Elizabeth M. Cherry

Curriculum Vitae

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Education

B.S., Mathematics and American Studies, Georgetown University, 1993 *summa cum laude*

Ph.D., Computer Science, Duke University (H.S. Greenside, advisor), 2000

Professional Experience

1993-1995	Systems Consultant, American Management Systems, Arlington, VA
2000-2001	Postdoctoral Researcher, UCLA School of Medicine, Los Angeles, CA
2001-2006	Postdoctoral Researcher, Hofstra University Physics Department and Center for Arrhythmia Research, Hempstead, NY
2006-	Research Associate, Department of Biomedical Sciences, College of Veterinary Medicine, Cornell University, Ithaca, NY

Fellowships and Support

1995-1999	James B. Duke Fellowship
1996-1999	National Science Foundation Graduate Research Fellowship
2002-	National Computational Science Alliance "The Role of Anatomical Structure in Ventricular and Atrial Arrhythmias" (renewed annually since 2002), 40,000 CPU hours (co-PI: FH Fenton)
2003-2005	Ruth B. Kirchstein National Research Service Award (Fellowship), National Institutes of Health
2005-2006	Cornell Faculty Innovation in Teaching Award (co-PIs: MS Kraus, FH Fenton), "Interactive learning modules for cardiovascular medicine." $20,000 toward developing interactive teaching tools for veterinary courses

Research Support

0824399, E.M. Cherry (PI), $174,998 — 08/15/08 – 07/31/10
NSF: BRIGE: Contribution of Purkinje Fiber Dynamics to Ventricular Fibrillation
Role: PI

0800793, F.H. Fenton (PI), $360,000 — 09/01/08 – 08/31/11
NSF: Nonlinear Dynamics and Bifurcations in Cardiac Tissue
Role: co-PI

Honors and Awards

2000	SIAM Student Travel Award
2003	Gordon K. Moe Young Investigator Award (American Heart Association and Upstate New York Cardiac Electrophysiology Society)
2005	9th Michaelem Servetus Educational Hall Award (Madrid Arrhythmia and Myocardium 2005), with Flavio H. Fenton
2006	Honorable Mention for "Cardiac Bioelectricity and Arrhythmias," National Science Foundation 2006 Science and Engineering Visualization Challenge, Interactive Media Category, with Flavio H. Fenton

2008 First prize in Adobe Acrobat 3D PDF Contest, Technical Publishing Category, with Flavio H. Fenton

Peer-reviewed Publications

1. **Cherry EM,** Greenside HS, Henriquez CS. A Space-Time Adaptive Method for Simulating Complex Cardiac Dynamics. *Physical Review Letters* 2000; 84: 1343-1346.
2. **Cherry EM,** Xie F, Feliciano Z, Garfinkel A. Computer Modeling of Atrial Fibrillation. *Cardiac Electrophysiology Review* 2001; 5: 271-276.
3. Fenton FH, **Cherry EM,** Hastings HM, Evans SJ. Multiple mechanisms of spiral wave breakup in a model of cardiac electrical activity. *Chaos* 2002; 12: 852-892.
4. Fenton FH, **Cherry EM,** Hastings HM, Evans SJ. Real-time Computer Simulations of Excitable Media: Java as a Scientific Language and as a Wrapper for C and Fortran Programs. *BioSystems* 2002; 64: 73-96.
5. **Cherry EM,** Greenside HS, Henriquez CS. Efficient simulation of three-dimensional anisotropic cardiac tissue using an adaptive mesh refinement method. *Chaos* 2003; 13: 853-865.
6. **Cherry EM,** Fenton FH. Suppression of Alternans and Conduction Blocks Despite Steep APD Restitution: Electrotonic, Memory and Conduction Velocity Restitution Effects. *American Journal of Physiology* 2004; 286: H2332-2341.
7. Fenton FH, **Cherry EM**, Karma A, Rappel WJ. Modeling Wave Propagation in Realistic Heart Geometries Using the Phase-Field Method. *Chaos* 2005; 15: 013502.
8. **Cherry EM,** Fenton FH. A tale of two dogs: Analyzing two models of canine ventricular electrophysiology. *American Journal of Physiology* 2007; 292: H43-55.
9. **Cherry EM**, Ehrlich JR, Nattel S, Fenton FH. Pulmonary vein reentry—Properties and size matter: Insights from a computational analysis. *Heart Rhythm* 2007; 4: 1553-1562.
10. Bueno-Orovio A, **Cherry EM**, Fenton FH. Minimal model for human ventricular action potentials in tissue. *Journal of Theoretical Biology* 2008; 253: 544-560.
11. Fenton FH, **Cherry EM,** Glass L. Cardiac arrhythmia. *Scholarpedia* 2008; 3: 1665.
12. **Cherry EM,** Hastings HM, Evans SJ. Dynamics of human atrial cell models: Restitution, memory, and intracellular calcium dynamics in single cells. *Progress in Biophysics and Molecular Biology* 2008; 98: 24-37.
13. Otani NF, Mo A, Mannava S, Fenton FH, **Cherry EM,** Luther S, Gilmour RF, Jr. Characterization of multiple spiral wave dynamics as a stochastic predator-prey system. *Physical Review E* 2008; 78: 021913.
14. Fenton FH, **Cherry EM**. Models of cardiac cell. *Scholarpedia* 2008; 3: 1868.
15. **Cherry EM,** Evans SJ. Properties of two human atrial cell models in tissue: Restitution, memory, propagation, and reentry. *Journal of Theoretical Biology,* in press.

