

CURRICULUM VITAE

Name: Edward G. Lakatta

Business Contact Information: [Lakattae@grc.nia.nih.gov](mailto:Lakattae@grc.nia.nih.gov)  
410-558-8202

Web of Science Researcher ID: [AAL-1447-2020](#)

Education:

1966-1970 MD, magna cum laude, Georgetown University School of Medicine,  
Washington, D.C.

1962-1966 B.S. (Biology), cum laude, University of Scranton, Scranton,  
Pennsylvania

Board Certification:

1977 Cardiovascular Disease

1973 Internal Medicine

Brief Chronology of Employment:

1983-Present Director, Laboratory of Cardiovascular Science, Biomedical Research Center,  
Intramural Research Program, National Institute on Aging, National Institutes of  
Health, Baltimore, Maryland

1982-Present Professor of Physiology, University of Maryland School of Medicine, Baltimore,  
Maryland (Adjunct Appointment)

1980-Present Professor of Medicine, Johns Hopkins School of Medicine, Baltimore, Maryland  
(Part-time)

1976-Present Visiting Physician, Johns Hopkins Bayview Medical Center, Baltimore,  
Maryland

1976-1983 Chief, Cardiovascular Section, Clinical Physiology Branch, Gerontology  
Research Center, National Institute on Aging, National Institutes of Health,  
Baltimore, Maryland

1975-1976 Fellow in Medical Science of the American College of Physicians for 1975,  
Department of Physiology, University College, London, and Department of  
Cardiac Medicine, Cardiothoracic Institute, London, England

- 1974-1975      Fellow in Cardiology, Georgetown University Hospital, Washington, D.C.
- 1972-1974      Research Fellowship, National Institutes of Health, NICHD, Gerontology Research Center, Cardiovascular Section, Baltimore,
- 1971-1972      Residency in Internal Medicine, Department of Medicine, Strong Memorial Hospital, Rochester, New York
- 1970-1971      Internship, Department of Medicine, Strong Memorial Hospital, Rochester, New York

Military Service:

- 1976 – 2001      Commissioned Officer, United States Public Health Service  
(Retired with rank of Medical Director (06))

Societies and Professional Memberships:

- American Society for Clinical Investigation
- Association of American Physicians
- American Physiological Society, Fellow, Cardiovascular Section
- Biophysical Society
- American Heart Association, Fellow, Council on Basic Science
- Heart Failure Society of America
- International Society for Heart Research
- Physiological Society of Great Britain

**Election into Prestigious Research Societies:**

- Fellow, Cardiovascular Section, American Physiological Society
- Fellow, American Society for Clinical Investigation
- Fellow of the American Heart Association (FAHA)
- Fellow, International Society for Heart Research
- Member, Association of American Physicians
- Lifetime Membership, International Society for Heart Research, 2007
- Fellow of the International Academy of Cardiovascular Sciences (F.I.A.C.S.), 2002
- Inaugural Fellow of the Council on Basic Cardiovascular Sciences of the American Heart Association, 2001
- Chairman, Scientific Program Committee International Society for Heart Research World Congress, 1998, 2004

Chairman, Gordon Conference on Mechanisms of Cardiac Regulation, 1994

### **Other Professional Activities:**

Guest Editor, JMCC Perspectives on Cardiovascular Aging: Top to Bottom June 2015

Guest Editor, *Journal of Applied Physiology*, Highlighted Topic on Arterial Aging, October 2008

Guest Editor, *Journal of the European Society of Cardiology* Spotlight Issue on Cardiovascular Research, May 2005

Consulting Editor, *Dialogues in Cardiovascular Medicine*, 2003

Council Member International Society for Heart Research, 1995-2002

American Heart Association - Task Force for the Application of the AHA Mission to the Elderly, 1989-1990; 1990-1991

Associate Editor, *Journal of Molecular and Cellular Cardiology*, 1987-2001

Editorial Boards--*Journal of Gerontology*, *Journal of Molecular and Cellular Cardiology*, *Cardioscience*, *Current Problems in Geriatrics*, *Journal of Cardiovascular Electrophysiology*, *Circulation*, *Cell Calcium*, *The American Journal of Geriatric Cardiology*, *Arterial'naya Gipertenziya - The Arterial Hypertension*

American Heart Association, Cardiovascular B - Research Study Committee, 1987-1989

Consulting Editor, *Cardiovascular Research*, 1983-1999

Editor for Clinical Sciences, *Experimental Aging Research*, 1982-1989

Member NIH Ad Hoc Study Section on Animal Model for the Study of Pathogenesis of Specific Heart Muscle Disease, 1981

Ad Hoc Grant Proposal Reviews and Site Visit Committees - Veterans Administration and National Science Foundation

### **NIA-IRP Internal Committees:**

Chairman, Search Committee for Director, Laboratory of Biological Chemistry, GRC

Chairman, Search Committee for NIA Clinical Director

Chairman, NIA Technology Transfer Committee

Chairman, NIA Committee for Recruitment of Women and Minorities, 1993

Chairman, NIA Intramural Promotions and Tenure Review Committee, 1989-1991, 2010

Search Committee for Director of NIA Intramural Program, 1988

Search Committee for Director of the National Heart, Lung, and Blood Institute, 1981

Honors and Other Special Scientific Recognition:

Research Exemplar Award from the Washington University School of Medicine for individuals who lead and manage their research labs with professionalism and integrity. 2017

Janice Pfeffer Distinguished Lecture Award, International Society of Heart Research, 2016

Extraordinary Lifetime Contribution to Arterial Hemodynamics, Pulse of Asia Society, 2013

Distinguished Leader Award, International Society of Heart Research, 2010

Schober Award, Universitaet Halle Wittenberg, Halle, Germany, 2003

Frank J. O'Hara Alumni Award, The University of Scranton, 2001

Irving Wright Award of Distinction, American Federation for Aging Research, 2000

Distinguished Service Medal, Public Health Service, National Institute of Health, National Institute on Aging, 2000

Novartis Prize for Gerontological Research, International Association of Gerontology, 1999

Docteur Honoris Causa, Universite D'Auvergne, Clermont, France, 1999

Honorary Professor, Department of Biology, Beijing University, Beijing, People Republic of China 1994

Allied Signal 1993 Achievement Award in Aging

Paul Dudley White Award in Cardiology, 1992

Public Health Service Commendation Medal for ,1990

National Institutes of Health, NIH Director's Award, 1985

Public Health Service Commendation Medal for 1982

Eli Lilly Fellow in Medical Science of the American College of Physicians for 1975

Alpha Omega Alpha, National Medical Honor Society

Georgetown Hospital Special Award in Medicine

Mosby Scholarship Book Award

Grants/Funded Research IRP, NIA, NIH:

Mentoring Activities:

*See attached*

Plenary or Named Lectures:

Invited Speaker at the Artery Society 2020 Artery Virtual Conference October 23 – 24, 2020

State of the Art Address at The American College of Veterinary Medicine (ACVIM) Scientific Sessions Virtual Meeting June 10, 2020

Keynote lecture at the University of Leeds, UK, Northern Cardiac Research Group April 28 – May 1, 2019

Distinguished Guest Lecturer “When and why will your next heart beat will occur” at the Department of Physiology and Membrane Biology School of Medicine at the University of California, Davis from January 16 – 18, 2019.

Plenary Lecture at the Tufts Medical Center Molecular Cardiology Research Institute (MCRI) 20<sup>th</sup> Annual Scientific Retreat, September 26 -28, 2018 at the Marine Biological Laboratories in Woods Hole, MA.

Distinguished Guest Lecturer “When and why will your next heart beat will occur” at the UCLA Cardiac Arrhythmia Center & EP Programs in Los Angeles, CA from February 5 - 7, 2018.

Keynote Invited Speaker, “Why and When Your Next Heartbeat Will Occur” at the American Physiological Society Annual Meeting at the George Washington University October 23, 2017. Distinguished Lecture selected by students University of Mississippi Medical Center, The UMMC Physiologists in Training Jackson, MS on December 7, 2016.

Plenary Lecture - International Symposium on: BRINGING CARDIOVASCULAR MEDICINE CENTER STAGE: NEW TRENDS TODAY AND TOMORROW Berlin Heart Summit October 27, 2016, Berlin, Germany.

Plenary Lecture - The Rank Prize Funds conference on “Nutrition: Implications to Ageing Processes and People, Grasmere, England October 3, 2016.

Plenary Lecture, North Florida Cardiovascular Education Foundation’s 13<sup>th</sup> Annual Ponte Verda Cardiovascular Symposium, Ponte Verda, FL. May 7, 2016

Janice Pfeffer Distinguished Lecture, “The Heartbreak of Aging Viewed from the Angiotensin II-remodeled Arterial Wall,” XXII World Congress International Society of Heart Research, Buenos Aires Argentina, April 18-21, 2016.

Internal Medicine Grand Rounds, “The Reality of Aging Viewed from the Arterial Wall,” Wake Forest School of Medicine, Winston-Salem, North Carolina, October 9, 2014.

Dr. Emil Bozler Distinguished Lecture. “Spontaneous Cardiac Cell Excitation: Bozler and Beyond,” Department of Physiology & Cell Biology Research Day, Ohio State University, Columbus, Ohio, March 27, 2014.

McDonald Lecture, “The reality of aging viewed from the arterial wall,” ARTERY 12, Vienna, Austria, October 18-20, 2012.

Keynote Speaker, Sanford-Burnham Medical Research Institute symposium on Genetic Analysis of Functional Aging, “The Stress of Aging Viewed from the Heart,” La Jolla, California, January 13, 2012.

Plenary Lecture Speaker, “A general theory of the heart’s beating rate and contractility,” 2011 NHLBI-VCU-W&M World Congress on Mathematical Modeling and Computational Simulation of Cardiovascular and Cardiopulmonary Dynamics, Williamsburg, Virginia, June 1-3, 2011.

Keynote Speaker, “Novel perspectives on how the heart’s pacemaker works,” annual meeting of the Argentinean Society of Physiology, Mar del Plata, Argentina, November 17-20, 2010.

Invited Speaker, State of the Heart Keynote address, “Systematic Study of Cardiovascular Aging is a Daunting Ordeal,” The Aging Heart: A Roadmap to Cardiac Independence, American Federation for Aging Research conference, New York, New York, October 6, 2009.

Plenary Lecturer, “Aging, the Major Factor of Hypertension in Our Society,” American Society of Hypertension 21<sup>st</sup> Annual Scientific Meeting, New York, New York, May 16-20, 2006.

Plenary Lecturer, “The Heartbreak of Advancing Age,” Annual Scientific Sessions of the German Society of Cardiology, Mannheim, Germany, March 31-April 2, 2005.

Plenary Lecturer, “Arterial Aging in Apparent Health Promotes Arterial Diseases,” 78<sup>th</sup> Annual Meeting of the Japanese Pharmacological Society, Yokohama, Japan, March 22-24, 2005.

Keynote Lecturer, “Older Arteries Operate on the Edge,” Artery 4, London, England, October 4, 2004.

Elaine Tao Memorial Lecture, University of Hong Kong, Department of Physiology Symposium, Hong Kong, December 8-9, 2003.

Schober Lecturer, Cardiovascular Aging from Molecular Biology to Clinical Perspectives Conference, Halle/Leipzig, Germany, September 27-29, 2003.

Plenary Lecture, “Cellular and Molecular Clues to Heart and Arterial Aging,” 10<sup>th</sup> National Congress Societa Italiana di Ricerche Cardiovascolari, Rome, Italy, September 24-26, 2003.

Plenary Lecture, "Heart and Blood Vessel Aging: Physiologic or Risky?" American College of Sports Medicine Annual Sessions, San Francisco, California, May 28-31, 2003.

Plenary Lecture at the Geriatric Congress, "Aging and the Cardiovascular System," Università Degli Di Milano, Milan, Italy, January 25, 2003.

Plenary Lecture, "The Heart of Survival," International Society for Heart Research, 19<sup>th</sup> Annual Meeting of the Japanese Section, Yamagata, Japan, October 31-November 2, 2002.

Medical Grand Rounds, Department of Medicine, Sinai Hospital of Baltimore, Baltimore, Maryland, December 13, 2001.

Plenary Lecture, International Symposium on Cardiovascular Sciences, Medicine and Surgery, Chinese University of Hong Kong, Hong Kong, China, November 23-24, 2001.

Stevenson Lecture, University of Western Ontario, Department of Physiology, London, Ontario, Canada, October 9, 2001.

Visiting Professor and Moderator, Research Day/Graduation, State University of New York (SUNY) at Buffalo, June 6, 2001

George Randolph and Patricia Scott Lectureship on the Physiology of Aging, "Cardiovascular Physiology and Aging," Mayo Interventional Cardiology Symposium, Mayo Medical School, Rochester, Minnesota, November 2, 2000.

Medical Grand Rounds Lecture, "Aging in the Absence of a Clinical Diagnosis," Boston University School of Medicine, Boston, MA; April 12, 2000.

Plenary Lecture, "Adaptive Mechanisms of Cardiac Aging." Xxth European Section Meeting of the International Society for Heart Research, Maastricht, The Netherlands, June 26, 1999.

President 's Lecture, "Age Associated Changes in Cardiovascular Structure and Function During Aging in Health and Their Modulation by Physical Conditioning." 1999 American College of Sports Medicine Meeting, Seattle, Washington, June 5, 1999.

Medical Grand Rounds, Saint Francis Medical Center, Hartford, Connecticut, March 20, 1997.

Cardiology Grand Rounds, Yale University Hospital, New Haven, Connecticut, November 25, 1995

Medical Grand Rounds, New York Medical College, Valhalla, New York, November 1995.

Medical Grand Rounds, Dartmouth University/Hitchcock Hospital, Lebanon, New Hampshire, October 27, 1995.

Grand Rounds Lecture, "Why Is Advancing Age in Health Care a Major Risk Factor for Cardiovascular Disease?" Sinai Hospital of Baltimore, Baltimore, Maryland, April 6, 1995

Lecture, "The Aging Heart," Matthew E. Fairbank Alumni Symposium in Geriatric Medicine, Center on Aging, University of Rochester, Rochester, New York, October 8, 1994.

Plenary Lecture, "Cardiovascular Reserve During Aging in Healthy Humans," and Chair, Main Session "Large Artery Function in Health and Disease" at the Joint 12th World Congress of



Cardiology and 16th Congress of the European Society of Cardiology, Berlin, Germany, September 12, 1994.

Chair, Gordon Research Conference on Cardiac Regulatory Mechanisms, Salve Regina University, Newport, Rhode Island, July 11-15, 1994.

Visiting Professor, Beijing University, Department of Biology, presented two lectures, "Differing Effects of Stimulation of  $\beta$ -Adrenergic Regulation Subtypes in Heart Cells" and "Modulation of the Myofilament  $Ca^{2+}$  Response in Heart Cells," Beijing, China, June 17-23, 1993.

