

CURRICULUM VITAE

Elizabeth S. Kaufman, M.D.

PERSONAL INFORMATION

Professional address and telephone: Heart and Vascular Center, Hamann 3rd Floor
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EDUCATION

College:	1977-1981	Yale University, New Haven, CT, B.A.
Medical School:	1981-1985	Harvard Medical School, Boston, MA, M.D.
Residency:	1985-1988	Columbia-Presbyterian Medical Center, New York, NY, Internal Medicine Internship and Residency
Fellowship:	1988-1991	Columbia-Presbyterian Medical Center, New York, NY, Fellowship in Cardiovascular Medicine and Clinical Cardiac Electrophysiology

PROFESSIONAL APPOINTMENTS

7/1/1991-9/16/1998	Case Western Reserve University, Senior Instructor of Medicine
9/17/1998-present	Case Western Reserve University, Assistant Professor of Medicine
7/1/91-present	Attending Cardiac Electrophysiologist, MetroHealth Medical Center
7/1/91-6/30/99	Director of Cardiac Electrophysiology, MetroHealth Medical Center,
12/3/1993-present	Fairview Hospital, Courtesy Staff
2/24/1995-present	Parma Community General Hospital, Active Staff
3/2/1995-present	Saint Vincent Charity Hospital, Active Staff
7/13/95-present	Saint John West Shore Hospital, Courtesy Staff
10/22/96-present	Medina General Hospital, Consulting Staff
9/1991-7/1997	Mount Sinai Medical Center, Associate Staff
2/1994-2/1999	Saint Luke's Medical Center, Courtesy Staff
8/1994-6/2001	Southwest General Health Center, Associate Staff
12/1994-1/1999	Lakewood Hospital, Courtesy Staff
2/1997-2/1999	Deaconess Hospital, Provisional Staff
10/2001-11/2003	Deaconess Hospital, Provisional Staff

MEDICAL LICENSURE

State of Ohio, 61193 (1991-present)

09/15/04

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BOARD CERTIFICATION

9/1986	National Board of Medical Examiners
9/1988	Diplomate of the American Board of Internal Medicine
11/1991	Diplomate in the Subspecialty of Cardiovascular Disease
11/1992	Diplomate in Clinical Cardiac Electrophysiology
11/2000	Recertified in Cardiovascular Disease and Clinical Cardiac Electrophysiology

PROFESSIONAL AND SOCIETY MEMBERSHIPS

Ohio Chapter of the American College of Cardiology
Northeastern Ohio Society of Pacing and Electrophysiology
Cardiac Electrophysiology Society
American Heart Association
North American Society of Pacing and Electrophysiology/ Heart Rhythm Society
Fellow of the American College of Cardiology

HONORS AND AWARDS

1979	Phi Beta Kappa
1980	Hart Lyman Prize for academic excellence
1981	Summa Cum Laude, Molecular Biophysics and Biochemistry, with Distinction in the Major
1985	Aesculapian Club, Harvard Medical School
2003	Alpha Omega Alpha, Faculty Inductee

PROFESSIONAL SERVICE

Investigator, International Long QT Registry, 2001-present
Faculty, First International Symposium on Long QT Syndrome on the Internet, 2003-present
Peer Review Study Group, American Heart Association Electrophysiology & Arrhythmias/Regulation (beginning 2004)
Editorial Board, Heart Rhythm, 2003-present
Scientific Reviewer, Archives of Internal Medicine, 2001-present
Scientific Reviewer, Journal of Cardiovascular Electrophysiology, 2001-present
Scientific Reviewer, Journal of the American College of Cardiology, 2002-present
Board of Directors, Ohio Chapter of the American College of Cardiology, 2002-present
President, Northeastern Ohio Society of Pacing and Electrophysiology, 4/2002-present
Board of Directors, Northeastern Ohio Society of Pacing and Electrophysiology, 1993-2002
Program Director, Heartbeats Fast & Slow (Annual all-day city-wide electrophysiology CME conference in Downtown Cleveland), 9/1999, 9/2001, 9/2004

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SERVICE ON HOSPITAL COMMITTEES

