

## **Erich Carr Everbach**

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### **Education**

*Yale University*, Ph.D. in Mechanical Engineering, December 1989. Dissertation title: *Tissue Composition Determination via Measurement of the Acoustic Nonlinearity Parameter*.  
Honors: 1989-1990 F.V. Hunt Postdoctoral Fellowship awarded by the Acoustical Society of America. Advisor: Robert E. Apfel.

*Yale University*, M.S. in Mechanical Engineering, May 1986.

*Harvard College*, B.A. in the Division of Applied Sciences, Applied Mechanics/Acoustics specialization, June 1982. Honors: Harvard Society of Engineers and Scientists Scholarship, Roger Ernst Scholarship.

### **Research and Teaching Experience**

Professor of Engineering, Swarthmore College Engineering Dept., Swarthmore, PA, 2006 – present  
Engineering Department Chair 2013 – 2018. Chair of Environmental Studies Committee 2019 –

courses taught:

- Engineering Methodology
- Mechanics
- Dynamics of Mechanical Systems
- Aerodynamics
- Electrical Circuit Analysis
- Linear Physical Systems
- Experimentation for Engineering Design
- Fluid Mechanics (senior level)
- Thermofluid Mechanics (junior level)
- Dynamics of Mechanical Systems (junior/senior level)
- Solar Energy Systems
- Exploring Acoustics
- Acoustics (senior level)
- Introduction to Environmental Protection
- Swarthmore and the Biosphere
- Capstone Seminar in Environmental Studies
- Women and Technology (see above web link)
- Human Nature, Technology, and the Environment (see above web link)

Private acoustics consultant (references upon request): Everbach Acoustics Consulting

Associate Professor with tenure, Swarthmore College, Swarthmore, PA 1996-2006.

Assistant Professor in Engineering, Swarthmore College, Swarthmore, PA, 1989 – 1996.

Visiting Professor of Mechanical Engineering, Boston University, Boston, MA, Fall 1996.

Adjunct Professor of Electrical Engineering, University of Rochester, Rochester, NY, 1990 –

Visiting Professor, Mathematics Department, Oglala Lakota College, Kyle, SD, Fall 1993.

Visiting Assistant Professor of Electrical Engineering, University of Rochester, Rochester, NY, 1989 – 1990.

Research Associate, Department of Mechanical Engineering, Yale University, 1984 – 1989.

Yale Prize Teaching Fellowship Nominee "for excellence in performance as a Teaching Fellow," Yale University, 1988.

Acoustical Engineer, Acoustic Technology Inc., Boston, MA, 9/82 to 5/84. Performed acoustical measurements, vibration analysis, environmental noise surveys, and developed a computer model for predicting sound propagation over large distances.

### **Professional Affiliations**

Fellow of the Acoustical Society of America, elected June, 2001; chair of Biomedical Ultrasound technical committee 1999-2002, co-chair of Homepage committee 1995-2005 (<http://asa.aip.org>); member of Physical Acoustics; chair of Online Education committee 2002-2005; Education in Acoustics committee; Public Relations committee; Medals & Awards committee. Session chair at 119th (Syracuse, NY; Session EEE), 120th (San Diego, CA; Session 8PA), 124th (New Orleans; Session 5aPAb), 127th (Cambridge, MA; Session 2aBA), 137th (Berlin, Germany, Session 4aBB) , and 141<sup>st</sup> (Chicago, IL), 161<sup>st</sup> (Seattle, WA) meetings of the Acoustical Society of America. Organizer and chair of special sessions at the 122nd (Houston, TX; Session 7PA), 130th (St. Louis, MO; Session 4aPA), 137th (Berlin, Germany; Session 5pBB), 140th (Newport Beach, CA; Topical Meeting on the Physics of Echo-contrast Agents), 145<sup>th</sup> (Nashville, TN; Session 1pBB), 149<sup>th</sup> (Vancouver, Canada; Session 2aBB), 151<sup>st</sup> (Providence, RI; Session 3aED), 155<sup>th</sup> (Paris, France; Sessions 4pPAc, 4pPAi), 159<sup>th</sup> (Baltimore, MD; Session 4aBB), 177<sup>th</sup> (Louisville, KY; Sessions 3PA, 3PAb) meetings of the ASA.

American Institute of Ultrasound in Medicine

American Physical Society

American Society for Engineering Education

Elected Board Member of the Council on Undergraduate Research 1995. Chair of the Engineering Division 1999-2002.

Institute of Electrical and Electronics Engineers, Inc. Branch Counselor for the Swarthmore College Student Chapter of the IEEE.

Sigma Xi research honor society member and departmental representative

Reviewer: Journal of the Acoustical Society of America, ASME, JFM, Phys. Rev, Science, Sensors.

Reviewer of grants for the National Institutes of Health, National Science Foundation, US Dept. of Agriculture.

Qualified as expert witness in acoustics, Nov. 1998, Norristown, PA county court.

Member in good standing of the National Council of Acoustical Consultants.

Elected School Board member 2006-2009, Wallingford-Swarthmore School District, Delaware County, PA

## Research Grants

Co-investigator with Karen Chan (Swarthmore College Biology Dept.) on NSF grant [2136018](#), Hydrodynamic consequences of spines on zooplankton: Functional morphology of horns and tails on barnacle nauplii (5/1/2022 – 4/30/2025). Provided summer salary to devise swimming robot that duplicates the movements of sub-millimeter sea creatures to study their hydrodynamics.

Co-investigator with Thomas R. Porter MD (PI, Univ. of Nebraska Cardiology Dept.) on NIH grant 1R01HL146489-01A1, subaward 34-5224-2009-001, [Scar Detection and Treatment with Droplet Activation](#) (4/01/2020 – 3/31/2024). Provided summer salary to devise cavitation detection system for *in vitro* component of this research project.

Principal Investigator on grant from Lower Merion Township, PA, to research current noise ordinance applicability and to recommend improvements. Involved students in ambient noise surveys and analysis (2014).

Co-investigator with Feng Xie (PI) and Thomas R. Porter, MD (Univ. of Nebraska Cardiology Dept.) on NIH NIBIB grant 1R01EB009050-01, [Sonolysis in Acute Coronary Syndromes](#) (9/1/08-6/30/11). Provided some summer salary support and travel expenses.

Principal Investigator, NIH R15 AREA grant, [Acoustic Cavitation of Constrained Microbubbles](#) 1 R15 EB004630-01 (3/1/05 – 12/31/06). Provided summer salary, leave support, and student research assistants to investigate the dynamics of individual microbubbles trapped in gels and blood clots subjected to ultrasound.

Co-investigator with Thomas R. Porter, MD (Univ. of Nebraska Cardiology Dept.) on American Heart Associate grant, [Determining the Optimal Ultrasound Parameters for Microbubble-mediated Gene Uptake in Human Coronary Arteries](#). AHA reference no. 9951171Z (7/1/99-6/30/01). Provided some salary support and travel expenses.

Consultant on National Institutes of Health Lifetime Achievement Award R37CA39230-27 (Morton W. Miller, Univ. of Rochester, principal investigator) to investigate the role of acoustic cavitation in producing undesirable bioeffects when ultrasound is used with commercial echo-contrast agents 7/2/98- 7/30/02.

Co-investigator with Thomas R. Porter, MD (Univ. of Nebraska Cardiology Dept.) on American Heart Associate Grant-in-Aid, [The Mechanism for Improved Ultrasound Contrast with Intermittant Imaging](#) (7/1/97-6/30/99). Provided summer salary support and travel expenses to allow research with Dr. Porter on transient response imaging, a useful technique for imaging perfusion of blood into the heart muscle of heart attack patients that may involve microbubble destruction.

