

Bradford J. Smith: Curriculum Vitae

Assistant Professor in Bioengineering (Primary)
Assistant Professor in Pediatric Pulmonary and Sleep Medicine (Secondary)
University of Colorado Denver | Anschutz Medical Campus

Education

Tulane University

Department of Biomedical Engineering, Tulane University, New Orleans, Louisiana

BSE in Biomedical Engineering **May 2003**

MSE in Biomedical Engineering **May 2007**

The Pulsatile Propagation of a Finger of Air Through a Fluid-Occluded Cylindrical Tube

Supervised by Donald P. Gaver III

Committee Members: Darryl Overby, Ricardo Cortez

PhD in Biomedical Engineering **May 2011**

Lagrangian Analysis of Surfactant Transport Processes in Experimental and Computational Models of Pulsatile Airway Reopening

Supervised by Donald P. Gaver III

Committee Members: Ricardo Cortez, Sergey Shevkoplyas

University of Vermont

Vermont Lung Center, College of Medicine, University of Vermont, Burlington, Vermont

Postdoctoral Fellow **June 2011-August**

2016

Research Focus: *Physiology, numerical methods, and quantitative microscopy in models of lung injury*

Primary Mentor: Jason H. T. Bates

Academic Appointments

University of Vermont

College of Medicine, University of Vermont, Burlington, Vermont

Instructor **Spring 2015**

University of Colorado

Department of Bioengineering, University of Colorado Denver | Anschutz Medical Campus, Aurora CO

Assistant Professor (Tenure Track) **September 2016-Present**

Honors and Awards

Alpha Eta Mu Beta Biomedical Engineering Honors Society **2003-Present**

Louisiana Board of Regents Fellowship	2006-2009
ASME Summer Bioengineering Conference Master's Level Student Paper Competition. 1st place, Biofluids and Imaging	2007
Tulane University Biomedical Engineering: Graduate Student Outstanding Achievement Award	2007
Tulane Center for Computational Science: IBM Corporation Fellowship	2008
Tulane University Biomedical Engineering: Graduate Student Outstanding Achievement Award	2010
American Thoracic Society Respiratory Structure and Function Abstract Scholarship	2016
NIH K99/R00 Career Development Award, HL128944 (Awarded)	2015-2019
Broadening Experiences in Scientific and Scholarly Training: Faculty Sponsor Award	2018

Membership In Professional Societies

American Thoracic Society (ATS)	2012-Present
Biomedical Engineering Society (BMES)	2005-2018
American Physiological Society (APS)	2018-Present
Alpha Eta Mu Beta Biomedical Engineering Honors Society	2002-Present

Service

External Service

American Thoracic Society Respiratory Structure and Function Conference Planning Committee. <i>Organize and plan sessions for the yearly ATS meeting; review and select abstracts.</i>	2018-Present
American Physical Society Division of Fluid Dynamics Conference 2017.	2017
Rocky Mountain Fluid Mechanics Conference Co-Organizer.	2018-Present
Acinar Micromechanics in Health and Disease Workshop Co-Organizer.	2018-2019
Co-Organizer of Research Topic in Frontiers in Physiology <i>Understanding Lung Acinar Micromechanics in Health and Disease: Linking Quantitative Imaging and Organ Scale Mechanics by Computational Modeling.</i> In collaboration with Lars Knudsen and Matthias Ochs.	2018-Present

American Thoracic Society Scientific Sessions

Thematic Poster Session Facilitator, "Acute Lung Injury and Mechanical Ventilation: Models and Mechanisms"	2018
Thematic Poster Session Facilitator, "Mechanical Ventilation"	2019
Poster Discussion Session Chair, "Mechanisms of Lung Injury"	2019

Biomedical Engineering Society Scientific Sessions

Oral Session Chair, "Respiratory Biomechanics" **2012**

Rocky Mountain Fluid Mechanics Conference Scientific Sessions

Oral Session Chair, "Biology" **2018**

Oral Session Chair, "Heat Transport" **2019**

Peer Review

Reviewer, Journal Publications

ASME Bioengineering
Annals of Biomedical Engineering
Canadian Respiratory Journal
Cellular Physiology and Biochemistry
Computer Methods and Programs in Biomedicine
Critical Care Medicine
Cytokine
Frontiers in Physiology
Journal of Applied Physiology
Journal of Theoretical Biology
PLOS One
Mathematical Medicine and Biology
Medical Sciences
Respiratory Physiology and Neurobiology
Respiratory Research
Respirology

Reviewer, Conference Abstracts:

Biomedical Engineering Society Annual Meeting **2017-Present**

American Thoracic Society Annual Meeting **2018-Present**

Editorial Work:

Guest Editor, Frontiers in Physiology **2018-Present**

Editorial Board Member, Critical Reviews in Biomedical Engineering **2017-Present**

Invited External Seminars, Symposia, and Workshops

External Institutional Seminars:

Invited Speaker at the National Jewish Health Seminar Series, December 2017: *Alterations in Alveolar Micromechanics During Lung Injury*.

Invited Symposia/Workshop Speaker:

Invited speaker at the SCIREQ FlexiVent User Training Workshop. Boston, Ma. April 2013. *Lung Mechanics, Ventilation, and Lung Injury*.

