

## CURRICULUM VITAE

**Allison D. Fryer, Ph.D. FBPhS**

Associate Dean, Graduate Studies in the School of Medicine  
 Professor, Pulmonary Critical Care Medicine and Chemical Physiology and Biochemistry

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**EDUCATION**

BS Biology	1980	Syracuse University, Syracuse, New York.
MSc Pharmacology	1983	Chelsea College, University of London, London, England
PhD Pharmacology	1986	University of London, London, England

**PROFESSIONAL EXPERIENCE**

(2003-current) Oregon Health & Science University, Portland Oregon  
 (2008- ) **Associate Dean, Graduate Studies School of Medicine**  
 (2006-2008) **Director, Graduate Program Molecular Cellular Biology**  
 (2003-) **Professor with tenure**, Medicine and Chemical Physiology and Biochemistry  
 (1986-2003) Johns Hopkins University School of Public Health, Baltimore MD.  
 (2002-2003) **Professor with tenure**, Physiology and Environmental Health Sciences  
 (1996-2002) **Associate Professor**, Physiology and Environmental Health Sciences  
 (1989-1996) **Assistant Professor**, Physiology and Environmental Health Sciences  
 (1987-1989) Post-doctoral Fellow, University of Maryland, Baltimore, Maryland  
 (1986-1987) Post-doctoral Fellow, University of California, San Francisco, California  
 (1980-1982) Research Pharmacologist, Roche Products Limited, Welwyn Garden City, England

**HONORS/AWARDS**

2016	Teaching award OHSU (also won in 2005, 2006, 2008, and 2012)
2011	Brian J Sproule Lecture, University of Alberta, Canada
2010	John A Resko Faculty Research Achievement and Mentoring Award, OHSU
2005	Visiting Scholar Duke University and University N Carolina.
2004	Elected Fellow of the British Pharmacological Society (FBPhS)
1999-2004	Associate Editor Am. J. Respir and Critical Care Medicine.
1993-1998	Editor British Journal of Pharmacology
1993	Sandoz Prize from British Pharmacological Society
1983-1986	Ph.D. Scholarship from Roche Products Limited, England

**PUBLICATIONS** (listed below)

111 Peer-reviewed original papers  
 32 Review articles  
 1 Book  
 17 Book chapters

**MENTOR:** (listed below) many of whom are now leaders in academia and industry.

24 PhD students  
 13 postdoctoral fellows

**ASSOCIATE DEAN GRADUATE STUDIES IN THE SCHOOL OF MEDICINE:**

Responsible for: 15 staff who support 750 students enrolled in 7 PhD programs, 8 Master's programs, 4 Certificate programs and the MD/PhD program.

**Major Achievements:**

- Created 3 new successful PhD programs (all accredited):
  - Cancer Biology
  - Clinical Psychology
  - Biomedical Sciences (replaced 7 department-based PhD with innovative, interdisciplinary program)
- Created DMD/PhD in collaboration with School of Dentistry
- Developed Mentorship Academy to train faculty and students in mentorship skills (over 450 faculty trained, as well as 2 cohorts of PhD students)
- Developed policies that decreased time to degree for PhD students by one year (currently 5.25 years)
- Created and staffed T32 office to support all institutional NIH training grants, leading to 3 new training grants from the NIH (Quantitative Biosciences, Physiology and Pharmacology, Experimental Therapeutics in Cancer Training Program)
- Developed an office for data collection/reporting on applications, admissions, student census, time to degree and career outcomes for all graduate programs.
- Developed a policy for the SOM to fill the stipend gap (difference between OHSU and federal stipend), expanding eligibility for students to be supported on training grants.

**Key Outcomes:**

- 30% PhD graduates remain in academia as faculty 15 years post-graduation (better than national data)
- Time to degree for PhD decreased 1 full year (from 6.25 years in 2006 to 5.25 years in 2023)
- Serving State of Oregon:
  - 50% PhD graduates remain in Oregon after graduation
  - 60% of MS students are from Oregon
  - 76% of students in Healthcare MBA are from Oregon
- Instituted policies that increased diversity of student body from 2 to 25%
- PhD applications have steadily increased (21% increase last year)

**SERVICE:**

**Associate Editor:** American Journal Respiratory and Critical Care Medicine (1999-2004)

**Editor:** British Journal of Pharmacology (1993-1998)

**Editorial Board:** American Journal of Respiratory Cell and Molecular Biology (2010-2020)

**External Advisory Board: Center of Excellence in Environmental Toxicology, Penn State** (2007-current)

**Chair of External Advisory Board: Center of Excellence in Environmental Toxicology, Penn State** (2021-current)

**NIH Study Section:**

SBIR study section member (1998-2000)

NIH ad Hoc Reviewer Special Emphasis Panel (2011-2012, 2015, 2016, 2019, 2020)

Lung Injury, Repair, and Remodeling ad hoc (2002, 2004-6)

Lung Cellular, Molecular Immunobiology ad hoc (2000, 2002, 2004-6)

Lung Cellular, Molecular Immunobiology study section member (2008-2012)

Assorted ad hoc, program project grants, training grants, research grants (2002-2024) average one/year

Chair NIH Study Section Ad Hoc: 2025

**Review Grants for Wellcome Trust:** 2010 and 2014

**International Eosinophil Society:**

Steering Committee 2018-2022

Organized Annual Conference 2019

President-Elect 2023-2025

**President: 2025-2027**

**Member Graduate Research Education and Training (GREAT) Steering Committee: 2020-2026****PEER REVIEWER:**

American Journal of Respiratory & Critical Care Medicine  
 American Journal of Respiratory Cell & Molecular Biology  
 American Journal Physiology  
 British Journal of Pharmacology  
 European Journal of Pharmacology  
 FASEB  
 Journal Allergy & Clinical Immunology  
 Journal Applied Physiology  
 Journal Clinical Investigations  
 Journal Pharmacology & Experimental Therapeutics  
 Nature

**Complete PUBLICATIONS: 1,930**

These include not only my original research but also over 1,700+ peer-reviewed journal articles on CAS numbered compounds, published between 2015-2026 as part of my contributions to the Expert Panel for the Research Institute for Fragrance Materials (RIFM).

**131 PEER REVIEW JOURNAL ARTICLES describing my primary research** (search for 'Fryer AD, not RIFM' on PubMed)

1. Machin PJ, Hurst DN, Bradshaw RM, Blaber LC, Burden DT, **Fryer AD**, Melarange RA, Shivdasani C. (1983)  $\beta$ 1-selective adrenoceptor antagonists .2.4-ether-linked phenoxy-propanolamines. J Med Chem 26:1570-1576.

2. **Fryer AD**, Maclagan J (1984) Muscarinic inhibitory receptors in pulmonary parasympathetic nerves in the guinea pig. Br J Pharmacol 83:973-978.

3. Blaber LC, **Fryer AD** \* (1985) The response of the cat airways to histamine in vivo and in vitro. Br J Pharmacol 84:309-316. \* I would have been the first author but journal policy was to list authors alphabetically at this time.

4. Blaber LC, **Fryer AD** \*, Maclagan J (1985) Neuronal muscarinic receptors attenuate vagally induced contraction of feline bronchial smooth muscle. Br J Pharmacol 86:723-728. \* I would have been the first author but journal policy was to list authors alphabetically at this time.

5. Faulkner D, **Fryer AD**\*, Maclagan J (1986) Post-ganglionic muscarinic inhibitory receptors in pulmonary parasympathetic nerves in the guinea pig. Br J Pharmacol 88:181-188. \* I would have been the first author but journal policy was to list authors alphabetically at this time.

6. **Fryer AD**, Maclagan J (1987) Pancuronium and gallamine are antagonists for pre- and post-junctional muscarinic receptors in the guinea-pig lung. Naunyn-Schmiedeberg's Archives of Pharmacology 335:367-371.

7. **Fryer AD**, Maclagan J (1987) Ipratropium bromide potentiates bronchoconstriction induced by vagal nerve stimulation in the guinea pig. Eur J Pharmacol 139:187-191.

8. Maclagan J, **Fryer AD**, Faulkner D (1989) Identification of M1 muscarinic receptors in pulmonary sympathetic nerves using pirenzepine. Br J Pharmacology 97:499-505.

9. Lee NH, **Fryer AD**, Forray C, El-Fakahany EE (1989) Different mechanisms of antagonism by methoctramine of two neuronal muscarinic receptor mediated second messenger responses. J Pharmacol and Expt Therapeutics 251:992-999.

10. **Fryer AD**, El-Fakahany EE (1989) An endogenous factor induces heterogeneity of binding sites of selective muscarinic receptor antagonists in rat heart. Membrane Biochem 8:127-132.

11. **Fryer AD**, El-Fakahany EE, Jacoby DB. (1990) Parainfluenza virus type 1 reduces the affinity of agonists for muscarinic receptors in guinea-pig lung and heart. Eur J Pharmacol 181:51-58.

12. **Fryer AD**, El-Fakahany EE (1990) Identification of three muscarinic receptor subtypes in rat lung using binding studies with selective antagonists. *Life Sciences* 47:611-618.

*Peer Reviewed Journal Articles Continued*

13. **Fryer AD** & Jacoby DB. (1991) Parainfluenza virus infection damages inhibitory M2 muscarinic receptors on pulmonary parasympathetic nerves in the guinea pig. *Br J Pharmacol* 102: 267-271.

14. **Fryer AD** & Wills-Karp M (1991) Dysfunction of M2 muscarinic receptors in pulmonary parasympathetic nerves after antigen challenge. *J. Appl Physiol* 71: 2255-2261.

15. Fernandes L, **Fryer AD**, Hirshman CA (1992) M2 muscarinic receptors inhibit isoproterenol-induced relaxation of canine airway smooth muscle. *J. Pharmacol. Exper. Therapeutics*, 262:119-126.