1992 Presidential Faculty Fellow of the NSF, grant number RCD 92-53777, October 1, 1992– October 1, 1997. One of only 15 fellowships each year for engineering faculty awarded nationally by the NSF, the award provided \$100,000 annually for five years to support research and teaching efforts in nonlinear dynamics at Swarthmore College.

Co-investigator with Amy Vollmer on NSF grant BES-9528168, [Interaction of Intense Ultrasound with Genetically Engineered Bacteria](#), June 1996 - June 1997. An investigation of the effect of acoustic cavitation on *E. coli* bacteria that have been altered

to produce visible light when stressed. Funds included summer salary and student research assistant support.

Co-investigator on National Institutes of Health Grant No. 2R01-DK39796-04, Role of Cavitation in Lithotripsy, June 1, 1991– June 1, 1994. The almost \$2 million grant provided \$12,000 annually to allow me and a Swarthmore student to spend summers at the University of Rochester working on lithotripsy research.

Grant-in-Aid to the American Heart Association for research into the possible undesirable side-effects of ultrasound in echocardiology, July 1992-1994. This work was a collaboration with the Department of Cardiology at the Strong Memorial Hospital, University of Rochester.

NSF Curriculum Development Grant USE-9150759, Interdisciplinary Exploration of Acoustics, July 1, 1991– Dec. 31, 1994, to develop a survey course at Swarthmore (Exploring Acoustics) primarily for non-engineering majors that teaches principles of science and engineering using analysis of sounds as a unifying theme.

NSF Instrumentation and Laboratory Improvement Grant, Graphics-based Data Acquisition and Control System, July 15, 1992 – July 14, 1994, to integrate graphics-based computers as data collection and analysis elements in existing ThermoFluids laboratories at Swarthmore.

Educational Foundation of America (EFA) grant, November 1991– May 1995, to fund development of “Swarthmore and the Biosphere,” an interdisciplinary seminar-style project-oriented course to investigate the relationship of one aspect of Swarthmore’s interaction with the environment.

### **Patents**

Infant Health Monitoring System, Patent 5,479,932. Co-inventors are Joseph Higgins (Swarthmore ‘91) and Kevin J. Parker (Univ. of Rochester). The device grew out of Joe Higgins’ 1991 Senior Design Project at Swarthmore.

### **Swarthmore College Service**

Committees: Black and Minority Affairs (SALNAAH), Women’s Studies, Public Policy, Environmental Studies (chair 1997-2000, acting chair 2001-02, member 2002-present), AAUP Executive Committee, AAUP chapter president (2005-07), Council on Educational Policy (1997-99), Linguistics, College Planning Committee 1999, Facilities Advisory Group, Land Use Planning Committee (co-chair 2002-04), Social Responsibility, Green Team (chair) of Science Project Committee, Assessment Planning Committee (2005-07), Interdisciplinary Representative to Curriculum Committee (2005-07), Sustainability Planning Committee co-chair (2007-2008), Sustainability Committee co-chair (2008-2012), Sustainability Committee member (2013- present), Inauguration Committee 2010 for Rebecca Chopp.

### Student Research Assistants

Brian Acosta '17  
Nii Addy '01  
Yewande Adele '12  
Paul Agyiri '08  
Nader Almadbooh '23  
Kofi Anguah '09  
Joseph Armah '98  
Lucy Atkinson '22  
Paul Azunre '07  
Fred "Nicky" Benton '02  
Kara Bledsoe '16  
Alyssa Bonnoit '03  
Franz Chee '21  
Lonnie Chien '23  
Briana Cox '17  
Conor Clark '16  
Evan Dorn '97  
Pemba Dorji 2021  
Omari Faakye '10  
Alexander Flurie '05  
Spencer Friske '16  
James Golden '04  
John "Jove" Graham '96  
Christopher Grasberger '17  
Ascanio Guarini '16  
Ani Hsieh '99  
Byron Holz '98  
Zhazira Irgebayeva '17  
Pete Jacobs '95  
Suor Kim '02  
Hyeongmin "Min" Kim '19  
Emery Ku '05  
Sylvia Kwakye '98  
Frank Kyei-Manu '06  
Christopher Lee '93  
Christopher Lemoine '95  
Carl Mas '98  
Temba Mateke '21  
Naisha Miller '98  
Dianne Moise '99  
Melissa Morrell '99  
Laura Morrison '94  
Frank Mote '00  
Atousa Nourmahnad '17  
Jane Ng '01

### Engineering Senior Design Projects

Gunter Schemmann 1991  
Joseph Higgins 1991  
Whitney Potter 1992  
Robert Boulware 1992  
John Arent 1993  
Olivier Colliou 1993  
Joseph Jankovski 1993  
Youngmoo Kim 1993  
Vilma Huertas 1994  
Alyssa Apsel 1995  
James Hockenberry 1995  
Han Park 1996  
Cindy Wu 1996  
Byron Holz 1998  
David Bosworth 1998  
Jon Makler 1998  
Melissa Morrell 1999  
Sarah Bergstrom 2000  
Olga Rostapshova 2002  
Johanna Yoon 2002  
Katie Saltonovitz 2002  
Stephen Divigneau 2003  
Geoff Klein 2003  
Emily Eddy 2003  
Laura Zager 2003  
Jesse Hartigan 2004  
Milos Ilak 2004  
Kristina Pao 2004  
"Max" Yu Li 2005  
James Golden 2005  
Frank Kyei-Manu 2006  
Alexey Rostapshov 2006  
Aloysius Obodoako 2006  
David Luong 2006  
Mark Piper 2006  
Tyler Strombom 2006  
Paul Azunre 2007  
Jesse Goodall 2007  
Omer Corluhan 2008  
Paul Agyiri 2008  
Jonathan Shoop 2008  
Paul Agyiri 2008  
Anna deRegt 2009  
Jonathan Shoop 2008  
Anna deRegt 2009

Omodayo Originwa '18  
Carol Ouellette '96  
Sonal Pasarampuria '12  
Daniel Pedersen '94  
Sophia Peipher '20  
Anjani Reddy '04  
Marc Rieffel '94  
Sergio Rosas '15  
Jeffrey Santner '10  
Tonet Santos '95  
Ming Soon '93  
Sierra Spencer '18  
Tyler Strombom '06  
Eric Studer '97  
Gabriel Stuger '20  
Andrew Taylor '16  
Soraya Terrab BMC '14  
Anteneh Tesfaye '03  
Hannah Torres '20  
Ali Usman '91  
Cathy Vaughn '01  
Roby Velez '09  
Annie Willman '01  
Andrea Wolfe '99  
Bilige "Billy" Yang '19  
Chung Yuen "Brandon" Yeung '18