Invited speaker at Physiologically Guided Mechanical Ventilation Session. American Thoracic Society. Dallas, TX. May 2019. *Identifying Targets to Guide Mechanical ventilation: The Injury Cost Function.*

Invited speaker at the Cotton Conference. Frasier, CO. March 2019. *Micromechanical forces that cause ventilator-induced lung injury.*

Invited speaker at the Acinar Micromechanics in Health and Disease workshop. Hannover, Germany. June 2019. *Computational modelling of structure- function relationships in ARDS and VILI.*

Invited speaker at the Acinar Micromechanics in Health and Disease workshop. Hannover, Germany. June 2019. *Potential computational modelling concepts for ARDS/VILI and pulmonary fibrosis.* Co-presented with Dr. Lars Knudsen.

Teaching Record

University of Vermont

2011-2016

Department of Mechanical Engineering:

Course Instructor for ME207 "Bioengineering." 3-Credit elective class open to senior-level undergraduate and graduate students. (2015)

Department of Computer Science:

1 Lecture in CS 121: "Theory and implementation of a continuous glucose monitoring systems" (2011)

University of Colorado

2016-Present

Department of Bioengineering

Course Instructor for BIOE3071 "Bioengineering Lab 2." 3 credit undergraduate core course (Spring 2017, 2018, 2019)

Course Instructor for BIOE4069/5069 "Bioengineering Lab 2." 3 credit track elective for undergraduate (4069) and graduate (5069) credit (Fall 2017, 2018, 2019)

3 Lectures in BIOE 5011 "Systems Physiology for Bioengineers" on lung physiology (2017)

Courses Developed or Significantly Modified:

ME207 "Bioengineering," 3 credit elective

BIOE3071 "Bioengineering Lab 2," 3 credit core course, lab activities and lectures

BIOE4069/5069 "Advanced Biomechanics," 3 credit track elective

Mentoring

MS Students:

Josh Pertile (2017-2019)

Amanda Benjamin (2019-Present)

Mitchell Stubbs (2017-Present)

PhD Students:

Courtney Mattson (2017-Present)

Alison Wallbank (2018-Present)

Postdoctoral Fellows

Michelle Mellenthin (2016-2019)

Undergraduate Students

Jessica Durr (2016-2018)

Matthew Kiselevach (2016-2018)

Vrajen Patel (2017-2018)

Peer-Reviewed Research Articles

1. **Smith, B.J.** and D.P. Gaver III, *The Pulsatile Propagation of a Finger of Air within a Fluid-Occcluded Cylindrical Tube*. J. Fluid Mech, 2008. **601**: p. 1-23.
2. Yamaguchi, E., **B.J. Smith**, and D.P. Gaver III, *Micro-Piv Measurements of the Ensemble Flow Fields Surrounding a Migrating Semi-Infinite Bubble*. Exp. Fluids, 2009. **47**(2): p. 309-320.
3. **Smith, B.J.** and D.P. Gaver III, *Agent-Based Simulations of Complex Droplet Pattern Formation in a Two-Branch Microfluidic Network*. Lab Chip, 2010. **10**: p. 303-312.
4. **Smith, B.J.**, E. Yamaguchi, and D.P. Gaver III, *A Translating Stage System for M-Piv Measurements Surrounding the Tip of a Migrating Semi-Infinite Bubble*. Meas. Sci. Technol., 2010. **21**(1): p. 015401.
5. **Smith, B.J.**, S. Lukens, E. Yamaguchi, and D.P. Gaver, 3rd, *Lagrangian Transport Properties of Pulmonary Interfacial Flows*. J Fluid Mech, 2011. **705**: p. 234-257.
6. Glindmeyer IV, H.W., **B.J. Smith**, and D.P. Gaver III, *In Situ Enhancement of Pulmonary Surfactant Function Using Temporary Flow Reversal*. J. Appl. Physiol., 2012. **112**(1): p. 149-158.
7. **Smith, B.J.** and J.H.T. Bates, *Assessing the Progression of Ventilator-Induced Lung Injury in Mice*. IEEE Trans. Biomed. Eng., 2013. **60**(12): p. 3449-3457.
8. **Smith, B.J.**, K.A. Grant, and J.H. Bates, *Linking the Development of Ventilator-Induced Lung Injury to Mechanical Function in the Lung*. Ann Biomed Eng, 2013. **41**(3): p. 527-536.
9. Kollisch-Singule, M., B. Emr, **B. Smith**, S. Roy, S. Jain, J. Satalin, K. Snyder, P. Andrews, N. Habashi, J.H. Bates, W. Marx, G. Nieman, and L. Gatto, *Mechanical Breath Profile of Airway Pressure Release Ventilation: The Effect on Alveolar Recruitment and Microstrain in Acute Lung Injury*. JAMA Surg, 2014.
10. Kollisch-Singule, M., B. Emr, **B.J. Smith**, C. Ruiz, S. Roy, Q. Meng, S. Jain, J. Satalin, K. Snyder, A. Ghosh, W. Marx, P. Andrews, N. Habashi, G. Nieman, and L. Gatto, *Airway*

