

BIOGRAPHICAL SKETCH

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NAME Lee, Lu-Yuan		POSITION TITLE Fred W. Zechman Professor of Physiology Professor of Biomedical Engineering	
eRA COMMONS USER NAME (credential, e.g., agency login) LU-YUAN.LEE			
EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)			
INSTITUTION AND LOCATION	DEGREE (if applicable)	MM/YY	FIELD OF STUDY
National Taiwan University, Taipei, Taiwan	B.S.	1969	Mechanical Engineering
University of Mississippi, University, MS	M.S.	1972	Mechanical Engineering
Univ. of Mississippi Medical Center, Jackson, MS	Ph.D.	1975	Physiology & Biophysics
Univ. of California San Francisco, San Francisco, CA	Post-Doc	1975-78	Pulmonary Physiology

A. Positions and Honors

Positions and Employment

1975-78	Postdoctoral Fellow, Cardiovascular Research Institute, Univ. of California San Francisco, San Francisco, CA
1978-84	Assistant Professor, Dept. of Physiology and Biophysics, Univ. of Kentucky
1984-92	Associate Professor, Dept. of Physiology and Biophysics, Univ. of Kentucky
1992-Present	Professor, Dept. of Physiology and Biophysics, Univ. of Kentucky
1985	Visiting Scholar, Dept. Physiol & Biophy, UTMB, Galveston, TX
1992	Visiting Scholar, Dept. Pharmacol, Karolinska Inst, Stockholm, Sweden
1994-97	Director of Research, Dept. of Physiology, Univ. of Kentucky
1997	Visiting Scientist, Novartis Inst for Medical Sciences, London, England
1997-2000	Co-director of Graduate Studies, Dept. of Physiology, Univ. of Kentucky

Honors & Awards

1980-83	NIH/NHLBI Young Investigator Research Award
1983	Silver Pointer Award, Univ. of Kentucky College of Medicine
1992-95	NIH Fogarty Senior International Fellowship
1991-	Ad Hoc Member, NIH/NHLBI Special Emphasis Panel Study Sections
1995-99	Regular Member, NIH Respiratory and Applied Physiology Study Section
1994, 96	Master Teacher Award, Univ. of Kentucky College of Medicine
2000	Abraham Flexner Master Educator Award, Univ. of Kentucky College of Medicine
2002-	Fred W. Zechman Endowed Professor of Physiology, Univ. of Kentucky
2004-11	Wethington Award for Research, Univ. of Kentucky College of Medicine
2005-	Editorial Board, Journal of Applied Physiology
2007-	Editorial Board, Respiration Physiology and Neurobiology
2008	Clinical and Translational Science Mentor Recognition Award, Univ. of Kentucky
2009	Holsinger Teaching Award, Univ. of Kentucky, Dept. of Physiology
2010	Fellow, Biomedical Engineering Society
2010-	Review Editor, Frontiers in Autonomic Neuroscience

B. Recent Publications (2005 - present)

Gu, Q., R.-L. Lin, H.-Z. Hu, M.X. Zhu, and L.-Y. Lee. 2-Aminoethoxydiphenyl borate stimulates pulmonary C neurons via the activation of TRPVs. Am. J. Physiol.: Lung Cell Mol. Physiol. 288:L932-41, 2005.