Peer-reviewed Published Abstracts

1. **Cherry EM,** Fenton FH, Hastings HM, Xie F, Garfinkel A, Weiss JN, Evans SJ. The Role of Decreased Conduction Velocity in the Initiation and Maintenance of Atrial Fibrillation in a Computer Model of Human Atria. *Pacing and Clinical Electrophysiology* 2002 (Part II); 24: 538.
2. Fenton F, **Cherry EM,** Banville I, Gray RA, Hastings HM, Evans SJ. Validation of Realistic 3D Computer Models of Ventricular Arrhythmias with Optical Mapping Experiments. *Pacing and Clinical Electrophysiology* 2002 (Part II); 24: 538.
3. Garfinkel A, Fenton F, Xie F, Weiss JN, Feliciano Z, Boyle N, Evans SJ, Hastings H, **Cherry E.** The Effects of Electrical Restitution on the Stability of Scroll Wave Reentry in Simulated Human Atrium. *Pacing and Clinical Electrophysiology* 2002 (Part II); 24: 538.
4. Xie F, Garfinkel A, Qu Z, Weiss JN, Fenton F, Evans SJ, Hastings H, Karma A, **Cherry E.** The Effect of Electrical Restitution on the Stability of Scroll Reentry in Anatomically Realistic Simulated Rabbit Ventricles. *Pacing and Clinical Electrophysiology* 2002 (Part II); 24: 628.

5. **Cherry EM,** Fenton FH, Hastings HM, Evans SJ. Differences in Reentry Dynamics Between Two Human Atrial Cell Models. *Pacing and Clinical Electrophysiology* 2003 (Part II); 26: 985.

6. **Cherry EM,** Rappel WJ, Evans SJ, Fenton FH. Effects of Wall Heterogeneity in an Anatomically Realistic Model of Cardiac Ventricles: A Simulation Study. *Pacing and Clinical Electrophysiology* 2003 (Part II); 26: 1109.

7. Fenton FH, **Cherry EM,** Hastings HM, Evans SJ. The APD Restitution Hypothesis Revised: Slope >1 Does Not Always Determine Alternans and Spiral Wave Breakup. *Pacing and Clinical Electrophysiology* 2003 (Part II); 26: 1026.

8. **Cherry EM,** Ehrlich JR, Nattel S, Evans SJ, Fenton FH. Heterogeneous conduction in pulmonary veins: A model of atrial fibrillation due to slow reentrant circuits appearing as focal activity. Heart Rhythm 2004; 1: S85.

9. Fenton FH, **Cherry EM,** Ehrlich JR, Nattel S, Evans SJ. A simulation study of atrial fibrillation initiation: Differences in resting membrane potential can produce spontaneous activation at the pulmonary vein-left atrial junction. Heart Rhythm 2004; 1: S187-S188.

10. Fenton FH, Bueno Orovio A, **Cherry EM,** Evans SJ. Basis for the induction of phase two reentry in the Brugada syndrome: Insights from computer simulations. Heart Rhythm 2004; 1: S224-S225.

11. Fenton FN, **Cherry EM,** Gray RA, Hastings HM, Evans SJ. Fibrillation without alternans in porcine ventricles. *Heart Rhythm* 2005; 2: S301-S302.

