

CURRICULUM VITAE – **Kenneth B. Bader, Ph.D.**

CONTACT INFORMATION

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EDUCATION

University of Mississippi – Oxford, Mississippi
Ph.D. (Physics), May 2011
Dissertation: The effect of static pressure on the inertial cavitation threshold and bubble collapse strength, advised by Charles C. Church

M.A. (Physics), May 2007

Grand Valley State University – Allendale, Michigan
B.S. (Physics), May 2005

ACADEMIC APPOINTMENTS

2016	Assistant Professor Department of Radiology University of Chicago, Chicago, IL
2011-2016	Postdoctoral Fellow Department of Internal Medicine University of Cincinnati, Cincinnati, OH
2006-2011	Barnard Fellowship Graduate Student Researcher Department of Physics University of Mississippi, Oxford, Mississippi
2005-2006	Graduate Teaching Assistant Department of Physics University of Mississippi, Oxford, Mississippi

RESEARCH GRANTS

Completed Support

The Development of Standards to Regulate Microbubble Cloud Formation During Histotripsy Pulses

Focused Ultrasound Foundation, Grant Number: 319R1
1 August 2014 – 31 December 2015, Total Direct Cost: \$107,512

PI: **Kenneth B. Bader**

The project aims to develop in vitro and in silico models to assess the area, location, and type of microbubble responsible for tissue ablation from histotripsy pulses

Upcoming Grant Submission

Localized Thrombus Ablation with Histotripsy and Echogenic Liposomes

NIH/NHLBI, Grant Application ID: 1R01HL133334-01

Submission Date: February 2017

PI: **Kenneth B. Bader**

Our long-term objective is to develop a combined ablation and targeted thrombolytic histotripsy technique that lyses chronic thrombi in the deep veins, decreases the risk of pulmonary embolism, improves long-term prognosis, and reduces health care costs.

PEER-REVIEWED
PUBLICATIONS

1. **Kenneth B. Bader**, Kevin J. Haworth, Himanshu Shekhar, Adam D. Maxwell, Tao Peng, David D. McPherson, Christy K. Holland, "Efficacy of histotripsy combined with rt-PA *in vitro*," *Physics in Medicine and Biology*, **61** (14): 5253-5274, 2016. doi:10.1088/0031-9155/61/14/5253
2. **Kenneth B. Bader**, Michael J. Crowe, Jason L. Raymond, Christy K. Holland, "The effect of frequency-dependent attenuation on predicted histotripsy waveforms in tissue mimicking phantoms," *Ultrasound in Medicine and Biology*, **42** (7): 1701-1705, 2016. doi:10.1016/j.ultrasmedbio.2016.02.010
3. **Kenneth B. Bader**, Christy K. Holland, "Predicting the growth of nanoscale nuclei by histotripsy pulses," *Physics in Medicine and Biology*, **61** (7): 2947-2966, 2016. doi:10.1088/0031-9155/61/7/2947
4. **Kenneth B. Bader**, Guillaume Bouchoux, Christy K. Holland, Tao Peng, Melvin E. Klegerman, David D. McPherson, "Thrombolytic efficacy and enzymatic activity of rt-PA-loaded echogenic liposomes," *Journal of Thrombosis and Thrombolysis* **40** (2): 144-155, 2015. doi:10.1007/s11239-015-1204-8
5. **Kenneth B. Bader**, Matthew J. Gruber, Christy K. Holland, "Shaken and stirred: Mechanisms of ultrasound-enhanced thrombolysis," *Ultrasound in Medicine and Biology* **41** (1): 187-196, 2015. doi:10.1016/j.ultrasmedbio.2014.08.018
6. Matthew J. Gruber, **Kenneth B. Bader**, Christy K. Holland, "Cavitation thresholds of contrast agents in an *in vitro* human clot model exposed to 120-kHz ultrasound," *Journal of the Acoustical Society of America* **135** (2): 646-653, 2014. doi.org/10.1121/1.4843175
7. Jason L. Raymond, Kevin J. Haworth, **Kenneth B. Bader**, Kirthi Radhakrishnan, Joseph K. Griffin, Shao-Ling Huang, David D. McPherson, Christy K. Holland, "Broadband attenuation measurements of phospholipid-shelled ultrasound contrast agents," *Ultrasound in Medicine and Biology* **40** (2): 410-421, 2014. doi:10.1016/j.ultrasmedbio.2013.09.018
8. Kirthi Radhakrishnan, **Kenneth B. Bader**, Kevin J. Haworth, Jonathan A. Kopechek, Jason L. Raymond, Shao-Ling Huang, David D. McPherson, Christy K. Holland, "Relationship between cavitation and loss of echogenicity from ultrasound contrast agents," *Physics in Medicine and Biology* **58** (18): 6541-6563, 2013. doi:10.1088/0031-9155/58/18/6541
9. **Kenneth B. Bader**, Christy K. Holland, "Gauging the likelihood of stable cavitation from ultrasound contrast agents," *Physics in Medicine and Biology* **58**(1): 127-144, 2013. doi:10.1088/0031-9155/58/1/127
10. Guillaume Bouchoux, **Kenneth B. Bader**, Joseph J. Korfhagen, Jason L. Raymond, Shivashankar Ravishankar, Todd A. Abruzzo, Christy K. Holland, "Experimental validation of a finite-difference model for the prediction of transcranial ultrasound fields based on CT images." *Physics in Medicine and Biology* **57**(23): 8005-8022, 2012. doi:10.1088/0031-9155/57/23/8005
11. **Kenneth B. Bader**, Joel Mobley, Charles C. Church, D. Felipe Gaitan, "The effect of static pressure on the strength of inertial cavitation events," *Journal of the Acoustical Society of America* **132**(4): 2286-2291, 2012. doi.org/10.1121/1.4750494