- Pressure Release Ventilation Reduces Conducting Airway Micro-Strain in Lung Injury* J Am Coll Surgeons, 2014.
11. Kollisch-Singule, M., S. Jain, P. Andrews, **B.J. Smith**, K.L. Hamlington-Smith, S. Roy, D. DiStefano, E. Nuss, J. Satalin, Q. Meng, W. Marx, J.H. Bates, L.A. Gatto, G.F. Nieman, and N.M. Habashi, *Effect of Airway Pressure Release Ventilation on Dynamic Alveolar Heterogeneity*. JAMA Surg, 2015: p. 1-9.
 12. Lutz, D., G. A. E. Lopez-Rodriguez, C. Ruppert, P. Mahavadi, A. Günther, W. Klepetko, J.H.T. Bates, **B. Smith**, T. Geiser, M. Ochs, and L. Knudsen, *Alveolar Derecruitment and Collapse Induration as Crucial Mechanisms in Lung Injury and Fibrosis*. Am J Respir Cell Mol Biol, 2015. **52**(2): p. 232-243.
 13. Ma, B., **B.J. Smith**, and J.H. Bates, *Resistance to Alveolar Shape Change Limits Range of Force Propagation in Lung Parenchyma*. Respir Physiol Neurobiol, 2015. **211**: p. 22-28.
 14. **Smith, B.J.** and J.H. Bates, *Variable Ventilation as a Diagnostic Tool for the Injured Lung*. IEEE Trans. Biomed. Eng., 2015. **62**(9).
 15. **Smith, B.J.**, L.K. Lundblad, M. Kollisch-Singule, J. Satalin, G. Nieman, N. Habashi, and J.H. Bates, *Predicting the Response of the Injured Lung to the Mechanical Breath Profile*. J Appl Physiol (1985), 2015. **118**(7): p. 932-40.
 16. Hamlington, K.L., B. Ma, **B.J. Smith**, and J.H. Bates, *Modeling the Progression of Epithelial Leak Caused by Overdistension*. Cell Mol Bioeng, 2016. **9**(1): p. 151-161.
 17. Hamlington, K.L., **B.J. Smith**, G.B. Allen, and J.H. Bates, *Predicting Ventilator-Induced Lung Injury Using a Lung Injury Cost Function*. J Appl Physiol (1985), 2016. **121**(1): p. 106-14.
 18. Pothen, J.J., V. Rajendran, D. Wagner, D.J. Weiss, **B.J. Smith**, B. Ma, and J.H. Bates, *A Computational Model of Cellular Engraftment on Lung Scaffolds*. Biores Open Access, 2016. **5**(1): p. 308-319.
 19. Smith. B. J. *Strain heterogeneity in the injured lung: cause or consequence?* J Appl Physiol (1985) 2016; 121: 1363-1364.
 20. Broche, L., G. Perchiazzi, L. Porra, A. Tannoia, M. Pellegrini, S. Derosa, A. Sindaco, J.B. Borges, L. Degrugilliers, A. Larsson, G. Hedenstierna, A.S. Wexler, A. Bravin, S. Verbanck, **B.J. Smith**, J.H.T. Bates, and S. Bayat, *Dynamic Mechanical Interactions between Neighboring Airspaces Determine Cyclic Opening and Closure in Injured Lung*. Critical Care Medicine, 2017. **45**(4): p. 687-694.
 21. **Smith, B.J.**, E. Bartolak-Suki, B. Suki, G.S. Roy, K.L. Hamlington, C.M. Charlebois, and J.H.T. Bates, *Linking Ventilator Injury-Induced Leak across the Blood-Gas Barrier to Derangements in Murine Lung Function*. Front Physiol, 2017. **8**: p. 466.
 22. Hamlington, K.L., J.H.T. Bates, G.S. Roy, A.J. Julianelle, C. Charlebois, B. Suki, and **B.J. Smith**, *Alveolar Leak Develops by a Rich-Get-Richer Process in Ventilator-Induced Lung Injury*. PLoS One, 2018. **13**(3): p. e0193934.
 23. Hamlington, K.L., **B.J. Smith**, C.M. Dunn, C.M. Charlebois, G.S. Roy, and J.H.T. Bates, *Linking Lung Function to Structural Damage of Alveolar Epithelium in Ventilator-Induced Lung Injury*. Respir Physiol Neurobiol, 2018. **255**: p. 22-29.
 24. Jawde, S.B., **B.J. Smith**, A. Sonnenberg, J.H.T. Bates, and B. Suki, *Design and Nonlinear Modeling of a Sensitive Sensor for the Measurement of Flow in Mice*. Physiol Meas, 2018. **39**(7): p. 075002.