Plenary Lecture, "Biophysical, Biochemical, and Molecular Changes in the Heart with Aging," Annual ICSABER Society Graduate Student Forum, Ohio State University, Columbus, Ohio, May 19, 1992.

Litchfield Lecture, "Age-Associated Changes in Cardiac Function," The Clinical Medicine of Later Life: The Scientific Basis of Practice, An International Symposium, The British Council, Oxford University, Oxford, United Kingdom, April 3-6, 1990.

Grand Rounds, "Cardiovascular Disease in the Elderly," Monmouth Medical Center, Hahnemann University School of Medicine, Long Branch, New Jersey, May 25, 1989.

Plenary Grand Rounds, "Mechanisms of Normal and Abnormal Heartbeats: Perspectives from Single Cardiac Cells to the Intact Heart," Visiting Professor, Cardiovascular Division, Harvard Medical School, Boston, Massachusetts, February 2, 1989.

Dean's Interdepartment Conference Lecture, "Cardiovascular Aging," The Aging Process, University of California, Davis, Martinez, California, June 29, 1988.

Joint Grand Rounds of the Department of Geriatrics and the Division of Cardiology Lecture, "Cardiovascular Physiology of the Aging," Mount Sinai Hospital, New York, New York, March 18, 1986.

Plenary Lecture, "An Integrated Approach Toward the Understanding of Myocardial Aging," 1986 Sandoz Lectures in Gerontology, Basel, Switzerland, February 26-28, 1986.

Grand Rounds, "The Aging Cardiovascular System--Myths and Realities," Francis Scott Key Medical Center, Baltimore, Maryland, December 18, 1985.

The Noble Wiley Jones Lecture, "Myths and Realities of Cardiovascular Aging," Oregon Health Sciences University, Portland, Oregon, December 2, 1985.

Visiting Lectureship in Geriatrics and Gerontology, Association of American Medical Colleges "Research Involving Aging and Disease of the Cardiovascular System," Veterans Administration Medical Center, North Chicago, Illinois, June 6, 1984.

American Medical Colleges Visiting Lectureship: Lecture, "The Physiology of the Aging of the Cardiovascular System," Roger Williams General Hospital; Cardiology Conference, Miriam Hospital; Grand Rounds, Rhode Island Hospital, Providence, Rhode Island, April 10-11, 1984.

Plenary Lecture, “The Physiology of Normal Aging,” The Thirtieth Annual Scientific Assembly and Annual Meeting of the Delaware Academy of Family Physicians, Wilmington, Delaware, March 26, 1982.

**Other Invited Lectures:**

Invited Speaker at the Artery Society 2020 Artery Virtual Conference October 23 – 24, 2020

Invited Virtual Professor, UCLA August 10, 2020

State of the Art Address at The American College of Veterinary Medicine (ACVIM) Scientific Sessions Virtual Meeting June 10, 2020

Guest lecturer at the international meeting “Shaping the Future of Regenerative Medicine” from May 16 – May 19, 2019 in Siena, Italy

Session Chair, 40th Annual Heart Rhythm Scientific Sessions, San Francisco, California May 7 – 11, 2019.

Invited Guest Lecturer “When and why your next heart beat will occur” at The Johns Hopkins Bloomberg School of Public Health, Baltimore, Maryland on March 12, 2019.

Invited Lecture, “Why and When Your Next Heartbeat Will Occur” at the Johns Hopkins Institute of CardioScience Basic Research Seminar Series, Baltimore, Maryland October 18, 2017.

Invited Lecture “What is Aging? Is Aging a Cardiovascular Disease?” at the International Symposium on: Cardiology of Today and Tomorrow: Prepared for the Future at the Federal Almazov North-West Medical Research Centre, St Petersburg, Russia September 21, 2017.

Invited Lecture “Age-Related Changes Affecting the Cardiovascular System” at the Johns Hopkins Bloomberg School of Public Health, Baltimore, MD on March 9, 2017.

Invited Lecture “Arterial phenotypes in SardiNIA. Central Arterial Stiffness, Arterial Pressure, Intimal Medial Thickness” at the International Meeting: Contribution to the “Centenarians Island” to the Study of Cardiovascular Aging and Diseases, Cagliari, Italy on February 24, 2017

Invited Lecture “*So What's Aging? Is Arterial Aging a Disease?*” at the Yale University School of Medicine, New Haven, CT on January 23, 2017

Invited Lecture “Molecular Mechanisms of Aging” Molecular Mechanism of Cardiovascular Aging session at the American Heart Association Annual Scientific Session November 12, 2016.

Chair American Heart Association Annual Scientific Session in New Orleans, LA, Vascular Aging: Novel Regulation and Contribution of Smooth Muscle Cells November 12, 2016.

Session Chair 2016 Paul F. Glenn Symposium on the Biology of Aging June 7, 2016 in Santa Barbara, CA.

Invited speaker at the 37<sup>th</sup> Annual Scientific Sessions of the Heart Rhythm Society in San Francisco May 4 – May 7, 2016.

Chair platform session on Cardiac Smooth and Skeletal Muscle Electrophysiology Biophysical Society in Los Angeles March 2, 2016.

Invited lecture at The Tulane Center for Aging in New Orleans, LA February 11, 2016.

Invited lecture at The Tulane Center for Aging in New Orleans, LA February 11, 2016.

Invited “Poster Professor” “Myocyte Electrical Properties and Calcium Regulation,” American Heart Association Scientific Sessions, Orlando, Florida, November 7-11, 2015.

Invited Speaker, 22<sup>nd</sup> Annual Louis E. Alley Memorial Lecture, “Pacemaker Clock Failure: A Heartbreak of Getting Old,” University of Iowa Department of Health and Physiology, Iowa City, Iowa, April 8, 2015.

Invited Speaker, “Cardiac output is determined by how fast and how strong the heart ticks,” Tulane Center for Aging, New Orleans, Louisiana, February 6, 2015.

Invited Speaker, “A general theory of cardiac chronotropy, inotropy and arrhythmias,” Frontiers in Cardiovascular Science seminar, University of Michigan Cardiovascular Center, Ann Arbor, Michigan, October 20, 2014.

Invited Speaker, “The What and why of aging and arterial disease,” Aging: is it a disease? Frankfurt am Main, Germany, September 27, 2014.

Invited Speaker, “The Reality of Aging Viewed from the Arterial Wall,” German Society of Gerontology and Geriatrics (DGGG) Congress “Stress und Altern – Chancen und Risiken” (“Stress and Aging—Opportunity and Risk”), Halle, Germany, September 25, 2014.

Invited Speaker/Panelist, “MDs as Basic Scientists,” 34<sup>th</sup> Korean Medical Association Congress, Seoul, South Korea, “Meet the Outstanding Scholars” session, June 28, 2014.

Invited Speaker, “The Reality of Aging Viewed from the Arterial Wall,” 34<sup>th</sup> Korean Medical Association Congress, Seoul, South Korea, June 28, 2014.

Invited Speaker, “The Conundrum of Age, Central Arterial Stiffness and Blood Pressure,” Korean Vascular Research Working Group, Choongnam National University Hospital, Daeju, South Korea, June 27, 2014.

Invited Speaker, “The What and Why of Aging,” Yonsei Medical College, Seoul, South Korea, June 27, 2014.

Moderator, Glenn Workshop on the Biology of Aging, Santa Barbara, California, June 4-5, 2014.

Invited Speaker, "The Calcium Clock," Heart Rhythm Society 35<sup>th</sup> Annual Scientific Sessions, San Francisco, California, May 7-10, 2014.

Invited Speaker, "The Calcium Clock," Heart Rhythm Society 35<sup>th</sup> Annual Scientific Sessions, San Francisco, California, May 7-10, 2014.

Invited Speaker, INOVA Heart & Vascular Institute Symposium, Tysons Corner, Virginia, April 25, 2014.

Invited Speaker, "The Reality of Aging Viewed from the Arterial Wall," The 2nd Systems Medicine Symposium, Keio University School of Medicine, Tokyo, Japan, March 22, 2014.

Invited Speaker, "The Reality of Aging Viewed from the Heart," Tulane Center for Aging, New Orleans, Louisiana, February 7, 2014.

Invited Speaker, "The Stress of Aging Viewed from the Arterial Wall," Whitaker Cardiovascular Institute, Boston University Medical Center, Boston, Massachusetts, December 10, 2013.

Invited Speaker, "Heart rate and rhythmicity emerge from phosphorylation-dependent synchronization of chemical and electrical oscillations," Wyss Institute, Boston, Massachusetts, December 9, 2013.

Invited Speaker, "Reality of Aging Viewed from the Arterial Wall," 66<sup>th</sup> Annual Scientific Meeting, Gerontological Society of America, New Orleans, Louisiana, November 20-24, 2013.

Invited Speaker, "Molecular Mechanisms of Aortic Deterioration with Aging and Disease," North American Artery 3<sup>rd</sup> annual meeting, Rosemont, Illinois, September 6-7, 2013.

Invited Speaker, "The emergence of rhythmicity of the heart's pacemaker cells is phosphorylation-dependent," ISHR XXI World Congress, San Diego, California, June 30-July 4, 2013.

Invited Speaker, "The emergence of rhythmicity of the heart's pacemaker cells is phosphorylation-dependent," ISHR XXI World Congress, San Diego, California, June 30-July 4, 2013.

Invited Speaker, "The Reality of Aging Viewed from the Arterial Wall," Aging Research and Chronic Disease Prevention: A Paul F. Glenn Symposium on the Biology of Aging, Santa Barbara, California, June 4-6, 2013

Invited Speaker, "Matrix Metalloproteinase and Vascular Remodeling," American Society of Hypertension 2013 Annual Scientific Meeting, San Francisco, California, May 15-18, 2013.

Invited Speaker, "The Reality of Aging Viewed from the Arterial Wall," Experimental Biology 2013, Boston, Massachusetts, April 24, 2013.

Invited Speaker, "Aging Begets Arterial Calcification" and "Reality of Aging Viewed from the Heart and Arteries" (Extraordinary Lifetime Contribution to Arterial Hemodynamics), Pulse of Asia 2013, Seoul, South Korea, April 19-20, 2013.

Lecture, "The What and Why of Aging," Cheil General Hospital, Seoul, South Korea, April 18, 2013.

Lecture, “The Reality of Aging Viewed from the Arterial Wall,” Younghan University Hospital, Daegu, South Korea, April 17, 2013.

Lecture, “Heart rhythmicity emerges from synchronization of multiple chemical and electrical oscillations,” 2013 Cardiovascular Research Center Seminar Series, Duke University Medical Center, Durham, North Carolina, April 10, 2013.

Lecture, “A General Theory for Cardiac Automaticity, Contractility and Arrhythmogenesis,” Cardiovascular Research Center of Rhode Island Hospital and Warren Alpert Medical School of Brown University, Providence, Rhode Island, March 19, 2013.

Invited Speaker, “Age-Associated Arterial Secretory Phenotype,” American Heart Association Scientific Sessions, Los Angeles, California, November 3-7, 2012.

Invited Speaker, “The Stress of Aging Viewed from the Arterial Wall,” Aging and Cardiovascular Diseases session of Keystone Symposium, Aging and Diseases of Aging, Tokyo, Japan, October 22-27, 2012.

Co-Chair, Small conductance calcium-activated potassium channels and cardiac arrhythmias session, Cardiostim 2012, 18<sup>th</sup> World Congress, Nice, France, June 13-16, 2012.

Co-Chair, Basic Aspects of Resistant Hypertension plenary session, and Invited Speaker, “Can we intervene in the epidemic of predominately systolic hypertension in Western Society?” European Society of Hypertension Congress 2012 Satellite Symposium “Resistant Hypertension,” St. Petersburg, Russia, May 24-26, 2012.

Co-Chair, Advanced Glycation End Products in Hypertension and Diabetes session, and Invited Speaker, “Arterial Stiffening, Inflammation, Fibrosis and Calcification: Potential Novel Remedies,” American Society of Hypertension Twenty-seventh Annual Scientific Meeting, New York City, May 19-22, 2012.

Invited Speaker, “The Stress of Aging Viewed from the Arterial Wall,” The Sam and Ann Barshop Institute for Longevity and Aging Studies, San Antonio, Texas, May 10, 2012.

Invited Speaker, “A General Theory for the Regulation of Heart Rate and Contractility,” UCLA Cardiovascular Research Laboratories, Los Angeles, California, April 26, 2012.

Invited Speaker, “The Stress of Aging Viewed from the Heart and Arteries,” UCLA Department of Molecular, Cellular & Integrative Physiology Distinguished Speaker Series, Los Angeles, California, April 25, 2012.

Invited Speaker, “Vascular Aging,” European Society of Cardiology Frontiers in Cardiovascular Biology meeting, London, England, March 30-April 1, 2012.

Invited Speaker, “The stress of ageing viewed from the heart and arteries” and “A general theory for how strong and how fast the heart beats,” University of Manchester, Manchester, England, March 28-29, 2012.

Invited Speaker, Centro Nacional de Investigaciones Cardiovasculares (CNIC) conference, Vascular Inflammation, Aging and Imaging,” Madrid, Spain, March 9-10, 2012.

Moderator, abstract oral session “New Concepts in Long QT and Sinoatrial Pacemaking,” American Heart Association annual Scientific Sessions, Orlando, Florida, November 12-16, 2011.

Invited Speaker, “The Biology of Cardiac Pacemakers and Their Marriage to Ventricular Myocytes,” 15<sup>th</sup> Annual Scientific Meeting of the Heart Failure Society of America, Boston, Massachusetts, September 20, 2011.

Invited Speaker, “Stress of Aging Viewed from the Arterial Wall,” Harvard/Paul F. Glenn Symposium on Aging, Boston, Massachusetts, June 20, 2011.

Invited Speaker, “The Stress of Arterial Aging Viewed from the Arterial Wall,” 40<sup>th</sup> Annual Meeting of the American Aging Association, Raleigh, North Carolina, June 3-6, 2011.

Invited Speaker, “Aging Beyond Telomeres,” Berzelius Symposium 85, Telomere Biology in Health and Disease—A Crystal Ball for the Future? Stockholm, Sweden, May 25-27, 2011.

Invited Speaker, “Is Vascular Aging Inevitable?” American Society of Hypertension 26<sup>th</sup> Annual Scientific Meeting, New York, New York, May 21-24, 2011.

Invited Speaker, “The stress of aging viewed from hearts and arteries,” Dartmouth Medical School Department of Physiology and Neurobiology Seminar Series, Lebanon, New Hampshire., May 11, 2011.

Guest Lecturer, “The stress of aging viewed from the cardiovascular system,” Department of Physiology and Program in Neuroscience, University of Maryland School of Medicine, Baltimore, Maryland, May 9, 2011.