12. **Kenneth B. Bader**, Jason L. Raymond, Joel Mobley, Charles C. Church, D. Felipe Gaitan, "The effect of static pressure on the inertial cavitation threshold," *Journal of the Acoustical Society of America* **132**(2): 728-737, 2012. doi.org/10.1121/1.4733539

BOOK CHAPTERS **Kenneth B. Bader**, Guillaume Bouchoux, Christy K. Holland, "Sonothrombolysis," in *Therapeutic Ultrasound*, J. Escoffe, Ed. (Springer, NY), 2016. pp. 339-362.

MANUSCRIPTS UNDER REVIEW **Kenneth B. Bader**, Kevin J. Haworth, Adam D. Maxwell, Christy K. Holland, "On the use of passive cavitation imaging as a predictive measure of mechanical ablation from histotripsy pulses," *Radiology* (submitted 6/2016)

Himanshu Shekhar, **Kenneth B. Bader**, Shenwen Huang, Tao Peng, Shaoling Huang, David D. McPherson, Christy K. Holland, "In vitro thrombolytic efficacy of echogenic liposomes loaded with tissue plasminogen activator and octafluoropropane gas," *Physics in Medicine and Biology* (submitted 5/2016)

Kevin J. Haworth, **Kenneth B. Bader**, Kyle T. Rich, Christy K. Holland, Douglas T. Mast, "Frequency-domain passive imaging of ultrasonics emissions," *IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control* (submitted 3/2016)

POPULAR ARTICLES "Histotripsy standards and lysis of deep vein thrombi," Research Update from the Focused Ultrasound Foundation: <http://www.fusfoundation.org/news/1723-research-update-histotripsy-standards-and-lysis-of-deep-vein-thrombi>