- Burki, N.K., W.J. Wheeler, and L.-Y. Lee. Intravenous adenosine and dyspnea in man. J. Appl. Physiol. 98: 180-185, 2005
- Kwong, K., and L.-Y. Lee. Prostaglandin E₂ potentiates a tetrodotoxin-resistant sodium current in capsaicin-sensitive pulmonary sensory neurons. J. Physiol. (London) 564:437-450, 2005.
- Lee, L.-Y., and B. J. Undem. Bronchopulmonary vagal sensory nerves. Chap. 11 in: Advances in Vagal Afferent Neurobiology. (eds B.J. Undem and D. Weinreich). Frontiers in Neuroscience Series, CRC Press, 2005 (Invited review)
- Ruan, T., Q. Gu, Y.R. Kou, and L.-Y. Lee. Hyperthermia increases sensitivity of pulmonary C-fiber afferents in rats. J. Physiol. (London) 565:295-308, 2005.
- Gu, Q. and L.-Y. Lee. Sensitization of pulmonary chemosensitive neurons by bombesin-like peptides. Am. J. Physiol.: Lung Cell Mol. Physiol. 289: L1104-12, 2005.
- Lin, R.L., Q. Gu, and L.-Y. Lee. Stimulatory effect of hypercapnia on vagal pulmonary C-fiber afferents during airway inflammation. J. Appl. Physiol. 99: 1704-11, 2005.
- Xu F., J. Zhuang, T. Zhou and L.-Y. Lee. Ovalbumin-sensitization alters the ventilatory responses to chemical challenges in guinea pigs. J. Appl. Physiol. 99: 1782-1788, 2005.
- Gu, Q. and L.-Y. Lee. Characterization of acid-signaling in rat vagal pulmonary sensory neurons. Am. J. Physiol.: Lung Cell. Mol. Physiol. 291: L58-L65, 2006.
- Lee, L.-Y., R.L. Lin, C.Y. Ho and J.L. Hong. Are there "CO₂ sensors" in the lung? The Arterial Chemoreceptors (ed. by Y. Hayashida, C. Gonzalez and H. Kondo). Advances in Experimental Medicine & Biology series, Vol. 580, pp. 281-292, 2006 (Invited review)
- Gu, Q., and L.-Y. Lee. Neural control of airway smooth muscle. Encyclopedia of Respiratory Medicine, ed. by G.J. Laurent and S.D. Shapiro. Elsevier Press, pp. 138-145, 2006.
- Carr, M.J., and L.-Y. Lee. Plasticity of peripheral mechanisms of cough. Respir. Physiol. Neurobiol. 152: 298-311, 2006 (Invited review)
- Lee, L.-Y. Reflexes of the Lung and Airways (Editorial of Highlighted Topic Series). J. Appl. Physiol. 101: 1-2, 2006
- Gu, Q., and L.-Y. Lee. Hypersensitivity of pulmonary chemosensitive neurons induced by activation of protease-activated receptor-2 in rats. J. Physiol. (Lond) 574: 867-876, 2006.
- Ni, D., Q. Gu, H. Hu, N. Gao, M. Zhu, and L.-Y. Lee. Thermal sensitivity of isolated vagal pulmonary sensory neurons: role of transient receptor potential vanilloid receptors. Am. J. Physiol: Reg. Int. Comp. Physiol. 291: R541-550, 2006.
- Gu, Q., R.L. Lin, T.C. Vanaman, L.Y. Lee. Role of cationic charge in hypersensitivity of pulmonary chemoreflex induced by poly-L-lysine. Resp. Physiol. Neurobiol. 151: 31-43, 2006.
- Burki, N.K., M. Alam, and L.Y. Lee. The pulmonary effects of intravenous adenosine in asthmatic subjects. Respir. Res. 7: 139, 2006 (doi.10.1186/1465-9921-7-139)
- Xu, J., W. Yang, G. Zhang, Q. Gu and L.-Y. Lee. Calcium transient evoked by nicotine in isolated rat vagal pulmonary sensory neurons. Am. J. Physiol.: Lung Cell. Mol. Physiol. 292: L54-61, 2007
- Lee, L.-Y., N.K. Burki, D.C. Gerhardstein, Q. Gu, and J. Xu. Airway irritation and cough evoked by cigarette smoke: role of neuronal nicotinic acetylcholine receptors. In: Physiology & Pharmacology of Cough, ed. by J.G. Widdicombe and K.F. Chung, Pulm. Pharmacol. Therap. 20: 355-64, 2007 (Invited review).
- Gu, Q., and L.-Y. Lee. Epinephrine enhances chemical stimulation-evoked calcium transient in isolated rat vagal sensory neurons. J. Appl. Physiol. 102: 1545-55, 2007.
- Zhang, G., and L.-Y. Lee. Prostaglandin E₂ potentiates the sensitizing effect of hyperthermia on vagal pulmonary C-fiber in rats. Resp. Physiol. Neurobiol. 156: 241-249, 2007.
- Jia, Y., and L.-Y. Lee. Role of TRPV receptors in respiratory diseases. In: TRP Channels in Disease, ed. by B. Nilius. Biochim. Biophys. Acta 1772: 915-927, 2007 (Invited review)
- Burki, N.K., M. Sheatt, and L.-Y. Lee. Effects of airway anesthesia on dyspnea and ventilatory response to intravenous injection of adenosine in healthy human subjects. Pulm Pharmacol Ther. 21: 208-13, 2008.
- Gu, Q., M.E. Wiggers, G.I. Gleich, and L.-Y. Lee. Sensitization of isolated rat vagal pulmonary sensory neurons by human eosinophil granule-derived cationic proteins. Am. J. Physiol.: Lung Cell. Mol. Physiol. 294: L544-52, 2008.
- Lee, L.-Y., and Q. Gu. Nicotine membrane receptors on cough sensors. In: Pharmacology and Therapeutics of Cough, ed by K.F. Chung and J.G. Widdicombe. Handbook of Exp. Pharmacol. 187: 77-98, 2008 (Invited review)
- Ni, D., and L.-Y. Lee. Effects of increasing temperature on TRPV1-mediated responses in isolated rat pulmonary sensory neurons. Am. J. Physiol.: Lung Cell. Mol. Physiol. 294: L563-71, 2008.
- Zhang, G. and L.-Y. Lee. Sensitizing effects of chronic exposure and acute inhalation of ovalbumin aerosol on pulmonary C fibers in rats. J. Appl. Physiol. 105: 128-138, 2008.