Department of Medicine Research Development Committee, MetroHealth Medical Center, 2003
General Clinical Research Center Committee, MetroHealth Medical Center, 1999
Institutional Review Committee, Southwest General Health Center, 1997-2001
Continuing Medical Education Committee, MetroHealth Medical Center, 1996-1999
Telemetry Services Planning Task Force, MetroHealth Medical Center, 1993-1995
Cardiopulmonary Resuscitation Committee, MetroHealth Medical Center, 1991-1998

RESEARCH INTERESTS

1. Congenital long QT syndrome and other genetic heart rhythm disorders
2. Noninvasive strategies for assessing risk of sudden cardiac death, especially T wave alternans and heart rate variability analysis

RESEARCH GRANTS AWARDED

- 7/2003-6/2005 American Heart Association Affiliate Grant-in-Aid 0355270B, Can Potassium Channel Blockade Resolve Phenotype/Genotype Discordance in Congenital Long QT Syndrome? (**Principal Investigator**, direct costs \$100,000, 30% effort).
- 7/2001-6/2003 American Heart Association Affiliate Beginning Grant-in-Aid 0160212B, Phenotype/Genotype Discordance in the Long QT Syndrome (**Principal Investigator**, direct costs \$80,000, 30% effort).
- 7/2003-6/2007 NIH-NHLBI R01-HL033834-16, Renewal of International Long QT Syndrome Registry Grant: Long QT Syndrome: Population, Genetic and Cardiac Studies, Principal Investigator Arthur Moss, direct costs for entire project: \$1,126,717 direct costs at MHMC \$5,994 in year 1, 1.5% effort.
- 9/2000-8/2003 NIH-NHLBI R01-HL-64862, Prognostic Significance of T Wave Alternans, Principal Investigator Daniel Bloomfield, direct costs \$13,636.
- 6/97-12/2002 NIH-NHLBI, Sudden Cardiac Death in Heart Failure Trial (SCD-HeFT), Principal Investigator Gust Bardy, multicenter trial, direct costs \$84,000.
- 7/99-12/2001 Muscular Dystrophy Association Neuromuscular Disease Research Grant, Cardiovascular Effect of Noninvasive Positive Pressure Ventilation in Duchenne Muscular Dystrophy, Principal Investigator is David Connuck, direct costs \$17,360; 2% effort.
- 2000 Mount Sinai Medical Society Fund, QT Prolongation in Postpartum Women (**Principal Investigator**, direct costs \$6650).
- 1997-2000 NIH RO1 Grant-in-Aid, Cocaine Exposed Infants, Principal Investigator Sudhir Ken Mehta, direct costs \$1,200,465; 10% effort.
- 1995-2001 NIH-NHLBI, Atrial Fibrillation Follow-Up Investigation of Rhythm Management (AFFIRM), Principal Investigator Leon Greene, multicenter trial.
- 1993-1995 Federal Aviation Administration Contract, Tolerance of medically treated hypertensives to moderate hypoxic and acceleration stresses, follow-up study (**Principal Investigator**, direct costs \$60,000).
- 1992-1993 Federal Aviation Administration Contract, Tolerance of medically treated hypertensives to moderate hypoxic and acceleration stresses (**Principal Investigator**, direct costs

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\$101,344).

Industry-Sponsored

- 5/2001-5/2003 St. Jude Medical, Alternans Before Cardioverter Defibrillator Trial (ABCD), Principal Investigator Otto Costantini, direct costs \$41,850; co-investigator and core laboratory committee (interpretation of electrophysiologic studies).
- 1998-1999 Cambridge Heart, A Prospective Multi-Center Study to Compare the Effectiveness of T Wave Alternans to Signal-Averaged Electrocardiography in Predicting Susceptibility to Ventricular Arrhythmias.
- 1995-1997 Procter & Gamble Pharmaceuticals, Multi-Center Assessment of the Safety and Efficacy of Azimilide Dihydrochloride for the Prophylactic Treatment of Symptomatic Atrial Fibrillation/Flutter and/or Symptomatic Paroxysmal Supraventricular Tachycardia.
- 1993-1994 Merck Research Laboratories, Multi-Center Comparison of MK-499 vs. Sotalol in Patients with Inducible Sustained Ventricular Tachycardia.

