

CURRICULUM VITAE FOR ACADEMIC PROMOTION
Johns Hopkins University School of Medicine

(signature)

Brendan J. Canning, Ph.D.

(revised February 2006)

DEMOGRAPHIC INFORMATION

Personal Data:

Current Appointment: Associate Professor of Medicine
Department of Medicine
Division of Allergy and Clinical Immunology
The Johns Hopkins Medical Institutions
Baltimore, Maryland

Business Address: Johns Hopkins Asthma and Allergy Center, Rm. 3A.24
5501 Hopkins Bayview Circle, Baltimore MD 21224
Phone: 410-550-2156
Fax: 410-550-2130
e-mail: bjc@jhmi.edu

Education and Training:

- 1982 - 1986: B.S. in Zoology
University of Maryland, College Park
- 1988 - 1993: Ph.D. in Physiology
The Johns Hopkins Medical Institutions
- 1993 - 1996: Postdoctoral Fellowship
The Johns Hopkins Asthma and Allergy Center

Professional Experience:

- 1994, 1997: Visiting Scientist
Institut für Anatomie und Zellbiologie
Justus-Liebig Universität
Giessen, Germany
- 1996 - 1997: Instructor in Medicine
Department of Medicine
The Johns Hopkins Asthma and Allergy Center
- 1997 - 2002: Assistant Professor of Medicine
Department of Medicine

The Johns Hopkins Asthma and Allergy Center

2002 - present: Associate Professor of Medicine
Department of Medicine
The Johns Hopkins Asthma and Allergy Center

RESEARCH ACTIVITIES

Publications: Peer-Reviewed Articles:

- 1) Farmer, SG, BJ Canning and DE Wilkins (1988). Adenosine receptor-mediated contraction and relaxation of guinea-pig isolated tracheal smooth muscle: Effects of adenosine antagonists. *Br J Pharmacol*, **95**: 371 - 378.
- 2) Noronha-Blob, L, BJ Canning, D Costello and WJ Kinnier (1988). Selective agents for muscarinic receptors linked to phosphoinositide breakdown. *Eur J Pharmacol*, **154**: 161-167.
- 3) Noronha-Blob, L, V Lowe, A Patton, BJ Canning, D Costello and WJ Kinnier (1989). Muscarinic receptors: Relationships among phosphoinositide breakdown, adenylate cyclase inhibition, *in vitro* detrusor muscle contractions and *in vivo* cystometrograms studies in guinea pig bladder. *J Pharmacol Exp Therap*, **249**: 843 - 851.
- 4) Canning, BJ, RR Hmieleski, EW Spannhake and GJ Jakab (1991). Ozone reduces murine alveolar and peritoneal macrophage phagocytosis: The role of prostanoids. *Am J Physiol (Lung Cell Mol Physiol, 5)*, **261**: L277 - L282.
- 5) Canning, BJ and BJ Udem (1993). Relaxant innervation of guinea-pig trachealis: evidence for capsaicin-sensitive and insensitive vagal pathways. *J Physiol (Lond.)*, **460**: 719 - 739.
- 6) Canning, BJ and BJ Udem (1993). Evidence that distinct neural pathways mediate parasympathetic contractions and relaxations of guinea-pig trachealis. *J Physiol (Lond.)*, **471**: 25-40.
- 7) Canning, BJ and BJ Udem (1994). Evidence that antidromically stimulated vagal afferents activate inhibitory neurons innervating guinea pig trachealis. *J Physiol (Lond.)*, **480**: 613-625.
- 8) Udem, BJ, JL Ellis, S Meeker, A Fischer and BJ Canning (1996). Inhibition by zinc protoporphyrin-IX of vasoactive intestinal peptide-induced relaxations of the guinea pig isolated trachea. *J Pharmacol Exp Therap*, **278 (2)**: 964 - 970.
- 9) Canning, BJ, BJ Udem, PC Karakousis and RD Dey (1996). Influence of organotypic culture on cholinergic and noncholinergic parasympathetic nerves innervating airway smooth muscle. *Am J Physiol (Lung Cell Mol Physiol, 15)*, **271**: L698 - L706.
- 10) Fischer, A, BJ Canning and W Kummer (1996). Correlation of vasoactive intestinal peptide and nitric oxide synthase with choline acetyltransferase in the airway innervation. *Ann NY Acad Sci*, **805**: 717 - 722.