Gu, Q., D. Ni, and L.-Y. Lee. Expression of neuronal nicotinic acetylcholine receptors in rat vagal pulmonary sensory neurons. Respir Physiol Neurobiol 161: 87-91, 2008.

Ni, D., and L.-Y. Lee. A lack of potentiating effect of increasing temperature on the responses to chemical activators in vagal sensory neurons isolated from TRPV1-null mice. Am. J. Physiol. Lung Cell. Mol. Physiol. 295:L897-904, 2008.

Zhang, G., R.-L. Lin, M. Wiggers, D.M. Snow, and L.-Y. Lee. Altered expression of TRPV1 and sensitivity to capsaicin in pulmonary myelinated afferents following chronic airway inflammation in the rat. J. Physiol. (Lond) 586:5771-86, 2008.

Lee, L.-Y. Respiratory Sensations Evoked by Activation of Bronchopulmonary C-fibers. In: Dyspnea (special issue), ed. by D.E. O'Connell and J.T. Fisher. Respir. Physiol. Neurobiol. 167: 26-35, 2009 (Invited review)

Gu, Q., M.E. Lim, G.J. Gleich, and L.-Y. Lee. Mechanisms of eosinophil major basic protein-induced hyperexcitability of vagal pulmonary chemosensitive neurons. Am. J. Physiol. Lung Cell. Mol. Physiol. 296: L453-61, 2009.

Lin, R.L., D. Hayes, and L.-Y. Lee. Bronchoconstriction induced by hyperventilation with humidified hot air: role of TRPV1-expressing airway afferents. J. Apply. Physiol. 106:1917-24, 2009.

Gu Q., and L.Y. Lee. Effect of PAR2 activation on single TRPV1 channel activities in rat vagal pulmonary sensory neurons. Exp. Physiol. 94: 928-936, 2009.

Lee, L.-Y., and Q. Gu. Role of TRPV1 receptor in inflammation-induced airway hypersensitivity. Current Opinion in Pharmacol. 9: 243-49, 2009 (Invited review)

Burki, N.K., and L.-Y. Lee. Blockade of airway sensory nerves and dyspnea in humans. Pulm Pharmacol Therap. 23: 279-282, 2010.

Lee, L.-Y., Q. Gu and Y.-S. Lin. Effect of Smoking on Cough Reflex Sensitivity: Basic and Pre-clinical Studies. Lung 188 (Suppl 1): S23-7, 2010. (Invited Review)

Gu, Q., M.E. Lim, and L.-Y. Lee. Regulation of acid signaling in rat pulmonary sensory neurons by protease-activated receptor-2. Am. J. Physiol. Lung Cell. Mol. Physiol. 298: L454-61, 2010.

Lee, L.-Y. TRPA1 ion channels: a gateway to airway irritation and reflex responses induced by inhaled oxidants. J Physiol (Lond) 588: 747-748, 2010 (Invited Perspectives article)

Gu, Q., and L.-Y. Lee. Acid-Sensing Ion Channels and Pain. Pharmaceuticals 3: 1411-1425, 2010.

Hu, Y, Q. Gu, R.-L. Lin, R. Kryscio, and L.-Y. Lee. Calcium transient evoked by TRPV1 activators is enhanced by tumor necrosis factor alpha in rat pulmonary sensory neurons. Am. J. Physiol. Lung Cell. Mol. Physiol. 299: L483-92, 2010.

Burki, N.K., and L.Y. Lee. Mechanisms of dyspnea. Chest 138: 1196-1201, 2010 (Invited review)

Lee, L.-Y., D. Ni, D. Hayes, and R.-L. Lin. TRPV1 as a cough sensor and its temperature-sensitive properties. Pulm. Pharmacol. Therap. 24: 280-5, 2011 (Invited review).