25. Knudsen, L., E. Lopez-Rodriguez, L. Berndt, L. Steffen, C. Ruppert, J.H.T. Bates, M. Ochs, and **B.J. Smith**, *Alveolar Micromechanics in Bleomycin-Induced Lung Injury*. Am J Respir Cell Mol Biol, 2018. **59**(6): p. 757-769.
26. Albert, R.K., **B. Smith**, C.E. Perlman, and D.A. Schwartz, *Is Progression of Pulmonary Fibrosis Due to Ventilation-Induced Lung Injury?* Am J Respir Crit Care Med, 2019. **200**(2): p. 140-151.
27. Mellenthin, M.M., S.A. Seong, G.S. Roy, E. Bartolak-Suki, K.L. Hamlington, J.H.T. Bates, and **B.J. Smith**, *Using Injury Cost Functions from a Predictive Single Compartment Model to Assess the Severity of Mechanical Ventilator Induced Lung Injuries*. J. Appl. Physiol, 2019. **127**(1): p. 58-70.
28. Mori, V., **B.J. Smith**, B. Suki, and J.H.T. Bates, *Linking Physiological Biomarkers of Ventilator-Induced Lung Injury to a Rich-Get-Richer Mechanism of Injury Progression*. Ann Biomed Eng, 2019. **47**(2): p. 638-645.
29. N. Rühl, E. Lopez-Rodriguez, K. Albert, **B. J. Smith**, T. E. Weaver, M. Ochs, L. Knudsen. *Surfactant protein B deficiency induced high surface tension: relationship between alveolar micromechanics, alveolar fluid properties and alveolar epithelial cell injury*. International Journal of Molecular Sciences, **In Press**.

Peer-Reviewed Review Articles

1. Bates, J. H. T., **B. J. Smith**, G. Allen. *Computational Models of Ventilator Induced Lung Injury and Surfactant Dysfunction*. Drug Discovery Today. 2014.
2. Bates, J. H. T., **B. J. Smith**. *Ventilator-induced lung injury and lung mechanics*. Annals of Translational Medicine 2018: 1-13.

Book Chapters

1. Yamaguchi E, Smith BJ, Gaver III DP. micro-PIV for the analysis of flow fields near a propagating air-liquid interface. In: Cavazzini G, editor. *The Particle Image Velocimetry - Characteristics, Limits and Possible Applications*: Intech; 2012.

Published/Presented Peer-Reviewed Conference Abstracts

Presenting author underlined

1. **Smith, B.J.** and D.P. Gaver III, *Airway Reopening: Oscillating Air Finger Propagation Through a Liquid-Filled Tube*. Biomedical Engineering Society Annual Meeting, Baltimore MD, September 2005. (Podium Presentation)
2. **Smith, B.J.** and D.P. Gaver III, *Airway Reopening: Oscillating Air Finger Propagation Through a Liquid-Filled Tube*. 5th World Congress of Biomechanics, Munich Germany, July 2006. (Poster Presentation)
3. **Smith, B.J.** and D.P. Gaver III, *Airway Reopening: The Pulsatile Propagation of a Finger of Air Through a Fluid-Occluded Cylindrical Tube*. ASME Summer Bioengineering Conference, Keystone Co, June 2007. (Poster Presentation)

4. **Smith, B.J.** and D.P. Gaver III, *Airway Reopening: The Pulsatile Propagation of a Finger of Air Within a Fluid-Occluded Cylindrical Tube*. Board of Regents Post-Katrina Forum, Biloxi Ms, August 2007. (Poster Presentation)
5. **Smith, B.J.** and D.P. Gaver III, *Pulsatile Airway Reopening: Implications for Reducing Ventilation-Induced Lung Injury*. Biomedical Engineering Society Annual Meeting, Hollywood Ca, September 2007. (Poster Presentation)
6. **Gaver, D.P.**, A.M. Jacob and **B.J. Smith**, The coupling of fluid flow and surfactant transport for the reduction of atelectrauma related to ventilator induced lung injury. International Bio-Fluid Symposium and Workshop, California Institute of Technology, Pasadena, CA. March 28-30, 2008 (Podium Presentation)
7. **Smith, B.J.** and D.P. Gaver III, *Droplet Periodicity and Reversibility in a Two-Branch Microfluidic Network*. Biomedical Engineering Society Annual Meeting, St. Louis Mo, October 2008. (Podium Presentation)
8. **Smith, B.J.**, E. Yamaguchi, and D.P. Gaver III, *A Translating Stage System for μ -PIV Measurements Surrounding a Migrating Semi-Infinite Bubble*. Biomedical Engineering Society Annual Meeting, St. Louis Mo, October 2008. (Poster Presentation)
9. **Yamaguchi, E.**, **B.J. Smith** and D.P. Gaver III. *μ -PIV measurements of the flow field surrounding a migrating semi-infinite bubble*. Biomedical Engineering Society Annual Meeting. St. Louis, MO. October, 2008
10. **Smith, B.J.**, E. Yamaguchi, and D.P. Gaver III, *A Translating Stage System for Micro-PIV Measurements Surrounding a Migrating Semi-Infinite Bubble*. ASME Bioengineering, Lake Tahoe Ca, June 2009. (Poster Presentation)
11. **Smith, B.J.**, E. Yamaguchi, and D.P. Gaver III, *μ -PIV measurements of the flow-field near the tip of a semi-infinite bubble during pulsatile flow*. BMES Annual Meeting, Pittsburgh Pa, October 2009. (Poster Presentation)
12. **Thieman, J.W.**, **B.J. Smith**, E. Yamaguchi, and D.P. Gaver III, *DSP Analysis of a Propagating Air-Liquid Interface in a Model of Pulmonary Airway Reopening*. Biomedical Engineering Society Annual Meeting, Pittsburgh Pa, October 2009.
13. **Yamaguchi, E.**, **B.J. Smith** and D.P. Gaver. *Micro-PIV studies of surfactant effects on the pulsatile motion of a semi-infinite bubble modeling ARDS*. Biomedical Engineering Society Annual Meeting. Pittsburgh, PA. October 2009.
14. **Smith, B.J.**, E. Yamaguchi, and D.P. Gaver III, *Ensemble averaged micro-PIV measurements of the flow field surrounding the tip of a semi-infinite bubble during pulsatile propagation*. 16th US National Congress of Theoretical and Applied Mechanics, State College Pa, June 2010. (Podium Presentation)
15. **Smith, B.J.**, E. Yamaguchi, J.W. Thieman, and D.P. Gaver III, *Shadowgraphic and μ -PIV measurements of bubble shape and flow fields during pulsatile propagation*. Biomedical Engineering Society Annual Meeting, Austin Tx, October 2010. (Podium Presentation)
16. **Thieman, J.W.**, **B.J. Smith**, and D.P. Gaver III, *The development of DSP techniques to estimate stress fields in biological two-phase flows*. Biomedical Engineering Society Annual Meeting, Austin Tx, October 2010. (Poster Presentation)