BIBLIOGRAPHY

Published Manuscripts:

- Bloomfield DM, Steinman RC, Namerow PB, Parides M, Davidenko J, **Kaufman ES**, Shinn T, Curtis A, Fontaine J, Holmes D, Russo A, Tang C, Bigger JT. T wave alternans identifies low risk patients who may not benefit from ICD therapy: an answer to the MADIT II conundrum. N Engl J Med, submitted.
- Sherman DG, Kim SG, Boop BS, Corley SD, DiMarco JP, Hart RG, Haywood LJ, Hoyte K, **Kaufman ES**, Kim MH, Nasco E, Waldo AL and the NHLBI AFFIRM Investigators. The occurrence and characteristics of stroke events in the AFFIRM study. Annals of Internal Medicine, submitted.
- Zareba W, Moss AJ, Sheu G, **Kaufman ES**, Priori S, Vincent GM, Towbin JA, Benhorin J, Schwartz PJ, Napolitano C, Hall WJ, Keating MT, Qi M, Robinson JL, Andrews ML, for the International LQTS Registry. Location of mutation in the KCNQ1 and phenotypic presentation of long QT syndrome. J Cardiovasc Electrophysiol 2003;14:1149-1153.
- Mehta SK, Super DM, Connuck D, Kirchner HL, Salvator A, Singer L, Fradley LG, **Kaufman ES**. Autonomic alterations in cocaine-exposed infants. Am Heart J 2002;144:1109-15.
- Mehta SK, Super DM, Salvator A, Fradley LG, Connuck D, **Kaufman ES**. Heart rate variability by triangular index in infants exposed prenatally to cocaine. Ann Noninvasive Electrocardiol 2002; 7:374-8.
- Perkiömäki JS, Zareba W, Nomura A, Andrews M, **Kaufman ES**, Moss AJ. Repolarization dynamics in patients with long QT syndrome. J Cardiovasc Electrophysiol 2002;13:651-656.
- Moss AJ, Zareba W, **Kaufman ES**, Gattman E, Peterson DR, Benhorin J, Towbin JA, Keating MT, Priori SG, Schwartz PJ, Vincent GM, Robinson JL, Andrews ML, Feng C, Hall WJ, Medina A,

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Zhang L, Wang Z. Increased risk of arrhythmic events in long QT syndrome with mutations in the pore region of the human ether-a-go-related gene potassium channel. *Circulation* 2002;105:794-799.

Benhorin J, Moss AJ, Bak M, Zareba W, **Kaufman ES**, Kerem B, Towbin JA, Priori S, Kass RS, Attali B, Brown AM, Ficker E. Variable expression of long QT syndrome among gene carriers from families with five different HERG mutations. *Ann Noninvasive Electrocardiol* 2002;7:40-6.

Mehta SK, Super DM, Connuck D, Salvator A, Singer L, Fradley LG, Harcar-Sevcik RA, Kirchner HL, **Kaufman ES**. Heart rate variability in healthy newborn infants. *Am J Cardiol* 2002;89:50-53.

Mehta SK, Super DM, Salvator A, Singer L, Connuck D, Fradley LG, Harcar-Sevcik RA, **Kaufman ES**. Heart rate variability in cocaine-exposed newborn infants. *American Heart J* 2001;142:828-32.

Kaufman ES, Priori SG, Napolitano C, Schwartz PJ, Iyengar S, Elston RC, Schnell AH, Gorodeski EZ, Rammohan G, Bahhur NO, Connuck D, Verrilli L, Rosenbaum DS, Brown AM. Electrocardiographic prediction of abnormal genotype in congenital long QT syndrome: experience in 101 related family members. *J Cardiovasc Electrophysiol* 2001;12:455-461.

Gold MR, Bloomfield DM, Anderson KP, El-Sherif NE, Wilber DJ, Groh WJ, Estes NAM, **Kaufman ES**, Greenberg ML, Rosenbaum DS. A comparison of T-wave alternans, signal averaged electrocardiography and programmed ventricular stimulation for arrhythmia risk stratification. *J Am Coll Cardiol* 2000;36:2247-53.

Ficker E, Thomas D, Viswanathan PC, Dennis AT, Priori SG, Napolitano C, Memmi M, Wible BA, **Kaufman ES**, Iyengar S, Schwartz PJ, Rudy Y, Brown AM. Novel characteristics of a misprocessed mutant HERG channel linked to hereditary long QT syndrome. *Am J Physiol Heart Circ Physiol* 2000;279(4):H1748-H1756.