Invited Speaker, “Stress of aging viewed from the cardiovascular system,” 16<sup>th</sup> Peter A. Rechnitzer Lecture, Canadian Centre for Activity and Aging, University of Western Ontario, London, Ontario, Canada, April 20, 2011.

Invited Speaker, “Arterial aging: a journey into subclinical arterial disease,” in symposium “The Anatomy of Aging: What Should We be Teaching our Medical Students” American Association of Anatomists Experimental Biology 2011, Washington, D.C., April 9-13, 2011.

Invited Speaker, “The Marriage of Cardiac Chronotropy and Inotropy,” 13<sup>th</sup> La Jolla-International Cardiovascular Research Conference, La Jolla, California, March 11-13, 2011.

Invited Speaker, “The Clocks of Cardiac Pacemaking,” Cardiac Arrhythmia Mechanisms Gordon Research Conference, Galveston, Texas, February 13-18, 2011.

Guest Lecturer, “Cardiovascular System and Aging,” Department of Molecular Microbiology and Immunology, Johns Hopkins Bloomberg School of Public Health, Baltimore, Maryland, February 8, 2011.

Invited Speaker, “The Stress of Aging Viewed from the Arterial Wall,” Physiology Research Seminars Series, Johns Hopkins University Bloomberg School of Public Health, Baltimore, Maryland, February 2, 2011.

Invited Speaker, “The Stress of Aging Viewed from the Arterial Wall,” Universidad Nacional de La Plata, La Plata, Argentina, November 22, 2010.

Invited Speaker, “A Novel Paradigm for the Heart’s Pacemaker,” and Symposium Chair, “Basic Mechanisms for Cardiac Arrhythmias,” 3<sup>rd</sup> Asia Pacific Heart Rhythm Society Scientific Sessions, Jeju, South Korea, October 27-30, 2010.

Invited Speaker, “Molecular Mechanisms of Cardiac and Vascular Aging,” and Discussion Chair, Case Based Approach for the management of hypertension: What does evaluating central pulse and blood pressure contribute in management of hypertension? Pulse of Asia satellite symposium, International Society of Hypertension 23<sup>rd</sup> Scientific Meeting, Vancouver, British Columbia, Canada, September 26, 2010.

Invited Speaker, “Future Perspectives,” session: Premature cardiovascular ageing—background and treatment, European Society of Cardiology Congress, Stockholm, Sweden, August 28-31, 2010.

Invited Speaker, “Age associated reductions in cardiovascular reserve: perspectives from humans to molecules,” Gordon Research Conference Biology of Aging, Les Diablerets, Switzerland, Aug. 22-27, 2010.

Invited Speaker, “What is Aging and Why Does It Occur: Perspectives from Hearts and Arteries” and “Old Hearts and Arteries Operate on the Edge,” National Institute of Health and Science of Aging (Istituto Nazionale Riposo e Cura Anziani--INRCA) in Rome and Ancona, Italy, July 12-15, 2010.

Visiting Professor, University of Sassari, “What is Aging and Why Does It Occur: Perspectives from Hearts and Arteries”; “Old Hearts and Arteries Operate on the Edge”; “What Makes Our Heart Tick?” Sassari, Italy, June 30-July 9, 2010.

Invited Speaker, “Old arteries operate on the edge” and “Molecular mechanisms of Ca overload in cardiac injury,” International Society for Heart Research XX World Congress, Kyoto, Japan, May 13-16, 2010.

Invited Speaker, “What the Hypertension Specialist Should Know About the Pathophysiology of Central Arterial Aging,” and co-chair of “Hypertension in the Elderly” theme in “Hypertension for the Primary Care Physician” session, American Society of Hypertension annual meeting, New York, New York, May 2, 2010.

Invited Speaker, “Novel perspectives on how the heart's pacemaker works,” Dalhousie University Department of Pharmacology seminar series, Halifax, Nova Scotia, Canada, April 15, 2010.

Invited Speaker, “Old Arteries Operate on the Edge,” Cardiovascular Medicine Grand Rounds, University Hospitals Case Medical Center and Case Western Reserve University, Cleveland, Ohio, Jan. 7, 2010.

Invited Speaker, “A Paradigm Shift for the Heart’s Pacemaker,” Medical University of South Carolina seminar series, Charleston, South Carolina, Dec. 2, 2009.

Invited Speaker, “Old Arteries Operate on the Edge,” American Heart Association Scientific Sessions, Orlando, Florida, November 14-18, 2009.

Invited Speaker, “Aging and diastolic function: fate or fact?,” international symposium: Heart failure with preserved ejection fraction: mechanisms, diagnosis, therapy, Irnding, Austria, October 22-24, 2009.

Invited Speaker, “Aging and the cardiovascular system in hypertension,” American Heart Association workshop at 63<sup>rd</sup> High Blood Pressure Research Conference, Chicago, Illinois, September 23, 2009.

Invited Speaker, “Arterial Aging is risky for hypertension,” and co-chair of symposium “Central or peripheral blood pressure—the accents are shifting,” 2<sup>nd</sup> International Korotkoff Congress on Hypertension, Saint Petersburg, Russia, September 17-19, 2009.

Invited Speaker, “Systematic Study of ‘Physiologic’ Aging is a Daunting Ordeal,” University of Colorado Department of Integrative Physiology Weekly Colloquium, Boulder, Colorado, September 3, 2009.

Discussion Chair, “Myocardial Regeneration,” 31<sup>st</sup> meeting of the North American Section of the International Society for Heart Research, Baltimore, Maryland, May 26-29, 2009.

Invited Speaker, “The Heart’s Pacemaker Clock is a Robust SYSTEM of Chemical and Electrical Clocks,” 31<sup>st</sup> meeting of the North American Section of the International Society for Heart Research, Baltimore, Maryland, May 26-29, 2009.

Invited Speaker, Antagonist in Debate: “Who’s Keeping Time in the SA Node? The Funny Current Clock is More Important than the Calcium Clock,” Heart Rhythm Society 30<sup>th</sup> Annual Scientific Sessions, Boston, Massachusetts, May 13-16, 2009.

Invited Speaker, “Arterial Aging is Risky,” keynote address for Heart & Stroke/Richard Lewar Centre of Excellence Annual Cardiovascular Scientific Day, University of Toronto, Toronto, Ontario, Canada, April 23, 2009.

Invited Speaker, “Evolving Concepts of the Timekeeping Mechanism of the Heart’s Pacemaker Clock,” Pennsylvania Muscle Institute, Philadelphia, Pennsylvania, March 23, 2009.

Discussion Chair, “Aging of the Vascular System,” 7<sup>th</sup> International Workshop on Structure and Function of the Vascular System,” Paris, France, March 12-14, 2009.

Discussion Chair, “Diseases of aging: genetics and epigenetics,” Biology of Aging Gordon Research Conference, February. 15-18, 2009.

Invited Speaker, “Age-Associated Changes in the Cardiovascular System and Avenues of New Therapies,” UCLA School of Medicine Joint Cardiac Symposium, Los Angeles, California, February 6, 2009.

Invited Speaker, “A Paradigm Shift for the Heart’s Pacemaker,” Krannert Institute of Cardiology Grand Rounds, Indiana University, Indianapolis, Indiana, January. 13, 2009.



Invited Speaker, "SA Node Changes to Lipid Raft: Proteomic and Functional Analysis of Adelyate Cyclase in Response to  $\beta$ -adrenergic Signaling," American Heart Association Scientific Sessions, New Orleans, Louisiana, November 8-13, 2008.

Invited Speaker, "A New Paradigm for the Heart's Pacemaker," 6<sup>th</sup> annual Center for Heart Failure Research symposium, Oslo, Norway, September 18-19, 2008.

Discussion Leader, "Regenerative Medicine," 4<sup>th</sup> World Ageing & Generations Congress, St. Gallen, Switzerland, August 28-30, 2008.

Invited Speaker, "SR  $Ca^{2+}$  release and pacemaker activity," 2008 Cardiac Regulatory Mechanisms Gordon Research Conference, New London, New Hampshire, July 20-25, 2008.

Invited Seminar Speaker, "Aging Arteries Operate on the Edge," "The Heartbreak of Aging" and "Hypertension in Older Patients," Korean Society of Cardiology, Seoul, South Korea, May 21-22, 2008.

Invited Seminar Speaker, "A Paradigm Shift for the Heart's Pacemaker," Nora Eccles Treadwell Distinguished Lectures Series, Cardiovascular Research and Training Institute, University of Utah, Salt Lake City, Utah, April 17, 2008.

Invited Speaker, "Old Arteries Operate on the Edge of Hypertension," American College of Cardiology 57<sup>th</sup> Annual Scientific Session, Chicago, Illinois, April 1, 2008.

Invited Seminar Speaker, "Aging Arteries Operate on the Edge," Department of Physiology Research Seminar Series, University of Louisville, Louisville, Kentucky, February 26, 2008.

Invited Seminar Speaker, "A Paradigm Shift for the Heart's Pacemaker," Cardiovascular Seminar Series Symposia, University of Iowa Roy J. and Lucille A. Carver College of Medicine, Iowa City, Iowa, December 14, 2007.

Invited Speaker, "Intracellular Calcium in Normal and Abnormal Pacemaker Activity," American Heart Association Scientific Sessions, Long Beach, California, November 3, 2007.

Invited Speaker, "Evolution of a General Theory for How Fast and Strong the Heart Beats," 5<sup>th</sup> Fairberg Cardiac Workshop, Istanbul, Turkey, September 16, 2007.

Invited Speaker, "A General Theory of the Initiation and Execution of the Heartbeat," XIX World Congress of the ISHR, Bologna, Italy, June 25, 2007.

Invited Speaker, "A Novel Paradigm for the Heart's Pacemaker," University of Maryland Department of Physiology, May 22, 2007

Invited Speaker, "The Old Heart Operates on the Edge," Second Biennial Colloquium on Heart Failure, London, Ontario, Canada, May 10, 2007.

Invited Speaker, "Arterial Aging and Cardiovascular Risk," Experimental Biology Meeting of the American Physiology Society, Washington, D.C., April 30, 2007.

Invited Speaker, "Aging Arteries and Vascular Disease," Finnish Hypertension Society Annual Scientific Symposium, April 20, 2007.

Invited Speaker, “A General Theory of the Initiation and Execution of the Heartbeat,” University of Wisconsin Cardiovascular Research Center’s Cardiovascular Research Conference, Madison, Wisconsin, March 20, 2007.

Invited Speaker, “Basis of premature vascular senescence,” Sixth International Workshop on Structure and Function of the Vascular System, Paris, France, February 1-3, 2007.

Invited Speaker, “A General Theory of the Initiation and Execution of the Heartbeat,” Australian Health and Medical Research Congress's scientific conference, “Where Worlds Collide: Pacemaker Cell, Heart Rate, and Atrial Dysfunction,” Melbourne, Australia, November 26-December 1, 2006.

Invited Speaker, “Physiological’ Aging Versus Atherosclerosis: Pathophysiology and Implications for Patient Management,” 2006 Scientific Sessions of the American Heart Association, Chicago, Illinois, November 12-15, 2006.

Invited Speaker, PRICE IV, Chicago, Illinois, November 11, 2006.

Invited Speaker, “Arterial Aging in Apparent Health Promotes Arterial Diseases,” Tenth Annual Scientific Meeting of the Japanese Heart Failure Society, Tokyo, Japan, October 12-15, 2006.

Invited Speaker, “Biology of Aging” Heart Failure Society of America’s Tenth Annual Scientific Meeting, Seattle, Washington, September 11-9, 2006.

Discussion Leader, “Channels, Transporters, and Function,” 2006 Cardiac Regulatory Mechanisms Gordon Research Conference, New London, New Hampshire, July 16-21, 2006.

Invited Speaker, “Cardiovascular Aging: A Risk Factor for Cell Therapy?” University of Bologna and National Institute of Biostructures and Biosystems International Scientific Symposium, Bologna, Italy, June 14, 2006.

Invited Speaker, “Old Arteries Operate on the Edge,” Unilever Corporate Research’s SPARK Meeting on the Future of Ageing Research, The Hague, Netherlands, May 22-23, 2006.

Invited Speaker, “A SCArIE Tale about the Intracellular Clock that Drives the Heart’s Pacemaker,” 4<sup>th</sup> Larry and Horti Fairberg Workshop, Charleston, South Carolina, April 23-27, 2006.

Invited Speaker, “The Importance of Basic Mechanisms of Cardiovascular Aging for Managing the Elderly Patient,” American College of Cardiology 55<sup>th</sup> Annual Scientific Session, Atlanta, Georgia, March 11-14, 2006.

Invited Speaker, “Rhythmic Ca<sup>2+</sup> Oscillations Drive Sinoatrial Nodal Cell Pacemaker Function to Make the Heart Tick,” Kyushu University, Fukuoka, Japan, March 27-28, 2005.

Invited Speaker, “Rhythmic Ca<sup>2+</sup> Oscillations Drive Sinoatrial Nodal Cell Pacemaker Function to Make the Heart Tick,” Osaka University, Osaka, Japan, March 25-26, 2005.

Invited Speaker, “Rhythmic Ca<sup>2+</sup> Oscillations Drive Sinoatrial Nodal Cell Pacemaker Function to Make the Heart Tick,” Kyoto University, Osaka, Japan, March 25, 2005.

Invited Speaker, “Rhythmic  $\text{Ca}^{2+}$  Oscillations Drive Sinoatrial Nodal Cell Pacemaker Function to Make the Heart Tick,” Tokyo University, Tokyo, Japan, March 18, 2005.

Invited Speaker, “Arterial Aging in Apparent Health Promotes Arterial Diseases,” 5<sup>th</sup> International Workshop on Structure and Function of Large Arteries, Paris, France, February 3-5, 2005.

Invited Speaker, “SR  $\text{Ca}^{2+}$  cycling in SN cells: Pacemaker calcium regulation,” 3<sup>rd</sup> Fairberg’s Cardiac Workshop, Sintra, Portugal, January 15-19, 2005.

Invited Speaker, “The Heartbreak of Advancing Age,” 8<sup>th</sup> Annual Scientific Meeting of the Heart Failure Society of America, Toronto, Ontario, Canada, Sept. 2-15, 2004.

Invited Speaker, “Cardiovascular Aging in Health,” The Aging People International Meeting, Pavia, Italy, Sept. 2-4, 2004.

Scientific Program Chair, XVIII World Congress of the International Society for Heart Research: Purpose in Paradise, Brisbane, Australia, August 2004.

Invited Speaker, “Ryanodine Receptor and the Sinus Node,” Cardiostim 2004, Nice, France, June 15-19, 2004.

Invited Speaker, “The Role of SR  $\text{Ca}^{2+}$  release in Pacemaker Activity,” European Section of the International Society for Heart Research Meeting, Dresden, Germany, June 2-6, 2004.