17. Pitre, J.J., E. Yamaguchi, **B.J. Smith**, O. Forouzan, S.S. Shevkoplyas, D.P. Gaver III, *Pulmonary-Airway-On-a-Chip: A Microfluidic Model of Pulmonary Airway Reopening at Bifurcations*. Biomedical Engineering Society Annual Meeting, Austin Tx, October 2010. (Poster Presentation)
18. Yamaguchi, E., **B.J. Smith**, B.D. Fowler, D.P. Gaver III, *Micro-flow Visualization to Evaluate Effects of Lung Surfactant Surrounding a Semi-infinite Bubble*. Biomedical Engineering Society Annual Meeting, Austin Tx, October 2010. (Poster Presentation)
19. Yamaguchi, E., **B.J. Smith**, and D.P. Gaver III, *μ -PIV/Shadowgraphy measurements to elucidate dynamic physicochemical interactions in a multiphase model of pulmonary airway reopening*. 77th Annual meeting of the southeastern section of the APS. Baton Rouge, La, October 2010. (Podium Presentation)
20. **Smith, B. J.**, Lukens S, Yamaguchi E, and Gaver III DP. *Lagrangian Transport Analysis of Microfluidic Experimental and Computational Pulsatile Airway Reopening Models*. Biomedical Engineering Society Annual Meeting. Hartford, Ct, 2011. (Podium Presentation)
21. Yamaguchi, E., **B.J. Smith**, and D.P. Gaver, *Development of Simultaneous μ -PIV/Shadowgraph Technique for Flow-field Analysis Near the Unsteady Pulsating Semi-infinite Bubble Tip Under the Influence of Pulmonary Surfactant*. Biomedical Engineering Society Annual Meeting. Hartford, Ct, October 2011. (Podium Presentation)
22. **Smith, B. J.**, G Allen, and JHT Bates. *Progressive Recruitment and Derecruitment Reflects the Development of Ventilator Induced Lung Injury*. Biomedical Engineering Society Annual Meeting. Atlanta Ga, 2012. (Podium Presentation)
23. **Smith B. J.**, KA Grant, and JHT Bates. *A Murine Model Of Overventilation-Induced Lung Injury At A Peak End Expiratory Pressure Of Zero*. American Thoracic Society International Conference. San Francisco Ca, 2012. (Poster Presentation)
24. **Smith, B. J.**, DP Gaver III, and JHT Bates. *Computation Model Of Lung Injury Progression Due To Mechanical Overventilation*. American Thoracic Society International Conference. San Francisco Ca, 2012. p. A1046-A1046. (Podium Presentation)
25. **Smith, B. J.**, and J.H. Bates. *Computational analysis of dynamic pressure-volume observations to assess lung injury status*. Biomedical Engineering Society Annual Meeting. Seattle Wa, 2013. (Podium Presentation)
26. **Smith B. J.**, and JHT Bates. *The Relationship Between Nonlinear Lung Elastance And Ventilator-Induced Lung Injury*. American Thoracic Society International Conference. Philadelphia Pa, 2013. (Poster Presentation)
27. Bates, JHT and **B.J. Smith**. Modeling the Dynamics of Recruitment and Over-distension in the Injured Lung. In: American Thoracic Society International Conference. Philadelphia, Pa: 2013. (Poster Presentation)
28. Kollisch-Singule, M. C., B. Emr, **B. J. Smith**, C. Ruiz, S. Roy, J. Satalin, K. Snyder, P. Andrews, N. Habashi, R. N. Cooney, G. Nieman, L. A. Gatto. *Identifying a potential mechanism of ventilator induced lung injury using a novel assessment of the lung micro-anatomy*. Shock Society Annual Meeting. Charlotte, NC, June 2014.