Kaufman ES, Mackall JA, Julka B, Drabek C, Rosenbaum DS. Influence of heart rate and sympathetic stimulation on arrhythmogenic T-wave alternans. *Am J Physiol Heart Circ Physiol* 2000;279(3):H1248-H1255.

Bloomfield DM, **Kaufman ES**, Bigger JT Jr, Fleiss J, Rolnitzky L, Steinman R. Passive head-up tilt and actively standing up produce similar overall changes in autonomic balance. *Am Heart J* 1997;134:316-320.

Finkelhor RS, Karwa P, **Kaufman ES**, Bahler RC. The relationship of autonomic function to age-related changes in left ventricular filling in normal subjects. *Eur Heart J* 1995;16:1716-1720.

Kaufman ES, Bosner MS, Bigger JT Jr, Stein PK, Kleiger RE, Rolnitzky LM, Steinman RC, Fleiss JL. Effects of digoxin and enalapril on heart period variability and response to head-up tilt in normal subjects. *Am J Cardiol* 1993;72:95-99.

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Editorials:

Kaufman ES, Waldo AL. The Impact of Asymptomatic Atrial Fibrillation. *J Am Coll Cardiol* 2004;43:53-54.

Kaufman ES. Saving lives in congenital long QT syndrome: who benefits from ICD therapy? *J Cardiovasc Electrophysiol* 2003;14:342-343.

Kaufman ES, Ficker E. Is Restoration of Intracellular Trafficking Clinically Feasible in the Long QT Syndrome: the Example of HERG Mutations. *J Cardiovasc Electrophysiol* 2003;14:320-322.

Abstracts:

Kaufman ES, Zimmerman PA, Wang T, Greene HL, Barrell PD and the AFFIRM Investigators. Female gender is not a risk factor for proarrhythmic events in the AFFIRM study: a multivariate analysis. *PACE* 2003;26:975.

Gorodeski EZ, Dikshteyn M, Dettmer MM, **Kaufman ES**. Epinephrine unmasks the long QT phenotype in subjects with LQT1 genotype and normal ECG. *PACE* 2003;26:999.

Sherman DG, Kim S, Boop B, Corley S, DiMarco J, Hart RG, Haywood LJ, Hoyte K, **Kaufman ES**, Kim M, Nasco E, Waldo A, for the AFFIRM Investigators. The occurrence and characteristics of stroke events in the AFFIRM study. *Neurology* 2003;60:A326.

Qi M, Moss A, Ning L, Zareba W, Robinson J, Xu Y, Rosero S, **Kaufman ES**, Ohle C, Kelly T, Ryan D. Three-year experience with mutation studies for the international long QT syndrome registry at Rochester: screening, molecular spectrum, mutation "hot-spots", phenotypic variations, and genotype-phenotype correlation. *Am J Hum Genet* 2002;71S:549.

Zareba W, Moss AJ, Sheu G, **Kaufman ES**, Robinson JL, Andrews ML, Carroll E for International LQTS Registry. Location of mutation in the KCNQ1 gene does not influence outcome of long QT syndrome patients. *J Am Coll Cardiol* 2003;41:273A.

Perkiömäki JS, Zareba W, Nomura A, Andrews M, **Kaufman ES**, Moss AJ. Repolarization variability in patients with congenital long QT syndrome. *Circulation* 2001;104:II-691.

Bloomfield DM, Gold MR, Anderson KP, Wilber DJ, El-Sherif N, Estes M, Groh WJ, **Kaufman ES**, Greenberg ML, Rosenbaum DS, Dabbous OH, Cohen RJ. T wave alternans predicts events independent of ejection fraction and etiology of heart disease in patients undergoing electrophysiologic testing for evaluation of known or suspected ventricular arrhythmias. *PACE* 2000;23:593.

Kaufman ES, Gorodeski EZ, Koide NS, Verrilli LM, Rammohan G, Bahhur NO, Iyengar S, Napolitano C, Priori SG. Microvolt level T-wave alternans is prevalent in a family with congenital long QT syndrome due to a HERG mutation. *J Am Coll Cardiol* 2000;35:137A.