Omari Faakye 2010  
Tane Remington 2010  
Anson Stewart 2010  
Perry Carlson 2010  
Ariel Horowitz 2010  
Ryan Charmichael 2011  
Janet Zarate 2011  
Jonathan Martin 2012  
Matthew Bowers 2012  
Eric Rodrigues 2013  
Katie Samuelson 2014  
Remy Donahey 2014  
Imoleayo Abel 2014  
Cody Ruben 2014  
David Lin 2015  
Karl Sadueste 2015  
Noah Weinthal 2015  
Neal MacFarland 2015  
Mercer Borris 2016  
Constance Bowen 2016  
Sara Brakeman 2016  
Conor Clark 2016  
Christine Emery 2016  
Madison Heppe 2016  
Jess Karol 2016  
Daniel Palmer 2016  
Henry Chen 2017  
Michael Chen 2017  
Michael "Cole" Fox 2017  
Christopher Grasberger 2017  
Gregory "Graham" Lesko 2017  
Atousa Nourmahnad 2017  
Cooper Woolston 2017  
Robin Ye Linn Htun 2018  
Alan Zheng Zhao 2018  
Emma Giordano 2018  
Omodayo Originwa 2018  
Isabella Branco-Lo 2018  
Natasha Noguiera 2018  
Ahmet Kayagil 2018  
Justin Chandrasekhar 2018  
Nathan Moreno-Mendelson 2020  
Quentin Millette 2020  
Frank Sammartino 2020  
Zachary Weiss 2020  
Liu Qing (Selina) Ye 2020

Terrence Xiao 2020  
Brandon Zunin 2020  
Gabriel Stuger 2020  
Megan Strachan 2021  
Charles Cole 2021  
Catherine Mohr 2021  
Nusaybah Estes 2021  
Daniel Curtis 2021  
Franz Chee 2021  
Leia Rich 2021  
Bethany Bronkema 2022  
Lucy Atkinson 2022  
Spencer Tate 2022  
Cecilia “Momi” Jeschke 2022  
Brendan Penfold 2022  
Michael Sepe 2022  
William Hoganson 2022  
Erin Chen 2023  
Thomas Dilts 2023  
Joshua Heckman 2023  
Dane Skufca 2023  
Joshua Vandervelde 2023  
Huiying Xiao 2023

### **Refereed Publications**

*Acoustic detection of retained perfluoropropane droplets within the developing myocardial infarct zone.* Zeng, P, Chen, C, Lof, J., Stolze, E, Li, S, Chen, X, Pacella, J, Villanueva, FS, Matsunaga, T, Everbach, E. Carr, Fei, H, Xie F, Porter, T. *Ultrasound in Med. & Biol.* 2022, <https://doi.org/10.1016/j.ultrasmedbio.2022.07.005>

*Determination of nonlinearity parameter  $B/A$  of liquids by comparison with solutions of the three-dimensional Westervelt equation.* Chien, LD, Cormack, J.M., Everbach, E. Carr, Hamilton, M.F. *J. Acoust. Soc. Am.* 2022, <https://doi.org/10.1121/2.0001563>  
DOI: 10.1121/2.0001563

*Molecular mechanisms of the effect of ultrasound on the fibrinolysis of clots.* I.N. Chernysh, **E. C. Everbach**, P.K. Purohit, and J.W. Weisel, *Journal of Thrombosis and Haemostasis*, 13:1-9, January 2015. (DOI: 10.1111/jth.12857)

*Improved sonothrombolysis from a modified diagnostic transducer delivering impulses containing a longer pulse duration.* J. Wu, F. Xie, T. Kumar, J. Liu, J. Lof, W. Shi, **E. Carr Everbach**, T.R. Porter, *Ultrasound in Med. & Biol.* Vol. 40, Issue 7, 1545–1553. doi:10.1016/j.ultrasmedbio.2014.01.015.

*Microbubble cavitation imaging.* F. Vignon, W. Shi, J. Powers, **E. Carr Everbach**, J. Liu, F. Xie, T.R. Porter, *IEEE-UFFC* 60(4), 661-670 (2013).

*Effects of attenuation and thrombus age on the success of ultrasound and microbubble-mediated thrombus dissolution.* F. Xie, **E. Carr Everbach**, S. Gao, L.K. Drvol, W.T. Shi, F. Vignon, J.E. Powers, J. Lof, T.R. Porter, *Ultrasound in Med. & Biol.* 37(2), 280-288 (2011).

*In-Vivo Microbubble Cavitation Imaging.* Vignon, F., Shi, W., Liu, J., Xie, F., Gao, S., Drvol, L., Lof, J., **Everbach, C.**, Porter, T. and Powers, J. *Proceedings of the Twelfth International Symposium on Therapeutic Ultrasound*, 2011, pp. 134-38.

*Investigation of Image-guided Sonothrombolysis in a Porcine Acute Ischemic Stroke Model.* William T. Shi, Thomas R. Porter, Vignon, Francois, Jeffrey E. Powers, Shunji Gao, Jinjin Liu, Feng Xie, Lucas Drvol, John Lof, and **E. Carr Everbach.** *IEEE Ultrasonics* 2011, 332-337.

*Real-Time Two-Dimensional Imaging of Microbubble Cavitation.* Thomas R. Porter, Vignon, Francois, Jeffrey E. Powers, William T. Shi, Shunji Gao, Jinjin Liu, Feng Xie, Lucas Drvol, John Lof, **E. Carr Everbach.** *Proceedings of the Eleventh International Symposium on Therapeutic Ultrasound*, 2011, 2032-2036.

*Threshold of Inertial Cavitation Induced by Diagnostic Ultrasound and Microbubbles.* Vignon, Francois, Thomas R. Porter, Jeffrey E. Powers, William T. Shi, Shunji Gao, Jinjin Liu, Feng Xie, Lucas Drvol, John Lof, **E. Carr Everbach.** *Proceedings of the Eleventh International Symposium on Therapeutic Ultrasound*, 2011, 2078-2083.

*Transcranial Threshold of Inertial Cavitation Induced by Diagnostic Ultrasound and Microbubbles.* Liu, J., Gao, S., Porter, T., **Everbach, C.**, Shi, W., Vignon, F., Powers, J., Lof, J., Turner, J., Xie, F. *IEEE Ultrasonics Letters*, Vol. 2, 2010, 434-439.

*Utilization of Diagnostic Transtemporal Guided High Mechanical Index Ultrasound and a Systemic Microbubble Infusion to Treat Ischemic Stroke without Fibrinolytic Agents.* Porter, T., Vignon, F., Powers, J. Gao, S., Liu, J. Xie, F., and **Everbach EC.** *American College of Cardiology, Letters* Vol 19(3), 2010, 2534-2539.

*Investigation of effectiveness of microbubble stable cavitation in thrombolysis.* William T. Shi, Shunji Gao, Vignon, Francois, Jeff E. Powers, Lucas Drvol, Ki Won Jung, Feng Xie, John Lof, **E. Carr Everbach**, Thomas R. Porter. *IEEE 2010 Ultrasound Symposium*, 1743-1749.

*Treatment of Acute Intravascular Thrombi with Diagnostic Ultrasound and Intravenous Microbubbles.* F. Xie, J. Lof, **Carr Everbach**, A. He, R.M. Bennett, T. Matsunaga, J. Johanning, T.R. Porter. *J. Am. Coll. Cardiol. Img* 2, 511-518 (2009).

*Bioeffects considerations for diagnostic ultrasound contrast agents.* D.L. Miller, M.A. Averkiou, A.A. Brayman, **E.C. Everbach**, C.K. Holland, J.H. Wible Jr., J. Wu. *Journal of Ultrasound in Medicine* 27(4), 611-623 (2008).

*American Institute of Ultrasound in Medicine consensus report on potential bioeffects of diagnostic ultrasound: Executive summary.* J.B. Fowlkes, J.S. Abramowicz, C.C. Church, ... **E.C. Everbach**, ... D.G. Simpson, *Journal of Ultrasound in Medicine* 27(4), 503-515 (2008).

*Diagnostic Ultrasound*. **E. Carr Everbach**, invited tutorial paper, *Physics Today*, March 2007.