Invited Speaker, 5<sup>th</sup> International Workshop on Structure and Function of Large Arteries, Paris, France, February 5-7, 2004.

Abstract Session Moderator, 76th Annual Scientific Sessions, American Heart Association, Orlando, Florida, November 10, 2003.

Invited Speaker, “The Old Heart and Arteries Operate on the Edge,” Mid-Atlantic Pharmacology Society Annual Meeting: New Frontiers in Aging Research, UMDNJ-School of Osteopathic Medicine, Stratford, New Jersey, October 10, 2003.

Invited Speaker, “Why Older Heart and Blood Vessels Might Need Revitalization,” 10<sup>th</sup> Congress of the International Association of Biomedical Gerontology (IABG), Cambridge, England, September 19, 23, 2003.

Invited Speaker, “Cardiovascular Aging in Health,” Cantonal Hospital Cardiovascular Pharmacology Seminar, Lucerne, Switzerland, September 18, 2003.

Invited Speaker, “Beyond Bowditch: Cardiac Chronotropy Marries Inotropy,” and Session Chair, European Muscle Conference, Montpellier, France, September 6-10, 2003.

Invited Speaker, “Cardiovascular Aging in Health Sets the Stage for Cardiovascular Disease,” Diet and Optimum Health Conference, Portland, Oregon, May 21-24, 2003.

Invited Speaker, “The Heartbreak of Aging,” Mechanisms of Cardiovascular Disease Conference, Rome, Italy, May 9, 2003.

Invited Speaker, “Aging and the Cardiovascular System,” Center on Aging, University of Alabama, Birmingham, Alabama, March 6, 2003.

Invited Speaker, "The Aging Heart and Arteries Operate on the Edge," University of Alabama at Birmingham, Department of Physiology and Biophysics, Birmingham, Alabama, March 6, 2003.

Seminar Speaker, Laboratory of Biochemistry and Laboratory of Cell Signaling, NHLBI, Bethesda, Maryland, January 10, 2003.

Invited Speaker, The Graying of America Seminar, Knight Center of Journalism, University of Maryland, Baltimore, Maryland, September 12, 2002.

Eweson Lecturer (AFAR), American Society of Hypertension Meeting, New York, New York, May 14-18, 2002.

Invited Speaker, NASPE 23<sup>rd</sup> Annual Scientific Sessions, San Diego, California, May 8-11, 2002.

Invited Speaker, Heart Failure Mini Symposium, Columbia University College of Physicians and Surgeons, New York, New York, May 1, 2002.

Invited Speaker, New Jersey Medical School, University of Medicine and Dentistry of New Jersey, Newark, New Jersey, March 18, 2002.

Invited Speaker, National Institute of Environmental Health Sciences, Research Triangle Park, North Carolina, March 11, 2002.

Cardiology and Medical Grand Rounds, Washington University in St. Louis, Department of Internal Medicine and Cardiovascular Division, St. Louis, Missouri, October 17-18, 2001.

Invited Speaker, Gunton Symposium, University of Western Ontario, London, Ontario, Canada, October 11, 2001.

Invited Speaker, Geneva Biology of Ageing Workshop 2001, Geneva, Switzerland, September 28, 2001.

Invited Speaker, SEB Annual Meeting, University of Kent, Canterbury, United Kingdom, April 5, 2001.

Lecturer, Vascular Biology of Aging Retreat, Claude Pepper Older Americans Independence Center, University of Michigan, Ann Arbor, Michigan, November 1, 2000.

Lecture, "Ageing and the Cardiovascular Disease," Cardiovascular Disease and Hormone Replacement Therapy Conference, London, England, October 13-16, 2000.

Lecture, "Sympathetic Cardiac Control Withers During 'Normal' Aging," Society of Autonomic Neuroscience Conference, London, England, July 17-21, 2000.

Session Chair, "The Aging of the Cardiovascular System," International Conference on Biochemistry of Exercise, Little Rock, Arkansas, June 4-6, 2000.

Invited Speaker, "Molecular Signaling on Cardiovascular Biology," International Symposium, London, England, May 31, 2000.

Invited Speaker, "Novel Aspects of Cardiac  $\beta$ 2-adrenergic Signaling," Third Ukrainian Congress of Pathophysiologists, Kiev, Ukraine; May 26-30, 2000.

Panel Participant, Cardiovascular Breakthroughs and the Medical Costs over the next 2-3 Decades, RAND, Santa Monica, California, March 10, 2000.

Lecturer, "Cardiac Beta2-adrenergic Receptor Couples to Gi Protein Which Limits the Range of its Signaling Broadcast," University of Pittsburgh, Pittsburgh, Pennsylvania, March 22, 2000.

Lecturer, Novartis Foundation Symposium: Ageing Vulnerability: Causes and Interventions, London, England, February 29-March 2, 2000.

Invited Speaker, "Cardiovascular Seminar," 72<sup>nd</sup> Annual Scientific Sessions of the American Heart Association, Atlanta, Georgia, November 10, 1999.

Abstract Session Moderator, 72<sup>nd</sup> Annual Scientific Sessions of the American Heart Association, Atlanta, Georgia, November 10, 1999.

Lecture, "Cardiovascular Aging in Health." Brazilian Society of Cardiology, Recife, Brazil, September 19-22, 1999.

Lecture, "Adrenergic control of the normal, hypertrophied and failing heart. XXI Congress of the Polish Physiology Society, Poznan, Poland, September 7-10, 1999.

Lecture, "Cardiovascular Aging." 6<sup>th</sup> Asia/Oceania Regional Congress of Gerontology Meeting, Seoul, Korea, June 8-11, 1999.

Lecture, "Broadcast of Cardiac  $\beta_2$ -adrenergic Receptor Signalling is Modulated by Gi Coupling." University of Connecticut Health Center, Farmington, CT, May 4, 1999.

Lecture, "Is the Senescent Heart an Overloaded Heart?" 8<sup>th</sup> International Congress on Cardiovascular Pharmacotherapy, Amsterdam, The Netherlands, April 1, 1999.

Lecture, "Apoptosis in Cardiac Disease-What Is It-How Does It Occur?" 8<sup>th</sup> International Congress on Cardiovascular Pharmacotherapy, Amsterdam, The Netherlands, March 30, 1999.

Lecture, "Withering of Cardiovascular  $\beta$ -adrenergic Receptors Response with Aging.," Directors of Research Laboratories in Pharmaceutical and Cosmetics Industries Meeting, Paris, France, March 29, 1999.

Lecture, "Cellular Mechanisms of Cardiovascular Aging.," Brazilian Cardiology Annual Meeting, Dallas, TX, November 7, 1998.

Lecture, " $\beta$ -adrenergic Signalling in Heart.," Department of Physiology, New York Medical Center, New York, October 30, 1998.

Lecture, "New Perspectives on Cardiac Adrenergic Signalling.," Department of Physiology, University of Berne, Switzerland, October 11, 1998.

Lecture, "Apoptosis in Cardiac Disease.," International Conference on Apoptosis in Cardiac Biology, Regensburg, Germany, October 8-10, 1998.

Lecture, "Alterations in the Aging Heart.," Swiss Society of Cardiology Annual Meeting, Basel, Switzerland, May 14-16, 1998.

Lecture, "Heart Disease and Cardiovascular Aging," 1998 Bennet Day at the College of Medicine at Ohio State, April 6, 1998.

Lecture, "Is the Heart a Failing Heart?" council on Geriatric Cardiology Annual Meeting, Atlanta, GA, March 28, 1998.

Lecture, "Health Disease and Cardiovascular Aging," Merck, San Antonio, Texas, March 6, 1998.

Lecture, "Cardiovascular Reserve during Aging," Medical Grand Rounds, "Health, Disease and Cardiovascular Aging," Geisinger Medical Center, Danville, Pennsylvania, October 24, 1997.

Lecture, "Multiple Mechanisms Underlie the Transition to Heart Failure in a Chronic Hypertensive Model," First Annual Scientific Meeting of Heart Failure Society of America, Baltimore, Maryland, September 21-24, 1997.

Lecture, "Cardiovascular Aging," Panel Discussion, "Aging and the Cardiovascular System," Duke University, Durham, North Carolina, September 17, 1997.

Chair, Sandoz Lectures, Sandoz Foundation for Gerontology Research, Singapore, August 15-18, 1997; Adelaide, August 19-23, 1997.

Lecture, "Cardiovascular Aging in Health," The Brookdale Foundation, Airlie Conference Center, Airlie, Virginia, July 22, 1997.

Lecture, "Cardiovascular Disease on Aging," Merck & Company, Mystic, Connecticut, July 18, 1997.

Lecture, "Different Signalling Pathways for Cardiac  $\beta$ -adrenergic Receptor Subtypes," XXXIII International Congress of Physiological Sciences, St. Petersburg, Russia, June 26-July 2, 1997.

Lecture, "Is the Aged Heart a Diseased Heart?" Heart Failure '97, Cologne, Germany, May 24-27, 1997.

Lecture, "The Effects of Aging on the Human Cardiovascular System," Society of Cardiovascular Anesthesiologists, 1997 Annual Meeting and Workshops, Baltimore, Maryland, May 12, 1997.

Lecture, "Cardiovascular Effects of Aging," Henry Ford Heart and Vascular Institute, Detroit, Michigan, April 16, 1997.

Lecture, " $\beta$ -Adrenergic Subtype Signalling in Heart," Merck and Company, Inc., West Point, Pennsylvania, April 8, 1997.

Lecture, "Cardiovascular Aging, Humans to Molecules," University of Texas Medical Branch at Galveston, Texas, February 28, 1997.

Lecture, "Health Disease and Cardiovascular Aging," Istituto Dermapatico Dell'Immacolata, Rome, Italy, February 13-14, 1997.

Lecture, "Overview of Cardiovascular Aging," Molecular Aspects of Age-related Cardiovascular Decline, NIA & Glenn Foundation for Medical Research, Montecito, California, January 21-24, 1997.

Lecture, "A Myocardial Gene Expression Changes and Resulting Phenotypic Changes with Aging," Gordon Conference, Ventura, California, January 5-10, 1997.

Lecture, "A Diversity of  $\beta$ -subtype Receptor Signaling in Heart," Wayne State University, Detroit, Michigan, December 19, 1996.

Chair, Session on Cardiac Excitability and Contractility, American Heart Association, New Orleans, Louisiana, November 10-14, 1996.

Lectures, "Cardiovascular Changes During Aging in Health: Preventable Risk Factors for Disease?" and "Cardiac Changes During Aging Mimic Adaptations to Hypertension," Nagoya Symposium, Nagoya, Japan, October 30-31, 1996.

Lecture, "The Transition to Failure in Hearts of Aged Rats with Chronic Pressure Overload and the Impact of Captopril," III International Conference on Myocardial Function, Padova, Italy, October 23-25, 1996.

Seminar, IX International Vascular Biology Meeting, Seattle, Washington, September 4-9, 1996.

Lectures, "Is there a normal cardiac aging?" and "Adaptability of the cardiovascular system to exercise," European Academy for Medicine of Ageing, 4th EAMA Training Session, Sion, Switzerland, August 20-23, 1996.

Lectures, "Cellular mechanisms of cardiovascular aging" and "Effects of aging on the cellular electrophysiology of cardiac tissue," Integrating Geriatrics into the Subspecialties of Internal Medicine, Banff, Alberta, Canada, August 12-14, 1996.

Chair, Session on Cardiac Regulatory Mechanisms, Gordon Research Conference, New London, New Hampshire, July 7-12, 1996.

Lecture, Unesco-sponsored International Conference on Human Aging, "Adding Life to Years," on Biological perspectives on loss and gain in aging, Paris, France, June 17-20, 1996.

Co-Chair, Endothelial Signalling Symposium, XVIII Meeting of the International Society for Heart Research-American Section, Chicago, Illinois, June 9-13, 1996.

Lectures, " $\beta$ -adrenergic sub-type signaling on the heart" at Cardiology Ground Rounds and "Cardiovascular Aging in Health as a risk factor for disease," at Medical Ground Rounds in San Diego, California, May 1-2, 1996.

Co-Chair, International Symposium on Cardiovascular in the Elderly on "Arrhythmia in the Elderly," Osaka, Japan, March 20-22, 1996.

Chair, Session on Cardiac Excitation Contraction Coupling Biophysical Society Annual Scientific Sessions, Baltimore, Maryland, February 1996.

Speaker, International Symposium on Care for the Elderly, Teipie, Taiwan, December 11-14, 1995.

Seminar, Department of Physiology, Yale University, New Haven, Connecticut, November 24, 1995.

Chair, Symposium “Cardiovascular Aging from Molecules to Humans,” Gerontological Society of America Meeting, Los Angeles, California, November 16, 1995.

Chair, Session on Cardiac Apoptosis, American Heart Association, National Scientific Meeting, Anaheim, California, November 13-16, 1995.

Keynote Address, American Osteopathic Association Annual Research Conference, Orlando, Florida, October 16, 1995.

Lecture, “Cardiovascular Reserve during Aging in Healthy Humans,” 8th Mhnster International Arteriosclerosis Symposium, Aging and Cardiovascular Diseases, Mhnster, Germany, October 2-3, 1995.

Lecture, Washington University School of Medicine, St. Louis, Missouri, September 4, 1995.

Lecture, “Cardiovascular Aging in Health,” 14th Annual Symposium of Geriatrics and Gerontology, “Cardiovascular Disease in Older Persons,” St. Louis, Missouri, September 11, 1995.

Lecture, “Cardiac Biophysical, Biochemical and Molecular Changes with Aging,” Biochemistry and Molecular Biology of Aging, 23rd Meeting of the Federation of European Biochemical Societies, Basel, Switzerland, August 14, 1995.

Lecture, “Cardiovascular Aging,” Emerk Darmstadt, Germany, August 10-11, 1995.

Chair, Young Investigators’ Award Review Committee, XV World Congress of the International Society for Heart Research, Prague, Czech Republic, July 2-7, 1995.

Lecture, “ $\beta$ -Adrenoceptor Subtypes Couple to Different Signal Pathways in Cardiac Cells,” Cardiology Grand Rounds, Columbia University Medical Center, New York, New York, June 27, 1995.

Visiting Professor, 1995 British Heart Foundation, London, England, June 1-15, 1995.

Lecture, “ $\beta$ -Adrenoceptor Subtypes in Cardiac Ventricular Cells Couple to Different Signal Pathways,” Sendai International Symposium on Molecular and Cellular Mechanism of Cardiovascular Regulation, Sendai, Japan, May 10-12, 1995.

Co-Chair, Aging Symposium Session on “Mechanisms Responsible for Cardiovascular-Renal Adaptations to Aging: From Cells to Whole Animals,” at the Experimental Biology ’95 meetings, Atlanta, Georgia, April 9-13, 1995.