Gu Q, Lee LY. Protease-activated receptor-2. In: Therapeutic targets: promises and challenges, ed. by L. M. Botana. Wiley-Blackwell (Invited book chapter; 2011, in press)

Kou, Y.R., K.K. Kwong and L.-Y. Lee. Airway Inflammation and Hypersensitivity Induced by Chronic Smoking. In: Inflammation and cardiorespiratory control (Special Issue), ed. by F.L. Powell and Y.R. Kou. Respir. Physiol. Neurobiol. (Invited review; 2011, in press)

Gu, Q. and L.-Y. Lee. Airway irritation and cough evoked by acid: from human to ion channel. Current Opinion in Pharmacol. 11: 238-47, 2011 (Invited review)

C. Research Support

Ongoing Research Support

Title: Role of TRPV1 in Airway Hypersensitivity Induced by Allergic Inflammation

PI: Lu-Yuan Lee

Agency: National Heart, Lung and Blood Institute

Type: R01 (HL96914)

Period: 9/1/09 - 8/31/12

This project aims to determine whether the airway hypersensitivity caused by allergic inflammation results from increased expression/excitability of TRPV channels in the bronchopulmonary sensory terminals.

Title: Pulmonary Stress Induced by Hyperthermia: Role of Airway Sensory Nerves

PI: Lu-Yuan Lee

Agency: Department of Defense

Type: DM090277

Period: 10/1/10 - 9/30/13

We hypothesize that thermal stress evokes reflex bronchoconstriction and other respiratory dysfunctions in patients with mild asthma and allergic airways, which is related to an overexpression of TRPV1 in their airways.

Title: Chemosensitivity of Tachykinin-containing Lung Afferents
PI: Lu-Yuan Lee
Agency: National Heart, Lung and Blood Institute
Type: R01 (HL58686)
Period: 4/1/98 - 6/30/11

The objective of this investigation is to understand the mechanisms underlying the hypersensitivity of pulmonary tachykinin-containing C neurons induced by the eosinophil granule-derived cationic proteins.

Title: Prenatal nicotinic exposure and depressed hypoxic ventilatory response in SIDS model
PI: Fadi Xu (L.-Y. Lee: Co-investigator)
Agency: National Heart, Lung and Blood Institute
Type: R01 (HL107462)
Period: 4/1/11 - 3/31/15

The major objective is to elucidate how prenatal nicotinic exposure inhibits the hypoxic ventilatory response and contributes to the cardiorespiratory failure (death) in rat pups during severe hypoxia.

Title: Cervical Auscultation and Developmental Outcomes
PI: E. Reynolds (L.Y. Lee: Faculty Co-mentor)
Agency: National Institute of Child Health and Human Development
Type: K23 (HD050581)
Period: 9/27/06-8/31/11

This Mentored Patient-oriented Research Career Development Award studies neural mechanisms underlying the development of patterns of suck-swallow-breath rhythms during feeding in preterm infants.

Title: Regulation of Acid Signaling by PAR2 in Pulmonary Sensory Neurons
PI: Qihai Gu (L.-Y. Lee: Co-investigator)
Agency: National Institute of Allergy and Infectious Diseases
Type: R03 (AI076714)
Period: 7/1/08 - 6/30/11

This project is designed to elucidate the mechanisms regulating the potentiating effects of PAR2 on pulmonary sensory neuron response to acid.

Recently Completed Research Support (2007-10)

Title: Pulmonary C-neuron Hypersensitivity: Cellular Mechanisms
PI: Lu-Yuan Lee
Agency: National Heart, Lung and Blood Institute
Type: R56 (HL67379)
Period: 8/17/07 -7/31/09

This NIH Bridge Award project tested the hypothesis that the activation of TRPV1 by a small increase in body temperature can sensitize pulmonary C neurons and induce airway hypersensitivity.

Title: Pulmonary C-neuron Hypersensitivity: Cellular Mechanisms
PI: Lu-Yuan Lee
Agency: National Heart, Lung and Blood Institute
Type: R01 (HL67379)
Period: 4/1/02 - 7/31/07

The objective of this project was to elucidate the intracellular transduction mechanisms involved in the PGE₂-induced hypersensitivity of cultured pulmonary capsaicin-sensitive neurons.

Title: Neurogenic Mechanisms of Pulmonary Stresses in SCLC.
PI: Qihai Gu (L.-Y. Lee: Primary Mentor)
Agency: Parker B. Francis Fellowship Program
Type: Pulmonary Research Fellowship
Period: 7/1/05 - 6/30/08

The study investigated the involvement of hypersensitivity of bronchopulmonary C-neurons in the pulmonary pathophysiology of small cell lung cancer.