- CONFERENCE PRESENTATIONS AND ABSTRACTS**
1. **Kenneth B. Bader**, Kevin J. Haworth, Adam D. Maxwell, Christy K. Holland, "Passive cavitation imaging as a predicative metric for histotripsy ablation," 172th Meeting of the Acoustical Society of America, Honolulu, HI, November 2016.
 2. **Kenneth B. Bader**, Kevin J. Haworth, Adam D. Maxwell, Christy K. Holland, "Monitoring histotripsy ablation with passive cavitation imaging," 5th International Symposium on Focused Ultrasound, North Bethesda, MA, August 2016.
 3. **Kenneth B. Bader**, Kevin J. Haworth, Tao Peng, David D. McPherson, Adam D. Maxwell, Christy K. Holland, "Fibrin-targeted echogenic liposomes for localized ablation of thrombi with histotripsy pulses," 170th Meeting of the Acoustical Society of America, Jacksonville, FL, November 2015. *Journal of the Acoustical Society of America* **138** (3): 1819.
 4. Christy K. Holland, Himanshu Shekar, **Kenneth B. Bader**, "Microbubble pumps: Ultrasound Theragnostic Agents," 170th Meeting of the Acoustical Society of America, Jacksonville, FL, November 2015. *Journal of the Acoustical Society of America* **138** (3): 1819.
 5. **Kenneth B. Bader**, Christy K. Holland, "The development of a hybrid finite difference solution of the Westervelt equation using the Fast Nearfield Method as a boundary condition for focused sources," 20th International Symposium on Nonlinear Acoustics, Lyon, France, June 2015.
 6. Michael J. Crowe, Jason L. Raymond, Christy K. Holland, **Kenneth B. Bader**, "Broadband attenuation measurements of tissue-mimicking phantoms employed for histotripsy," 169th Meeting of the Acoustical Society of America, Pittsburgh, PA, May 2015. **137** (4): 2399.

7. **Kenneth B. Bader**, Guillaume Bouchoux, Christy K. Holland, "Comparison of rt-PA echogenic liposomes to Definity exposed to sub-megahertz sonothrombolysis in an in vitro model," 168th Meeting of the Acoustical Society of America, Indianapolis, IN, October 2014. *Journal of the Acoustical Society of America* **136** (4): 2095.
8. Christy K. Holland, T. Douglas Mast, Kevin J. Haworth, **Kenneth B. Bader**, Himanshu Shekhar, Kirthi Radhakrishnan, "Biomedical research at the image-guided ultrasound therapeutics laboratories," 169th Meeting of the Acoustical Society of America, Pittsburgh, PA, May 2015. **137** (4): 2199.
9. **Kenneth B. Bader**, Matthew J. Gruber, Christy K. Holland, "Mechanisms enhancing thrombolysis with submegahertz ultrasound: Visual observations," 14th International Symposium on Therapeutic Ultrasound, Las Vegas, NV, April 2014.
10. **Kenneth B. Bader**, Kirthi Radhakrishnan, Kevin J. Haworth, Jason L. Raymond, Shao-Ling Huang, David D. McPherson, Christy K. Holland, "Modeling the loss of echogenicity from ultrasound contrast agents," 166th Meeting of the Acoustical Society of America, San Francisco, CA, December 2013. *Journal of the Acoustical Society of America* **134**(5): 3977.
11. **Kenneth B. Bader**, Christy K. Holland, "Gauging the likelihood of stable cavitation from ultrasound contrast agents." 164th Meeting of the Acoustical Society of America, Kansas City, MO, October 2012. *Journal of the Acoustical Society of America* **132**(3): 1906.
12. Guillaume Bouchoux, **Kenneth B. Bader**, Joseph J. Korfhagen, Jason L. Raymond, Shivashankar Ravishankar, Todd A. Abruzzo, Christy K. Holland, "Validation of a finite-difference acoustic propagation model of transcranial ultrasound." 164th Meeting of the Acoustical Society of America, Kansas City, MO, October 2012. *Journal of the Acoustical Society of America* **132**(3): 1927.
13. **Kenneth B. Bader**, Jason L. Raymond, Joel Mobley, Charles C. Church, D. Felipe Gaitan, "The effect of static pressure on the inertial cavitation threshold and collapse strength." 161th Meeting of the Acoustical Society of America, Seattle, WA, May 2011. *Journal of the Acoustical Society of America* **129**(4): 2587.
14. **Kenneth B. Bader**, Jason L. Raymond, Joel Mobley, Charles C. Church, D. Felipe Gaitan, "Inertial cavitation threshold dependence on high static pressures." 160th Meeting of the Acoustical Society of America, Cancun, Mexico, November 2010. *Journal of the Acoustical Society of America* **128**(4): 2313.
15. **Kenneth B. Bader**, Jason L. Raymond, Joel Mobley, Charles C. Church, D. Felipe Gaitan, "Inertial cavitation threshold dependence on high static pressures." 159th Meeting of the Acoustical Society of America, Baltimore, MA, March 2010. *Journal of the Acoustical Society of America* **127**(3): 1984.
16. **Kenneth B. Bader**, Jason L. Raymond, Joel Mobely, D. Felipe Gaitan, Ross Tessien, Robert Hiller, "Characterization of a high Q spherical resonator," 74th Annual Meeting of the Southeastern Section of the American Physical Society, Nashville, TN, November 2007.