Speaker, “Collagen Expression During the Transition from LV Dysfunction to Heart Failure,” Session on Transition from Asymptomatic LV Dysfunction to Heart Failure at Heart Failure ’95: First International Meeting of the Task Force on Heart Failure, Amsterdam, The Netherlands, April 1-4, 1995.

Lecture, “Aging and Autonomic Nervous System,” 3rd International Congress on Hypertension in the Elderly, Rome, Italy, February 4, 1995.

Lectures, “cAMP-Independent Effects of  $\beta$ -Adrenergic Receptor Simulation on Cardiac Excitation-Contraction” and “Cardiovascular Aging in Health: A Time Bomb for Disease Risk,”



Cardiovascular Grand Rounds, University of Texas Medical School at Houston, Houston, Texas, January 5, 1995.

Speaker, “ $\beta$  Adrenergic deficits with Aging,” The Signal Transduction Workshop, Montecito, California, December 7-9, 1994.

Lecture, “The Aging Heart: Discriminating Disease from Aging,” Fifteenth Annual Meeting of the Southeastern Pharmacology Society (SEPS), Clearwater, Florida, October 1, 1994.

Speaker, “Cardiovascular Aging: Perspectives from Man to Molecules,” Pharmacologic Intervention in the Ageing Process, London, England, September 26, 1994.

Lecture, “Role of Free Radicals in the Cardiovascular with Ageing and Atherosclerosis--Clinical Aspects,” 15th Congress of the Society of Cardiology of the State of San Paulo, Ribeirao Preto, Sao Paulo, Brazil, June 2, 1994.

Lecture, “Cardiovascular Disease in the Elderly,” Workshop, Current Geriatric Cardiology Challenges, Ribeirao Preto, Sao Paulo, Brazil, June 1, 1994.

Speaker, “ $\beta$ -Adrenoceptor Subtype Stimulation Effects in Cardiac Cells,” International Conference on Heart Failure; Frontiers of Molecular, Cellular and Clinical Cardiology, Winnipeg, Manitoba, Canada, May 23, 1994.

Seminar, “Relaxation Mechanisms in Cardiac Cells,” Department of Physiology, University of North Texas Health Science Center, Fort Worth, Texas, May 13, 1994.

Lecture, “Regulation-Mediated Modulation of the Heart Beat,” Beijing University, Beijing, China, April 28, 1994.

Lecture, “Cardiovascular Aging in Health and Disease,” Tongji Medical University, Wuhan, China, April 22, 1994.

Lecture, “Cardiovascular Aging and Health and Disease,” Chunqin Medical University, Chunqin, China, April 21, 1994.

Lecture, “Receptor-Medicated Modulation of the Heart Beat,” Xian Medical University, Xian, China, April 18, 1994.

Lecture, “Cardiac Muscle Change in Hypertrophy and Aging,” Xian Medical University, Xian, China, April 17, 1994.

Lecture, “Cardiovascular Aging in Health and Disease,” Xiamen University, Xiamen, China, April 16, 1994.

Lecture, “Receptor-Medicated Modulation of the Heart Beat,” Hauqiao University of China, Quanzhou, China, April 15, 1994.

Lecture, “Receptor-Mediated Modulation of the Heart Beat,” Fujian Medical University, Zuzhou, China, April 13, 1994.

Lecture, “Cardiovascular Aging in Health and Disease,” Fujian Provincial Hospital, Zuzhou, China, April 12, 1994.

Lecture, "Cardiac Muscle Change in Hypertrophy and Aging," Fujian Provincial Research Institute for Cardiovascular Disease, Zuzhou, China, April 11, 1994.

Lecture, "Effects of Oxidative Stress (Free Radicals) on Excitable (Cardiac) Cells," First International Conference on Oxidative Stress and Aging, Kailua-Kona, Hawaii, March 23, 1994.

Lecture, "Effect of Aging on the Vasculature," American College of Cardiology Session, Disorders of Cardiovascular Aging, Atlanta, Georgia, March 17, 1994.

Lecture, "Cardiovascular Changes with Advancing Age," 11th Marquette Life Sciences Symposium, Biology of Aging, Milwaukee, Wisconsin, March 11, 1994.

Speaker, "Subtypes of Beta-Adrenergic Receptors Differ in their Modulation of Excitation-Contraction Coupling in Cardiac Cells," Second International Conference on Myocardial Function, Padova, Italy, February 3, 1994.

Speaker, 1994 Gordon Research Conference on the Biology of Aging, "Neuroendocrine Cardiac Communication Deteriorates During Aging," Casa Sirena, California, February 28, 1994.

Lecture, "The Aging Heart," 21st Annual Geriatrics Symposium: A Board Review, Cosponsored by the American Geriatrics Society and Gerontology Research Center, Baltimore, Maryland, January 24, 1994.

Lecture, "Cardiovascular Disease Risk Factors," Akron City Hospital, Akron, Ohio, January 7, 1994.

Lecture, "Differing Effects of Beta-Adrenergic Subtype Receptor Stimulation on the Heart," Physiology Department, Case Western Reserve University, Cleveland, Ohio, January 6, 1994.

Speaker, "The Circulatory Response to Exercise," Symposium--The Physiological Consequences of Aging," Kings College, London, England, December 15-17, 1993.

Lecture, "Interactions of Cardiac and Vascular Cells," University of Pennsylvania School of Medicine, Philadelphia, Pennsylvania, December 7, 1993.

Lectures, "Cardiovascular Aging in Health and Disease," and "Free Radical Effects on Myocardial Cells," VI International Symposium, Heart Institute, University of San Paulo, San Paulo, Brazil, October 21-23, 1993.

Lecture, "Different Effects of  $\beta_1$  and  $\beta_2$  Adrenergic Receptor Stimulation on E-C Coupling," University of Cincinnati, Cincinnati, Ohio, October 17-18, 1993.

Lecture, "Overview of Congestive Heart Failure in the Elderly--Is the difference in kind or complexity?" Mercy Heart Institute, Geriatric Cardiology Seminar III--Congestive Heart Failure in the Elderly, Pittsburgh, Pennsylvania, October 8, 1993.

Lecture, "Impact on Lifestyle Disease and Aging on the Geriatric Cardiovascular System," Cardio Forum: Trends in Cardiovascular Healthcare, Minneapolis, Minnesota, September 22, 1993.

Lecture, "Impact on Lifestyle Disease and Aging on the Geriatric Cardiovascular System," Cardio Forum: Trends in Cardiovascular Healthcare, Minneapolis, Minnesota, September 9, 1993.

Co-Chair, Session VII Excitation-Contraction Coupling in Normal and Failing Cardiac Muscle, presentation, "Calcium and Myofilament Regulation of Relaxation in Ventricular Myocytes," Scientific Conference on the Molecular Biology of the Normal, Hypertrophied, and Failing Heart, Asilomar Conference Center, Pacific Grove, California, August 4-8, 1993.

External Examiner for the PhD Thesis & Lecture, "Age Associated Changes in Heart Muscle," Faculty of Graduate Studies, University of Alberta, Edmonton, Alberta, Canada, July 26-28, 1993.

Lecture, "Impact on lifestyle, Disease and Aging on the Geriatric Cardiovascular System," Symposium Cardio Forum: Trends in Cardiovascular Healthcare, Baltimore, Maryland, July 24, 1993.

Lecture, "Impact on Lifestyle, Disease and Aging on the Geriatric Cardiovascular System," Symposium Cardio Forum: Trends in Cardiovascular Healthcare, Baltimore, Maryland, July 17, 1993.

Chairperson, Round Table, Blood Lipids and Cardiovascular Aging, presentation, "Aging of Cardiovascular System," XVth World Congress of Gerontology, sponsored by the International Association of Gerontology, Budapest, Hungary, July 4-9, 1993.

Co-Chair, APRIL Study Session - XVth World Congress of Gerontology, Budapest, Hungary, July 4-9, 1993.

Lecture, "Diminished Norepinephrine Augmentation of Calcium Current Cystolic  $[Ca^{2+}]$  and Contraction with Aging in Single Rat Ventricular Cells," Symposium, Pharmacology of Aging Process: Methods of Assessment and Potential Interventions, 5th Congress of International Association of Biomedical Gerontology (IABC), Budapest, Hungary, July 1-3, 1993.

Lecture, "Health Disease and Cardiovascular Aging," Natural Hospital of China, Beijing, China, June 22, 1993.

Seminar, "Health Disease and Cardiovascular Aging," Department of Pharmacology, Yamagata University School of Medicine, Yamagata, Japan, June 16, 1993.

Seminar, "Differing Effects of Stimulation of  $\beta$ -Adrenergic Regulation Subtypes in Heart Cells," Department of Medicine and Pathophysiology, Osaka University, Osaka, Japan, June 14, 1993.

Lecture, "Modulation of the Myofilament  $Ca^{2+}$  Response in Heart Cells," Symposium Drug Action on Intracellular Calcium and Cardiovascular Function, part of the 2nd Symposium, Calcium and Drug Action, Osaka, Japan, June 12, 1993

Lecture, "Treatment of Hypertension in the Older Individual," Program, Hypertension: Treating the High Risk Patient, American Medical Communications, Dallas, Texas, March 25, 1993.

Lecture, "Cardiovascular Function and Healthy Aging," 1993 VALIC Symposium on Research on Aging: Functional Capacity and Exercise Intervention, National Convention of the American

Alliance for Health, Physical Education, Recreation and Dance (AAHPERD), Washington, D.C., March 24, 1993.

Lecture, "A Communication Gap Between the Brain and Heart with Aging," NIA Seminar, National Youth Leadership Forum on Medicine, National Institute on Aging, Bethesda, Maryland, March 10, 1993.

Lecture, "Milestones and Medicine: The Elderly Hypertensive," Houston, Texas, February 15-16, 1993.

Lecture, "Mechanisms of Cardiac Relaxation: Perspectives from Studies in Single Cardiac Cells," International Symposium, Physiology of Diastole in Health and Disease, Palm Beach, Florida, January 29-31, 1993.

Lecture, "Novel Aspects of Neuropeptides Modulate Cardiac Function," Cardiovascular Division, Beth Israel Hospital, Boston, Massachusetts, December 17, 1992.

Lecture, "Systolic/Diastolic Dysfunction in Hypertension: Implications for Therapy," Symposium, The Heart in Hypertension (ASN/NKF), Twenty-fifth Annual Meeting of the American Society of Nephrology, Baltimore, Maryland, November 15, 1992.

Lecture, "Cardiovascular Changes in Advancing Age in Healthy Humans," New Perspectives in Hypertension in the Elderly during the American Geriatrics Society/American Federation for Aging Research Annual Scientific Meeting, Washington, D.C., November 14, 1992

Lecture, "Cardiovascular Aging in Health and Disease," 2nd Annual Dialogue Program of the American Academy of Family Physicians, San Diego, California, October 18, 1992.

Lecture, "Negative Feedback of Opioid Peptide Receptor Regulation on Beta-Adrenergic Effects in Heart Cells," 2nd International Symposium on the Mammalian Myocardium, Biochemical and Physiological Mechanisms Underlying the Heart Beat, University of Leeds, England July 26-29, 1992.

Lecture, "Pathophysiology of Heart Failure," Free-standing Symposium, Recent Advances in the Prevention and Treatment of Left Ventricular Dysfunction and Heart Failure, Sao Paulo, Brazil, July 18, 1992.

Organizer, Symposium, Excitation Contraction Coupling and Energetics in Experimental Myocardial Failure, International Society for Heart Research, Burlington, Vermont, June 17-20, 1992.

Discussion Leader, Excitation/Contraction Coupling II, presentation, "Mechanisms of Contraction and Relaxation in Single Heart Cells," Gordon Conference on Cardiac Regulatory Mechanisms, Plymouth State College, Plymouth, New Hampshire, June 9, 1992.

Vice-Chair, Gordon Conference on Cardiac Regulatory Mechanisms, Plymouth State College, Plymouth, New Hampshire, June 8-12, 1992.

Lecture, "Novel Perspectives of Cardiac Excitation-Contraction Coupling in Single Cardiac Cells," XIV World Congress of the International Society for Heart Research, Kobe, Japan, May 10-14, 1992.

Lecture, "Regulation of Relaxation in Myocardial Cells," Satellite Symposium, Osaka, Japan, May 8-9, 1992.

Lecture, "The Assessment of Diastolic Function," Fireside Panel, American College of Cardiology 41st Annual Scientific Session, Dallas, Texas, April 12-16, 1992.

Lecture, "Exercise and Cardiovascular Functioning," House Select Committee on Aging Briefing, Biology Aging Program, National Institute on Aging, Bethesda, Maryland, March 1, 1992.

Lecture, "Ventricular Function in Aging," program on Left Ventricular Hypertrophy: Epidemiology Mechanisms and Clinical Picture; Focus on the Effects of Aging, Monte Carlo, January 24, 1992.

Lecture, "Cardiovascular Aging: From a Social and Economic Reality to Recent Physiopathological Notes," Institut DeProduits DeSynthese Et D'Extraction Naturelle (IPSEN), Paris, France, January 18, 1992.

Chairman, Abstract Session on the Effect of Aging on the Heart; and presentation, "Cardiac Hypertrophy in the Elderly," at the American Heart Association Scientific Sessions, Anaheim, California, November 11-14, 1991.

Lecture, University of California, San Diego, Asilomar Conference on the Molecular and Cellular Biology of the Cardiac Myocyte, Asilomar, California, November 17-20, 1991.

Lecture, "Interaction Between Nutrition and Aging: Cardiovascular System Effects," Tokyo, Japan, October 26, 1991.

Lecture, "Physiology of the Aging Heart," Canadian Cardiovascular Society Symposium: Heart Disease in the Elderly, Calgary, Alberta, Canada, October 19, 1991.

Chairman, Symposium on "Mechanisms of Cardiovascular Aging," and presentation, "Biophysical, Biochemical and Molecular Changes in the Senescent Rat Heart," 21st Annual Meeting of the American Aging Association, Denver, Colorado, October 9-12, 1991.

Lecture, "Regulation of the Heart Beat in Health and Science," Bayview Campus-Wide Series, The Johns Hopkins General Clinical Research Center, Baltimore, Maryland, October 4, 1991.

Lecture, "Changes in Excitation-Contraction Mechanism with Development and Aging," Satellite Meeting of the XII Meeting of the European Section of the International Society for Heart Research "The Calcium Paradox: The First Quarter Century," Utrecht, The Netherlands, September 9-10, 1991.

Symposium, "Cardiovascular Changes in Advancing Age in Healthy Humans," Thirteenth Annual Conference on Geriatrics and Gerontology in Primary Care, Milton S. Hershey Medical Center, Hershey, Pennsylvania, August 16-17, 1991.

Lecture, "Health, Disease, and Cardiovascular Aging," Summer Institute in Research on Aging, National Institute on Aging, Warrenton, Virginia, July 6-13, 1991.