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Kaufman ES, Julka B, Drabek C, Rosenbaum DS. T-wave alternans bursting in patients at risk for sudden cardiac death. *J Am Coll Cardiol* 2000;35:113A.

Kaufman ES, Bahhur NO, Rammohan G, Gorodeski EZ, Schnell AH, Elston RC, Koide NS, Verrilli LM, Iyngar S, Napolitano C. The QT Interval Identifies Adults but not Children with a HERG Mutation. *Circulation* 1999;100:I-158.

Bloomfield DM, Gold MR, Anderson KP, Wilber DJ, El-Sherif N, Estes M, Groh WJ, **Kaufman ES**, Greenberg ML, Rosenbaum DS, Dabbous OH, Cohen RJ. T Wave Alternans Predicts Events in Patients with Syncope Undergoing Electrophysiologic Testing. *Circulation* 1999;100:I-508.

Bloomfield DM, Gold MR, Anderson KP, **Kaufman ES**, El-Sherif N, Estes M, Greenberg ML, Groh W, Wilber DJ, Cohen RJ. A Comparison of T Wave Alternans and Signal-Averaged Electrocardiography in Predicting Outcome of Electrophysiology Testing. *PACE* 1999;22:751.

Quan KJ, Yuan Z, **Kaufman ES**, Lewis WR, Johnson NJ, Rimm AA, Biblo LA. Prognostic Differences Between Patients with Atrial Flutter and Atrial Fibrillation. *PACE* 1999;22:712.

Gold MR, Bloomfield DM, Anderson KP, Wilber DJ, El-Sherif N, Estes NAM III, Groh WJ, **Kaufman E**, Cohen RJ. A Comparison of T Wave Alternans, Signal Averaged Electrocardiography and Electrophysiology Study to Predict Arrhythmia Vulnerability. *J Am Coll Cardiol* 1999;33:145A.

Kaufman ES, Gorodeski EZ, Koide N, Verrilli LM, Rammohan G, Rosenbaum DS. Microvolt Level T-Wave Alternans is Prevalent in Subjects with Congenital Long QT Syndrome. *J Am Coll Cardiol* 1999;33:130A.

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Biblo LA, Yuan Z, **Kaufman ES**, Lewis WR, Mackall JA, Rimm AA. "Lone" atrial flutter, insights to embolic risk. *PACE* 1998;21:918.

Helguera ME, Trohman RG, Pinski SL, Ellenbogen KA, **Kaufman E**, Tchou P. Radiofrequency ablation of the left bundle branch or its fascicles for treatment of interfascicular reentrant ventricular tachycardias. *PACE* 1998;21:843.

Kay GG, Eberle CA, **Kaufman E**, Hordinsky J. The effects of antihypertensive medication, hypoxia, and orthostatic stress on cognition. *Journal of the International Neuropsychological Society* 1996;2(1):63-64.

Kaufman ES, Hershey JA, Mian HA, Cragg NJ, Fogarty AM, Einstadter D, Hordinsky JR. Effects of antihypertensive drug class on heart rate variability. *PACE* 1996;19:690.

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Bosner MS, **Kaufman ES**, Stein PK, Kleiger RE, Bigger JT, Rolnitzky LM, Fleiss JL, Steinman R. The effect of enalapril and digoxin on heart period variability in normal subjects. *Circulation* 1991;84S:II-616.

Kaufman ES, Homma S. The significance of the color-flow Doppler finding of trace mitral regurgitation: a one-year follow-up study. *J Am Soc Echo* 1990;3:218.

Clancy RM, **Kaufman E**, Cannon PJ. Augmented prostaglandin E2 synthesis by human monocyte macrophages incubated with modified forms of LDL. *Circulation* 1989;80S:II-454.

Chapters in Textbooks:

Lewis, WR, **Kaufman ES**. ECG monitoring. *In* Webb A, Shapiro M, Singer M, and Suter P(eds). *Oxford Textbook of Critical Care*, Oxford University Press, Oxford, New York, Tokyo, 1999.

Rakita L, Vrobel TR, **Kaufman ES**. Electrocardiography. *In* Shoemaker WC, Ayres SM, Grenvik A, and Holbrook PR (eds). *Textbook of Critical Care*, Third edition, Philadelphia; WB Saunders, 1995.