17. Jason L. Raymond, **Kenneth B. Bader**, Joel Mobley, D. Felipe Gaitan, Robert A. Hiller, Ross A. Tessien, "Characterization of a large volume spherical resonator for studies of acoustically induced cavitation in liquids," 154th Meeting of the Acoustical Society of America, New Orleans, LA, October, 2007. *Journal of the Acoustical Society of America* **122**(5): 2991.
18. **Kenneth B. Bader**, Karen Gipson, "Cavitation effects of therapeutic ultrasound." 149th Meeting of the Acoustical Society of America, Vancouver, BC, May, 2005. *Journal of the Acoustical Society of America* **117**(4): 2474.

INVITED TALKS

1. **Kenneth B. Bader**, Kevin J. Haworth, Christy K. Holland, "Passive cavitation imaging as a predicative metric for histotripsy ablation," 172th Meeting of the Acoustical Society of America, Honolulu, HI, November, 2016.
2. **Kenneth B. Bader**, "Histotripsy: Mechanical ablation with focused ultrasound," University of Chicago (Chicago, IL), Marquette University (Milwaukee, WI), University of Mississippi (Oxford, MS), and Penn State University (State College, PA), March 2016.
3. Christy K. Holland, Himanshu Shekar, **Kenneth B. Bader**, "Microbubble pumps: Ultrasound Theragnostic Agents," 170th Meeting of the Acoustical Society of America, Jacksonville, FL, November 2015. *Journal of the Acoustical Society of America* **138** (3): 1819.
4. **Kenneth B. Bader**, "Towards regulatory guidelines for shock scattering histotripsy," University of Oxford, The Institute of Biomedical Engineering, Oxford, UK, July 2015
5. **Kenneth B. Bader**, "The use of ultrasound contrast agents for nucleating stable cavitation," Colloquium, National Institutes of Health, Bethesda, MD, USA, April 2014.
6. **Kenneth B. Bader**, "Acoustic Cavitation and Thrombolysis," Colloquium, The University of Cincinnati, Department of Biomedical Engineering, Cincinnati, OH, USA, September 2013.
7. **Kenneth B. Bader**, "Thrombolysis and the stably cavitating bubble," Colloquium, The University of Mississippi, Department of Physics, Oxford, MS, USA, September 2012.
8. **Kenneth B. Bader**, "The effect of static pressure on the inertial cavitation threshold and collapse strength," Colloquium, The University of Cincinnati, Image-guided Ultrasound and Therapeutics Laboratories, Cincinnati, OH, USA, June 2011.
9. **Kenneth B. Bader**, "Inertial cavitation and the tensile strength of water," Colloquium, Grand Valley State University, Department of Physics, Allendale, MI, USA, October 2010.
10. **Kenneth B. Bader**, "Inertial cavitation and the tensile strength of water," Colloquium, The University of Mississippi, Department of Physics, Oxford, MS, USA, October 2010.
11. **Kenneth B. Bader**, "Characterization of high Q spherical resonator," Colloquium, The University of Mississippi, Department of Physics, Oxford, MS, USA, March 2008.