16. **Fryer AD** & Jacoby DB (1992) Function of pulmonary M2 muscarinic receptors in antigen challenged guinea pigs is restored by heparin and poly-l-glutamate. *J Clin Invest*, 90: 2292-2298Peer

17. **Fryer AD** & Okanlami OA (1993) Neuronal M2 muscarinic receptor function in guinea-pig lungs is inhibited by indomethacin. *Am. Rev Respir Dis*, 147: 560-565.

18. Jacoby DB, Gleich GJ, & **Fryer AD**. (1993) Human eosinophil major basic protein is an endogenous allosteric antagonist at the inhibitory muscarinic M2 receptor. *J Clin Invest*, 91:1314-1318.

19. **Fryer AD** & Jacoby DB. (1993) Effects of inflammatory cell mediators on M2 muscarinic receptors in the lungs. *Life Sciences* 52:529-536

20. Schultheis AH, Bassett DJP & **Fryer AD**. (1994) Ozone-induced airway hyperresponsiveness and loss of neuronal M2 muscarinic receptor function. *J Appl Physiol*, 76:1088-1097

21. **Fryer AD**, Yarkony KA & Jacoby DB (1994) The effect of leukocyte depletion on pulmonary M2 muscarinic receptor function in parainfluenza virus infected guinea pigs. *Br. J. Pharmacol*, 112:588-594.

22. Gambone LM, Elbon CL. & **Fryer AD**. (1994) Ozone-induced loss of neuronal M2 muscarinic receptor function is prevented by cyclophosphamide. *J. Appl Physiol* 77:1492-1499.

23. Elbon CL, Jacoby DB, & **Fryer AD**. (1995) The function of pulmonary M2 muscarinic receptors in antigen challenged guinea pigs is protected by pretreatment with antibody to IL-5. *Am J Respir Cell and Mol Bio*. 12: 320-328.

24. Olubunmi AO, **Fryer AD**, & Hirshman C, (1996) Interaction of non-depolarizing muscle relaxants with M2 and M3 muscarinic receptors in guinea-pig lung and heart. *Anesthesiology*. 84:155-161.

25. Kahn RM, Olubunmi OA, Jacoby DB, **Fryer AD**. (1996) Viral infection induces dependence of neuronal M2 muscarinic receptors on cyclooxygenase in guinea pig lung. *J. Clin Invest*. 98: 299-307.

26. **Fryer AD**, Elbon CL, Kim AL, Xiao HQ, Levey AI, Jacoby DB. (1996) Primary cultures of post-ganglionic parasympathetic nerves in the lungs express functional M2 muscarinic receptors. *Am J Respir Cell and Mol Bio* 15:716-725.

27. **Fryer AD**, Costello RW, Lobb RR, Tedder TF, Bochner BS. (1997) Antibody to VLA4 protects neuronal M2 receptors in antigen challenged guinea pigs. *J Clin Invest* 99:2036-2044.

28. **Fryer AD**, Huang YC, Rao G, Jacoby DB, Mancilla E, Whorton R, Piantadosi C, Kennedy T, Hoidal, J. (1997) Selective O-desulfation produces non anticoagulant heparin that retains pharmacologic activity in the lung. *J Pharm Expt Thera*. 282:208-219.

29. Costello RW, Schofield BH, Gleich GJ, Kephardt G, Jacoby DB, **Fryer AD**. (1997) Localization of eosinophils to airway nerves and the effect on neuronal M2 muscarinic receptor function. *Am J Physiol*. 273:L93-L103.

30. Belmonte KE, Jacoby DB, **Fryer AD**. (1997) Increased function of inhibitory neuronal M2 muscarinic receptors in diabetic rat lungs. *Br. J. Pharmacol* 121:1287-1294.
31. Schulman SR, Canada AT, **Fryer AD**, Winsett DW, Costa DL. (1997) Airway hyperreactivity produced by short-term exposure to hyperoxia in neonatal guinea pigs. *Am J Physiology* 270: L1211-1216.

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32. Evans CE, **Fryer AD**, Jacoby DB, Gleich GJ, Costello RW. (1997) Pretreatment with an antibody to eosinophil major basic protein prevents hyperresponsiveness by protecting neuronal M2 muscarinic receptors in antigen challenged guinea pigs. *J Clin Invest* 100:2254-2262.
33. Costello, RW, **Fryer AD**, Belmonte KE, Jacoby DB (1998) Effects of tachykinin NK1 receptor antagonists on vagal hyperreactivity and neuronal M2 muscarinic receptor function in antigen challenged guinea pigs. *Br. J. Pharmacology* 124:267-276.
34. Jacoby DB, Xiao HQ, Lee NH, Chan-Li Y, **Fryer AD**. (1998) Virus and interferon induced loss of inhibitory M2 muscarinic receptor function and gene expression in guinea-pig airway parasympathetic neurons. *J Clin Invest.* 102:242-248.
35. Belmonte KE, **Fryer AD**, Costello RW. (1998) Role of insulin in antigen induced airway eosinophilia and neuronal M2 muscarinic receptor dysfunction. *J Appl Physiol* 85:1708-1718
36. **Fryer AD**, Adamko DJ, Yost BE, & Jacoby DB. (1999) Effects of inflammatory cells on neuronal M2 muscarinic receptor expression and function in the lungs. *Life Sciences* 64:449-455.
37. Costello RW, Evans CM, Yost BL, Belmonte KE, Gleich GJ Jacoby DB, **Fryer AD**. (1999) Antigen induced hyperreactivity to histamine: the role of the vagus nerves and eosinophils. *Am J Physiol* 276: L709-714.
38. Yost BL, Gleich GJ & **Fryer AD**. (1999) Ozone induced hyperresponsiveness and blockade of M2 muscarinic receptors by eosinophil major basic protein. *J Appl Physiol.* 87:1272-1278.

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39. Adamko, DA, Yost BL, Gleich GJ, **Fryer AD**, and DB Jacoby. (1999) Eosinophils Mediate Virus Induced Airway Hyperresponsiveness and M2 Muscarinic Receptor Dysfunction in Sensitized Guinea Pigs. *J Expt Med* 190:1465-1477.
40. Jacoby DB, Yost BL, Elwood T, **Fryer AD**. (2000) Effects of neurokinin receptor antagonists in virus infected airway. *Am J Physiol Lung Cell Mol Physiol* 279: L59-L65.
41. Evans CE, Belmonte KE, Gleich GJ, Costello RW, Jacoby DB, **Fryer AD**. (2000) Substance P induced M2 receptor dysfunction and airway hyperreactivity via neurokinin-1 receptor mediated eosinophil degranulation. *Am J Physiol* 279: L477-L486.
42. Golkar L, Yarkony KA, **Fryer AD**. (2000) Inhibition of neuronal M2 muscarinic receptor function in the lungs by extracellular nitric oxide. *Br J Pharmacol* 131:312-318.
43. Jacoby DB, Yost BL, Kumaravel B, Chan-Li Y, Xiao HQ, Kawashima K, **Fryer AD**. (2001) Glucocorticoid treatment increases inhibitory M2 muscarinic receptor expression and function in the airways. *Am J Respir Cell Mol Biol.* 2001 Apr 1;24(4):485-491.
44. Evans CE, Jacoby DB, **Fryer AD**. (2001) Effects of dexamethasone on antigen-induced airway eosinophilia and M2 receptor dysfunction. *Am J Respir Crit Care Med.* 163: 1484-1492.
45. Zhou C, **Fryer AD**, Jacoby DB. (2001) Structure of the M2 muscarinic acetylcholine receptor gene and its promoter. *Gene.* 271;87-92.

46. Coulson FR, Jacoby DB, **Fryer AD**. (2002) Increased function of inhibitory neuronal M2 muscarinic receptors in trachea and ileum of diabetic rats. *Br J Pharmacol* 135:1355-1362.
47. Bowerfind WML, **Fryer AD**, Jacoby DB. (2002) Double-stranded RNA causes airway hyperreactivity and neuronal M2 muscarinic receptor dysfunction. *J Applied Physiology* 92:1417-1422.
48. Sawatzky DA, Kingham PJ, Court E, Kumaravel B, **Fryer AD**, Jacoby DB, McLean WG, Costello RC. (2002) Eosinophil adhesion to cholinergic nerves via ICAM-1 and VCAM-1 and associated eosinophil degranulation. *Am J Physiology* 282: L1279-L1288.