Lecture, "Biophysical, Biochemical and Molecular Changes in the Senescent Rat Heart," First International Congress on Biomarkers of Aging: Expression and Regulation, University of Bologna, Bologna, Italy, June 30 - July 1, 1991.

Lecture, "Cardiovascular Changes in Advancing Age in Healthy Humans," Chair of workshop on Cardiovascular Function, 4th International Association of Biomedical Gerontology, Ancona, Italy, June 26-29, 1991.

Lecture, "Myocardial Calcium-Myofilament Interaction During Relaxation and Diastole: Perspectives from Single Cardiac Cells," Osaka University Medical School, Osaka, Japan, June 6, 1991.

Lecture, "Excitation-Contraction Coupling Mechanisms in Cardiac Cells," IXth Meeting of the Japanese Section for the International Society for Heart Research, Hamamatsu, Japan, June 7-8, 1991.

Symposium, "Modifications in Post-Synaptic Beta-Adrenergic Response in the Myocardium with Aging," Mid-Atlantic Pharmacology Society, Philadelphia, Pennsylvania, May 14, 1991.

Symposium, "Cardiovascular Function in the Elderly: An Overview, of Cardiovascular Disease in the Elderly," Current Concepts in Pathophysiology, Evaluation and Management, 1991 AGS/AFAR Annual Scientific Meeting in Chicago, Illinois, May 9, 1991.

Chairman of the Faculty Panel Satellite Symposium, Treatment of Hypertension in the Elderly, presentation "Physiological Characteristics of Aging--Defining the Term 'Elderly'," Merck Sharp & Dohme, Atlanta, Georgia, March 2, 1991.

Lecture, " $\text{Ca}^{2+}$ -Myofilament Interaction During Relaxation and at Rest in Single Cardiac Myocytes," University of California, Los Angeles, Center for Health Sciences, Los Angeles, California, January 31, 1991.

Lecture, "The Aging Patient: Special Considerations in Their Evaluation: Medical Examination and Exercise Testing," University of Florida, Gainesville, Florida, January 28, 1991.

Lecture, "Cardiovascular Aging in Health and Disease," Desert Hospital, Palm Springs, California, January 11, 1991.

Lectures, "Myocardial Adaptations with Aging," and "Functional Sequelae of Spontaneous  $\text{Ca}^{2+}$  Release in the Heart," Northwestern University Medical School, Chicago, Illinois, December 18, 1990.

Lecture, "E-C Coupling in Ischemia, Hypoxia and Reoxygenation," Annual Meeting of The British Society for Cardiovascular Research, "Physiology and Pathophysiology of Excitation-Contraction Coupling," London, United Kingdom, December 6-7, 1990.

Co-Chair, Abstract Session, "Mechanisms of Cardiac Contractility," 63rd Scientific Sessions of the American Heart Association, Dallas, Texas, November 13-14, 1990.

Colloquium, "Aging of the Heart," Symposium on "Ageing and the Cardiovascular System," Istituto Scientifico Roussel, Italy; Rome, Italy, October 25-26, 1990.

Seminar, New Seminar Series on Aging, The Medical College of Pennsylvania, Philadelphia, Pennsylvania, October 17, 1990.

Lecture, "Cytosolic Calcium, Contraction and Membrane Current Measured Simultaneously in Single Cardiac Myocytes," Polish Physiological Society, XVIII Congress, Krakow, Poland, September 20-22, 1990.

Lecture, Symposium, "Myocardial Optimization and Efficiency," International Institute for Theoretical Cardiology, Graz, Austria, September 14, 1990.

Lecture, "The Effect of Ace-Inhibitors on Diastolic Function," Merck Sharpe & Dohme, Free-Standing Symposium on Renitec for Latin America, Mexico City, Mexico, July 28, 1990.

Seminar, "Physiologic and Pathophysiologic  $Ca^{2+}$  Release in the Heart," Glaxo Research Labs, Research Triangle Park, North Carolina, July 23, 1990.

Lecture, "Similarities between Myocardial Alterations in Aging and Hypertension," Institute of Gerontology, University of Michigan, Ann Arbor, Michigan, May 30, 1990.

Lecture, "Health, Disease and Cardiovascular Aging," Institute of Gerontology, University of Michigan, Ann Arbor, Michigan, May 29, 1990.

Lecture, "Calcium Regulation in Cardiac Cells," Eisai Co., Ltd., Tokyo, Japan, April 20, 1990.

Lecture, "Determinants of Relaxation (Calcium, Myofilament  $Ca^{2+}$  Sensitivity and External Mechanical Load) in Cardiac Cells," Osaka University Hospital, Osaka, Japan, April 19, 1990.

Lecture, "Mechanisms of Physiologic and Pathophysiologic Excitation-Calcium-Contraction Coupling in Cardiac Cells," Fujisawa Pharmaceutical Co., Ltd., Osaka, Japan, April 18, 1990.

Lecture, "CaOS in the Ventricular Myocyte," Toyama Medical & Pharmaceutical University, Toyama, Japan, April 17, 1990.

Lecture, "Determinants of Relaxation (Calcium, Myofilament  $Ca^{2+}$  Sensitivity and External Mechanical Load) in Cardiac Cells," Yamagata University School of Medicine, Yamagata, Japan, April 16, 1990.

Lecture, "Myocardial Aging: Perspectives from Man to Cells to Molecules," Sendai Forum on Cardiology, Tohoku University School of Medicine, Sendai, Japan, April 14, 1990.

"Workshop on Left Ventricular Dysfunction," Merck & Co. Inc., Rahway, New Jersey, March 23, 1990.

Lecture, "Regulation of Cardiac Muscle Function in the Hypertensive Heart," Symposium Cellular and Molecular Mechanisms of Hypertension, Bockus Research Institute, The Graduate Hospital, Philadelphia, Pennsylvania, November 1-2, 1989.

Lecture, "Arterial Hypertension and Aging Effects on the Heart," Colloquium, Basic and Clinical Interactions in Hypertensive Heart, Villeneuve-lez Avignon, France, October 5, 1989.

Invited Discussant, Symposium, Cardiac Excitation and Contraction: From Molecular Biology to Clinical Application, Homburg, Germany, September 18-21, 1989.

Lecture, "Cardiac Dysfunction in the Aged Heart," Symposium, Heart Failure and Diastolic Dysfunction: New Insights," XI Congress of the European Society for Cardiology, Nice, France, September 13, 1989.

Lecture, "Altered Contractile and Biochemical Responses to Beta-adrenergic Stimulation in Cardiac Muscles and Myocytes from Aged Rats," Symposium on Basic Research on Hypertensive Hearts, European Section of the Society for Cardiac Research and INSERM, Jouy-en-Josas, France, July 17, 1989.

Colloquium, "Function of Single Myocytes," American College of Sports and Medicine, Baltimore, Maryland, June 1, 1989.

Lecture, "Effects of Exercise on the Aging Cardiovascular System," Symposium, Exercise and Aging, American College of Sports and Medicine, Baltimore, Maryland, May 31, 1989.

Co-Chairman, Energetics and Myocardial Ionic Homeostasis, Satellite Meeting of the American Physiological Society, Baltimore, Maryland, May 11-13, 1989.

Lecture, "Health, Disease in Cardiovascular Aging," Symposium Special Considerations in the Treatment of Cardiovascular Disease in the Elderly, American Geriatric Society, Boston, Massachusetts, May 11, 1989.

Lecture, "Aging and Cardiovascular Disease," Plenary Session, The Challenge of Health Care in the Aged, Pharmaceutical Manufacturers Association Joint Program: Research and Development and Medical Section, Laguna Beach, California, April 10, 1989.

Lecture, "Effects of Aging on the Cardiovascular System," Cardiovascular Physiology, Spring 1989 Course, Department of Physiology, University of Maryland School of Medicine, Baltimore, Maryland, March 31, 1989.

Lecture, "Heart Failure," Cardiovascular Physiology, Spring 1989 Course, Department of Physiology, University of Maryland School of Medicine, Baltimore, Maryland, March 30, 1989.

Lecture, "Excitation-Contraction Coupling Properties of Heart Cells," Department of Pharmacology, Strong Memorial Hospital, University of Rochester, Rochester, New York, March 2, 1989.

Lecture, "Basic Mechanisms of Normal and Abnormal Heart Beats," Cardiology Division, Department of Medicine, Strong Memorial Hospital, University of Rochester, Rochester, New York, March 1, 1989.

Lecture, "Aging Myocardium," Annual Johns Hopkins/Mason F. Lord Continuing Medical Education in Geriatrics for 1989, Baltimore, Maryland, February 3, 1989.

Seminar, Stetten Research Seminar, Stone House, National Institutes of Health, Bethesda, Maryland, January 27, 1989.

Lecture, Clinical Liaison Team of the National Academy of Sciences for the Establishment of a National Research Agenda on Aging, Wake Forest University, Winston-Salem, North Carolina, January 6-7, 1989.



Lecture, "Aging Heart: Clinical Aspects," Office of Continuing Medical Education of Howard University College of Medicine Seminar: Management of the Geriatric Patient, Washington, D.C., December 1, 1988.

Seminar, "Advances in Understanding Cardiovascular Disease in the Elderly," Annual Scientific Meeting of the Gerontological Society of America, San Francisco, California, November 20, 1988.

Lecture, "Hypertension and Congestive Heart Failure in the Elderly," Loyola University of Chicago, Stritch School of Medicine Division of Continuing Medical Education and Section of Geriatric Services, and Resurrection Medical Center Symposium: Current Topics in Geriatric Medicine, Chicago, Illinois, November 9, 1988.

Lecture, "Age-Associated Changes in Cardiovascular Function," Breeders' Cup Symposium, Louisville, Kentucky, November 4, 1988.

Lecture, " $\text{Na}^+$ - $\text{Ca}^{2+}$  Exchange, Sarcolemmal  $\text{Ca}^{2+}$  Fluxes, Excitation-Contraction Coupling," Departmental Seminars on Cell Physiology, Jefferson Medical College of Thomas Jefferson University, Philadelphia, Pennsylvania, November 1, 1988.

Lecture, "Health, Disease and Cardiovascular Aging," Medical Grand Rounds, Minneapolis VA Medical Center, Minneapolis, Minnesota, October 28, 1988.

Lecture, "Myths and Realities of Cardiovascular Aging," Clinical Center Grand Rounds, Bethesda, Maryland, October 26, 1988.

Seminar, "Are Cardiovascular Structure and Function Decremental or Adaptive?" Biology Department, Syracuse University, Syracuse, New York, October 13, 1988.

Chairman, Symposium, Age-related Changes in Adrenergic Control of the Cardiovascular System, presentation, "Excitation-Contraction Alterations in Cardiac Muscle that Occur in Senescence," Canadian Physiology Society, Montreal, Quebec, Canada, October 11, 1988.

Lecture, "Age Associated Adaptations in Cardiovascular Structure and Function," Symposium, Changes in Organ System with Aging, Montreal, Quebec, Canada, October 11, 1988.

Seminar, "Functional Implications of Spontaneous Diastolic Sarcoplasmic Reticulum Calcium Release in Heart," Merck Sharp and Dohme Research Laboratories, West Point, Pennsylvania, October 6, 1988.

Senior Discussant, IX Meeting of the European Section of the International Society for Heart Research, Oxford, United Kingdom, September 15-18, 1988.

Lecture, "The Effects of Exercise on the Aging Heart," Third Annual Gerontology Seminar, Geriatrics Comes of Age, Branson, Missouri, August 21, 1988.

Lecture, "Health, Disease and Cardiovascular Aging," Summer Institute in Research on Aging, Warrenton, Virginia, July 18-19, 1988.

Lecture, "Age Associated Changes in the Efficacy of  $\beta$ -Adrenergic Modulation of Cardiovascular Function," 1st International Congress, Aging and Pathology of the Autonomic Nervous System, Room, Italy, June 16-18, 1988.

Lecture, "The Regulation of Blood Pressure in Older People," 45th Annual Meeting of the American Geriatrics Society, Anaheim, California, May 22, 1988.

Lecture, "Cardiovascular Aging--Myths and Realities," Continuing Medical Education Symposium on Management of the Institutionalized Elderly, Medical Society of the County of Kings and the Academy of Medicine of Brooklyn, Inc., Brooklyn, New York, May 15, 1988.

Seminar, "Heart Failure Can Result from a Rebellion of Cardiac Myocytes," Department of Physiology, Ohio State University, Columbus, Ohio, April 27, 1988.

Seminar, "Health, Disease and Cardiovascular Aging," Lankenau Medical Research Center and the Center for the Study of Aging of the University of Pennsylvania, Symposium on Aging, Philadelphia, Pennsylvania, March 19, 1988.

Lecture, "Disease, Lifestyle, and Cardiovascular Aging," West Penn and Wintage Geriatric Care Program, Third Annual Forum in Geriatric Care, Pittsburgh, Pennsylvania, March 4, 1988.

Seminar, "Ageless Limits in Cardiovascular Systems," Annual Meeting of the American Physical Therapy Association Session on Geriatrics, Washington, D.C., February 11, 1988.

Lecture, "Health, Disease and Cardiovascular Aging," Guest Faculty Member, University of California 1988 Intensive Course in Geriatric Medicine and Board Review, Los Angeles, California, January 22, 1988.

Seminar, "Aging Effects on the Heart and the Effect of Exercise," Center of Aging, University of Kansas Medical Center, Kansas City, Kansas, December 16, 1987.

Lecture, "Myocardial Function," 15th Annual Mason F. Lord Symposium and Geriatric Medicine and Board Review Course, Annapolis, Maryland, December 12, 1987.

Lecture, "Alterations of the Cardiovascular Response to Exercise in Advancing Age," Annual Scientific Meeting of the American Heart Association, Connecticut Affiliate, University of Connecticut School of Medicine, Farmington, Connecticut, December 2, 1987.

Seminar, "Spontaneous Calcium Release: A Rebellion of Cardiac Myocytes," Molecular Cardiology Seminar Series, Division of Cardiovascular Disease, University of Alabama, Birmingham, Alabama, December 1, 1987.

Lectures, "Myths and Realities of Cardiovascular Aging and Excitation -Contraction Coupling Alterations in Cardiac Muscle with Aging," Department of Physiology, Louisiana State University Medical Center Lecture Series "The Role of Exercise in Health Maintenance," New Orleans, Louisiana, November 19-20, 1987.

Lecture, "Aging of the Cardiovascular System--Physiologic Considerations," Symposium, "Cardiovascular Disease in the Elderly," Plenary Session VI of the American Heart Association's 60th Annual Scientific Sessions, Anaheim, California, November 16, 1987.