29. **Smith B**, L Lundblad, J Satalin, M Kollisch-Singule, B Emr, K Snyder, L Gatto, P Andrews, N Habashi, G Nieman, and J Bates. *Personalized Predictions of Recruitment, Derecruitment, and Tissue Distention in the Injured Lung*. Biomedical Engineering Society Annual Meeting. San Antonio Tx, 2014. (Podium Presentation)
30. **Bates, J.** and **B.J. Smith**. *A Composite Cost Function for Quantifying Ventilator-induced Lung Injury*. Biomedical Engineering Society Annual Meeting. San Antonio Tx, October 2014. (Poster Presentation)
31. **D. P. Gaver III**, A-M Job, **B. J. Smith**, and E. Yamaguchi. Pulmonary Atelectrauma: Biophysical Insights into Mechanisms of Damage and Prevention. *Annals of the American Thoracic Society*. 2015. 12(1): p. S70. (Podium Presentation)
32. **Smith B**, G Roy, K. Hamlington, J Bates. *The Synergy Between Volutrauma and Atelectrauma in Blood-Air Barrier Disruption*. Biomedical Engineering Society Annual Meeting. Tampa FL, October 2015. (Poster Presentation)
33. **Hamlington, K.**, **B. Smith**, and J. Bates, *Modeling Strain-Induced Leak in an Inhomogeneous Alveolar Epithelial Monolayer*. Biomedical Engineering Society Annual Meeting. Tampa, FL, October 2015. (Poster Presentation)
34. **Bates, J.**, **B. Smith**, G. Roy, D. St. Pierre, and B. Ma. A Disposable Device for Measuring Lung Impedance in Mechanically Ventilated Patients. Biomedical Engineering Society Annual Meeting. Tampa, FL, October 2015. (Podium Presentation)
35. **Smith B.J.**, S.A. Seong, G.S. Roy, J.H.T. Bates. *The Role Of Surfactant Dysfunction In Ventilator Induced Lung Injury Pathogenesis*. American Thoracic Society International Conference. San Francisco CA, May 2016. (Poster Presentation)
36. **Hamlington, K.L.**, C.M. Dunn, G.S. Roy, **B.J. Smith**, and J.H.T. Bates. *Linking Alveolar Epithelial Barrier Disruption To Function In Ventilator-Induced Lung Injury*. American Thoracic Society International Conference. San Francisco CA, May 2016. (Poster Presentation)
37. **Frodella, C.M.**, **B.J. Smith**, L.T. Hellman, M.E. Poynter, A. Van Der Vliet, M. Aliyeva, N. Daphtary, M. Hristova, and L. Lundblad. *Elimination Of IL-33 Inhibits Airways Hyperresponsiveness*. American Thoracic Society International Conference. San Francisco CA, May 2016. (Poster Presentation)
38. **Bates, J.H.T.**, **B.J. Smith**, K.L. Hamlington, and G.B. Allen. *Calculating An Injury Cost Function For Ventilator-Induced Lung Injury*. American Thoracic Society International Conference. San Francisco CA, May 2016. (Poster Presentation)
39. **Knudsen, L. E.** Lopez-Rodriguez, L. Berndt, C. Boden, C. Ruppert, J.H.T. Bates, M. Ochs, and **B.J. Smith**. *Pressure Dependent Alveolar Derecruitment Is Linked With Surfactant Dysfunction In Bleomycin-Induced Acute Lung Injury*. American Thoracic Society International Conference. San Francisco CA, May 2016. (Poster Presentation)
40. **Broche, L.**, G. Perchiazzi, L. Porra, A. Tannoia, M. Pellegrini, S. Derosa, A. Sindaco, J. Batista Borges, L. Degrugilliers, A. Larsson, G. Hedenstierna, A. Wexler, A. Bravin, S. Verbanck, **B. J. Smith**, J.H.T. Bates, S. Bayat. *Dynamic Mechanical Interactions between Neighboring Airspaces Determine Cyclic Opening and Closure in Injured Lung*. Joint