12. **Cherry EM**, Gilmour RF, Jr., Fenton FH. Tissue dynamics of two models of canine ventricular cell electrophysiology: Restitution, memory, and reentry properties. *Heart Rhythm* 2006; 3: S227.

13. Fenton FH, Bueno Orovio A, Evans SJ, Hastings HM, **Cherry EM**. Reentrant arrhythmias in human ventricular models. *Heart Rhythm* 2006; 3: S186.

14. Fenton FH, **Cherry EM**, Hastings HM, Evans SJ. Web-based programs for learning cardiac electrophysiology: Interactive simulations of heart cells and tissue. *Heart Rhythm* 2006; 3: S136.

15. Dierckx H, **Cherry EM,** Bernus O, Gilbert S, Holden A, Gilmour RF, Fenton FH. Detailed anatomical reconstruction of the whole canine heart including fiber and sheet architecture using MRI and DTMRI. *Heart Rhythm* 2008; 5: S106.

Conference Presentations and Invited Talks

1. An adaptive mesh refinement method for simulating cardiac tissue. SIAM Conference on Applications of Dynamical Systems, Snowbird, Utah, May 1999.

2. An adaptive mesh refinement method for simulating cardiac tissue. Workshop on Computational Cardiac Electrophysiology, Duke University, Durham, North Carolina, July 1999, invited talk.

3. A space-time adaptive method for simulating complex cardiac dynamics. Industrial Partners Program Annual Meeting, Computer Science Department, Duke University, Durham, North Carolina, November 1999, invited talk.

4. A space-time adaptive method for simulating complex cardiac dynamics. American Physical Society March Meeting, Minneapolis, March 2000, poster presentation.

5. A space-time adaptive method for simulating cardiac dynamics. Department of Physiology, McGill University, Montreal, April 2000, invited talk.

6. A space-time adaptive method for simulating complex cardiac dynamics. SIAM Annual Meeting, Puerto Rico, July 2000.

7. A space-time adaptive method for simulating cardiac dynamics. World Congress on Medical Physics and Biomedical Engineering, Chicago, July 2000.

8. A space-time adaptive method for simulating complex cardiac dynamics. Department of Physics, Hofstra University, Hempstead, NY, February 2001, invited talk.

9. Modeling cardiac electrophysiology and arrhythmias. The Heart Institute, Beth Israel Medical Center, New York, NY, July 2001, invited talk.

10. The role of long-range and interatrial connections in atrial arrhythmias: A Computer Simulation Study. Biomedical Engineering Society Meeting, Durham, NC, October 2001, invited talk.
11. Atrial structure and arrhythmia maintenance: A simulation study. Department of Physics, University of Missouri at St. Louis, St. Louis, MO, October 2001, invited talk.
12. Atrial structure and arrhythmia maintenance: A simulation study. Department of Biomedical Engineering, University of Alabama at Birmingham, Birmingham, AL, January 2002, invited talk.
13. Contributions of tissue structures to cardiac arrhythmias. SIAM Conference on the Life Sciences, Boston, MA, March 2002, invited talk.
14. Effects of anatomical structure on initiation and maintenance of atrial fibrillation in a computer model of human atria. APS March meeting, Indianapolis, IN, March 2002.
15. The role of decreased conduction velocity in the initiation and maintenance of atrial fibrillation in a computer model of human atria. North American Society of Pacing and Electrophysiology Scientific Sessions, San Diego, CA, May 2002.
16. Effects of wall heterogeneity in an anatomically realistic model of cardiac ventricles: A simulation study. North American Society of Pacing and Electrophysiology/Heart Rhythm Society Scientific Sessions, Washington, DC, May 2003, poster presentation.
17. Differences in reentry dynamics between two human atrial cell models. North American Society of Pacing and Electrophysiology/Heart Rhythm Society Scientific Sessions, Washington, DC, May 2003.
18. Mechanisms for spiral wave breakup. SIAM Annual Meeting, Montreal, July 2003.
19. APD restitution slope > 1 does not always well predict spiral wave breakup. UNYCES, Ithaca, NY, November 2003.
20. Short-term cardiac memory can suppress alternans. American Physical Society March Meeting, Montreal, March 2004.
21. Heterogeneous conduction in pulmonary veins: A model of atrial fibrillation due to slow reentrant circuits appearing as focal activity. Heart Rhythm Society Scientific Sessions, San Francisco, CA, May 2004.
22. Alternans suppression by electrotonic and memory effects. Nolineal 2004, Toledo, Spain, June 2004.
23. Heterogeneous conduction in pulmonary veins: A model of atrial fibrillation due to slow reentrant circuits appearing as focal activity. University of Leeds, Leeds, United Kingdom, June 2004, invited talk.
24. Advanced computational methods for simulating cardiac tissue. Oxford University, Oxford, United Kingdom, June 2004, invited talk.
25. Alternans suppression in cardiac tissue by electrotonic and memory effects. SIAM Conference on the Life Sciences, Portland, OR, July 2004.
26. A tale of two dogs: comparing the Fox et al. and Hund-Rudy canine ventricular cell models. SIAM Conference on Applications of Dynamical Systems, Snowbird, UT, May 2005.
27. Data visualization in physics I: Java applets for interactive demonstration of physics concepts. American Physical Society March Meeting, Baltimore, MD, March, 2006.
28. Tissue dynamics of two models of canine ventricular cell electrophysiology: Restitution, memory, and reentry properties. Heart Rhythm Society Scientific Sessions, Boston, MA, May, 2006, poster presentation.
29. Understanding cardiac arrhythmias: *in silico m*odeling from cell to organ. Department of Theoretical and Applied Mechanics, Cornell University, Ithaca, NY, 2006, invited talk.
30. A tale of two dogs and other modeling adventures. Kavli Institute of Theoretical Physics, University of California, Santa Barbara, CA, July, 2006, invited talk.
31. Alternans in cardiac ventricular myocardium. Department of Physiology, McGill University, Montreal, Canada, March 2007, invited talk.
32. Nonlinear dynamics of the heart: modeling, simulating, and visualizing arrhythmias. Department of Mathematics, Cornell University, Ithaca, NY, March 2007, invited talk.