Seminar, "Changes in Excitation-Contraction Coupling Mechanisms in Cardiac Muscle with Senescence," Harvard Medical School, Division of Aging Physician Scientist Program Seminar Series, Boston, Massachusetts, November 4, 1987.

Lecture, "A Rebellion of Myocytes Leads to Myocardial Dysfunction," Colloquium in Physiology, University of Pittsburgh, Pittsburgh, Pennsylvania, October 28, 1987.

Lecture, "Similar Effects of Aging Hypertension on Cardiac Muscle Function," XI National Cardiological Congress, Ancona, Italy, October 12-14, 1987.

Lecture, "Mechanisms of Excitation-Contraction Coupling in the Heart," Department of Physiology, University of Cologne, Koln, West Germany, July 27, 1987.

Lecture, "Functional Implications of Ca<sup>2+</sup> Release in the Heart," Department of Biology, University of Turku, Turku, Finland, July 20, 1987.

Lecture, "Changes in Cardiac Muscle with Senescence," 2nd International Congress of Biomedical Gerontology, Hamburg, West Germany, July 15-17, 1987.

Lecture, Lilly Research Laboratories Cardiovascular Task Force, Indianapolis, Indiana, June 11-12, 1987.

Lecture, "Functional Sequelae of Spontaneous Diastolic Sarcoplasmic Reticulum Calcium Release," VIIth International Washington Spring Symposium "Cell Calcium Metabolism '87," Washington, D.C., May 21, 1987.

Lecture, "The Heart in the Aging Process," National AAPHARD Meeting Seminar "Cardiac and Skeletal Muscle Changes in Older Adult," Las Vegas, Nevada, April 15, 1987.

Lecture, "Cardiovascular Aging in Health and Disease and Autonomic Modulation of Cardiovascular Function with Aging," Second Annual Geriatric Medicine Seminar, Louisville, Kentucky, April 2, 1987.

Invited Lecture, "Cardiovascular Function in Human Aging," International Symposium, The Cardiovascular System in the Elderly: Normal and Clinical Problems," Montreux, Switzerland, March 30, 1987.

Lecture, "Myths and Realities of Cardiovascular Aging," American Heart Association Council on Epidemiology Session, "Cardiovascular Disease in the Elderly," jointly sponsored by AHA, NHLBI and NIA, Charleston, South Carolina, March 21, 1987.

Lecture, "Altered Cardiovascular Physiology," American College of Cardiology's Core Curriculum Session, "Cardiovascular Disease in the Elderly," New Orleans, Louisiana, March 9, 1987.

Seminar, "Calcium and Cardiovascular Function," Scientific Session: Age Related Changes in Calcium Function, First Joint Symposium of the Tokyo Metropolitan Institute of Gerontology and the National Institute on Aging, Tokyo, Japan, February 18-20, 1987.

Lecture, "Why Be Concerned About Spontaneous Sarcoplasmic Reticulum Calcium Release?" Cardioprotection Workshop, San Ysidro Ranch, Montecito, California, January 16, 1987.

Lecture, International Conference on "Hypertension in the Elderly," Orlando, Florida, December 10-12, 1986.

Symposium, "Inotropism," Institut Scientifique Roussel, Paris, France, December 4-5, 1986.

Lecture, "Myths and Realities of Cardiovascular Aging," in a series on "The Elderly - A Generation at Risk," Timken Mercy Medical Center, Canton, Ohio, October 22, 1986.

Seminar, "Realities and Myths of Cardiovascular Aging," Geriatric Medicine CME Course, Hennepin County Medical Center, Minneapolis, Minnesota, October 17, 1986.

Lecture, "Age-Related Physiologic Changes in the Cardiovascular System," Symposium on Managing Cardiovascular Disease in the Elderly, Post-Convention Program of the American Academy of Family Physicians, New York, New York, October 3, 1986.

Lecture, "Vascular Etiology of Disturbed Behavior in the Elderly," Continuing Medical Course at the 38th Annual American Academy of Family Physicians Convention, Washington, D.C., September 29, 1986.

Lecture, "Aging of the Cardiovascular System," Department of Medicine, Bowman Gray School of Medicine, Wake Forest University, Winston-Salem, North Carolina, September 25, 1986.

Lecture, "Functional Implications of Spontaneous  $Ca^{2+}$  Release in Diastole," International Symposium, "The Physiology of Diastole in Health and Disease," Sponsored by Harvard Medical School, Department of Medicine, Beth Israel Hospital, Cambridge, Massachusetts, September 12-14, 1986.

Lecture, "Cardiovascular Considerations in Exercise Programs for the Elderly," Conference on Nutrition and Aging II: Health Promotion and Disease Prevention in the Elderly, Little Rock, Arkansas, September 11, 1986.

Lecture, "How Hypertension Mimics the Effect of Age on the Myocardium," Symposium on Management of Hypertension and Heart Disease in Older Patients, Johns Hopkins University School of Medicine, Baltimore, Maryland, June 4, 1986.

Lecture, "Myths and Realities of Cardiovascular Aging," Symposium on Aging, Pennsylvania State Gerontology Center and College of Medicine, Hershey Pennsylvania, May 15, 1986.

Bethesda Conference No. 18 on Cardiovascular Disease in the Elderly, Bethesda, Maryland, May 8-10, 1986

Lecture, "Cardiovascular Aging," Fitness and Aging Seminar, Wayne State University, Detroit, Michigan, May 7, 1986.

Seminar, "Realities and Myths of Cardiovascular Aging," Cardiology Conference, Sinai Hospital of Detroit, Detroit, Michigan, April 23, 1986.

Lecture, "Effects of Exercise-Training on the Aged Cardiovascular System - Studies on Rats," The American Physiological Society Symposium, Aging and Exercise: Physiological Interactions, 70th Annual Meeting of the Federation of American Societies for Experimental Biology, April 13-18, 1986.

Seminar, "Cardiovascular Physiology in Elderly Subjects," Annual Meeting of the Association of University Anesthetists, Gainesville, Florida, April 5, 1986.

Symposium, The Developing Adult and Aging Heart, International Society for Heart Research, XII Congress, Melbourne, Australia, February 9-13, 1986.

Seminar, "Evidence for Altered Adrenergic Modulation of Cardiovascular Function with Advancing Age," Department of Biomedical Engineering, Biomedical Engineering Cardiovascular Group, Johns Hopkins University School of Medicine, January 10, 1986.

Seminar, "The Function of the Left Ventricle and Aging," Journal Club, Department of Medicine and Medical Physiology, University of Calgary, Calgary, Alberta, Canada, December 5, 1985.

Visiting Lecture, "The Functional Significance of Spontaneous Diastolic Calcium Release in the Myocardium," Alberta Heritage Foundation for Medical Research, University of Calgary, Calgary, Alberta, Canada, December 4, 1985.

Lecture, "Cardiac Drugs in Heart Failure," Interdisciplinary Team Conference, Oregon Health Sciences University, Portland, Oregon, December 3, 1985.

Lecture, "Cardiology of the Elderly," Symposium on Geriatric Medicine, Dewitt Army Community Hospital, Fort Belvoir, Virginia, November 1, 1985.

Seminar, "Spontaneous Ca Release in Cardiac Preparations," Merck Institute for Therapeutic Research, Rahway, New Jersey, October 30, 1985.

Working Conference on the "Recognition and Management of Coronary Heart Disease in the Elderly," Bethesda, Maryland, September 4-6, 1985.

Co-Chair Symposium, "Aging and the Heart," XIIIth International Congress of Gerontology, New York City, New York, July 12-17, 1985.

Richard S. Ross 25th Anniversary Symposium, June 13, 1985.

Lecture, "New Perspectives of Adaptations to Exercise in Healthy Elderly Subjects," Second Acta Medica Scandinavica Symposium on Physical Activity in Health and Disease, Gothenburg, Sweden, June 10-12, 1985.

Lecture, "Spontaneous Ca<sup>2+</sup> Release in Mammalian Hearts," Department of Clinical Pharmacology, Thomas Jefferson University Hospital, Philadelphia, Pennsylvania, June 6, 1985.

Symposium, "Heart and Coronary Vessels in Hypertension," Cleveland Clinic Foundation, Cleveland, Ohio, May 17-19, 1985.

Lecture, "The Aging Cardiovascular System," Symposium, Aging and the Lung, American Thoracic Society, Clinical Problems Assembly, Anaheim, California, May 15, 1985.

Lecture, "The Aging Heart," Second Annual Symposium on Aging and Health, Atlanta, Georgia, May 9-10, 1985.

Science Advisor, Boston University School of Medicine, Hypertension Faculty Meeting, Puerto Vallarta, Mexico, May 2-5, 1985.

Seminar, "Spontaneous Ca<sup>2+</sup> Release in Myocardial Cells and Muscle," Roche Institute of Molecular Biology, Nutley, New Jersey, April 16, 1985.

Lecture, "What Effect Does Aging Have on the Cardiovascular System?" Postgraduate Workshop Minicourse, Geriatric Medicine: From Bench to Bed, American College of Physicians, Washington, D.C., March 28, 1985.

Lecture, "Aging of the Cardiovascular System," 26th Annual New Jersey Postgraduate Anesthesia Seminar, Cherry Hill, New Jersey, March 24, 1985.

Lecture, "Cardiovascular Function in the Aging Patient," Mini-Course, Geriatric Cardiology -- Use of Cardiovascular Drugs in the Elderly, 34th Annual Scientific Session of the American College of Cardiology, Anaheim, California, March 10-14, 1985.

Lecture, "Prevalence of Coronary Artery Disease in Autopsy Studies and Living Populations," Workshop, Biobehavioral Determinants of Coronary Artery Disease, Duke University, Durham, North Carolina, February 21-23, 1985.

Lecture, "The Aging Heart," American Heart Association's Twelfth Science Writers Forum, Monterey, California, January 13-16, 1985.

Post Graduate Seminar, "Aging and Heart Disease," American Heart Association, Council on Clinical Cardiology, Miami Beach, Florida, November 11, 1984.

Workshop, "Research Needs in Blood Pressure Regulation and Aging," National Heart, Lung, and Blood Institute and National Institute on Aging co-sponsors, Bethesda, Maryland, September 19-20, 1984.

Symposium, Scientific Meeting of the American Session of the International Society for Heart Research, Oklahoma City, Oklahoma, September 13-15, 1984.

Workshop, "Physiologists' Approach to Age-Dependent Changes in Function," 35th Annual Fall Meeting of the American Physiology Society, University of Kentucky, August 29-31, 1984.

Symposium, "Ryanodine: A Probe of Sarcoplasmic Reticular Function in Striated Muscle," American Society for Pharmacology and Experimental Therapeutics (ASPET) First Fall Meetings, Indianapolis, Indiana, August 21, 1984.

Lecture, "Ion Regulation in the Heart," Meeting of the American Association of Colleges of Pharmacy, Baltimore, Maryland, July 29, 1984.

NATO Workshop on the Biology of Aging, Aquafredda di Maratea, Italy, July 8-14, 1984.

Symposium, "Fundamental Defects in Energy Metabolism," Cardiology, Department of Medicine, The Johns Hopkins Medical Institutions, Tidewater Inn, Easton, Maryland, June 20-23, 1984.

Seminar, "Evidence for Altered Beta-adrenergic Modulation of the Cardiovascular System with Adult Aging," Division of Cardiology, University of Connecticut Health Center, Farmington, Connecticut, May 22, 1984.

Association of American Medical Colleges Visiting Lectureship in Geriatrics and Gerontology, Medical College of Georgia, Augusta, Georgia, May 16-17, 1984.

“Basic Science” Lecture, “Aging and the Cardiovascular System,” Annual Meeting of the Society of Cardiovascular Anesthesiologists, Boston, Massachusetts, May 7, 1984.

Lecture, “Health, Disease and the Aging Cardiovascular System,” American College of Physician's Course on Common Clinical Challenges in the Elderly, Philadelphia Geriatric Center, Philadelphia, Pennsylvania, May 4, 1984.

Panel Discussion, “Age Associated Changes in Cardiac Function in Response to Disease,” 65th Annual Session of the American College of Physicians, Atlanta, Georgia, April 29, 1984.

Seminar, “The Contractile State of Relaxed Myocardium,” Department of Physiology, Yale University, New Haven, Connecticut, April 12, 1984.

Visiting Lecture, “Starling's Law of the Heart,” Reactivated, Cardiovascular Research Conference, Boston University Medical Center, Boston, Massachusetts, April 2, 1984.

CME Program, Grand Rounds, “Myths and Realities of Cardiovascular Aging,” Holy Cross Hospital, Silver Spring, Maryland, March 20, 1984.

Seminar, “Myths and Realities of the Aging Heart,” University of Michigan Biomedical Research Council Research Forum, Ann Arbor, Michigan, March 10, 1984.

Seminar, “Myths and Realities of Cardiovascular Aging,” Cardiovascular Meeting of the Cleveland Clinic Foundation, Tucson, Arizona, February 16-17, 1984.

Annual Cardiac Symposium, “Geriatric Cardiology,” British Columbia Heart Foundation, Vancouver, British Columbia, February 10, 1984.

Symposium, “Aging and Altered Cardiovascular Function,” 56th Scientific Sessions of the American Heart Association, Anaheim, California, November 13-17, 1983.

Ochsner Medical Foundation Symposium, “The Heart and Antihypertensive Therapy,” Anaheim, California, November 13, 1983.

3rd Annual Texas Tech Symposium, “Interfaces in Physiology,” Texas Tech University, Lubbock, Texas, November 3-4, 1983.

Seminar, “Age Related Alterations in Myocardial Excitation-Contraction Coupling,” Department of Physiology, The University of Texas Health Science Center, San Antonio, Texas, November 1, 1983.

Lecture, “How the Heart Ages,” Workshop on Geriatric Care, John L. Deaton Medical Center, Baltimore, Maryland, October 29, 1983.

Annual Clinical Gerontology Lectures, “Senescent Heart in Health and Disease,” 13th Annual Meeting of the American Aging Association, Washington, D.C., October 8, 1983.

Symposium, “Heart Failure,” Scientific Meeting of the American Section of the International Society for Heart Research, Hilton Head Island, South Carolina, September 21-24, 1983.

Symposium, "Drugs and Aging," Medical Chemical Section of the American Chemical Society National Meeting, Washington, D.C., August 31, 1983.

Discussion, "Health, Disease and the Cardiovascular System," National Academy of Sciences Committee on an Aging Society, Washington, DC, July 18-20, 1983.

Lecture, "Starling's Law of the Heart: Reactivated," Department of Physiology, Texas College of Osteopathic Medicine, Camp Bowie at Montgomery, Fort Worth, Texas, April 22, 1983.

"Intensive Course in Geriatric Medicine," American College of Physicians, Santa Monica, California, January 15-23, 1983.

Symposium, "Age and the Heart," 35th Annual Scientific Meeting of the Gerontological Society, Boston, Massachusetts, November 21, 1982.