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49. Adamko DJ, **Fryer AD**, Bochner BS, Jacoby DB. (2003) CD8+ T lymphocytes in viral hyperreactivity and M2 muscarinic receptor dysfunction. *Am J Respir Critical Care Medicine* 167:550-556.
50. Moreno L, Jacoby DB, **Fryer AD**. (2003) Dexamethasone prevents virus-induced hyperresponsiveness by multiple mechanisms. *Am J Physiol, Lung Cell Mol.* 285:L451-L455.
51. Kingham PJ, McLean WG, Walsh MT, **Fryer AD**, Gleich GJ and Costello RW. (2003) Eosinophil-mediated nerve remodeling: The role of reactive oxygen species and p38 MAP kinase *Am J Physiol, Lung Cell Mol* 282: L1279-L1288.
52. Coulson FR, Jacoby DB, **Fryer AD**. (2004) Insulin regulates neuronal M2 receptor function in ileum of diabetic rats. *J Pharmacol Expt Thera.* 308:1-7.
53. **Fryer AD**, Lein PL, Howard AS, Yost BL, Jett DA. (2004) Mechanisms of organophosphate insecticide-induced airway hyperreactivity. *Am J Physiol* 286:L963-9.
54. Lee AM, **Fryer AD**, van Rooijen N, Jacoby DB. (2004) Virus induced airway hyperresponsiveness and neuronal M2 muscarinic receptor dysfunction are mediated by macrophages. *Am J Physiol Lung Cell Mol Physiol.* 286:L1255-9
55. Lein PL, **Fryer AD** (2005) Organophosphorus Insecticides Induce Airway Hyperreactivity by Decreasing Neuronal M2 Muscarinic Receptor Function Independent of Acetylcholinesterase Inhibition. *Toxicological Sciences* 83:166-176.
56. Rangasamy T, Guo J, Mitzner WA, Roman J, Singh A, **Fryer AD**, Yamamoto M, Kensler TW, Tuder RM, Georas SN, Biswal S. (2005) Disruption of Nrf2 enhances susceptibility to severe airway inflammation and asthma in mice. *J Expt Medicine.* 202:47-49.
57. Yost BL, Gleich GJ, Jacoby DB, **Fryer AD** (2005) Multiple roles of eosinophils in long term hyperreactivity following ozone. *Am J Physiol* 289:L627-535.
58. **Fryer AD**, Stein LH, Nie Z, Curtis DE, Evans CM, Hodgson ST, Jose PJ, Belmonte KE, Fitch E, Jacoby DB. (2006) Neuronal expression of eotaxin in airway hyperreactivity and M2 muscarinic receptor dysfunction. *J Clin Invest.* 116;228-236.
59. Verboet NG, Lorton JK, Jacoby DB, **Fryer AD**. (2007) Atropine pretreatment enhances airway hyperreactivity in antigen challenged guinea pigs through an eosinophil dependent mechanism. *Am J Physiol.* 292:L1126-35
58. Nie Z, Nelson CS, Jacoby DB, **Fryer AD** (2007) Expression and regulation of ICAM on airway parasympathetic nerves. *J Allergy Clinical Immunology.* 119:1415-22.
59. Proskocil BJ, Bruun DA, Lorton JK, Blensly KC, Jacoby DB, Lein PJ, **Fryer AD**. (2008) Antigen sensitization influences organophosphorus pesticide-induced airway hyperreactivity. *Environ Health Perspect.* 116 (3):381-8.

60. Verhein KC, Jacoby DB, **Fryer AD**. (2008) IL-1 Receptors Mediate Persistent, but Not Acute, Airway Hyperreactivity to Ozone in Guinea pigs. *Am J Respir Cell Mol Biol*. 39:730-8.
61. Nie Z, Jacoby DB, **Fryer AD** (2009) Etanercept prevents airway hyperresponsiveness by protecting neuronal M2 muscarinic receptors in antigen challenged guinea pigs. *Br J Pharmacology*;156:201-10.
62. Verbout NG, Jacoby DB, Gleich GJ, **Fryer AD**. (2009) Atropine-enhanced, antigen challenge-induced airway hyperreactivity in guinea pigs is mediated by eosinophils and nerve growth factor. *Am J Physiol*. 297:L228-37.
63. Moreno-Vinasco L, Verbout NG, **Fryer AD**, Jacoby DB. (2009) Retinoic acid prevents virus-induced airway hyperreactivity and M2 receptor dysfunction via anti-inflammatory and antiviral effects. *Am J Physiol* 297:L340-6. PMID: PMC2742790
64. Proskocil BJ, Bruun DA, Thompson CM, **Fryer AD** and Lein PJ (2010) Organophosphorus Pesticides Decrease M2 Muscarinic Receptor Function in Guinea Pig Airway Nerves via Indirect Mechanisms. *PLOS One* May 10;5(5):e10562. doi: 10.1371/journal.pone.0010562. PMID: PMC2866713

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65. Verhein KC, Hazari MS, Moulton BC, Jacoby IW, Jacoby DB, **Fryer AD** (2011) Three days after a single exposure to ozone, the mechanism of airway hyperreactivity is dependent on substance P and nerve growth factor. *Am J Physiol Lung Cell Molecular Physiology* 300:L176-L184 PMID: PMC3043818
66. Kauffman E, **Fryer AD**, Jacoby DB (2011) Toll-like receptor 7 agonists are potent and rapid bronchodilators in guinea pigs. *J Allergy Clinical Immunology* 127:462-469 PMID: PMC3066064
67. Grodzki AC, Ghoga A, Mangini L, **Fryer AD**, Lein PJ (2011) IFN $\gamma$  increases M2 muscarinic receptor expression in cultured sympathetic neurons. *Current Neurobiology* 2:23-29. PMID: PMC3515643
68. Nie Z, Scott GD, Weis PD, Itakura A, **Fryer AD**, Jacoby DB (2011) Role of TNF- $\alpha$  in virus-induced airway hyperresponsiveness and neuronal M2 muscarinic receptor dysfunction *Br J Pharmacol* 164:444-452 PMID: PMC3188913
69. Foster EL, Simpson EL, Fredrikson LJ, Lee JJ, Lee NA, **Fryer AD**, Jacoby DB. (2011) Eosinophils increase neuron branching in human and murine skin and in vitro. *PLoS One*. 2011;6(7):e22029. PMID: PMC3140999
70. Belsito D, Bickers D, Bruze M, Calow P, Dagli ML, **Fryer AD**, Greim H, Miyachi Y, Saurat JH, Sipes IG. THE RIFM EXPERT PANEL (2011) A toxicological and dermatological assessment of macrocyclic ketones when used as fragrance ingredients The RIFM Expert Panel. *Food Chem Toxicol*. Dec;49 Suppl 2:S126-41. Epub 2011 Jul 23.
71. Belsito D, Bickers D, Bruze M, Calow P, Dagli ML, **Fryer AD**, Greim H, Miyachi Y, Saurat JH, Sipes IG. THE RIFM EXPERT PANEL (2011) A toxicologic and dermatologic assessment of cinnamyl phenylpropyl materials when used as fragrance ingredients. *Food Chem Toxicol*. Dec;49 Suppl 2:S256-67. Epub 2011 Jul 28
72. Belsito D, Bickers D, Bruze M, Calow P, Dagli ML, **Fryer AD**, Greim H, Miyachi Y, Saurat JH, Sipes IG. THE RIFM EXPERT PANEL (2011) A toxicological and dermatological assessment of macrocyclic lactone and lactide derivatives when used as fragrance ingredients. *Food Chem Toxicol*. Dec;49 Suppl 2:S126-41. Epub 2011 Jul 23.
73. Buels KS, Jacoby DB, **Fryer AD** (2012) Non-bronchodilating mechanisms of tiotropium prevent airway hyperreactivity in a guinea pig model of allergic asthma. *Br J Pharmacol*. 165:1501-1514. PMID: PMC3372733

74. Nie Z, **Fryer AD**, Jacoby DB.  $\beta(2)$ -Agonists Inhibit TNF- $\alpha$ -Induced ICAM-1 Expression in Human Airway Parasympathetic Neurons. PLoS One. 2012;7(9):e44780. doi: 10.1371/journal.pone.0044780. Epub 2012 Sep 25. PMID: PMC3458032
75. Belsito D, Bickers D, Bruze M, Calow P, Dagli ML, **Fryer AD**, Greim H, Miyachi Y, Saurat JH, Sipes IG. THE RIFM EXPERT PANEL (2012) A toxicological and dermatological assessment of aryl alkyl alcohols when used as fragrance ingredients. Food Chem Toxicol. 2012 Sep;50 Suppl 2:S269-313
76. Belsito D, Bickers D, Bruze M, Calow P, Dagli ML, **Fryer AD**, Greim H, Miyachi Y, Saurat JH, Sipes IG. THE RIFM EXPERT PANEL (2012) A toxicological and dermatological assessment of aryl alkyl alcohol simple acid ester derivatives when used as fragrance ingredients. Food Chem Toxicol. 2012 Mar 9.
77. Belsito D, Bickers D, Bruze M, Calow P, Dagli ML, **Fryer AD**, Greim H, Miyachi Y, Saurat JH, Sipes IG, Api AM. THE RIFM EXPERT PANEL (2012) A toxicologic and dermatologic assessment of cyclopentanones and cyclopentenones when used as fragrance ingredients. Food Chem Toxicol. 2012 Oct;50 Suppl 3:S517-56. doi: 10.1016/j.fct.2012.04.019. Epub 2012 May 2.
78. Scott GD, **Fryer AD**, Jacoby DB. (2013) Quantifying Nerve Architecture in the Mouse and Human Airway Using Three-Dimensional Computational Mapping. Am J Respir Cell Mol Biol. 2013 Jan;48(1):10-6 PMID: PMC3547082
79. Proskocil BJ, Bruun DA, Jacoby DB, van Rooijen N, Lein PJ, **Fryer AD**. (2013) Macrophage TNF $\alpha$  mediates parathion-induced airway hyperreactivity in guinea pigs. Am J Physiol Lung Cell Mol Physiol. 2013 Apr 15;304(8):L519-29. doi: 10.1152/ajplung.00381.2012. Epub 2013 Feb 1 PMID: PMC3625991
80. Drake MG, Evans SE, Dickey BF, **Fryer AD**, Jacoby DB (2013) TLR2/6 and TLR9 Agonists Suppress Viral Replication but not Airway Hyperreactivity in Guinea Pigs. Am J Respir Cell Mol Biol. 2013 Jun;48(6):790-6. doi: 10.1165/rcmb.2012-0498OC75. PMID: PMC3727870
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81. Drake MG, Scott GD, Proskocil BJ, **Fryer AD**, Jacoby DB, Kaufman EH (2013) Toll-like receptor 7 rapidly relaxes human airways Am J Respir Crit Care Med. 2013 Sep 15;188(6):664-72. doi: 10.1164/rccm.201303-0442OC. PMID:PMC3826186
82. Verhein KC, Salituro FG, Ledebor MW, **Fryer AD**, Jacoby DB. (2013) Dual p38/JNK mitogen activated protein kinase inhibitors prevent ozone-induced airway hyperreactivity in guinea pigs. PLoS One. 2013 Sep 18;8(9):e75351. doi: 10.1371/journal.pone.0075351. eCollection 2013. PMID:PMC3776780
83. Belsito D, Bickers D, Bruze M, Calow P, Dagli ML, **Fryer AD**, Greim H, Miyachi Y, Saurat JH, Sipes IG. (2013) A toxicological and dermatological assessment of alkyl cyclic ketones when used as fragrance ingredients. RIFM Expert Panel. Food Chem Toxicol. 2013 Dec;62 Suppl 1:S1-44. doi: 10.1016/j.fct.2013.09.033.
84. Scott GD, Blum ED, **Fryer AD**, Jacoby DB (2014). Tissue optical clearing, three-dimensional imaging, and computer morphometry in whole mouse lungs and human airways. Am J Respir Cell Mol Biol. 2014 Jul;51(1):43-55. doi: 10.1165/rcmb.2013-0284OC PMID: PMC4091855
85. Nie Z, Jacoby DB, **Fryer AD**. (2014) Hyperinsulinemia potentiates airway responsiveness to parasympathetic nerve stimulation in obese rats. Am J Respir Cell Mol Biol. 2014 Aug;51(2):251-61. doi: 10.1165/rcmb.2013-0452OC. PMID: PMC4148040
86. Rynko AE, **Fryer AD**, Jacoby DB (2014) Interleukin-1 $\beta$  mediates virus-induced m2 muscarinic receptor dysfunction and airway hyperreactivity. Am J Respir Cell Mol Biol. 2014 Oct;51(4):494-501. doi: 10.1165/rcmb.2014-0009OC. PMID: PMC4189486