*Characterization of individual submicron perfluorocarbon gas bubbles by ultrasonic backscatter*. **E. Carr Everbach**, D.B. Khismatullin, J.T. Flaherty and R.A. Roy, *Acoustics Research Letters Online*, ARLO 6(3), 175-181(July, 2005). DOI: <http://dx.doi.org/10.1121/1.1901743>

*Biological and environmental factors affecting ultrasound-induced hemolysis in vitro 2. Medium dissolved gas (pO<sub>2</sub>) content*. M.W. Miller, **E.C. Everbach**, L.F. Battaglia, *Ultrasound Med. Biol.* 29, 93-102 (2003).

*Biological and environmental factors affecting ultrasound-induced hemolysis in vitro 1. HIV macrocytosis (cell size)*. M.W. Miller, **E.C. Everbach**, L.F. Battaglia, *Ultrasound Med. Biol.* 29, 77-91 (2003).

*Enhanced Retention in the Passive-Avoidance Task by 5-HT<sub>1A</sub> Receptor Blockade is not associated with increased activity of the Central Nucleus of the Amygdala*. A.M. Schneider, E. Wilkins, A. Firestone, **E. Carr Everbach**, J.C. Naylor, and P. Simson, *Learning & Memory* 10:394-400 (2003).

*Differences in Definity and Optison microbubble destruction rates at a similar mechanical index with different real-time perfusion systems*. C. Sonne, F. Xie, J. Lof, J. Oberdorfer, P. Phillips, **E. Carr Everbach**, and T.R. Porter, *J. Am. Soc. Echocardiology* 16, 1178-1185 (2003).

*Effectiveness of transcranial and thoracic ultrasound and microbubbles in dissolving intravascular thrombi*. T.R. Porter, D. Kricsfeld, J. Lof, **E. Carr Everbach**, F. Xie, *J. Ultrasound Med.* 2001, 20:1313-1325.

*A comparison of the hemolytic potential of Optison™ and Albunex® in whole human blood in vitro: acoustic pressure, ultrasound frequency, donor and passive cavitation detection considerations*. M.W. Miller, **E. Carr Everbach**, C. Cox, R.R. Knapp, A.A. Brayman, and T.A. Sherman, *Ultrasound in Med. & Biol.* 27(5), 709-721 (2001).

*Myocardial cavitation activity during continuous infusion and bolus intravenous injections of perfluorocarbon-containing microbubbles*. T.R. Porter, **E. Carr Everbach**, D. Kricsfeld, and F. Xie, *Journal of the American Society of Echocardiography* 14(6):618-625:2001.

*Cavitation mechanisms in ultrasound-accelerated thrombolysis at 1 MHz*. **E. Carr Everbach** and Charles W. Francis, *Ultrasound in Med. & Biol.* 26(7), 1153-1160 (2000).

*Bacterial stress responses to 1 MHz pulsed ultrasound in the presence of microbubbles*. Vollmer, A.C., Kwayke, S., Halpern, M. and **E. Carr Everbach**, *Appl. Environ. Microbiol* 64(10), 3927-3931 (1998).

*Effect of acoustic cavitation on platelets in the presence of an echo-contrast agent*. **E. Carr Everbach**, I.R.S. Makin, C. Francis, and R. Meltzer, *Ultrasound in Med. & Biol.* 24(1), 129-136 (1998).

Encyclopedia article: *Ultrasound, Physical Effects of*, **E. Carr Everbach** in *Encyclopedia of Applied Physics*, G. Trigg, ed., Wiley-VCH publ., NY (1998), ISBN 3-527-29475-9.

*Correlation of ultrasound-induced hemolysis with cavitation detector output in vitro*. **E. Carr Everbach**, I.R.S. Makin, M. Azadniv, and R. Meltzer, *Ultrasound in Med. & Biol.* 23(4); 619-624 (1997).

Book Chapter: *Parameters of Nonlinearity of Acoustic Media*, **E. Carr Everbach** in *Encyclopedia of Acoustics*, Malcolm J. Crocker, ed., John Wiley & Sons, NY (1997), ISBN 0-471-17767-9.

*Measurement of pressure and assessment of cavitation for a 22.5 kHz intra-arterial angioplasty device.* I.R.S. Makin and **E. Carr Everbach**, J. Acoust. Soc. Am. 100(3); 1855-1864 (1996).

*An interferometric technique for B/A measurement.* **E. Carr Everbach** and R.E. Apfel, J. Acoust. Soc. Am. **98**(6); 3428-3438 (1995).

*Effect of a stabilized microbubble echo contrast agent on hemolysis of human erythrocytes exposed to high intensity pulsed ultrasound.* Brayman, A.A, Azadniv, M., Makin, I.R.S., Miller, M.W., Carstensen, E.L., Child, S.Z. Raeman, C.H., Meltzer, R.S., and **Everbach, E.C.**, Echocardiography 12(1), 13–21 (1995).

*Endoscopic measurement of lesion size: improved accuracy with image processing.* N. Vakil, W. Smith, K. Bourgeois, **E. Carr Everbach**, K. Knyrim, Gastrointestinal Endoscopy 40, Number 2, Part 1; 178-183 (1994).

*Transient acoustic cavitation causes gallstone fragmentation: a study of gallstones fragmented in vivo.* N. Vakil, and **E. Carr Everbach**, Ultrasound in Med. & Biol. 19(4); 331-342 (1993).

*Internal stress wave measurements in solids subjected to lithotripter pulses.* S.M. Gracewski, G. Dahake, Z. Ding, S.J. Burns, and **E. Carr Everbach**, J. Acoust. Soc. Am. 94(3), 652-61 (1993).

*Gallstone movement during lithotripsy: mechanisms and effects on fragmentation .* N. Vakil, **E. Carr Everbach** and S.M. Gracewski, J. Ultrasound in Med. 11:419-424, 1992.

*Microhardness properties of human gallstones and synthetic stones.* S.M. Gracewski, Nimish Vakil, **E. Carr Everbach**, Mark E. Davis, and S.J. Burns, J. Material Sci. Lett.11, 554-557 (1992).

*Applications of mixture laws for predicting the compositions of tissue phantoms.* P. Jiang, **E. Carr Everbach**, and R.E. Apfel, Ultrasound in Med. and Biol. 17(8), 829-838 (1991).

*Therapeutic cardiac ultrasound.* R.S. Meltzer, K.Q. Schwarz, J.G. Mottley, and **E.C. Everbach**, Am. Journ. of Cardiol. 67, 422-424 (1991).

*Gas in gallstones: quantitative determinations and possible effects on fragmentation by shock waves.* Nimish Vakil and **E. Carr Everbach**, Gastroenterology 101, 1628-1634 (1991).

Book chapter: *The appreciation of colour in endoscopy.* Nimish Vakil, Klaus Knyrim, and **E. Carr Everbach**, Baillière's Clinical Gastroenterology, Vol. 5, No. 1, London, March 1991. ISBN 0-7020-1529-6.

*Relationship of Model Stone Properties to Fragmentation Mechanisms during Lithotripsy.* N.Vakil, S.M. Gracewski, and **E. Carr Everbach**, J. Lithotripsy & Stone Disease 3(4), 1-8, (1991).

*A Corrected Mixture Law for B/A.* **Erich Carr Everbach**, Zhe-ming Zhu, Peng Jiang, Boa Teh Chu, Robert E. Apfel, J. Acoust. Soc. Am., **89**(1), 446-447 (1991).