Seminar, "Spontaneous  $\text{Ca}^{2+}$  Oscillations in Intact Cardiac Muscle," Department of Physiology, Temple University, Philadelphia, Pennsylvania, November 10, 1982.

Lecture, "Cardiology and Aging," Fifth International Workshop on Experimental Gerontology, University Erlanger-Nurnberg, Nurnberg, West Germany, October 20-22, 1982.

Lecture, "The Contractile State of 'Relaxed' Myocardium," Cardiothoracic Institute, London, England, October 14, 1982.

"Workshop on Calcium Antagonists," Cannes, France, October 11, 1982.

Lecture, "Laser Spectroscopy Detects Spontaneous  $\text{Ca}^{2+}$  Oscillations in Mammalian Cardiac Muscle," Laboratoire De Physiologie Cellulaire Cardiaque, Universite de Paris, INSERM, Orsay, France, October 8, 1982.

III International Erwin Riesch Symposium, "Cardiac Adaptation to Hemodynamic Overload, Training and Stress," Tubingen University, Tubingen, West Germany, September 19-22, 1982.

Lecture, "Aging of the Cardiovascular System," Washington University Medical Center, St. Louis, Missouri, June 17, 1982.

Symposium, "The Exercise Response of the Aged Cardiovascular System," Annual Meeting of the American College of Sports and Medicine, Minneapolis, Minnesota, May 27, 1982.

1981-1982 CME Lecture Series, "Clinical Update on Aging and Disease," the Fifth Annual Continuing Medical Education Lecture Series of the Montgomery County Medical Society, Gaithersburg, Maryland, April 20, 1982.

Gordon Conference (Invited Speaker), "Biology of Aging," Ventura, California, February 15-19, 1982.

Seminar, "Laser Spectroscopic Studies of Diastolic Cardiac Muscle: Implications Regarding Diastolic Tone and Systolic Function," Physiology-Pharmacology and Bioengineering Departments, University of California, San Diego, California, February 12, 1982.

Lecture, "Age-Related Modifications of the Cardiovascular Response to Adrenergic Stimulation," Texas College of Osteopathic Medicine, Camp Bowie at Montgomery, Fort Worth, Texas, January 13, 1982.



Lecture, "Biochemical and Physiological Aging of the Adult Myocardium," North Texas State University, Fort Worth, Texas, January 13, 1982.

Lecture, "Laser Spectroscopic Studies of Diastolic Cardiac Muscle: Implications Regarding Diastolic Tone and Systolic Function," University of Texas Health Science Center at Dallas, Dallas, Texas, January 12, 1982.

Chairman, Symposium, "Cardiovascular System," XII International Congress of Gerontology, Homburg, West Germany, July 12-17, 1981.

Seminar, Department of Pharmacology, University of Kiel, Kiel, West Germany, June 9, 1981.

Conference, "Non-Lethal Biological Markers of Aging," National Institute on Aging, National Institutes of Health, Bethesda, Maryland, June 20, 1981.

Symposium, "Biology of Myocardial Hypertrophy and Failure - Mechanics I," Annual Meeting of the International Society for Heart Research - American Section, University of Vermont, Burlington, Vermont, June 18, 1981.

Symposium, "Drugs and the Elderly," Pharmaceutical Manufacturers Association of Canada, Medical R and D Section, Spring '81 International Symposium, Montreal, Quebec, Canada, May 4-5, 1981.

Seminar, "Modification of the Cardiovascular Response to Stress in Advance Age," Research Seminar Series in Geriatric Medicine, co-sponsored by the Institute on Aging and the Medical School Department of Medicine, Metabolism Section, Temple University, Philadelphia, Pennsylvania, March 24, 1981.

Seminar, "Aging of the Cardiovascular System," Eisenhower Medical Research and Education Center, Rancho Mirage, California, October 31, 1980.

Symposium, "Research in Geriatrics," 3rd Inter-University Conference on Geriatric Education of the American Geriatric Society, Chicago, Illinois, April 18, 1980.

Course, "Aging in Man, Understanding the Interplay of Physiology and Disease," Winter Scientific Meeting of the American Medical Association, San Antonio, Texas, January 12-15, 1980.

Symposium, "Biology of Aging," 30th Fall Meeting of the American Physiology Society, New Orleans, Louisiana, October 15-19, 1979.

Seminar, Department of Physiology, Medical College of Wisconsin, Milwaukee, Wisconsin, October 5, 1979.

Symposium, "Maturation and Aging of the Heart," 2nd Meeting of the American Section of the International Society for Heart Research, Ottawa, Ontario, Canada, May 11-19, 1979.

Symposium, "Muscle Function and Aging," 31st Annual Meeting of the Gerontological Society, Dallas Texas, November 16-20, 1978.

Symposium, "Cerebral Manifestations of Episodic Cardiac Dysrhythmias," Miami, Florida, June 19-30, 1978.

Symposium, "Systems Physiology and Aging," 62nd Annual Meeting of the Federation of American Societies for Experimental Biology, Atlantic City, New Jersey, April 9-14, 1978.

Symposium, "Pharmacological Interventions of the Aging Process," 2nd Philadelphia Symposium on Aging, Philadelphia, Pennsylvania, May 26-28, 1977.

Symposium, "Explorations in Aging," 1st Philadelphia Symposium on Aging, Philadelphia, Pennsylvania, September 30-October 2, 1974.

Professional Activities:

Guest Editor, JMCC Perspectives on Cardiovascular Aging: Top to Bottom June 2015

Consulting Editor, *Dialogues in Cardiovascular Medicine*, 2003-

Guest Editor, *Journal of Applied Physiology*, Highlighted Topic on Arterial Aging, October 2008

Guest Editor, *Journal of the European Society of Cardiology* Spotlight Issue on Cardiovascular Research, May 2005

Associate Editor, *Journal of Molecular and Cellular Cardiology*,

Editorial Boards--*Journal of Gerontology*, *Journal of Molecular and Cellular Cardiology*, *Cardioscience*, *Current Problems in Geriatrics*, *Journal of Cardiovascular Electrophysiology*, *Circulation*, *Cell Calcium*, *The American Journal of Geriatric Cardiology*, *Arterial'naya Gipertenziya - The Arterial Hypertension*

Consulting Editor, *Cardiovascular Research*, 1983-1999

Editor for Clinical Sciences, *Experimental Aging Research*, 1982-1989

Council Member International Society for Heart Research, 1995-2002

American Heart Association - Task Force for the Application of the AHA Mission to the Elderly, 1989-1990; 1990-1991

American Heart Association, Cardiovascular B - Research Study Committee, 1987-1989

Member NIH Ad Hoc Study Section on Animal Model for the Study of Pathogenesis of Specific Heart Muscle Disease, 1981

Ad Hoc Grant Proposal Reviews and Site Visit Committees - Veterans Administration and National Science Foundation

### **NIA-IRP Internal Committees:**

Chairman, Search Committee for Director, Laboratory of Biological Chemistry, GRC

Chairman, Search Committee for NIA Clinical Director

Chairman, NIA Technology Transfer Committee

Chairman, NIA Committee for Recruitment of Women and Minorities, 1993

Chairman, NIA Intramural Promotions and Tenure Review Committee, 1989-1991, 2010

Search Committee for Director of NIA Intramural Program, 1988

Search Committee for Director of the National Heart, Lung, and Blood Institute, 1981

### **Service on Advisory Boards:**

#### **Patents held:**

Anti-Marinobufagenin Antibodies and Methods for Their Use; Bagrov, Fedorova, Lakatta, Simibirtsev, Kotov, Kolodkin; U.S. Patent No. 8,038,997. Issued: October 18, 2011.

Nucleic acid modules for expression and tagging of membrane proteins and methods of use; Lin, Pang, Wei, Lakatta; U.S. Patent No. 8,501,925. Issued: August 6, 2013.

Method for the Diagnosis of Age-Associated Vascular Disorders; Wang M., Fu, Lakatta, Van Eyk; European Patent No. EP2399131. Issued: August 2, 2014.

Milk Fat Globule Epidermal Growth Factor VIII (MFG-E8) and Other Secreted Proteins Increase Markedly with Aging in Rats, Non-human Primates, and Human Arteries and modulate Arterial Aging and the ....; Van Eyk, Lakatta, Fu, Wang; U.S. Patent Application 2010/024816. Status: Chapter 1.

Design and Generation of Membrane-targeting and Epitope-tagging Module for Subcloning and Expression of Mammalian Membrane Proteins; Wei, Xiao, Zeng, Pang, Lakatta, Lin; U.S. Patent Application 12/652,395. Status: Pending.

Serum Carboxymethyl-lysine and Circulating Receptor for Advanced Glycation End Products (RAGE) as Clinical Biomarkers for Adverse Aging-related Outcomes; Lakatta, Ferrucci, Semba; U.S. Patent Application 2009/003923. Status: Pending.

Engineered Biological Pacemakers; Maltsev, Lakatta, Zihanich, Sirenko, Milkheev, Vodovotz; U.S. Patent Application 2012/0134971. Status: Awarded

Engineering Rhythmic and Responsive Biological Pacemakers Based on the Enhancement of Cell Intracellular Signaling Targeting Both Ca Cycling and Sarcolemma; Sirenko, Zahanich, Lakatta Maltsev; U.S. Patent Application 61/180,491. Status: In preparation.

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2. **Lakatta EG**, Gerstenblith G, Angell CS, Shock N, Weisfeldt ML. Prolonged contraction duration in aged myocardium. *J Clin Invest* 1975; 55:61-68.
3. Angell CS, **Lakatta EG**, Weisfeldt ML, Shock NW. Relationship of intramyocardial oxygen tension and epicardial ST segment changes following acute coronary artery ligation: Effects of coronary perfusion pressure. *Cardiovasc Res* 1975; 9:12-18.
4. **Lakatta EG**, Gerstenblith G, Angell CS, Shock NW, Weisfeldt ML. Diminished inotropic response of aged myocardium to catecholamines. *Circ Res* 1975; 36:262-269.
5. Gerstenblith G, **Lakatta EG**, Weisfeldt ML. Age changes in myocardial function and exercise response. *Prog Cardiovasc Dis* 1976; 19:1-21.
6. Gerstenblith G, Lakatta EG, Weisfeldt ML. Age changes in myocardial function and exercise response. In: Sonnenblick EH, Lesch M (Eds), *Exercise and Heart Disease*. New York: Grune & Stratton, 1977, pp. 105-126.
7. **Lakatta EG**, Henderson AH. Starling's law reactivated. *J Mol Cell Cardiol* 1977; 9:347-351.
8. Horton JD, Sherber HS, **Lakatta EG**. Distance correction for precordial electrocardiographic voltage in estimating left ventricular mass: an echocardiographic study. *Circulation* 1977; 55:509-512.
9. **Lakatta EG**, Jewell BR. Length-dependent activation its effect on the length-tension relation in cat ventricular muscle. *Circ Res* 1977; 40:251-257.
10. Gerstenblith G, Frederiksen J, Yin FCP, Fortuin NJ, **Lakatta EG**, Weisfeldt ML. Echocardiographic assessment of a normal adult aging population. *Circulation* 1977; 56: 273-278.
11. Froehlich JP, Lakatta **EG**, Beard E, Spurgeon HA, Weisfeldt ML, Gerstenblith G. Studies of sarcoplasmic reticulum function and contraction duration in young and aged rat myocardium. *J Mol Cell Cardiol* 1978; 10:427-438.

12. Yin FCP, Raizes GS, Guarnieri T, Spurgeon HA, **Lakatta EG**, Fortuin NJ, Weisfeldt ML. Age-associated decrease in ventricular response to haemodynamic stress during beta-adrenergic blockade. *Brit Heart J* 1978; 40:1349-1355.
13. **Lakatta EG**. Alterations in the cardiovascular system that occur in advanced age. *Federation Proc* 1979; 38:163-167.
14. Gerstenblith G, Spurgeon HA, Froehlich JP, Weisfeldt ML, **Lakatta EG**. Diminished inotropic responsiveness to ouabain in aged rat myocardium. *Circ Res* 1979; 44:517-523.
15. Yin FCP, Spurgeon HA, Greene HL, **Lakatta EG**, Weisfeldt ML. Age-associated decrease in heart rate response to isoproterenol in dogs. *Mech Ageing Dev* 1979; 10:17-25.
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19. **Lakatta EG**, Spurgeon HA. Force staircase kinetics in mammalian cardiac muscle modulation by muscle length. *J Physiol (Lond.)* 1980; 299:337-352.
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21. Lappe DL, **Lakatta EG**. Intensity fluctuation spectroscopy monitors contractile activation in "resting" cardiac muscle. *Science* 1980; 207:1369-1371.
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23. **Lakatta EG**, Lappe DL. Diastolic scattered light fluctuation, resting force and twitch force in mammalian cardiac muscle. *J Physiol (Lond.)* 1981; 315:369-394.
24. Costa PT, Fleg JL, McCrae RR, **Lakatta EG**. Neuroticism, coronary artery disease and chest pain complaints: cross-sectional and longitudinal studies. *Exper Aging Res* 1982; 8:37-44.
25. Wei JY, Spurgeon HA, **Lakatta EG**. Electro-mechanical responsiveness of hyperthyroid cardiac muscle to  $\beta$ -adrenergic stimulation. *Am J Physiol Endocrinol Metab* 1982; 243: E114-E122.
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28. Fleg JL, Das DN, **Lakatta EG**. Right bundle branch block: Long-term prognosis in apparently healthy men. *J Am Coll Cardiol* 1983; 1:887-892.
29. Spurgeon HA, Steinbach MF, **Lakatta EG**. Chronic exercise prevents characteristic age-related changes in rat cardiac contraction. *Am J Physiol Heart Circ Physiol* 1983; 244:H513-H518.
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37. Fleg JL, **Lakatta EG**. Prevalence and prognosis of exercise-induced nonsustained ventricular tachycardia in apparently healthy volunteers. *Am J Cardiol* 1984; 54:762-764.
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39. Renlund DG, Gerstenblith G, **Lakatta EG**, Jacobus WE, Kallman CH, Weisfeldt ML. Perfusate sodium during ischemia modifies post-ischemic functional metabolic recovery in the rabbit heart. *J Mol Cell Cardiol* 1984; 16:795-801.
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89. Guarnieri T, **Lakatta EG**. Mechanism of myocardial contractile depression by clinical concentrations of ethanol: a study in ferret papillary muscles. *J Clin Invest* 1990; 85:1462-1467.
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93. Danziger RS, Tobin JD, Becker LC, **Lakatta EG**, Fleg JL. The age-associated decline in glomerular filtration in healthy normotensive volunteers: Lack of relationship to cardiovascular performance. *J Am Geriatr Soc* 1990; 38:1127-1132.
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#### **INVITED REVIEWS AND BOOK CHAPTERS**

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