87. Api AM, Belsito D, Bruze M, Cadby P, Calow P, Dagli ML, Dekant W, Dent M, Ellis G, **Fryer AD**, Fukayama M, Griem P, Hickey C, Kromidas L, Lalko JF, Liebler DC, Miyachi Y, Politano VT, Renskers K, Ritacco G, Salvito D, Schultz TW, Sipes IG, Smith B, Vitale D, Wilcox DK. (2014) Criteria for the Research Institute for Fragrance Materials, Inc. (RIFM) safety evaluation process for fragrance ingredients. *Food Chem Toxicol.* 2014 Dec 12. pii: S0278-6915(14)00481-5. doi: 10.1016/j.fct.2014.11.014.
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89. Proskocil BJ, Bruun DA, Garg JA, Villagomez CC, Jacoby DB, Lein PJ, **Fryer AD**. (2015) The Influence of Sensitization on Mechanisms of Organophosphorus Pesticide-Induced Airway Hyperreactivity. *Am J Respir Cell Mol Biol.* 2015 Nov;53(5):738-47
90. Drake MG, Bivins-Smith ER, Proskocil BJ, Nie Z, Scott GD, Lee JJ, Lee NA, **Fryer AD**, Jacoby DB. (2016). Human and Mouse Eosinophils Have Antiviral Activity Against Parainfluenza Virus. *Am J Respir Cell Mol Biol.* 2016 Sep;55(3):387-94. doi: 10.1165/rcmb.2015-0405OC. PMID: PMC5023029
91. Wicher SA, Jacoby DB, **Fryer AD** (2017) Newly divided eosinophils limit ozone-induced airway hyperreactivity in nonsensitized guinea pigs. *Am J Physiol Lung Cell Mol Physiol.* 312(6):L969-L982. PMID:PMC5495948
92. Wicher SA, Lawson K, Jacoby DB, **Fryer AD**, Drake MG (2017) Ozone-induced eosinophil recruitment to airways is altered by antigen sensitization and tumor necrosis factor- $\alpha$  blockade. *Physiol Rep.* Dec;5(24). pii: e13538. doi: 10.14814/phy2.13538. PMID: PMC5742702
93. **Fryer AD**, Jacoby DB Wicher SA (2017) Protective role of eosinophils and TNF- after ozone. *Res Rep Health Eff Inst.* 2017 Mar;(191):1-41. PMID: 2965924
94. Drake MG, Scott GD, Blum ED, Lebold KM, Nie Z, Lee JJ, **Fryer AD**, Costello RW, Jacoby DB. (2018) Eosinophils increase airway sensory nerve density in mice and in human asthma. (2018) *Sci Transl Med.* 2018 Sep 5;10(457) PMID: PMC6592848

*Peer Reviewed Journal Articles Continued*

95. Proskocil BJ, Grodzki ACG, Jacoby DB, Lein PJ, **Fryer AD**. (2019) Organophosphorus Pesticides Induce Cytokine Release from Differentiated Human THP1 Cells. *Am J Respir Cell Mol Biol.* 61(5):620-630. doi: 10.1165/rcmb.2018-0257OC.
96. Nie Z, Maung JN, Jacoby DB, **Fryer AD**. (2019) Lung eosinophils increase vagus nerve-mediated airway reflex bronchoconstriction in mice. *Am J Physiol Lung Cell Mol Physiol.* 2020 Feb 1;318(2):L242-L251. doi: 10.1152/ajplung.00040.2019. Epub 2019 Nov 20. PMID: PMC7052679
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98. Pincus AB, Adhikary S, Lebold KM, **Fryer AD**, Jacoby DB (2020) Optogenetic Control of Airway Cholinergic Neurons In Vivo. *Am J Respir Cell Mol Biol.* 2020 Apr;62(4):423-429. doi: 10.1165/rcmb.2019-0378MA PMID: PMC7110977
99. Marsh BJ, **Fryer AD**, Jacoby DB, Drake MG (2020) Transient receptor potential ankyrin-1 causes rapid bronchodilation via nonepithelial PGE<sub>2</sub>. *Am J Physiol Lung Cell Mol Physiol.* 2020 May 1;318(5):L943-L952. doi: 10.1152/ajplung.00277.2019. Epub 2020 Apr 1. PMID: PMC7272731
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Respir Crit Care Med. 2021 Feb 1;203(3):348-355. doi: 10.1164/rccm.201912-2347OC. PMID: PMC7874308

101. Proskocil BJ, **Fryer AD**, Jacoby DB, Nie Z. (2021) Pioglitazone prevents obesity-related airway hyperreactivity and neuronal M<sub>2</sub> receptor dysfunction. Am J Physiol Lung Cell Mol Physiol. Jul 1;321(1):L236-L247. PMID: PMC8321847

102. Proskocil BJ, Wai K, Lebold KM, Norgard MA, Michaelis KA, De La Torre U, Cook M, Marks DL, **Fryer AD**, Jacoby DB, Drake MG (2021) TLR7 is expressed by support cells, but not sensory neurons, in ganglia. J Neuroinflammation. 2021 Sep 16;18(1):209 PMID: PMC8447680

103. Calco GN, Proskocil BJ, Jacoby DB, **Fryer AD**, Nie Z. (2021) Metformin prevents airway hyperreactivity in rats with dietary obesity Am J Physiol Lung Cell Mol Physiol. 2021 Dec 1;321(6):L1105-L1118. doi: 10.1152/ajplung.00202.2021. Epub 2021 Oct 20 PMID: PMC8715020

104. Pincus AB, Huang SJ, Lebold KM, De La Torre U, Proskocil BJ, Drake MG, Nakai H, **Fryer AD**, Jacoby DB. (2022) Multicolor labeling of airway neurons and analysis of parasympathetic heterogeneity Sci Rep. 2022 Mar 23;12(1):5006. doi: 10.1038/s41598-022-08655-6. PMID: PMC8943012

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107. Calco GN, Alharithi YJ, Williams KR, Jacoby DB, **Fryer AD**, Maloyan A, Nie Z. (2023) Maternal high-fat diet increases airway sensory innervation and reflex bronchoconstriction in adult offspring (20223) Am J Physiol Lung Cell Mol Physiol. 2023 Jul 1;325(1):L66-L73. doi: 10.1152/ajplung.00115.2023. Epub 2023 Jun 6. PMID: PMC10390047

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#### *Peer Reviewed Journal Articles Continued*

109. Proskocil BJ, Bash GN, Jacoby DB, **Fryer AD**, Nie Z. (2024) Eosinophils prevent diet-induced airway hyperresponsiveness in mice on a high-fat diet Am J Physiol Lung Cell Mol Physiol. 2024 Dec 1;327(6):L867-L875. doi: 10.1152/ajplung.00213.2024. Epub 2024 Sep 24. PMID: PMC11684943

110. Pincus AB, Pierce AB, Kappel N, Lebold KM, Drake MG, **Fryer AD**, Jacoby DB. (2025) Parasympathetic Airway Hyperreactivity Is Enhanced in Acute but Not Chronic Eosinophilic Asthma Mouse Models Am J Respir Cell Mol Biol. 2025 Jun;72(6):698-707. doi: 10.1165/rcmb.2024-0360OC. PMID: PMC12143406

111. Williams KR, Bright HA, **Fryer AD**, Jacoby DB, Nie Z. (2025) Maternal high-fat diet programs offspring airway hyperinnervation and hyperresponsiveness. JCI Insight Jan 9;10(1):e181070. doi: 10.1172/jci.insight.181070. PMID: PMC11721309