33. A tale of two dogs: comparing two models of canine ventricular electrophysiology. Oxford University, United Kingdom, April 2007, invited talk.

34. A tale of two dogs: comparing two models of canine ventricular electrophysiology. Workshop on Nonlinear Dynamics, Ghent University, Belgium, April 2007, invited talk.

Conference Sessions Organized

1. Advances in Cardiac Simulation. Minisymposium organized for SIAM Annual Meeting, Puerto Rico, July 2000.Speakers: Elizabeth Cherry, Flavio Fenton, Niels Otani, and Edward Vigmond.

2. Instabilities and Dynamics of Spiral Waves in Cardiac Tissues Minisymposium organized for SIAM Annual Meeting, Montreal, July 2003. Speakers: Elizabeth Cherry, Jeffrey Fox, Niels Otani, and Arkady Pertsov.

3. Electrical Dynamics of Cardiac Tissue. Four-part minisymposium organized for SIAM Conference on the Life Sciences with F.H. Fenton, Portland, OR, July 2004. Speakers: Jacques Beaumont, Alfonso Bueno Orovio, Xiaohong Chen, Elizabeth Cherry, Eric Cytrynbaum, Flavio Fenton, Peter Jordan, Arkady Pertsov, Wouter-Jan Rappel, Blanca Rodriguez, David Schaeffer, Yohannes Shiferaw, Elena Tolkacheva, Natalia Trayanova, Edward Vigmond, and John Wikswo.

4. Instabilities and Complexities of the Heart. Three-part minisymposium organized for SIAM Conference on Applications of Dynamics Systems with F.H. Fenton, Snowbird, UT, May 2005. Speakers: Alfonso Bueno, Elizabeth Cherry, Blas Echebarria, Flavio Fenton, Boyce Griffith, Sarah Healy, Craig Henriquez, Chris Johnson, Yeong-Sun Kim, L. Joshua Leon, Niels Otani, Jack Rogers, Yohannes Shiferaw, Joseph Tranquillo, and Christian Zemlin.

Professional Services

Referee for the following journals:

1. American Journal of Physiology.
2. Annals of Biomedical Engineering.
3. Chaos.
4. Heart Rhythm.
5. IEEE Transactions on Biomedical Engineering.
6. Journal of Biological Physics.
7. Numerical Algorithms.
8. Numerical Methods for Partial Differential Equations.
9. Physica D.
10. Physical Review E.
11. Physical Review Letters.
12. SIAM Journal on Scientific Computing.