OTHER TALKS

1. **Kenneth B. Bader**, "Cavitation threshold dependence on high static pressures." Meeting of the midsouth chapter of the Acoustical Society of America, Oxford, MS, USA, October 2009.
2. **Kenneth B. Bader**, "Cavitation threshold dependence on high static pressures." Meeting of the midsouth chapter of the Acoustical Society of America, Conway, AR, USA, March 2009.
3. **Kenneth B. Bader**, "Acoustic Cavitation," Seminar for Theoretical Gravity Group, The University of Mississippi, Department of Physics, Oxford, MS, USA, October 2007.
4. **Kenneth B. Bader**, "Cavitation effects of therapeutic ultrasound," Student Scholarship Day, Grand Valley State University, Allendale, MI, USA, May 2005.
5. **Kenneth B. Bader**, "Cavitation caused by ultrasound," Student Scholarship Day, Grand Valley State University, Allendale, MI, USA, May 2004.

HONORS AND RECOGNITIONS

Postdoctoral

Focused Ultrasound Foundation Award (319R1), 2014-2015
Young Investigator Travel Grant, Acoustical Society of America, 2015
Excellence in Outreach Award, Sigma Xi, 2016

Graduate

Barnard Fellowship, Physics Department, University of Mississippi, 2005-2006
Distinguished Alumnus-in-Residence, Grand Valley State University, 2010
Physical Acoustics Summer School Scholarship, Acoustical Society of America, 2006

Undergraduate

Michigan space grant consortium, Seed grant program, 2004
Third place poster competition, Michigan space grant consortium, 2004
Student Summer Scholars program, Grand Valley State University, 2004
Society of Physics Students, Reporter Award, 2005

TEACHING EXPERIENCE

University of Cincinnati

Seminars, Guest Lectures

BME 7001, Graduate Student Seminar Series: Seminar on 'Mechanical Ablation with Focused Ultrasound,' Fall 2015. Number of students: 14

BME 6010, Principles of Biomedical Ultrasound: Seminar on 'Mechanical Ablation with Focused Ultrasound,' Spring 2015. Number of students: 20

BME 6010, Principles of Biomedical Ultrasound: Seminar on 'Principles of Microbubble Dynamics,' Spring 2013. Number of students: 20

BME 2000: Provided evaluation of the final presentation, summarizing the device research by students, Fall 2012. Number of students: 80

Courses

BME 5099: Independent Study: Provided students with in depth mentoring of tissue phantom development and the development of a histotripsy system, Fall 2014-Spring 2015. Number of students: 2

University of Mississippi

Seminars, Guest Lectures

PHY 214: Seminar on 'Faraday's law of induction,' Spring 2010. Number of students: 80

Courses

Astronomy 103-104: Basic concepts in modern astronomy taught, including location of stellar objects and constellations, handling and use of telescopes, calculation of speed of light, and molecular transitions. Number of students: 90

Grand Valley State University

Physics Laboratory Teaching Assistant

Physics 220: Laboratory examples of algebra-based physics taught, such as conservation of momentum, Newton's second law, and conservative forces. Fall 2004. Number of students: 30