- 11) Canning, BJ and A Fischer (1997). Localization of cholinergic nerves in the airways of the guinea pig using antisera to choline acetyltransferase. *Am J Physiol (Lung Cell Mol Physiol, 16)*, **272**: L731 - L738.
- 12) Canning, BJ, A Fischer and BJ Udem (1998). Pharmacological analysis of the tachykinin receptors that mediate activation of nonadrenergic, noncholinergic relaxant nerves that innervate guinea pig trachealis. *J Pharmacol Exp Therap*, **284**: 370 - 377.
- 13) Canning, BJ and A Fischer (1998). Localization of heme oxygenase-2 (HO-2) immunoreactivity to parasympathetic ganglia of human and guinea pig airways. *Am J Respir Cell Mol Biol*, **18**: 279-285.
- 14) Fischer, A, BJ Canning, BJ Udem and W Kummer (1998). Evidence for an esophageal origin of VIP- and NO synthase-IR nerves innervating guinea pig trachealis: A retrograde tracing, immunohistochemical analysis. *J Comp Neurol*, **394(3)**: 326-334.
- 15) Kesler, BS and BJ Canning (1999). Regulation of baseline cholinergic tone in guinea-pig airway smooth muscle. *J Physiol (Lond.)*, **518**: 843-856.
- 16) Canning, BJ, SM Reynolds and SB Mazzone (2001). Multiple mechanisms of reflex bronchospasm in guinea pigs. *J Appl Physiol*, **91(6)**: 2642-2653.
- 17) Kesler, BS, SB Mazzone and BJ Canning (2002). Nitric oxide dependent modulation of smooth muscle tone by airway parasympathetic nerves. *Am J Respir Crit Care Med*, **165 (4)**, 481-488.
- 18) Mazzone, SB and BJ Canning (2002). Evidence for differential reflex regulation of cholinergic and noncholinergic parasympathetic nerves innervating the airways. *Am J Respir Crit Care Med*, **165 (8)**, 1076-1083.
- 19) Mazzone, SB and BJ Canning (2002). Synergistic interactions between airway afferent nerve subtypes mediating reflex bronchospasm in guinea pigs. *Am J Physiol (Regul Integr Comp Physiol)*, **283**, R86-R98.
- 20) Canning, BJ, SM Reynolds, LU Anukwu, R Kajekar and AC Myers (2002). Endogenous neurokinins facilitate synaptic neurotransmission in guinea pig airway parasympathetic ganglia. *Am J Physiol (Regul Integr Comp Physiol)*, **283**, R320-R330.
- 21) Mazzone SB and BJ Canning (2002). An in vivo guinea pig preparation for studying the autonomic regulation of airway smooth muscle tone. *Auton Neurosci*, **99 (2)**, 91-101.
- 22) Wang SQ, H Cheng, AC Myers, BJ Canning, and KY Xu (2003). Positive inotropic effect induced by sequence-specific Na(+),K(+)-ATPase antibody in intact cardiac myocytes. *Ann N Y Acad Sci.*, **986**, 630-632.
- 23) Canning, BJ, SB Mazzone, SN Meeker, SM Reynolds and BJ Udem (2004). Identification of the tracheal and laryngeal afferent neurones mediating cough in anaesthetised guinea-pigs. *J. Physiol.*, **557 (2)**, 543-558.
- 24) Mazzone SB, N Mori and BJ Canning (2005). Synergistic interactions between airway afferent nerve subtypes regulating the cough reflex in guinea-pigs. *J. Physiol.*, **569(2)**, 559-573.

- 25) Canning, BJ, DG Farmer and N Mori (2006). Mechanistic studies of citric acid evoked coughing in anesthetized guinea pigs. *Am J Physiol (Regul Integr Comp Physiol)*, In Press.
- 26) Oh, E, SB Mazzone, BJ Canning, D Weinreich (2006). Reflex regulation of airway sympathetic nerves. *J. Physiol*, In Press.