#### **REVIEW ARTICLES AND EDITORIALS (32)**

1. Jacoby DB & **Fryer AD** (1990) Abnormalities in the neural control of smooth muscle in virus infected airways. *Trends in Pharmacological Sciences* 11:393-395.
2. Jacoby, DB & **Fryer AD** (1991) Virus induced airway hyperresponsiveness- possible involvement of neural mechanisms. *Am Rev Respir Dis* 144:1422-1423.
3. Gleich GJ, Jacoby DB, **Fryer AD**. (1995) Eosinophil-associated inflammation in bronchial asthma: a connection to the nervous system. *Int. Arch. Allergy Immunology* 107: 205-207.
4. Costello RW, Jacoby DB, **Fryer AD** (1998) Pulmonary neuronal M2 muscarinic receptor function in asthma and animal models of hyperreactivity. *Thorax* 53: 613-616.
5. **Fryer AD**, Jacoby DB, (1998) Muscarinic receptors and control of airway smooth muscle. *Am J Respir and Critical Care Medicine* 158: S154-S160.
6. Jacoby DB & **Fryer AD** (1999). Interactions of viral infections with muscarinic receptors. *Clinical and Experimental Allergy*. 29: 00-00.
7. **Fryer AD** (1999). Immunobiology of asthma and rhinitis: Pathogenic factors and therapeutic options. *American Thoracic Society Workshop Summary*. pg 15-16.
8. Costello RW, Jacoby BD, **Fryer AD**. (1999) Muscarinic receptor function in asthma. *Current opinion in cardiovascular. pulmonary and renal investigational drugs*. 4:468-477.
9. Costello RW, Jacoby BD, Gleich GJ, **Fryer AD**. (2000) Eosinophils and airway nerves in asthma. *Histology and Histopathology* 15:861-8.
10. **Fryer AD**, Costello RW, Jacoby DB (2000) Muscarinic receptor dysfunction in asthma. *J. Allergy and Clinical Immunology International*. 12: 63-67.
11. Jacoby DB, Costello RM, **Fryer AD**. (2001) Eosinophil Recruitment to the Airway Nerves. *J Allergy Clin Immunol*. Feb;107(2):211-8.
12. Jacoby DB, **Fryer AD**. (2001) Anticholinergic therapy in airway disease. *Life Sciences*, 68: 2565-2572.
13. Lee AM, Jacoby DB, **Fryer AD**. (2001) Selective muscarinic receptor antagonists for airway disease. *Current Opinion in Pharmacology*. 1: 223-229.
14. **Fryer AD** and Jacoby DB. (2002) Plasticity of cholinergic and tachykinergic nerves; the convergence of the twain. *Am J Physiol Lung Cell Mol* 27: L1-L2.
15. Coulson FR and **Fryer AD**. (2003) Muscarinic receptors and airway disease. *Pharmacol Ther*. 2003 98:59-69.
16. Proskocil BJ, **Fryer AD**. (2005) Beta2-agonist and anticholinergic drugs in the treatment of lung disease. *Proc Am Thorac Soc*. 2005;2(4):305-10; discussion 311-2

*Review Articles and Editorials continued*

17. Abrams P, Andersson KE, Buccafusco JJ, Chapple C, de Groat WC, **Fryer AD**, Kay G, Laties A, Nathanson NM, Pasricha PJ, Wein AJ. (2006) Muscarinic receptors: their distribution and function in body systems, and the implications for treating overactive bladder. *Br J Pharmacol*. 148:565-78.
18. Verhein KC, **Fryer AD**, Jacoby DB (2009) Neural control of airway inflammation. *Curr Allergy Asthma Rep*. 2009 Nov;9(6):484-90.
19. Moulton B and **Fryer AD** (2011). Muscarinic Receptor Antagonists, From Folklore to Pharmacology; Finding Drugs that Actually Work. *Br J Pharmacology*. 163:44-52. PMID: PMC3085867
23. Scott GD, **Fryer AD**. (2012) Role of parasympathetic nerves and muscarinic receptors in allergy and asthma. *Chem Immunol Allergy*. 98:48-69. Epub 2012 Jun 26 PMID: PMC4039300

24. Drake MG, Kaufman EH, **Fryer AD**, Jacoby DB. (2012) The therapeutic potential of toll-like receptor 7 stimulation in asthma. *Inflamm Allergy Drug Targets*. 11(6):484-91 PMID: PMC4049154
25. Buels KS, **Fryer AD**. (2012) Muscarinic receptor antagonists: effects on pulmonary function. *Handb Exp Pharmacol*. 2012;(208):317-41. doi: 10.1007/978-3-642-23274-9\_14. Review PMID: MC4104281
26. Drake MG, Lebold KM, Roth-Carter QR, Pincus AB, Blum ED, Proskocil BJ, Jacoby DB, **Fryer AD**, Nie Z. Eosinophil and airway nerve interactions in asthma. 2018 *J Leukoc Biol*. 104:61-67. PMID: PMC6541210.
27. Rosenberg HF, **Fryer AD**, Munitz A, Bochner BS, Jacoby DB, Levi-Schaffer F, Gleich GJ, Furuta GT, Rothenberg ME, Lacy P, Fulkerson PC, Hogan SP, Ackerman SJ, Foster PS. In Memory and Celebration: Dr. James J. Lee. *Clin Exp Allergy*. 2017 Jul;47(7):980-981. doi: 10.1111/cea.12959.
28. Shaffo FC, Grodzki AC, **Fryer AD**, Lein PJ. Mechanisms of organophosphorus pesticide toxicity in the context of airway hyperreactivity and asthma. 2018. *Am J Physiol Lung Cell Mol Physiol*. Oct 1;315(4):L485-L501. PMID: PMC6230874
29. Pincus AB, **Fryer AD**, Jacoby DB. (2021) Mini review: Neural mechanisms underlying airway hyperresponsiveness. *Neurosci Lett*. 2021 Mar 2;751:135795. doi: 10.1016/j.neulet.2021.135795 PMID: PMC8068501
30. Drake MG, **Fryer AD**, Jacoby DB. (2021) Protective effects of eosinophils against COVID-19: More than an ACE(2) in the hole? *J Allergy Clin Immunol Pract*. 2021 Jun;9(6):2539-2540. PMID: PMC8181741
31. Drake MG, Cook M, **Fryer AD**, Jacoby DB, Scott GD. (2021) Airway Sensory Nerve Plasticity in Asthma and Chronic Cough *Front Physiol*. 2021 Sep 7;12:720538. PMID: PMC8452850
32. Nie Z, **Fryer AD**, Jacoby DB, Drake MG. (2023) Mechanisms of Obesity-related Asthma: Is Insulin Getting on Your Nerves? *Am J Respir Crit Care Med*. 2023 Jan 1;207(1):109-110. doi: 10.1164/rccm.202207-1419LE. PMID: PMC9952872

### **BOOKS (1)**

**Fryer AD**, A Christopoulos and N Nathanson. Editors of Muscarinic Receptors for the Handbook of Experimental Pharmacology published by Springer Verlag. Series Editors: Ganten, D., Page, C.P., Rosenthal, W., Michel, M.C., Beavo, J.A., Busch, A., Karlsson, J. 2012. ISBN-13: 978-3642232732/ ISBN-10: 3642232736

### **BOOK CHAPTERS (17)**

1. Gleich GJ, **Fryer AD**, Jacoby DB. (1993) Eosinophil granule proteins and bronchial hyperreactivity. *Asthma: Physiology, Immunopharmacology and Treatment*. 4th International Symposium. Academic Press Ltd. pp119-129.
2. **Fryer AD** Muscarinic Receptors. (1994) *Asthma and Rhinitis*, eds: W. Busse and S. Holgate. Blackwell Scientific Publications, Boston. pp691-703.
3. **Fryer AD** & Jacoby DB. (1996) Parasympathetic Innervation of the Lungs. *Pulmonary Pharmacology and Therapeutics*. ed: A. Leff. McGraw-Hill. pp 81-98.

### *Book Chapters continued*

4. **Fryer AD** (1997) Cholinergic control of the airways. *Autonomic control of the respiratory system*. editor Peter Barnes. Series editor Prof. G. Burnstock. Harwood Academic Publishers, Reading England. pp59-86.
5. Costello RW & **Fryer AD** (1997) Cholinergic mechanisms in Asthma. *Asthma*, eds: PJ Barnes, MM Grunstein, A Leff, and AJ Woolcock. Lippincott-Raven Press, Philadelphia. pp965-984.

6. **Fryer AD** Costello RW, & Jacoby DB. (1998) Anticholinergic agents. Allergy Principles and Practice. Chapter 48, pgs 668-677 ed F. Adkinson Jr. Mosby-Year Book.
7. Jacoby DB, & **Fryer AD** (1999) Loss of Airway M2 muscarinic receptor function following inflammation and viral infection. Asthma: causes and mechanisms of an epidemic inflammatory disease. eds T. Platts-Mills, Lewis Publishers, Boca Raton. pgs 63-87.
8. **Fryer AD** Costello, RW & Jacoby DB (2000) Muscarinic receptor subtypes and anticholinergic therapy. New and Exploratory Therapeutic Agents for Asthma. eds Z. Diamonte and M. Yeadon. Marcel Dekker Inc. pgs 85-118
9. **Fryer AD** (2000) Muscarinic Receptors. Asthma and Rhinitis 2edition, eds: W. Busse and S. Holgate. Blackwell Scientific Publications, Boston. Chapter 60.
10. Adamko DJ, **Fryer AD**, Jacoby DB. (2001) Dysfunction of prejunctional muscarinic M2 receptors: role of environmental factors. In Muscarinic receptors in Airway disease. Eds: JH Zaagsma. Birkhauser Verlag AG. (pages 107-120)
11. Bowerfind WL, Jacoby DB & **Fryer AD** Anticholinergic agents. (2003) Allergy Principles and Practice. Second Ed. Editor Adkinson Jr. Mosby-Year Book.
12. Lein PL, **Fryer AD** & Higgins D. Cell Culture: Autonomic and Enteric Neurons (2010) In: Squire LR (ed.) Encyclopedia of Neuroscience, volume 2, pp. 625-632. Oxford: Academic Press.
13. **Fryer AD** and Jacoby DB (2009) Cholinergic Mechanisms and Anticholinergic Therapy in Respiratory Diseases. Middleton's Allergy Principles and Practice. 7th Ed. Editors Adkinson, Bochner, Busse, Holgate, Lemanske and Simons. Mosby Elsevier.
14. Buels, K and **Fryer AD** (2012) Muscarinic receptor antagonists: effects on pulmonary function. Chapter in Muscarinic Receptors for the Handbook of Experimental Pharmacology published by Springer Verlag. Series Editors: Ganten, D., Page, C.P., Rosenthal, W., Michel, M.C., Beavo, J.A., Busch, A., Karlsson, J. 2012;208:317-41.
15. Scott GD and **Fryer AD** (2013) Eosinophil and Nerve Interactions. Chapter in Eosinophils in Health and Disease. Editors Helene Rosenberg and Jamie Lee. Academic Press, Elsevier.
16. Buels KS, **Fryer AD**. (2012) Muscarinic receptor antagonists: effects on pulmonary function. Handbook Exp Pharmacol. 2012;(208):317-41. Review. PMID: 22222705
17. Lein PL, **Fryer AD**. Cell Culture: Autonomic and Enteric Neurons In: Squire LR (ed.) Encyclopedia of Neuroscience, Oxford: Academic Press. 2019.