- Meeting of the Federation of European Physiological Societies and the French Physiological Society. Paris France, June 2016. (Podium Presentation)
41. **Smith, B. J.**, L. Knudsen, E. Lopez-Rodriguez, L. Berndt, C. Boden, C. Ruppert, M. Ochs, and J.H.T. Bates. *Viscoelastic Model of Alveolar and Alveolar Duct Dynamics in Bleomycin-induced Lung Injury*. Biomedical Engineering Society Annual Meeting. Minneapolis MN, October 2016. (Podium Presentation)
 42. Hamlington, K., **B.J. Smith**, G. Allen, and J.H.T. Bates. *Cost Functions to Predict Ventilator-Induced Lung Injury*. Biomedical Engineering Society Annual Meeting. Minneapolis MN, October 2016. (Hamlington)
 43. Bou Jawde, S., **B.J. Smith**, J.H.T. Bates, and B. Suki. *Design and Implementation of a Sensitive Sensor for the Measurement of Flow in Mice*. Biomedical Engineering Society Annual Meeting. Minneapolis MN, October 2016. (Poster Presentation)
 44. Charlebois, C., G. Roy, K. Hamlington, A. Julianelle, A. Cleveland, **B.J. Smith**, and J.H.T. Bates. *Linking Cellular Membrane Disruption and Blood-Gas Barrier Leak in Ventilator-Induced Lung Injury*. Biomedical Engineering Society Annual Meeting. Minneapolis MN, October 2016. (Poster Presentation)
 45. **Smith, B. J.**, G. S. Roy, A. Cleveland, C. Charlebois, K. L Hamlington, M. M. Mellenthin, L. Knudsen, J. H.T. Bates. *The Structural Basis Of Changes In Lung Function During Ventilator Induced Lung Injury*. American Thoracic Society International Conference. Washington DC, May 2017. (Poster Presentation)
 46. Hamlington, K.L., A. J. Julianelle, C. M. Charlebois, G. S. Roy, **B. J. Smith**, J. H.T. Bates. *Alveolar Cell Injury And Blood-Gas Barrier Leak In Mechanically Ventilated Mice*. American Thoracic Society International Conference. Washington DC, May 2017. (Poster Presentation)
 47. Knudsen, L., E. Lopez-Rodriguez, L. Berndt, L. Steffen, C. Ruppert, J. Bates, H. Hoymann, M. Ochs, **B. J. Smith**. *Surfactant Replacement Therapy Attenuates Abnormal Alveolar Micromechanics In Bleomycin Induced Lung Injury*. American Thoracic Society International Conference. Washington DC, May 2017. (Poster Presentation)
 48. Mellenthin, M. M., S. A. Seong, G. S. Roy, K. L. Hamlington, J. H.T. Bates, **B. J. Smith**. *The Roles Of Volutrauma And Atelectrauma In Ventilator Induced Lung Injury Pathogenesis*. American Thoracic Society International Conference. Washington DC, May 2017. (Poster Presentation)
 49. Mellenthin, M., S.A. Seong, G.S. Roy, K.L. Hamlington, J.H.T. Bates, **B.J. Smith**. *Finding Meaningful Metrics for Predicting Ventilator-Induced Lung Injury*. Biomedical Engineering Society Annual Meeting. Phoenix AZ, October 2017. (Podium Presentation)
 50. **Smith, B.J.**, J.R. Durr, K.L. Hamlington, J.H.T. Bates, M.M. Mellenthin. *Alveolar Mechanical Interdependence Increases Alveolar Septal Strain During Heterogeneous Alveolar Edema*. American Thoracic Society International Conference. San Diego CA. May 2018. (Poster Presentation)

51. Mori, V., **B.J. Smith**, J.H.T. Bates. *Alveolar Pressure Opposes Fluid and Protein Leak In Ventilator-Induced Lung Injury*. American Thoracic Society International Conference. San Diego CA. May 2018. (Poster Presentation)
52. Mellenthin, M.M., R.K. Albert, K.L. Hamlington, J.H.T. Bates, **B.J. Smith**. Fluid-Elastic Bistability in Pulmonary Alveolar Edema. American Thoracic Society International Conference. San Diego CA. May 2018. (Poster Presentation)
53. Mattson, C., K. Okamura, M. Kiselevach, **B.J. Smith**. *Spatial Distribution of Cell Injury During the Progression of Ventilator-Induced Lung Injury*. American Thoracic Society International Conference. San Diego CA. May 2018. (Podium Presentation)
54. S. Bow Jawde, **B. J. Smith**, J. H. T. Bates, K. Lutchen, B. Suki. *A Novel Approach to Measure Low-frequency Respiratory Impedance During Variable Ventilation*. Biomedical Engineering Society Annual Meeting. Atlanta, GA. October 2018. (Poster Presentation)
55. Mandell, E., C. Mattson, G. Seedorf, S. Ryan, A. Wallbank, T. Gonzalez, S. Abman, **B.J. Smith**. *Antenatal Endotoxin Impairs Lung Mechanics and Increases Sensitivity to Ventilator-Induced Lung Injury in Newborn Rat Pups*. Pediatric Academic Societies, Baltimore MD, April 2019. (Poster Presentation)
56. Hilton, S.A., C. Zgheib, L.C. Dewberry, J. Hu, J. Xu, A. Wallbank, C. Mattson, S. Seal, E. Nozik-Grayck, **B. Smith**, K. W. Liechty. *Cerium Oxide Nanoparticle Conjugated with MicroRNA-146a Improves Lung Function After Lung Injury in Bleomycin Induced Murine Model of Pulmonary Fibrosis*. Pacific Association of Pediatric Surgeons. Christchurch, New Zealand, April 2019. (Podium Presentation)
57. Mellenthin, M. M., R. K. Albert, K. L. Hamlington, J. H. T. Bates, **B. J. Smith**. *A Time-Dependent Network Model with Recrutable Edematous Alveoli*. American Thoracic Society International Conference, Dallas TX, May 2019. (Poster Presentation)
58. Mattson, C., K. Okamura, M. Kiselevach, **B. J. Smith**. *Cell Injury Cluster Progression During Ventilator-Induced Injury*. American Thoracic Society International Conference, Dallas TX, May 2019. (Poster Presentation)
59. **Smith, B.J.**, D. Fink, J. Wagner, M. M. Mellenthin, E. M. DeBoer, J. Pertile. *Distal Airway Pressure Heterogeneity During Low Frequency Jet Ventilation*. American Thoracic Society International Conference, Dallas TX, May 2019. (Poster Presentation)
60. **B. J. Smith**, C. Mattson, G. Seedorf, S. Ryan, T. Gonzalez, A. Wallbank, S. H. Abman, E. Mandell. *Antenatal Endotoxin Impairs Lung Mechanical Function and Increases Sensitivity to Ventilator-Induced Lung Injury in Newborn Rat Pups*. American Thoracic Society International Conference, Dallas TX, May 2019. (Poster Presentation)
61. Stancil, I. T., E. Dobrinskikh, J. E. Michalski, I. V. Yang, **B. J. Smith**, D. A. Schwartz. *The Jamming Transition Is Dynamically and Structurally Delayed in Idiopathic Pulmonary Fibrosis Bronchial Epithelial*. American Thoracic Society International Conference, Dallas TX, May 2019. (Podium Presentation)
62. Bou Jawde, S. A., A. Majumdar, A. J. Walkey, G. T. O'Connor, **B. J. Smith**, J. H. T. Bates, K. R. Lutchen, B. Suki. *ZVV: A Novel Approach to Measure Low-Frequency Respiratory*