## Unrefereed Publications

*Biomedical Ultrasound – Past, Present, and Future*. **E. Carr Everbach**, cover article for Echoes, the newsletter of the Acoustical Society of America, Winter, 2006.

<http://asa.aip.org/winter2006.pdf>

*Sono et Gravitas - The Legacy of Robert Edmund Apfel*. Christy Holland and **E. Carr Everbach**, Acoustics Research Letters Online, ARLO 6(3), i-iii (July 2005). <http://scitation.aip.org/ARLO/>

*Teaching computing to engineering freshmen through a “high-tech tools and toys laboratory.”* S.W. McKnight, W.E. Cole, G. Tadmor, M.F. Ruane and **E. Carr Everbach**, Proc. of ASEE 2001. Paper presented at meeting of the ASEE in Albuquerque, NM, June 2001.

*Networking to advance undergraduate research in engineering and achieve more balanced EC2000 outcomes.* F.L. Orthleib, L.A. Molter, and **E. Carr Everbach**, Proc. of ASEE 2001. Paper presented at meeting of the ASEE in Albuquerque, NM, June 2001.

*Wide-bandwidth PVDF lithotripsy hydrophone.* **E. Carr Everbach**. ASEE 1996 Ann. Conf. Proc. paper 1659. Poster/paper presented at the ASEE annual conference in Washington, D.C., June 1996.

Book chapter: *Image Processing in Electronic Endoscopy*. Nimish Vakil and **E. Carr Everbach**, Clinical Gastroenterology, Vol. 2, No. 1, Gordon and Breach, London 1996.

*Light from Sound.* **E. Carr Everbach**, cover article for Echoes, the newsletter of the Acoustical Society of America, April 1993.

*Letter to the Editor.* Nimish Vakil, **E. Carr Everbach**, Klaus Knyrim, New England Journal of Medicine, May 1993.

*Report of the 22nd Hunt Fellow of the Acoustical Society of America.* **E.C. Everbach**, J. Acoust. Soc. Am., June 1991, Forum Section.

*Using the Acoustic Nonlinearity Parameter for Tissue Composition Prediction.* Robert E. Apfel and **E. Carr Everbach**, Proc. Intrntl. Conf. on Acoust., Vol. 4, pp. 167–170. (August 22–31, 1989). Paper presented at the 13th I.C.A. in Belgrade, Yugoslavia.

## Abstracts of Papers Presented

*Detection of HIFU lesions by optical coherence tomography*, Raymond J, Marques M, Everbach E. Carr, Hughes M, Roy R, Podoleanu A, J. Acoust. Soc. Am. 152. Paper presented to the 183<sup>rd</sup> meeting of the Acoustical Society of America in Nashville, TN, December 8, 2022.

*Determination of nonlinearity parameter B/A of liquids by comparison with solutions of the three-dimensional Westervelt equation*, Chien L, Cormack JM, Everbach EC, Hamilton MA, J. Acoust. Soc. Am. 150(4); online 10.1121/10.0007851. Paper presented to the 181<sup>st</sup> meeting of the Acoustical Society of America in Seattle, WA, by the student,

November 30, 2021.

*Irreversible shifts in optical autofluorescence spectra applied to the assessment of thermal lesion formation under HIFU*, Shivastava S, Everbach C, Raymond J, Roy R, J. Acoust. Soc. Am. 145(3):online 10.1121/1.5101507. Paper presented at the 177<sup>th</sup> meeting of the Acoustical Society of America in Louisville, KY, May 15, 2019.

*HIFU tissue lesion quantification by optical coherence tomography*, Raymond JL, Everbach EC, Roy RA, Marques M, Hughes M, Podoleanu A. J. Acoust. Soc. Am. 145(3):online 10.1121/1.5101623. Paper presented at the 177<sup>th</sup> meeting of the Acoustical Society of America in Louisville, KY, May 15, 2019.

*Ultrasonic method for monitoring muscle water content*, CH McLeish, SN Tsyuryupa, AP Sarvazyan, and EC Everbach, IEEE UFFC 4C-6, September 4, 2017, Washington, DC, presented by the student.

*Sonothrombolysis of porcine blood clots using 1 MHz pulsed ultrasound*. Nourmahnad, Atousa; Barbano, Luke; and **Everbach, Erich C.**, J. Acoust. Soc. Am. 136(3):1825. Poster presented at the 169<sup>th</sup> meeting of the Acoustical Society of America in Jacksonville, FL, November 4, 2015, by the students.

*Modeling of microbubbles pushed through clots via acoustic radiation force*. Ascanio Guarini and **E.C. Everbach**, J. Acoust. Soc. Am. 133(5):3356. Paper presented at the 165<sup>th</sup> meeting of the Acoustical Society of America and ICA in Montreal, Canada, June 5, 2013, by the student.

*Tracking the motion of cavitation bubbles using pulsed Doppler*. **E.C. Everbach, J.** Acoust. Soc. Am. 132(3):1907. Paper presented at the 164<sup>th</sup> meeting of the Acoustical Society of America in Kansas City, MO, October 25, 2012.

*Cavitation activity in bacterial biofilms exposed to 1 MHz ultrasound*. **E. Carr Everbach**, Roby Velez, and Amy C. Vollmer, J. Acoust. Soc. Am. 123(5):3557. Paper presented at the 155<sup>th</sup> meeting of the Acoustical Society of America in Paris, France, July 3, 2008.

*Effect of 810 kHz cw ultrasound on bacterial biofilms*. Kofi Anguah, Roby Velez, Amy C. Vollmer, and **E. Carr Everbach**, J. Acoust. Soc. Am. 122(5):3052. Paper presented at the 154<sup>th</sup> meeting of the Acoustical Society of America in New Orleans, LA, November 30, 2007, by the students.

*A possible noncavitation mechanism of ultrasound-accelerated thrombolysis in fibrin clots*. **E. Carr Everbach**, J. Acoust. Soc. Am. 119(5):3406. Paper presented at the 151<sup>st</sup> meeting of the Acoustical Society of America in Providence, RI, June 8, 2006.

*Use of ultrasound as educational tool in medicine.* **E. Carr Everbach**, J. Acoust. Soc. Am. 119(5):3381. Paper presented at the 151<sup>st</sup> meeting of the Acoustical Society of America in Providence, RI, June 7, 2006.

*Wavelet analysis of active cavitation detector output.* Kofi Anguah and **E. Carr Everbach**, J. Acoust. Soc. Am. 119(5):3322. Paper presented at the 151<sup>st</sup> meeting of the Acoustical Society of America in Providence, RI, June 7, 2006 by the student.

*Tutorial Lecture: Diagnostic Imaging in Biomedical Ultrasound.* **E. Carr Everbach**, J. Acoust. Soc. Am. 118(3):1877. Prestigious lecture presented at the 150<sup>th</sup> meeting of the Acoustical Society of America in Minneapolis, MN, October 17, 2005.

*Hot Topics in Acoustics: Biomedical Ultrasound.* **E. Carr Everbach**, J. Acoust. Soc. Am. 118(3):1972. Paper presented at the 150<sup>th</sup> meeting of the Acoustical Society of America in Minneapolis, MN, October 17, 2005.

*Confocal microscopy movies of fibrin clots during ultrasound-accelerated thrombolysis.* **E. Carr Everbach**, I.N. Chernysh, J.W. Weisel, J. Acoust. Soc. Am. 117(4):2413. Paper presented at the 149<sup>th</sup> meeting of the Acoustical Society of America in Vancouver, BC, May 2005.