Publications: Review Articles:

- 1) Jakab, GJ, EW Spannhake, BJ Canning, SR Kleeberger and MI Gilmour (1995). The effects of ozone on immune function. *Environmental Health Perspectives*. **103 (Suppl. 2):** 77 - 89.
- 2) Canning, BJ (1997). Potential role of tachykinins in inflammatory diseases. *Journal of Allergy Clinical Immunology*, **99 (5):** 579 - 582.
- 3) Canning BJ, Widdicombe JG (2001). Innervation of the airways: Introduction. *Respiration Physiology*, **125**, 1-2.
- 4) Canning, BJ, and A Fischer (2001). Neural control of airway smooth muscle. *Respiration Physiology*, **125**, 113-127.
- 5) Canning, BJ (2001). Inflammation in asthma: Role of nerves and potential influence of gastroesophageal reflux disease. *American Journal of Medicine*, **111 (Suppl. 8A):** 13S-17S.
- 6) Canning, BJ. (2002). Neurology of allergic inflammation and rhinitis. *Current Asthma and Allergy Reports*, **2(3)**, 210-215.
- 7) Mazzone, SB and BJ Canning. (2002). Central nervous system control of the airways: pharmacological implications. *Current Opinion in Pharmacology*. **2**, 220-228.
- 8) Canning, BJ. (2002). Interactions between vagal afferent nerve subtypes mediating cough. *Pulmonary Pharmacology and Therapeutics*, **15**, 187-192.
- 9) Mazzone SB and BJ Canning. (2002). Plasticity of the cough reflex. *European Respiratory Review*, **12 (85)**, 236-242.
- 10) Canning, BJ. (2003). Modeling asthma and COPD in animals: a pointless exercise? *Current Opinion in Pharmacology*. **3**, 244-250.
- 11) Canning BJ and SB Mazzone (2003). Reflex mechanisms in gastroesophageal reflux disease and asthma. *American Journal of Medicine*, **115 Suppl 3A**, 45S-48S.
- 12) Scarupa, MD, N Mori and BJ Canning (2005). Gastroesophageal reflux disease in children with asthma: Treatment Implications. *Pediatr Drugs*, **7 (3)**, 177-186.
- 13) Irwin RS, Baumann MH, Bolser DC, Boulet LP, Braman SS, Brightling CE, Brown KK, Canning BJ, et al. (2006). Diagnosis and management of cough executive summary: ACCP evidence-based clinical practice guidelines. *Chest*. **129(1 Suppl)**, 1S-23S.
- 14) Canning BJ. (2006). Anatomy and neurophysiology of the cough reflex: ACCP evidence-based clinical practice guidelines. *Chest*. **129(1 Suppl)**, 33S-47S.

Publications: Book Chapters:

- 1) Canning, BJ and BJ Udem (1994). Parasympathetic innervation of airway smooth muscle. *In: Airways Smooth Muscle: Structure Innervation and Neurotransmission*. D. Raeburn and M. Gymbiec eds. Birkhauser Verlag AG. Basel. pp 43 - 77.
- 2) Canning, BJ (1999). Nicotinic receptors. *In Current Protocols in Pharmacology*, T. Kenakin ed., John Wiley and Sons, New York.
- 3) Canning, BJ (1999). Inflammation in asthma: Role of nerves and potential influence of gastroesophageal reflux disease. *In GERD and Airway Diseases*, M.R. Stein ed., Marcel Dekker, Inc., New York, Basel, 19-54.
- 4) Canning, BJ. (2002). Overview of animal models of asthma. *In Current Protocols in Pharmacology*, T. Kenakin ed., John Wiley and Sons, New York..
- 5) Mazzone, SB and BJ Canning. (2002). Guinea pig models of asthma. *In Current Protocols in Pharmacology*, T. Kenakin ed., John Wiley and Sons, New York.
- 6) Baroody FM and BJ Canning (2003). Comparative anatomy of the upper and lower airways. *In Upper and Lower Airway Diseases*, J Corren, A Togias and J Bousquet eds., Marcel Dekker Inc., New York, Basel. pp1-51.
- 7) Mazzone, SB, BJ Canning and JG Widdicombe (2003). Sensory pathways for the cough reflex. *In Cough: Causes, Mechanisms and Therapy*, F Chung, J Widdicombe and H Boushey, eds., Blackwell Publishing, Oxford. pp161-171.
- 8) Canning, BJ and BJ Udem (2003). Neuronal control of airway function in allergy. *In Middleton's Allergy: Principles and Practice*, 6th Edition. NF Adkinson, JW Yunginger, WW Busse, BS Bochner, ST Holgate and FER Simons, eds. Mosby, Philadelphia. pp231-241.
- 9) Mazzone SB and BJ Canning (2004). Tachykinin NK₃ receptor antagonists. *In Handbook of Experimental Pharmacology: Tachykinins*. P Holzer, ed. Springer, Berlin, Volume 164, pp245-271.
- 10) Canning, BJ and SB Mazzone (2005). Reflexes initiated by activation of the vagal afferent nerves innervating the airways and lungs. *In: Advances in Vagal Afferent Neurobiology*. BJ Udem and D Weinreich, eds., CRC Press, Taylor and Francis, Boca Raton, London. pp403-430.
- 11) Canning, BJ and SB Mazzone (2005). Afferent pathways regulating the cough reflex. *In: Acute and Chronic Cough*. AE Redington and AH Morice, eds. Taylor and Francis, Boca Raton, pp25-48.
- 12) Advenier, C, BJ Canning, and V Lagente (2005). Role of tachykinins in cough. *In: Acute and Chronic Cough*. AE Redington and AH Morice, eds. Taylor and Francis, Boca Raton, pp65-80.

Publications: *Manuscripts in Press, Submitted, or in Preparation and Abstracts.*

One original research article and one review article are currently under review for publication. Two book chapters are in press for publication. Five additional original research articles, four additional invited review articles and one additional book chapter are currently in preparation.

Senior author or first author on 23 abstracts (14 of which describe unpublished data) published since 2000.

Research Grant Participation:

Current funding:

1999 – present: Unrestricted funding from industry (UCB Research Inc., Immunex, Inc.)
Total Direct Costs: \$120,000

2004 – present: “Effect of pertussis toxin on cough in guinea pigs”
RO3, NIAID, PI: Nicholas Carbonetti, Univ. of Maryland
Direct costs: \$58,000

Beginning July 2006: "Reflexes and gastroesophageal reflux disease"
RO1, NHLBI, P.I.: Brendan J. Canning
Annual Direct Costs Requested: \$200,000
(scored in February 2006: 4.6th percentile)

Grants pending:

Submitted November 2005: “Integration in human airway parasympathetic ganglia”
RO1 renewal application, NHLBI, P.I.: Allen Myers
Annual Direct Costs Requested: \$200,000

Submitted June 2005: “Evaluation of potential therapeutics used for treating cough”
Sponsored Research, AstraZeneca
Total Direct Costs Requested: \$22,000

Submitted December 2005: “Potassium channel regulation of cough
Sponsored Research, Neurosearch
Total Direct Costs Requested: \$50,000

Previous Funding from sources other than the NIH:

1997 - 1998: Asthma and Allergy Foundation of America
Investigator Award Grant (\$20,000)

2000 – 2003: "Potential adverse effects of less active enantiomers of beta agonists in human airway smooth muscle."
Sponsored Research, Sepracor, Inc., PI: Brendan J. Canning
Total Direct Costs: \$44,000

2004 – 2005: “Assessing the antitussive and bronchoprotective effects of GABA receptor agonists in guinea pigs”
Sponsored research, AstraZeneca, PI: Brendan J. Canning
Direct costs: \$58,000

Previous NIH Funding:

1994 - 1997: "Relaxant innervation of guinea pig airway smooth muscle" (HL09137)
NHLBI Postdoctoral National Research Service Award
(NRSA) (Salary only)