**RESEARCH GRANT PARTICIPATION:** My research has been continuously funded since 1987.

*CURRENT GRANTS:*

NIH R01HL155623 (PI DRAKE)

Role: Investigator

Identifying mechanisms and reversibility of eosinophil induced airway hyperinnervation in asthma

Project Dates: 02/2021-01/2026

Total Award Amount (Including Indirect Costs): \$3,251,305

Objective: To discover new mechanisms of asthma and identify drug targets that will prevent and/or reverse the effects of nerve dysfunction in asthma

R01HL164474 (PI Z NIE)

Role: Investigator

Title: Mechanisms of airway hyperresponsiveness in the offspring of obese mothers

Major Goals: Elucidate mechanisms of airway hyperresponsiveness in offspring of mothers with high BMI

Project/Proposal Start and End Date: 06/2022-04/2026

Total Award Amount (Including Indirect Costs): \$2,365,910

Objective: Elucidate mechanisms of airway hyperresponsiveness in offspring of mothers with high BMI

R01HL163087 (PI Z NIE)

Role: Co-Principal Investigator

Title: Insulin increases nerve mediated bronchoconstriction in obesity related asthma

Project/Proposal Start and End Date: 12/2022-11/2026

Total Award Amount (Including Indirect Costs): \$2,432,071

Objective: To increase our understanding of underlying mechanisms by which obese patients with increased insulin are more prone to severe asthma and facilitate identification of novel therapeutic targets for prevention and treatment of obesity-related asthma

TL1TR002371(PI of TL1 AD FRYER/ PI of CTSA: DH Ellison)

Role: Co-Principal Investigator

Title: Oregon Clinical and Translational Research Institute TL1

Source of Support: National Center for Advancing Translational Sciences/NIH/DHHS

Project/Proposal Start and End Date: 08/2022-07/2027

Total Award Amount (Including Indirect Costs): \$47,064,885

Major Goals: The major goal of OCTRI is to foster research to find better treatments for disease and help find ways to keep people healthy.

R01HL171226 (PI DRAKE)

Role: Investigator

Title: Mechanisms of tachykinergic nerve mediated severe bronchoconstriction and inflammation

Status of Support: Active

Project/Proposal Start and End Date: 06/2024-03/2028

Total Award Amount (Including Indirect Costs): \$3,096,501

Major Goals: To test mechanisms by which increased substance P innervation causes 1) lethal bronchoconstriction, 2) increased inflammation and 3) eosinophil activation and degranulation, producing data that may support a role for tachykinins in severe asthma.

#### PREVIOUS GRANTS:

NIH RO1 HL131525 Insulin modulates parasympathetic nerve control of lungs. 12/2016 - 11/2021

Principal Investigator: AD Fryer

NIH R01 HL 144008 Prenatal control of offspring airway hyperresponsiveness Principal Investigator:

DB Jacoby, Co-investigator: AD Fryer.

NIH R21 AI 152498 Optigenetic approach to airway research. 2021- 2023 Principal Investigator: DB

Jacoby, Co-investigator: AD Fryer.

NIH-NHLB R01 HL113023 Acute airway effects of TLR7 and TLR8 stimulation in health and disease.

4/2012 - 3/2018 PI Jacoby, Co-investigator: AD Fryer

NIH-NIAMS R01 AR061567 Eosinophil nerve interactions in mouse models of dermatitis. 4/2102 -

3/2018 PI Jacoby, Co-investigator: AD Fryer

NIH-NIEHS R01 ES017592 Role of macrophages in organophosphorus pesticide-induced airway

hyperreactivity 2010-2015 Principal Investigators: AD Fryer and PL Lein

NIH-NIEHS RO1:Asthma exacerbation by organophosphate pesticides 2006-2013: Principal Investigator: AD Fryer

Health Effects Institute: Air Pollution and Systemic Inflammation of Autonomic Nerves 2011-2015.

Principal Investigator: AD Fryer

NIH-NHLB R01: Ozone inhibition of neuronal M2 muscarinic receptors. 1996-2011 Principal Investigator: AD Fryer

NIH-NHLB R01: Environmental influences on the vagal control of airways. 1996-2009 Principal Investigator: DB Jacoby, Co-investigator: AD Fryer.

NIH-NHLB R01: Mechanisms of virus-induced hyperreactivity in atopics. 1998-2007 Principal Investigator: DB Jacoby, Co-investigator: AD Fryer

Dept of Defense. Mechanistic studies investigating the role of organophosphate insecticide exposure in the development and exacerbation of asthma. 2002-2005. Principal investigator; AD Fryer and PL Lein.

NIH-NHLB PPG: Mechanisms of inflammation-induced airway hyperreactivity. Principal Investigator: Wayne Mitzner. Project 4. Mechanisms of hyperreactivity in atopic hosts. Principal Investigator AD Fryer.

American Heart Association: Mechanisms of eosinophil recruitment to parasympathetic nerves. 1998-2001, Established Investigator Award. Principal Investigator: AD Fryer

Sepracore Pharmaceuticals: Determine whether S-Albuterol affects hyperreactivity in antigen challenged guinea pigs. 2000-2001. Principal investigator AD Fryer

Center for Indoor Air Research: Virus induced changes in M2 muscarinic receptor function and expression. 1996-2000. Principal Investigator: DB Jacoby, Co-investigator, AD Fryer.

Council for Tobacco Research: Mechanisms of neuronal M2 muscarinic receptor dysfunction in the lung. 1994-1997, Principal Investigator: AD Fryer.

Johns Hopkins Pilot Project: Development of a method to study neuronal muscarinic receptor function in cultured nerve cells. 1994-1995, Principal Investigator: AD Fryer.

Scandipharm: Effect of heparin analogues on neuronal M2 receptor function in antigen-challenged guinea pigs. 1994-1995. Principal Investigator: AD Fryer.

NIH-NHLB FIRST AWARD: Viral enzymes and neuronal muscarinic receptors in lung. 1991-1996. Principal Investigator: AD Fryer.

Council for Tobacco Research: Airway disease and neuronal muscarinic receptors in lung. 1991-1994. Principal Investigator: AD Fryer.

American Lung Association: Allergen-induced dysfunction of airway muscarinic receptors in the lung. 1991-1993 Principal Investigator: AD Fryer.

Johns Hopkins Pilot Project: Neuronal muscarinic receptors and ozone-induced inflammation and hyperreactivity in the lungs. 1990-1991. Principal Investigator: AD Fryer. Previous grants continued:

California Lung Association: Interaction of canine mastocytoma cells and airway smooth muscle. 1987-1988. Principal Investigators: AD Fryer and W Gold.

NIH-NHLB F32: Characterization of muscarinic receptors in the lung. 1987-1989. Principal Investigator: AD Fryer.