*Active cavitation detection of asymmetrical inertial cavitation.* **E. Carr Everbach**, J. Acoust. Soc. Am. 115(5):2514. Paper presented at the 147<sup>th</sup> meeting of the Acoustical Society of America, 75<sup>th</sup> Anniversary, New York, NY, May 2004.

*ASA Education in Acoustics website as a new portal.* **E Carr Everbach**, J. Acoust. Soc. Am. 114(4): 2309. Paper presented at the 146<sup>th</sup> meeting of the Acoustical Society of America in Austin, TX, November 2003.

*Acoustics Demonstrations.* **E Carr Everbach**, J. Acoust. Soc. Am. 113(4): 2240. Demos presented at the 145<sup>th</sup> meeting of the Acoustical Society of America in Nashville, TN, April 2003.

*ASA education outreach.* Uwe Hansen and **E Carr Everbach**, J. Acoust. Soc. Am. 113(4): 2267. Paper presented at the 145<sup>th</sup> meeting of the Acoustical Society of America in Nashville, TN, April 2003.

*Differences in Definity and Optison Microbubble Destruction Rates at the Same Mechanical Index with Different Real Time Perfusion Systems,* T R Porter, F Xie, J Oberdorfer, **E Carr Everbach**, P Rafter, L Venneri, C Sonne, ASE 2003 Annual Meeting. Paper presented at the 2003 ASE meeting in Toronto, Canada.

*30 MHz backscatter and Doppler signals from individual microbubbles undergoing inertial cavitation.* Johanna Yoon '02 and **E. Carr Everbach**, J. Acoust. Soc. Am. 111(5): 2002. Paper presented at the 143<sup>th</sup> meeting of the Acoustical Society of America in Pittsburgh, PA, June 2002.

*Quantification of sub-micron DDFP gas bubbles using 30 MHz ultrasound backscattered tonebursts.* **E. Carr Everbach**, R.A. Roy, and J. Flaherty, J. Acoust. Soc. Am. 110(5): 2001. Paper presented at the 141th meeting of the Acoustical Society of America in Ft. Lauderdale, FL, December 2001.

*Srotonin receptor blockade by NAN-190 enhances memory modulation.* A.M. Schneider, E. Wilkins, A. Firestone, M. Choy, D. Levin, **C. Everbach**, P.E. Simson, J.C. Naylor, K.R. Short; Neurosciences, Nov. 2001.

*In vitro study of mechanisms of transient response imaging.* Suor Kim '02 and **E. Carr Everbach**, J. Acoust. Soc. Am. 107(6):2198, 2000. Paper presented at the 139th meeting of the Acoustical Society of America in Atlanta, GA, by the student, May 30, 2000.

*Parameter dependence of 20-MHz passive inertial cavitation detector output.* Alyssa Bonnoit '03 and **E. Carr Everbach**, J. Acoust. Soc. Am. 107(6):2198, 2000. Paper presented at the 139th meeting of the Acoustical Society of America in Atlanta, GA, by the student, May 30, 2000.

*Interdisciplinary Undergraduate Research at Small Colleges*, **E. Carr Everbach**. Keynote speaker at first undergraduate research symposium, Albright College, April 15, 2000.

*Bacterial stress response due to acoustic cavitation.* Annie Willman '01, **E. Carr Everbach**, and Amy C. Vollmer, J. Acoust. Soc. Am. 106(4):2198, 1999. Paper presented at the 138th meeting of the Acoustical Society of America in Columbus, OH, by the student, Nov. 3, 1999.

*Teaching science/engineering students about gender issues in science and technology.* **E. Carr Everbach** and members of the Tri-College Gender-in-Science discussion group, Greater Philadelphia Women's Studies Consortium meeting, West Chester University (West Chester, PA), May 7, 1999.

*Enhancement of fibrinolysis by low-intensity c.w. ultrasound.* Charles W. Francis, Valentina Suchkova, and **E. Carr Everbach**, J. Acoust. Soc. Am. 105(2):1369, 1999. Paper presented at the 137th meeting of the Acoustical Society of America, joint meeting with the European Acoustics Association and German Acoustics DEGA, in Berlin, Germany, March 15-19, 1999.

*An Investigation of the Effects of Ultrasound Exposure on Escherichia coli Using a Bioluminescent Reporter System.* Halpern, M., Kwakye, S., **Everbach, E. C.**, and Vollmer, A.C., in Abstracts of the 98th General Meeting of the American Society for Microbiology, A-98, p.55. American Society for Microbiology, Washington, D.C., May 1998.

*Acoustic detection of microbubble destruction in gaseous contrast agents.* William T. Shi, Flemming Forsberg, and **E. Carr Everbach**, J. Acoust. Soc. Am. 103(5):3002, 1998. Paper presented at the 135th meeting of the Acoustical Society of America, joint meeting with the 16th International Congress on Acoustics, in Seattle, WA, June 25, 1998.

*Overpressure reduces acceleration of thrombolysis due to ultrasound.* **E. Carr Everbach**, Janice White, and Charles W. Francis, J. Acoust. Soc. Am. 102(5): 3154 (1997). Paper presented at the 134th meeting of the Acoustical Society of America, in San Diego, CA, December 4, 1997.

*Bubble collapse emissions suggest mechanism for transient response imaging.* **E. Carr Everbach**, Shouping Li, and Thomas R. Porter, J. Acoust. Soc. Am. 102(5): 3154 (1997). Paper presented at the 134th meeting of the Acoustical Society of America, in San Diego, CA, December 4, 1997.

*Effect of acoustic cavitation on genetically engineered bacteria.* Sylvia Kwakye (Swarthmore '98), Amy C. Vollmer and **E. Carr Everbach**, J. Acoust. Soc. Am. 101(5):3096 (1997). Poster presented at the 133rd meeting of the Acoustical Society of America in State College, PA, by the student, June 18, 1997.

*Musical acoustics in teaching engineering.* **E. Carr Everbach**, J. Acoust. Soc. Am. 101(5) (1997). Paper presented at the 133rd meeting of the Acoustical Society of America, in State College, PA, June 18, 1997.

*Experimental results for transmission of a finite-amplitude, focused sound beam at a curved interface between two media.* I.R.S. Makin, **E. Carr Everbach**, and M.F. Hamilton, J. Acoust. Soc. Am. 100(4), 2589 (1996). Paper presented at the 132nd meeting of the Acoustical Society of America, Honolulu, HI, December 2, 1996.

*Acoustic emissions of a fluorocarbon echo-contrast agent undergoing inertial cavitation.* **E. Carr Everbach**, I.R.S. Makin, T. Porter, F. Xie, and R.S. Meltzer, Circulation 94, I-319 (1996). Paper presented at the 69th meeting of the American Heart Assoc., November, 1996.

*Lecture demonstrations in acoustics.* F. Bell-Berti, **E. Carr Everbach**, M.C. Hastings, P.K. Kuhl, J.M. Weisenberger, J. Acoust. Soc. Am. 99(4), 2537 (1996). Paper presented at the 131st meeting of the Acoustical Society of America, Indianapolis, IN, May 16, 1996.

*Comparison of cavitation activity of fluorocarbon echo-contrast agent with air-filled agents.* **E. Carr Everbach**, I.R.S. Makin, T. Porter, F. Xie, and R.S. Meltzer. Paper to be presented at the 38th meeting of the American Assoc. of Physicists in Medicine, Philadelphia, PA, July 21-25, 1996.