- 1997 - 2000: "Mast cell nerve interactions in the airways" (HL38095)
RO1, NHLBI, P.I.: Bradley J. Undem
Annual Direct Costs: \$151, 797
- 1998 – 2002: "Autonomic regulation of airway smooth muscle tone"
RO1, NHLBI, P.I.: Brendan J. Canning
Annual Direct Costs: \$70, 000
- 2000 – 2001: Supplemental RO1 Funding., NIH/ NHLBI
P.I., Brendan J. Canning
Postdoctoral Training of an Underrepresented Minority (Dr. L. Anukwu).
Annual Direct Costs: \$43, 400
- 2000 – 2003: "Kinins as mediators of human reactions" (HL32273)
RO1, NHLBI, P.I.: Brendan J. Canning
Annual Direct Costs: \$185, 863

EDUCATIONAL ACTIVITIES

Editorial Activities (referee): (approximately 10 manuscripts/ year, 1996-present)

Allergy, American Journal of Physiology, American Journal of Respiratory and Critical Care Medicine, American Journal of Respiratory Cell and Molecular Biology, Biochemical Pharmacology, Brain Research, British Journal of Pharmacology, Clinical and Experimental Allergy, European Respiratory Journal, Experimental Lung Research, FASEB Journal, International Archives of Allergy and Immunology, Journal of Allergy and Clinical Immunology, Journal of Applied Physiology, Journal of Cellular Biochemistry, Journal of Clinical Investigation, Journal of Comparative Neurology, Journal of Internal Medicine, Journal of Neurophysiology, Journal of Pharmacology and Experimental Therapeutics, Journal of Physiology (London), Life Sciences, Microvascular Research, Regulatory Peptides, Pulmonary Pharmacology and Therapeutics, Respiration Physiology, Respiratory Research, Trends in Pharmacological Sciences

Editorial Activities (Guest Editor):

- 1999 - 2000: Respiration Physiology, Special Issue
"Innervation of the Airways", Volume 125, March 2001
- 2004 – present: Pulmonary Pharmacology and Therapeutics, Special Issue
"Modeling asthma and COPD in animals"

Doctoral Thesis Committees:

Eunjoo Oh, Department of Pharmacology, University of Maryland
Mehdi Hazari, Division of Physiology, Johns Hopkins University
Liliana Moreno, Division of Physiology, Johns Hopkins University
Benjamas Chuaychoo, Division of Physiology, Johns Hopkins University

Training Grant Participation:

Training Grant for Division of Pulmonary and Critical Care Medicine
Johns Hopkins University, Department of Medicine

Mentoring and Teaching:

Mentoring:

Petros Karakousis, undergraduate (1993-1994 academic year)
Co-authored 1 paper while working in my lab
Current position, Clinical fellow, Johns Hopkins Medical Institutions

Sandra Reynolds, undergraduate (summer 1995, 1996)
Coauthored 2 papers while working in my lab
Current position: Postdoctoral fellow, Kings College, London

Branko S. Kesler, M.D., pulmonary fellow (July 1997 – June 2001)
Awarded 1997 NHLBI National Research Service Award
Coauthored 2 papers while working in my lab
Current position: private practice

Linus Anukwu, M.D., postdoctoral fellow (April 2000 – June 2001)
NRSA recipient for underrepresented minorities
Coauthored 1 paper while working in my lab
Current position: Medical resident, Brown University

Stuart B. Mazzone, Ph.D., postdoctoral fellow (June 2000 – June 2003)
Awarded a CJ Martin Fellowship from the Australian MHMRC
(fellowship co-sponsors: B. Canning (JHU), P. Beart (Univ. Monash))
Coauthored 11 papers while working in my lab
Current position: Faculty Howard Florey Institute, Melbourne, Australia

Michelle Petrovic, medical student (summer 2000)
Winner of a Denison Award for outstanding research by a medical

student

Current position: Medical resident

Edwin Yau, undergraduate (2000 – 2001 academic year)
Current position: Medical school, Baylor College of Medicine

David Farmer, undergraduate (summers, 2002-2004)
Coauthored 1 paper while in my lab
Current position: Undergraduate student, Univ. of Glasgow, Scotland

Mark Scarupa, M.D., allergy fellow (September 2002 – 2004)
Coauthored 1 paper while in my lab
Current position: private practice

Classroom Instruction:

Co-Director, Orientation Course in Clinical Immunology (1998 –
present)

The Johns Hopkins Asthma and Allergy Center
Baltimore, Maryland

Guest Faculty (1998 – 2002)
Pharmaceutical Education and Research Institute (PERI, Inc.)
Respiratory Clinical Development Course
"Basic Pharmacology of Pulmonary Drugs"

Lecturer in Physiology (2003 – present)
Principles of Physiology
"The autonomic nervous system" and "Somatic motor nerves"
Bloomberg School of Public Health
Johns Hopkins Medical Institutions

ORGANIZATIONAL ACTIVITIES

Institutional Administrative Appointments:

Institutional Animal Care and Use Committee (2000 – present)
Division of Clinical Immunology, Equipment Committee Chair (2000 – present)

Conferences:

- April 1999: Session Co-Chair
"Airway sensory nerves"
American Thoracic Society Meeting
- June 2001: Organizer and Chairman
"Proteases and protease activated receptors as drug targets"
Pulmonary Research Group
- May 2002: Session Co-Chair
"Sensorineural mechanisms in the airways"
American Thoracic Society Meeting
- 2002-present: Programming Committee Member
Respiratory Structure and Function Assembly
American Thoracic Society
- May 2002: Organizer and Co-Chair
"Physiology and Pathophysiology of Cough"
Pulmonary Research Group
- April 2003: Session Co-Chair
"Reflex regulation of the airways"
Experimental Biology Meeting
- May 2003: Session Facilitator
"Pulmonary Secretions"
American Thoracic Society Meeting
- March 2004: Facilitator and Session Co-Chair
Scientists Center for Animal Welfare
IACUC Advanced Workshop

May 2004: Session Co-Chair
“Physiology and Pathophysiology of Cough”
American Thoracic Society

October 2004: Session Co-Chair
“Animal models of inflammatory disease”
Inflammation Research Association

May 2005: Session Co-Chair
“Neural Control: The master switches regulating airway caliber”
American Thoracic Society

Professional Societies:

American Physiological Society-Regular Member
American Thoracic Society-Regular Member
International Society for Autonomic Neuroscience-Regular Member
Maryland Thoracic Society-Regular Member
Pulmonary Research Group – President (2001-2003)
Pulmonary Research Group – Board member (2003 – present)
American College of Chest Physicians – Expert panel on cough (2004)

Grant Reviewer:

British Lung Foundation (June 2001)
FWF Der Wissenschaftsfonds (Austria) (September 2001)
National Asthma Campaign (United Kingdom) (February 2002)
Higher Education Authority, Republic of Ireland (May 2003)
NIH/ NHLBI, Program Project Grant (May 2003)
NIH/ NINDS, Special Neuroscience Program Site Visit/ Review (July
2004)
NIH/ NINDS, Special Neuroscience Program Revision Review (April
2005)
Philip Morris External Research Program (November 2005)
Asthma UK, Research Fellowship Grant (December 2005)
NIH/ NHLBI, LCMi Study Section, Ad Hoc Reviewer (February 2006)

Scientific Advisory Panel:

University of California at Davis (2004-present)
Program Grant: Pulmonary effects of environmental oxidant pollutants

Consultantships/ Collaboration with Industry:

1997 Schering Plough Inc.
Pharmacological properties of putative NK₂ receptor antagonists
1997 - 1998 Cytomed, Inc.
In vitro pharmacology of 5-lipoxygenase inhibitors in human airways
1998 - present: Glaxo Smithkline
Neuronal control of the airways

- 1999 - 2004: UCB Pharma Research
Physiology and pathophysiology of cough
- 2000 – 2002: Immunex Corporation
Effects of IL-4 and IL-13 on human airway smooth muscle
- 2000 – 2003: Sepracor, Inc.
Stereoselective effects of beta agonists on human airway smooth muscle
- 2001: Aventis Pharmaceuticals Inc.
Role of the nervous system in inflammatory diseases of the airways
- 2003: Altana Pharma AG
Role of PDE isozymes in asthma and in COPD
- 2003: Merck & Co., Inc.
Scientific Thought Leaders Conference on Respiratory Diseases
- 2003-present: AstraZeneca
Respiratory consequences of reflux disease
- 2003 – 2004: Scios Pharmaceutical Corporation
Effects of inflammation on the cough reflex
- 2004: Alkermes Pharmaceutical Corporation
Regulation of the cough reflex
- 2005-present: Merck & Co., Inc.
Regulation of the cough reflex