MENTORING

Graduate Students and Medical Students

1. Name: Robert Kleven
Department: UC Physician-Scientist Training Program and Biomedical Engineering Program (M.D./Ph.D. Program)
Role: Secondary research mentor (Ph.D.)
Dates: 8/15-Present
2. Name: Shenwen Huang
Department: UC Physician-Scientist Training Program and Biomedical Engineering Program (M.D./Ph.D. Program)
Role: Secondary research mentor (Ph.D.)
Dates: 8/12-Present
3. Name: Jason L. Raymond
Department: UC Biomedical Engineering Program
Role: Secondary research mentor (Ph.D.)
Dates: 8/11-5/2015
Thesis: "Bioactive gas encapsulation and release from echogenic liposomes" Ph.D. Dissertation, Biomedical engineering program, University of Cincinnati, Cincinnati, OH: 2015.
4. Name: Matthew Gruber
Department: UC Biomedical Engineering Program
Role: Secondary research mentor (Ph.D.)
Dates: 8/11-8/14
Thesis: "Ultraharmonic and broadband cavitation thresholds for ultrasound contrast agents in an in vitro flow model" M.S. thesis. Biomedical engineering program, University of Cincinnati, Cincinnati, OH: 2014.
5. Name: Kirthi Radhakrishnan
Department: UC Biomedical Engineering Program
Role: Secondary research mentor (Ph.D.)
Dates: 8/11-8/15
Thesis: "Relationship between loss of echogenicity and cavitation emissions from echogenic liposomes insonified by spectral Doppler ultrasound" Ph.D. dissertation. Biomedical engineering program, University of Cincinnati, Cincinnati, OH: 2013.

Undergraduate Students

1. Name: Jahrane Dale
Department: SURF Undergraduate student, Department of Biomedical Engineering, Columbia University,
Role: Co Research Advisor
Dates: 05/2015-08/2015
2. Name: Melissa Deitzer
Department: UC Biomedical Engineering Program
Role: Primary Research Advisor
Dates: 08/2014-12/2014
3. Name: Michael Crowe
Department: Xavier University, Department of Physics
Role: Primary Research Advisor
Dates: 08/2014-08/2015
4. Name: Tyler Zicht
Department: UC Physics Department
Role: Secondary research mentor
Dates: 01/2014-05/2014
5. Name: Kenekwukwu Okoye
Department: UC Biomedical Engineering Program
Role: Secondary research mentor
Dates: 8/2012-12/2012

PROFESSIONAL MEMBERSHIPS

Acoustical Society of America, Student Member, 2005-2012; Associate Member, 2012-Present
Sigma Pi Sigma, 2011-Present
Sigma Xi, 2016-Present

UNIVERSITY AND PROFESSIONAL SERVICE

Outreach

Donald E. Cline Elementary, Cold Springs, KY, 2013
School for Creative and Performing Arts, Cincinnati, OH, 2015

University of Cincinnati

Graduate student poster competition, Judge, 2011-Present
SURF poster competition, Judge, 2012- Present
NSF Semester term REU, Judge, 2014-Present

Professional

Acoustical Society of America

Biomedical Acoustics Technical Committee, Member, 2011-Present
Physical Acoustics Technical Committee, Member, 2005-Present

Session Chair

- 1pBA: Medical Ultrasound, 10/2014
- 3aBAa: Sonothrombolysis, 11/2015

Live Streaming Committee, Member, 2015-Present

Take a student to lunch program, 2014-Present

Member Advisory Editorial Board, *Ultrasound in Medicine and Biology*

Referee for Peer Review

Ultrasound in Medicine and Biology, 2011-Present
Journal of the Acoustical Society of America, 2003-Present
Ultrasonics, 2012-Present
Noise Control Engineering Journal, 2011-Present
IEEE Ultrasonics, Ferroelectrics and Frequency Control, 2012-Present
Journal of Healthcare Engineering, 2012-Present
Physics in Medicine and Biology, 2012-Present
Journal of Thrombosis and Thrombolysis, 2014-Present
Applied Physics Letters, 2003-Present
Journal of Ultrasound in Medicine, 2015-Present

Referee for Funding Agencies

Focused Ultrasound Foundation (April 2016)

REFERENCES

Christy K. Holland, Ph.D.
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David D. McPherson, M.D.
University of Texas
Health Science Center at Houston
6431 Fannin Street
Medical Sciences Building 1.150
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