*Induction of the heat shock response and the SOS response in Escherichia coli by the effects of acoustic cavitation from ultrasound.* A.C. Vollmer, I.R.S. Makin, and **E.C. Everbach**, Amer Soc Microbiology 1996.

*A durable, wide-bandwidth lithotripsy hydrophone.* Byron Holz (Swarthmore '98) and **E. Carr Everbach**, J. Acoust. Soc. Am. 98(5) (1995). Paper presented at the 130th meeting of the Acoustical Society of America in St. Louis, MO, by the student.

*Acoustical characterization of straw bales as structural elements.* Carl J. Mas (Swarthmore '98) and **E. Carr Everbach**, J. Acoust. Soc. Am. 98(5) (1995). Paper

presented at the 130th meeting of the Acoustical Society of America in St. Louis, MO, by the student.

*Correlation of cavitation-induced damage to blood elements with passive acoustic detector output.* **E. Carr Everbach**, Inder Raj S. Makin, and Charles W. Francis, J. Acoust. Soc. Am. 98(5) (1995). Paper presented at the 130th meeting of the Acoustical Society of America in St. Louis, MO.

*Effects of acoustic cavitation on luminescent bacteria.* **E. Carr Everbach**, Inder R.S. Makin, and Amy Cheng Vollmer, J. Acoust. Soc. Am. 97(5), 3406 (1995), presented at the 129th meeting of the Acoustical Society of America in Washington, DC.

*Pressure and cavitation measurements of an intra-arterial angioplasty device.* Inder Raj S. Makin and **E. Carr Everbach**, J. Acoust. Soc. Am. 97(5) 3326 (1995), presented at the 129th meeting of the Acoustical Society of America in Washington, DC.

*Comparison of cavitation activity of echocontrast agents filled with different gases.* Makin, I.R.S., **Everbach, E. Carr**, Porter, T., Xie, F., and Meltzer, R.S., Am. Heart Assoc., presented November 14, 1995, at the AMA Anaheim meeting.

*Platelet Damage due to Intense Pulsed Ultrasound in the Presence of an Albumin Echocontrast Agent.* **E. Carr Everbach**, I.R.S. Makin, R.S. Meltzer, and C. Francis, Am. Soc. of Echocardiol., poster presented June 14, 1995, at the Toronto meeting.

*Hemolysis due to cavitation by intense pulsed ultrasound in the presence of an albumin echocontrast agent.* **E. Carr Everbach**, I.R.S. Makin, Mitra Azadniv, and R.S. Meltzer, Am. Soc. of Echocardiol., poster presented June 14, 1995, at the Toronto meeting.

*Flexible Data Acquisition and Control System for Thermofluid Mechanics.* **E.C. Everbach**, E. Cheever, and A.E. McGarity, Am. Soc. for Engin. Educ., poster presented June 26, 1995, at the ASEE Anaheim meeting.

*Correlation of cavitation-induced hemolysis with output from an acoustic cavitation monitoring system.* **Everbach, E.C.**, Makin, I.R.S, Azadniv, M., Meltzer, R.S., American Inst. of Ultrasound in Med., presented at March 1995 AIUM meeting in San Francisco, CA.

*Ultrasound & microbubbles: contrast, bioeffects, and therapeutic applications.* Richard S. Meltzer, David Harpaz, Ran Kornowski, **Carr Everbach**, Zvi Vered, Am. J. Cardiac Imaging 8:270, 1994.

*Active cavitation detection of microbubble echocontrast agents in blood.* Vilma E. Huertas (Swarthmore '94), Inder Raj S. Makin, and **E. Carr Everbach**, J. Acoust. Soc. Am. 95(5), Part 2; 2856 (1994). Paper presented at the 127th meeting of the Acoustical Society of America in Cambridge, MA, by the student.

*Ray-tracing analysis of auditorium acoustics for the Macintosh.* Marc Rieffel (Swarthmore '94), Geoffrey Noer (Swarthmore '95), Jeremy Dilatush (Swarthmore '96), Andrew Brown (Swarthmore '97), and **E. Carr Everbach**, J. Acoust. Soc. Am. 95(5), Part 2; 2887 (1994). Poster presented at the 127th meeting of the Acoustical Society of America in Cambridge, MA, by the students.

*Field measurements for an intra-arterial angioplasty device.* Inder Raj S. Makin and **E. Carr Everbach**, J. Acoust. Soc. Am. 95(5), Part 2; 2855 (1994). Paper presented at the 127th meeting of the Acoustical Society of America in Cambridge, MA.

*Of flaming tubes and spinning cups.* **E. Carr Everbach**, J. Acoust. Soc. Am. 95(5), Part 2; 2934 (1994). Demonstration presented at the 127th meeting of the Acoustical Society of America in Cambridge, MA.

*Ultrasound & Microbubbles: contrast, bioeffects and therapeutic applications.* D. Harpaz, R. Kornowski, **Carr Everbach**, Zvi Vered. 4th International Conference on Non-Invasive Medicine, Limassol, Cyprus, October 10-15, 1993.

*Sonochemistry and acoustic cavitation.* **E. Carr Everbach**. Invited paper presented July 7, 1993 at "Future Problems in Mechanics and Materials," a Young Investigators Meeting sponsored by the Institute for Mechanics and Materials and the NSF.

*Acoustic cavitation, or how sound can break stones.* **E. Carr Everbach**. Invited seminar paper presented February 15, 1993 for students and faculty at the University of Pennsylvania, Dept. of Chemical Engineering.

*Lithotripter shock wave propagation through layered media.* Joseph Jankovsky (Swarthmore '93), P. Ted Christopher, and **E. Carr Everbach**, J. Acoust. Soc. Am., 93(S1), 1993. Paper presented at the 125th meeting of the Acoustical Society of America in Ottawa, Canada, by the student.

*Intra-arterial ultrasonic angioplasty: a feasibility study.* Olivier K. Colliou (Swarthmore '93) and **E. Carr Everbach**, J. Acoust. Soc. Am., 93(S1), 1993. Paper presented at the 125th meeting of the Acoustical Society of America in Ottawa, Canada, by the student.

*Developing a MIDI pitch detector.* Youngmoo Kim (Swarthmore '93) and **E. Carr Everbach**, J. Acoust. Soc. Am., 93(S1), 1993. Paper presented at the 125th meeting of the Acoustical Society of America in Ottawa, Canada, by the student.

*Viscosity of human bile and its role in gallstone lithotripsy.* **E. Carr Everbach**, Nimish Vakil, and S.M. Gracewski, J. Acoust. Soc. Am., 92(4), 2377, 1992. Paper presented at the 124th meeting of the Acoustical Society of America in New Orleans, LA.

*Strain measurements inside solids subjected to lithotripter pulses.* S.M. Gracewski, G. Dahake, Z. Ding, S.J. Burns, and **E. Carr Everbach**, J. Acoust. Soc. Am., 92(4), 2376, 1992. Paper presented at the 124th meeting of the Acoustical Society of America in New Orleans, LA.

*Materials characterization via acoustic levitation in air.* Bob Boulware (Swarthmore '92) and **E. Carr Everbach**, J. Acoust. Soc. Am., 91(S1), 1992. Paper presented at the 123rd meeting of the Acoustical Society of America in Salt Lake City, UT, by the student.

*Acoustic scale modelling of auditoria.* Whitney N. Potter (Swarthmore '92) and **E. Carr Everbach**, J. Acoust. Soc. Am., 91(S1), 1992. Paper presented at the 123rd meeting of the Acoustical Society of America in Salt Lake City, UT, by the student.

