Hillman RE.** Measuring the neck frequency response of laryngectomy patients: Implications for the design of electrolarynx devices. J Acoust Soc Am. 2003;114(2):1035-1047.
42. Senior Author

43. Cheyne H, Hanson H, Genereux R, Stevens K, **Hillman R**. Development and Testing of a Portable Vocal Accumulator. J Speech Lang Hear Res. 2003;46(6):1457-1467.

44. Goldstein EA, Heaton, JT, Kobler JB, Stanley G.B, **Hillman RE.** Design and Implementation of a Hands-Free Electrolarynx Device Controlled by Neck Strap Muscle Electromyographic Activity. IEEE Trans Biomed Eng. 2004;51(2):325-332.

45. Zeitels SM, Franco RA, Dailey SH, Burns J, **Hillman RE**, Anderson RR. Office-based treatment of glottal dysplasia and papilloma with the 585nm pulsed dye laser and local anesthesia. Ann Otol Rhinol Laryngol. 2004;113:265-276.

46. Heaton J, Goldstein E, Kobler, J, Zeitels S, Randolph G, Walsh M, Gooey J, **Hillman R.** Surface Electromyographic Activity in Total Laryngectomees Following Laryngeal Nerve Transfer to Neck Strap Muscles: Correlation with Vocal and Non-Vocal Behaviors. Ann Otol Rhinol Laryngol. 2004;113(9): 754-764.

47. Dailey SH, Kobler JB, **Hillman RE**, Tangrom K, Thananart E, Mauri M, Zeitels SM. Endoscopic Measurement of Vocal Fold Movement During Adduction and Abduction. Laryngoscope. 2005;115:178-183.

48. Gunter HE, Howe RD, Zeitels SM,Kobler JB, **Hillman RE**. Measurement of Vocal Fold Collision Forces During Phonation: Methods and Preliminary Data. J Speech Hear Res. 2005;48(3):567-76.

49. Meltzner G, **Hillman RE.** Impact of Aberrant Acoustic Properties on the Perception of Sound Quality in Electrolarynx Speech. J Speech Hear Res. 2005;48: 766-779.
50. Senior Author

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Professional educational materials or reports, in print or other media

1. **Voice Disorders Database** (CD) Lincoln Park (NJ): Kay Elemetrics Corporation; 1994. This still stands as the largest collection (over 500 patients) of acoustic data for patients with a wide variety of voice disorders that was gathered using standardized procedures. As such it is still actively employed (for over 15 years) as a basic data resource by researchers in the field, primarily in the development and testing of new approaches for acoustic and perceptual analysis/clinical assessment of voice production.

2. **Management of hyperfunctional voice disorders: Unifying concepts and strategies** (video/DVD) Rockville Pike (MD): American Speech-Language-Hearing Association; 1999. This is a video of an interactive nation-wide satellite broadcast of a 3-hour seminar on the diagnosis and treatment of the most prevalent types of voice disorders co-presented by Dr. Hillman. It is still available for purchase through the American Speech-Language-Hearing Association.

3. **Database of Stroboscopic Recordings of Vocal Pathologies** (DVD) Lincoln Park (NJ): Kay Elemetrics Corporation; 2003. This is a standardized data base of videostroboscopic (laryngeal endoscopy) recording of a wide variety of the most common voice disorders. It is still provided by KayPentax (the largest maker of clinical instrumentation for voice and speech) for users of its videostroboscopic equipment as a reference to assist in the diagnosis of voice disorders.

Narrative Report **(limit to 500 words)**

Currently, the majority of my time is split between clinical work and conducting research, with additional effort directed towards teaching and educational programming. In my role as Co-Director of the Center for Laryngeal Surgery and Voice Rehabilitation at the Massachusetts General Hospital, I am in charge of the speech pathology clinical component of this program. This entails conducting assessments of patients with voice disorders and prescribing voice therapy treatment, as well as all of the administrative duties associated with running a hospital

department, including all matters related to overseeing a clinical staff.

In my role as Research Director of the Center for Laryngeal Surgery and Voice Rehabilitation I am in charge of a research staff that includes doctoral level scientists, and the research facilities of the Center. We also support several graduate students from the Doctoral Program in Speech and Hearing Bioscience and Technology (SHBT) at the Harvard-MIT Division of Health Sciences and Technology (HST) with research grant funds. Major aspects of my research have been funded by the National Institutes of Health since 1984, with additional funding from the Veterans Administration and private foundations. My research has focused mainly on the quantitative description of laryngeal mechanisms for normal and disordered voice production, with a particular interest in hyperfunctional voice disorders. I have also conducted investigations examining the efficacy of methods for treating voice disorders, and continue to lead an effort aimed at developing an improved electrolarynx communication system. In recent years, much of my research has evolved towards the development of new clinical instruments for voice assessment. This has largely entailed partnering with small companies and research firms via contractual arrangements to obtain Small Business Initiative Research (SBIR) NIH funding for such projects. One tangible result of the SBIR collaborations has been the recent development of an ambulatory monitoring and feedback system for evaluating and treating voice disorders that can: (1) reliably and unobtrusively provide long-term, continuous tracking of important parameters of vocal function, and (2) provide feedback to the user when voice parameters exceed 'safe' limits and/or target phonatory behaviors are not maintained. This device is now being manufactured for clinical use by Kay-Pentax Corporation.

In terms of teaching and educational programming, I provide lectures in for the speech pathology section of the Clinical Aspects of Speech and Hearing course taken by SHBT-HST doctoral students. In addition, I developed and currently serve as the coordinator/Area Chairman for the speech pathology clinical track that can be pursued by SHBT-HST doctoral students under a collaborative arrangement between HST and the MGH Institute of Health Professions (IHP). I also teach a course in Voice Disorders in the Graduate Program in Communication Sciences and Disorders at the MHG-IHP. Since 2007 I have held academic leadership positions at the MGH Institute of Health Professions including Interim Academic Dean, Special Assistant to the Provost for Research, and am currently Associate Provost for Research. In these positions I have been primarily responsible for building research infrastructure and expanding research activity at the Institute, including leading efforts to start an interdisciplinary PhD program in rehabilitation sciences.