RECOGNITION:

Invited Talks:

- June 1993: Zeneca Inc.
Wilmington, Delaware
"Relaxant innervation of airway smooth muscle"
- November 1994: Philips University
Marburg, Germany
"Peripheral reflex regulation of airway smooth muscle tone"
- December 1994: Krankenhaus
Grosshansdorf, Germany
"Relaxant innervation of airway smooth muscle"
- March 1997: Justus-Liebig University, Giessen, Germany
"Differential reflex regulation of cholinergic and noncholinergic parasympathetic nerves innervating the airways"
- March 1998: St. Johns University, School of Pharmacy

- Queens, New York
"Potential role of tachykinins in airway diseases"
- October 1998: University of Erlangen-Nürnberg
Anatomy Institute, Erlangen, Germany
"Evidence for an esophageal origin of noncholinergic
parasympathetic nerves innervating the guinea pig trachea."
- February 1999: Smithkline Beecham
King of Prussia, Pennsylvania
"Role of tachykinins in airways diseases"
- March 1999: Pulmonary Research Group
New York Academy of Sciences
"Central sensitization as a mechanism of airways
hyperresponsiveness"
- April 1999: American Thoracic Society Meeting (San Diego)
Symposia on Neural Control of the Airways
"Regulation of parasympathetic nerves in the airways"
- September 1999: Smithkline Beecham
King of Prussia, Pennsylvania
"Central and peripheral actions of NK₃ receptor-mediated
alterations in airway nerve activity"
- August 2000: 3rd Multi-disciplinary international symposium on
supraesophageal complications of reflux disease.
Boston, Massachusetts
"Supraesophageal complications of reflux disease"
- September 2000: Sepracor, Inc.
New Orleans, Louisiana
Scientific Research Forum
- October 2000: Tachykinins 2000
Montpelier, France
"Modulation of synaptic transmission in the airways by
tachykinins"
- August 2001: Respiratory young investigators meeting
Manhattan, New York
Sponsored by Merck
- October 2001: 2nd International symposium on cough: Pharmacology and
therapy
London, England
"Interactions between airway sensory nerves mediating cough"

- February 2002: Sepracor scientific research forum
New Orleans, Louisiana
- May 2002: University of California at Los Angeles, Harbor Hospital
“Neuronal regulation of airway function”
- May 2002: Schering Plough Research Institute
Kenilworth, New Jersey
Pulmonary Research Group Symposia on Cough
“Overview of mechanisms of cough in airway disease”
- August 2002: 4th Multi-disciplinary international symposium on
supraesophageal complications of reflux disease.
San Diego, California
“Role of nerves in airway inflammation”
- March 2003: Johnson&Johnson Pharmaceutical Research and Development,
LLC Spring House, Pennsylvania
“Central and peripheral mechanisms of airways hyperreflexia”
- April 2003: Experimental Biology Meeting (San Diego)
Featured Topic: Reflex regulation of the airways
“Reflex regulation of airway parasympathetic nerves”
- December 2003: British Pharmacological Society Symposium on cough
Winter Meeting, London, December 2003
“Neuronal control of cough: Therapeutic implications”
- December 2003: Sackler Institute of Pulmonary Pharmacology
Kings College, London
“Identification of the Cough Receptor”
- February 2005: First Annual Winter Tachykinin Meeting
Breckenridge, Colorado
“Neurokinin₃ receptor regulation of the airways”
- April 2005: Airway Diseases: A Shared Approach
University of York, Yorkshire, United Kingdom
“Upper Airway Sensations”
- July 2005: Symposium on integrating mechanisms linking mind, brain and
periphery: Applications in asthma and atherosclerosis.
Mind Brain Body and Health Initiative, National Center for
Complementary and Alternative Medicine
“Reflex regulation of the airways: Recent advances”