*Auditorium acoustics simulation for the Macintosh.* Marc Rieffel (Swarthmore '94) and **E. Carr Everbach**, J. Acoust. Soc. Am., 91(S1), 1992. Paper presented at the 123rd meeting of the Acoustical Society of America in Salt Lake City, UT, by the student.

*Biological effects of lithotripter fields.* E.L. Carstensen, S.Z. Child, C. Hartman, and **E. Carr Everbach**, J. Acoust. Soc. Am., 90(S1), 1991. Invited paper presented at the 122nd meeting of the Acoustical Society of America in Houston, TX.

*The role of gallstone and bile properties in stone breakup in lithotripsy.* Nimish Vakil, **E. Carr Everbach**, and S.M. Gracewski, J. Acoust. Soc. Am., 90(S1), 1991. Paper presented at the 122nd meeting of the Acoustical Society of America in Houston, TX.

*Therapeutic cardiac ultrasound.* R.S. Meltzer, Karl Q. Schwarz, Jack G. Mottley, and **E. Carr Everbach**, 9th Symp. on Echocardiology, Rotterdam, the Netherlands, June 26-28, 1991.

*Acoustic levitation positioning of objects in water.* Gunter S. Schemmann (Swarthmore '91) and **E. Carr Everbach**, J. Acoust. Soc. Am., 89(S1), 1991. Paper presented at the 121st meeting of the Acoustical Society of America in Baltimore, MD, by the student.

*Prototype and feasibility study of a PVDF infant health monitor.* Joe Higgins (Swarthmore '91) and **E. Carr Everbach**, J. Acoust. Soc. Am., 89(S1), 1991. Paper presented at the 121st meeting of the Acoustical Society of America in Baltimore, MD, by the student.

*Scale-model acoustical analysis of the Performing Arts Center at Swarthmore College.* Ming Hin Soon (Swarthmore '93) and **E. Carr Everbach**, J. Acoust. Soc. Am., 89(S1), 1991. Paper presented at the 121st meeting of the Acoustical Society of America in Baltimore, MD, by the student.

*Wave propagation in solids: computation vs. experiment.* Ali Usman (Swarthmore '91) and **E. Carr Everbach**, J. Acoust. Soc. Am., 89(S1), 1991. Paper presented at the 121st meeting of the Acoustical Society of America in Baltimore, MD, by the student.

*Dynamic failure mechanisms in gallstones using lithotripsy.* S.J. Burns, S.M. Gracewski, **E.C. Everbach**, Nimish Vakil, and A.R. Basu, Intl. Smnr. on Dynam. Failure of Materials. Paper presented at the ISDFM meeting in Vienna, Austria, January 1991.

*The potential of therapeutic cardiac ultrasound.* R.S. Meltzer, K.Q. Schwarz, J.G. Mottley, and **E. Carr Everbach**, Am. Coll. Cardiol. Paper presented at March 1990 meeting in Atlanta, GA.

*Pressure sensitivity of sonicated albumin and saccharide contrast agents.* R.S. Meltzer, Shmuel Gottlieb, Jack Mottley, Alexander Ernst, **Erich C. Everbach**, Reinhard Schlieff, Karl Q. Schwarz, Janine R. Shapiro, Feinstein Meeting on Echocontrast, Chicago, IL, Oct. 4-5, 1990.

*Decay of ultrasound integrated backscatter from a saccharide contrast agent is accelerated by increased pressure.* J. Mottley, **E.C. Everbach**, K.Q. Schwarz, R. Schlieff, and R.S. Meltzer, American Heart Association. Paper presented at AHA meeting in Dallas, TX, November 1990.

*Microhardness properties of gallstones and synthetic stones.* S.M. Gracewski, Nimish Vakil, **E. Carr Everbach**, and S.J. Burns, Intl. Conf. IEEE Engineering in Med. & Biol. Society. Paper presented at 12th annual meeting of the IEEE in Philadelphia, PA, November 1990.

*An inexpensive wide-bandwidth hydrophone for lithotripsy research.* **E. Carr Everbach**, J. Acoust. Soc. Am. S1 (87), S128 (Spring 1990). Paper presented at 119th meeting of the Acoustical Society of America in University Park, PA.

*Properties of gallstones and their relationship to destruction mechanisms in acoustic lithotripsy.* **E. Carr Everbach**, S.M. Gracewski, and N. Vakil, J. Acoust. Soc. Am. S1 (87), S141 (Spring 1990). Paper presented at 119th meeting of the Acoustical Society of America in University Park, PA.

*Mixture laws for ultrasonic tissue characterization.* Peng Jiang, Robert E. Apfel, and **E. Carr Everbach**, J. Acoust. Soc. Am. S1 (87), S115 (Spring 1990). Paper presented at 119th meeting of the Acoustical Society of America in University Park, PA.

*Mechanisms of Stone Destruction by Shock Waves.* **E. Carr Everbach**, S.M. Gracewski, and Nimish Vakil, Gastroenterology, Vol. 98, No. 5, Part 2, A574 (1990). Paper presented at May 1990 meeting, San Antonio, TX.

*Static Mechanical Properties of Gallstones and their Relationship to Lithotripsy.* S.M. Gracewski, S.J. Burns, **E. Carr Everbach**, and Nimish Vakil, Gastroenterology, Vol. 98, No. 5, Part 2, A590 (1990). Poster presented at May 1990 meeting, San Antonio, TX.

*Quantitative Determinations of Gas in Human Gallstones.* Nimish Vakil and **E. Carr Everbach**, Gastroenterology, Vol. 98, No. 5, Part 2, A641 (1990). Poster presented at May 1990 meeting, San Antonio, TX.

*Mixture Composition Determination from Measurements of the Acoustic Nonlinearity Parameter.* **E.C. Everbach** and R.E. Apfel, J. Acoust. Soc. Am. S1 (85), S151 (Spring 1989). Paper presented at 117th meeting of the Acoustical Society of America in Syracuse, NY.

*Application of the Acoustic Nonlinearity Parameter to Tissue Composition Prediction.* Robert E. Apfel and **E.C. Everbach**, J. Acoust. Soc. Am. S1 (84), S138 (Fall 1988). Paper presented at 116th meeting of the Acoustical Society of America in Honolulu, HI.

*Enhanced Nonlinearity in a Bubbly Liquid considered as a Mixture.* **E.C. Everbach** and R.E. Apfel, J. Acoust. Soc. Am. S1 (83), S109 (Spring 1988). Paper presented at 115th meeting of the Acoustical Society of America in Seattle, WA. <http://doi.org/10.1121/1.2025126>

*Comparison of Tissue Composition Models via the Measurement of the Nonlinearity Parameter of Mixtures.* **E.C. Everbach** and R.E. Apfel, J. Acoust. Soc. Am. S1 (82), S12 (Fall 1987). Paper presented at 114th meeting of the Acoustical Society of America in Miami, FL.

*Measurement of the Nonlinear Parameter of Mixtures to test Apfel's Tissue Composition Model.* **E.C. Everbach** and R.E. Apfel, J. Acoust. Soc. Am. S1 (80), S4 (Fall 1986). Paper presented at 112th meeting of the Acoustical Society of America in Anaheim, CA.

*The Nonpropagating Hydrodynamic Soliton in Annular Geometries.* **E.C. Everbach** and R.E. Apfel, J. Acoust. Soc. Am. S1 (79), S32 (Spring 1986). Paper presented at 111th meeting of the Acoustical Society of America in Cleveland, OH.