### **Selected, INVITED LECTURES/ SCIENCE**

1984 British Thoracic Society, Royal Free Hospital School of Medicine, London, England

1985 Pharmacology Department, Strathclyde University, Glasgow, Scotland

*Invited lectures continued*

1985 Glaxo Group Research Ltd, Ware, Hertfordshire, England

1985 Royal Postgraduate Medical School, Hammersmith Hospital, London, England

- 1985 Pharmacology/Medicinal Chemistry Dept, Organon Pharmaceuticals, Glasgow, Scotland
- 1986 Pharmacology Department, Pfizer Ltd, Sandwich, Kent, England
- 1986 Pharmacology Department, Stuart Pharmaceuticals, Wilmington, Delaware
- 1987 Cardiovascular Research Institute, University of California, San Francisco, California
- 1988 Pulmonary Division, Temple University School of Medicine, Philadelphia, Pennsylvania
- 1989 Pulmonary Division, University of Maryland School of Medicine, Baltimore, Maryland
- 1990 Cardiovascular Research Institute, University of California, San Francisco, California
- 1990 School Veterinary Medicine, Michigan State University, East Lansing, Michigan
- 1991 Anesthesiology Grand Rounds, Johns Hopkins University, Baltimore, Maryland
- 1992 Chair: Poster session muscarinic receptors, American Thoracic Society, Miami, FL
- 1992 Speaker 5<sup>th</sup> International Symposium Subtypes of Muscarinic Receptors, Newport, CA
- 1992 Physiology Department, Wayne State University, Detroit, Michigan
- 1993 Pharmacology Department, Temple University School of Medicine, Philadelphia, PA
- 1993 Speaker American Thoracic Society, San Francisco, CA.
- 1993 Chair: Poster session: Prejunctional control of pulmonary autonomic nerves. American Thoracic Society, San Francisco, CA.
- 1993 Pharmacology of muscarinic receptors in the lungs. Pulmonary Research Group, New York, NY.
- 1994 The effect of age on neuroregulation in asthma. NIH Workshop: Adult vs Childhood Asthma. Bethesda, MD.
- 1994 Research Division, Syntex Pharmaceuticals, Palo Alto, California
- 1995 Dept of Pharmacology and Toxicology, University of West Virginia, Morgantown WV
- 1995 Speaker American Thoracic Society & American Academy of Allergy, Asthma and Immunology, Symposium on Asthma: theory to treatment. Chicago, IL.
- 1995 Chair and speaker: Neuronal Control of Airway Smooth Muscle. American Thoracic Society & American Academy of Allergy, Asthma and Immunology, Symposium on Asthma: theory to treatment. Chicago, IL
- 1996 Department of Pharmacology, Shering Plough Pharmaceuticals, New Jersey
- 1996 Neuropharmacology Seminar, Johns Hopkins University, Baltimore, Maryland
- 1996 Speaker Muscarinic receptor subtypes: Contribution to asthma pathogenesis and potential for therapeutic options. ATS Post graduate course on asthma pathogenesis and therapy, New Orleans, Louisiana.
- 1996 Chair: Poster session: In vivo models of airway inflammation. American Thoracic Society, New Orleans.
- 1997 Pulmonary Division, Washington University, St Louis Missouri
- 1998 Pharmacology Department, Connecticut University, Hartford, Connecticut
- 1998 Symposium Speaker Parasympathetic control of airway smooth muscle. Transatlantic Conference, Lucern, Switzerland.
- 1998 Symposium Speaker Eosinophils mediate hyperreactivity by inhibiting neuronal M2 muscarinic receptor function. American Academy of Allergy Asthma and Immunology, Washington DC
- 1998 Chair and speaker: Session on muscarinic receptors in heart and lung 8th International Symposium on Subtypes of Muscarinic Receptors, Boston, MA
- 1998 Pharmacology muscarinic receptors in the lungs. Pulmonary Research Group, Rutgers, NJ.
- 1999 Pharmacology Department, University of Groningen, The Netherlands
- 1999 Speaker Muscarinic receptor dysfunction in asthma. American Thoracic Society & American Academy of Allergy, Asthma and Immunology, Symposium on Asthma: theory to treatment. Honolulu, Hawaii
- 2000 Speaker Neuroregulation in asthma. NIH Workshop: Mechanisms of severe asthma. Bethesda, MD.
- 2000 Pharmacology Department, Sinai School of Medicine, New York, New York.
- 2001 Toxicology Division, Johns Hopkins University School of Public Health.
- 2001 Biochemistry Department, Johns Hopkins University School of Public Health
- 2001 Department of Medicine, University of Dublin, Ireland.
- 2001 Chair and speaker: Symposium Pharmacology of the airways. American Thoracic Society, San Francisco, CA.

- 2001 Speaker Eosinophil 2001 International Symposium, Banff, Alberta, Canada.  
*Invited lectures continued*
- 2002 Speaker American Academy of Allergy Asthma and Immunology, New York, NY.
- 2002 Speaker Pharmacology of Airway Nerves. IUPHAR, San Francisco, CA
- 2003 Symposium Speaker. International Eosinophil Symposium 2003, Snowmass, Aspen CO.
- 2004 Member International Advisory Board Novartis Pharmaceuticals Muscarinic Receptor Symposium, NY.
- 2004 Chair and Symposium Speaker: Cholinergic nerves and asthma. American Thoracic Society, Orlando, Florida
- 2004 Combination of beta agonists and anticholinergics in treatment of Lung disease. 4<sup>th</sup> Congress on Respiratory Science. Miami, Florida
- 2005 Visiting Scholar. Duke University, University North Carolina and Environmental Protection Agency.
- 2005 Speaker. NIH Workshop: Integrating mechanisms Linking Mind, Brain and Periphery Washington DC.
- 2006 Anesthesiology Department, Oregon Health and Science University.
- 2006 Heart Research Center , Oregon Health and Science University
- 2008 Conference Organizer: 10<sup>th</sup> International Symposium Subtypes of Muscarinic Receptors, San Diego, California.
- 2008 Invited Speaker: 10<sup>th</sup> International Symposium Subtypes of Muscarinic Receptors, San Diego, California.
- 2009 Invited Speaker "Excellence Cluster Cardio-Pulmonary System" Series, Max-Planck Institute, Germany.
- 2009 Invited Speaker, International Eosinophil Symposium, Bruges, Belgium.
- 2010 Invited Speaker, Cardiovascular Medicine, Albany Medical School.
- 2011 Brian J Sproule Lecture, University of Edmonton, Canada
- 2011 Marquam Lecturer, Science for the Public, Portland Oregon
- 2011 Invited Speaker, World Allergy Congress, Cancun Mexico
- 2013 Invited Speaker, International Eosinophil Symposium, London
- 2014 Invited Speaker, Pharmacology Department University of Minnesota
- 2016 Invited Speaker, Pharmacology Department University, California, Davis.
- 2017 Invited Speaker, International Eosinophil Symposium, Sweden
- 2018 Visiting Professor, Mayo Clinic, Rochester, MN
- 2019 Meeting Organizer, International Eosinophil Society, Portland OR
- 2020 Invited Speaker, AAMC Graduate Research and Training, National Meeting, Denver, Colorado
- 2021 Invited Speaker, Northwestern University, Chicago

#### **INVITED PRESENTATIONS/EDUCATION**

- 2018 Western Association Graduate Schools, Invited Speaker: *Curricular Development for a changing Scientific Landscape.*
- 2018 Western Association Graduate Schools, Invited Speaker: *Scrappy Career Outcome Tracking: Towards an Economical and Efficient Methodology for Tracking Career Outcomes for PhD students.*
- 2019 Conference Steering Committee, AAMC Graduate Research and Training, National Meeting, Seattle, WA
- 2019 Invited Speaker GREAT/AAMC meeting. *Design, Implementation, and Evaluation of a Learner-Centered Foundational Doctoral Curriculum.* AAMC Graduate Research and Training, National Meeting, Seattle, WA
- 2022 Invited Speaker, *Building a Mentorship Academy.* Western Association Graduate Schools, Portland, Oregon
- 2024 Session Chair, AAMC Graduate Research and Training, National Meeting, Dallas Texas
- 2024 Invited Speaker, *Creating a Community to Support Mentorship* AAMC Learn, Serve Lead National Meeting, Seattle, WA

## MENTORSHIP

I have mentored many **undergraduate students**, some for summer internships, others for years through the BUILD EXITO (Building Infrastructure Leading to Diversity/Enhance Cross-Disciplinary Infrastructure Training at Oregon) program with Portland State University that was funded by an NIH initiative to develop, implement, and evaluate innovative research training models for undergraduates historically underrepresented in biomedical research careers.

I have also served on many **Dissertation Advisory Committees** and **Dissertation Exam Committees**, these are not listed here.

*mentorship continued*

PhD students (\*co-mentored with Dr Jacoby, Dr Drake or Dr Nie).

**Amy Schultheis** (1990-1992) PhD thesis: *Effect of ozone on inflammatory cell infiltration and airway hyperresponsiveness in the guinea pig*. Current: Research Associate Physics Department at Johns Hopkins University

**Kathryn Yarkony** (1992-1995) PhD thesis: *The role of nitric oxide synthase in pulmonary neuronal M2 muscarinic receptor function*. Current: Research Coordinator Johns Hopkins University

**Kristen Belmonte Slaoui** (1993-1997) PhD thesis: *The role of insulin in function of neuronal M2 muscarinic receptors*. Current: Vice President Tesaro Inc.

**Richard Costello**, BMS, MD (1994-1997) MD Thesis awarded by University of Dublin, Ireland: *'Eosinophil recruitment to airway nerves and effects on vagal neurotransmission'*. Consultant Physician and Professor University Dublin, Ireland. Vice President Royal College of Surgeons, Ireland.

**Christopher Evans** (1996-2000) PhD thesis: *Eosinophils and Neuronal M2 Muscarinic Receptor Function in the Guinea Pig*. Thesis won Kruse award for best thesis in School of Public Health). Currently: Professor University of Colorado, Denver.

**Liliana Moreno** (2000-2003) PhD thesis: *Mechanisms Underlying the Ability of Glucocorticoids and Retinoic Acid to Reverse Virus-Induced Hyperreactivity*. Currently: Research Associate Professor of Medicine at University of Arizona

**Louis Stein\*** (2001-2003) MD, PhD Cardiac surgeon, Newark Beth Israel Hospital.

**Mehdi Hazari**,(2002-2005)PhD thesis: *Neural Plasticity Following Ozone Exposure Mediates Airway Hyperresponsiveness*. Winner Presidential Early Career Award from President Obama. Currently: Principle Investigator at US Environmental Protection Agency

**Norah Green Verbout**, (2004-2008) recipient of American Heart Association Award. PhD Thesis: *Role of eosinophils and muscarinic receptors in paradoxical airway hyperreactivity associated with antigen challenge*. Currently: Director of Strategic Partnerships, Aronora, Portland Oregon

**Kirsten Blensley Verhein**, (2005-2010) recipient of NRSA grant from the NIH. PhD Thesis: *Mechanisms of ozone induced airway hyperreactivity change over time*. Currently: Staff Scientist at Q<sup>2</sup> Solutions

**Erin Fitch Foster\***, (2006-2010) PhD Thesis: *Eosinophils Increase Sensory Neuron Branching*. Currently: Assistant Professor, Oregon Health and Science University.