- Impedance During Variable Ventilation*. American Thoracic Society International Conference, Dallas TX, May 2019. (Podium Presentation)
63. N. Villalba, A. Sackheim, L. Haines, Y. Ma, J. Li, J. Ather, M. Poynter, D. Collier, K. Okamura, **B. Smith**, M. Nelson, K. Freeman. *Suramin Neutralizes Cytotoxic Histones And Prevents Vascular Injury, Edema, And Death*. Shock Society Annual Meeting, Coronado CA, June 2019. (Poster Presentation)
64. M. Cookson, T. Gonzalez T1, G. Seedorf, **B. Smith**, S.H. Abman, E.W. Mandell. *Antenatal Vitamin D Attenuates Lung Injury in a Preeclampsia Model of Bronchopulmonary Dysplasia*. Western Medical Research Conference, Carmel, CA, January 2020. (Podium Presentation)
65. M. Cookson, T. Gonzalez T1, G. Seedorf, **B. Smith**, S.H. Abman, E.W. Mandell. *Antenatal Vitamin D Attenuates Lung Injury in a Preeclampsia Model of Bronchopulmonary Dysplasia*. Pediatric Academic Society, Philadelphia, PA, May 2020. (Podium Presentation)
66. S. M. Niemiec, A. Wallbank, A. E. Louiselle, E. Nozik-Grayck, C. Zgheib, **B. Smith**, K. W. Liechty. *CNP-miR146a Reduces Inflammation in LPS-induced Acute Lung Injury*. American Pediatric Surgical Association. Orlando, FL, May 2020.

Patents

1. *Variable ventilation as a diagnostic tool for assessing lung mechanical function*. Inventors: Bradford J. Smith, Jason H.T. Bates. US20160360996A1.
2. *Device to measure flow from jet ventilation setup*. Inventors: Joshua Pertile, Bradford Smith, Daniel S. Fink. Patent pending.

Grant Support

Active Funding:

R00 HL128944

01/01/2017 – 12/31/2020

NIH/NHLBI

“The importance of inhomogeneity in the pathogenesis of lung injury”

The goal of this project is to understand how alveolar and ventilation heterogeneity affect the development of ventilator-induced lung injury using morphometry, measurements of lung function, and computational models

Role: Principal Investigator

\$605,230 USD in total direct costs

F31 HL149628

09/01/2019-08/30/2022

“Spatiotemporal evolution of lung injury during ventilator-induced lung injury”

This mentored PhD student training grant will determine quantify the time-dependent evolution of injury heterogeneity during mechanical ventilation using innovative image analysis techniques coupled to statistical and mechanistic computational models.

PI: Mattson

Role: Primary Mentor

\$120,660 in total direct costs

T32 HL007085

07/01/2016 – 06/30/2020

PI: Schwartz

NRSA Multidisciplinary Research Training in Respiratory Disease

Role: Faculty member/mentor

F32 HL145900

07/01/2019-06/30/2020

“Stereological localization of interstitial macrophages in the lungs of smokers and nonsmokers”

This mentored training grant will quantify the spatial distribution of macrophages in lungs of human smokers and nonsmokers using design-based stereology.

PI: Hume

Role: Co-Mentor

\$69,950 in direct costs.

F32HL149290

09/01/2019-08/31/2022

“Identification of a Wnt/ Beta-catenin responsive adult lung epithelial progenitor cell for tissue repair in chronic lung disease”

This mentored training grant seeks to characterize the population of progenitor cells in the distal lung that can be triggered to repair chronic lung disease.

PI: Hu

Role: Co-Mentor

\$197,082 in total direct costs

American Laryngological Association

07/01/2019-06/30/2020

“Jet ventilation heterogeneity”

This project will assess the heterogeneity of low frequency jet ventilation using benchtop fluid mechanics experiments and clinical electrical impedance tomography measurements.

Role: Co-Investigator

\$10,000 in direct costs over one year