**Kalmia Smith Buels**, (2006- 2011) PhD Thesis: *Tiotropium Inhibits Increases in Nerve-Associated Eosinophils Following Antigen Challenge and Prevents Airway Hyperreactivity in a Guinea Pig Model of Asthma*. Currently: Instructor, Harvard

**Elad Kauffman\***, (2006-2011) PhD thesis: *Acute Bronchodilator Effects of Toll-Like Receptor 7-Agonists*. Currently: Vice President, Program Strategy at Enveda Biosciences

**Greg Scott\***, (2009-2012) recipient of NRSA grant from the NIH. PhD Thesis: *Sensory Neuroplasticity in Asthma*. Currently: Assistant Professor, Oregon Health and Science University

**Abby Rynko\***, (2009-2013) PhD Thesis: The role of TNF- [alpha] and IL-1[beta] in virus-induced M2 receptor dysfunction. Strategic Global Marketing Leader, Diagnostics, Biotechnology and Medical Devices.

**Sarah Wicher**, (2010-2017) PhD Thesis Ozone induces eosinophil hematopoiesis in non-sensitized guinea pigs. Assistant Professor , College of Idaho, ID.

**Quinn Roth-Carter\***, (2011-2018) PhD thesis Eosinophils Mediate Inflammation in the Skin through the Activity of Eosinophil Peroxidase Currently: Team Leader, Chan Zuckerberg Biohub Chicago

**Katherine Lebold\***, (2015-2019) PhD thesis: Pre and Postnatal Determinants of Airway *Hyperactivity*. Currently: Fellow Pulmonary and Emergency Room Medicine, OHSU

*mentorship continued*

**Alexandria Pincus\***, (2017-2021) PhD thesis: *Assessing sensory and parasympathetic contributions to airway hyperreactivity using optogenetic activation and multicolor labeling of airway neurons*. Currently: Resident Pediatric Neurology, UCSF.

**Gina N Calco\*** (2016-2020) PhD thesis: *Increased nerve-mediated bronchoconstriction in obesity-related asthma: the central role of elevated*. Currently Resident dermatology, OHSU

**Ubaldo De La Torre\*** (2020-) PhD student

**Kayle Williams\*** (2021) PhD student

**Priscilla Opore\*** (2024) PhD student

**Shelby Hoffmeister\*** (2024) PhD student

Post-Doctoral Fellows : (\*co-mentored with Dr Jacoby, Dr Drake or Dr Nie).

**Olubunmi Okanlami**, M.D. (1990-1992) Chair Palliative Care, Indiana Univ.

**Richard Kahn\***, M.D. (1993-1995) Private Practice, Maine

**Richard Costello**, M.D. (1994-1997) Consultant and Professor, Royal College Surgeons, Dublin, Ireland

**Thomas Elwood**, M.D. (1996-1997) Anesthesiologist, Washington

**Darryl Adamko\***, M.D. (1997-2001) Professor Pediatrics and Director Pediatric Research, U Saskatchewan, Canada

**Ann Lee\***, M.D. (1999-2003). Private Practice, Tacoma, WA

**William Bowerfind\***, M.D. (1999-2003) Private Practice, Portland, OR

**Fiona Coulson**, PhD (2000-2003) Deputy Vice-President Education Strategy and Innovation, University of Queensland, Australia

**Becky Proskocil**, PhD (2004-2010) recipient of NRSA grant from the NIH. Research Associate OHSU.

**Bart Moulton\***, MD (2010-2012) Assistant Professor, Pulmonary and Critical Care Medicine, OHSU

**Matthew Drake\***, MD (2010- 2014) Associate Professor. Division Chief Pulmonary and Critical Care Medicine, OHSU

**Brenda Marsh\***, MD (2015-2020) Private Practice, Sacramento, CA

**Payel Kundu\*** PhD (2025)

CLASSROOM INSTRUCTION: LECTURES

1987-1989 Receptor Theory, Physiology, School of Pharmacy, University of Maryland

1990-2003 Autonomic Nervous System, Physiology, Johns Hopkins University

1990-1994 Lab Physiology, Medical School, Johns Hopkins University

1993-2003 Autonomic and Somatic Nervous Systems, Undergraduate Physiology, Johns Hopkins University

1995-1998 Autonomic and Somatic Nervous Systems, Physiology, Johns Hopkins University

1994-1996 Course Director: Communication in Science, Johns Hopkins University

1997-1998 Course Director: Pharmacology of the Airways. Johns Hopkins University

1999-2000 Neurotoxins affecting the autonomic nerves. Neurotoxicology, Johns Hopkins University

2004-2008	Receptors and G proteins. Neuroscience. Oregon Health & Science University
2005-2008	Course director: Organ Systems Biology Oregon Health & Science University.
2005-2018	Autonomic and Motor nerves, Systems Biology, Oregon Health & Science University
2005-2021	Pulmonary Pharmacology, Systems Processes, Oregon Health & Science University
2015-2021	Ethical considerations of using animals in research
2019-2021	Lecture on Philosophy of Science/Creative Thinking
2019-2024	Course director: Scientific Logic

*Instruction continued*

**NEW GRADUATE COURSES CREATED**

1994: **Communication in Science** for Johns Hopkins University (taught 1994-2003)

1997: **Pharmacology of the Airways** for Johns Hopkins University (taught 1997-1999)

2015: **Nano course** format for Oregon Health & Science University (This is a means for faculty to rapidly deliver

content to students in a just-in-time format; and also try out new curriculum; coursed run from 2015-current)

2005: **Organ Systems Biology** for Oregon Health & Science University (2005-current)

2019: **Scientific Logic** for Oregon Health & Science University (2019-current)

**ACADEMIC SERVICE**

**Oregon Health & Science University**

Physiology and Pharmacology Program Steering Committee (2003-2006)

PMCB Graduate Student Admission Committee (2004-2008)

Elected to Faculty Council (2004-2006)

Director Graduate Program in Cellular and Molecular Biosciences (2006-2008)

Associate Dean Graduate Studies (2008-current)

Member Assessment Council (2008-current)

Faculty Council School of Medicine (2008-current)

Member Academic and Student Affairs Council (2008-current)

Mentor High School Students in OHSU Partnerships in Scientific Inquiry (2008-09)

Faculty advisor for Graduate Student Organization (2009-current)

Faculty advisor for Women in Science (2010-2015)

Member Steering Committee to create OHSU's Research Roadmap (2010-2015)

Liaison for Student Accommodations in School of Medicine (2010-2015)

Chair committee to create integrated MD/PhD program (2011-2012)

Chair review of NIH training grants at OHSU (2012-2013)

Committee to redesign MD curriculum (2012-2013)

Committee Academic Assessment (2014-current)

Committee Academic Policy (2015-current)

University Planning for 2025: Member Education Planning Committee (2019-2021)

**Major Search Committees:**

Chair of Emergency Medicine (2006)

Faculty in Physiology and Pharmacology (2010)

Associate Dean of Medical Education (2014)

New Dean for OHSU/OSU School of Pharmacy (2021)

**Internal Department Reviews:** Behavioral Neuroscience (2009), Center for Research on Occupational and Environmental Toxicology (2009), Science and Engineering (2010), Biochemistry (2015),

Physiology and Pharmacology (2015), Biomedical Engineering (2018), Knight Cardiovascular Center (2018), Computer Science Electrical Engineering (2019).

### **Johns Hopkins University**

Animal Care and Use Committee School of Public Health (1997-2000)  
 Search Committee for Assistant Professor in Department Environmental Health Sciences (1998)  
 Search Committee for Assistant Professor in Department Environmental Health Sciences (1999)  
 Biochemistry and Molecular Biology strategic planning committee (2000-2001)  
 Faculty Senate School of Public Health (2000-2002)  
 Steering Committee Graduate Education (2000-2003)  
 Search Committee for Chair Population Health and Family Planning (2002)

*Service continued*

### **Johns Hopkins University *continued***

Committee of Academic Standards (2001-2003)  
 Self-Study for Environmental Health Sciences (2001)  
 Departmental Committee of Academic Standards (2001-2003)

### **Scientific Community**

Editor British Journal of Pharmacology (1993-1998)  
 Associate Editor American Review Respiratory and Critical Care Medicine (1999-2004)  
 Regular Member NIH SBIR study section member (1998-2000)  
 NIH ad Hoc Reviewer Lung Injury, Repair, and Remodeling Study Section (2002, 2004-6)  
 NIH ad Hoc Reviewer Lung Cellular, Molecular Immunobiology Study Section (2000, 2002, 2004-6)  
 Regular Member NIH LCMI study section member (2008-2011)  
 NIH ad Hoc Reviewer Special Emphasis Panel (2011-2012, 2015, 2016, 2019, 2020)  
 Board International Eosinophil Society (2015-current)

### **Community Service**

Volunteer in Public Elementary and Middle Schools-Baltimore, MD  
 (1994-2003) Art and Science classes and demonstrations  
 (1998-1999) Coach Odyssey of the Mind team (State Champions'98)  
 (1999-2001) Coach Destination Imagination team (District Champions each year)  
 Volunteer in Public Elementary and Middle Schools-Lake Oswego, OR  
 (2003-2006) classroom volunteer-Art and Science once a month.  
 (2004-2006) Coach Destination Imagination team  
 Volunteer Portland Oregon Food Bank, once a month (2008-2015).  
 Member OHSU School of Medicine Alliance (2009-current)  
 Board of Directors for the Art Council of Lake Oswego (2013-2023)  
 Volunteer COVID OHSU Vaccination Site 2021