

COLLEGE OF MEDICINE  
UNIVERSITY OF OKLAHOMA HEALTH SCIENCES CENTER  
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**CURRICULUM VITAE**

I. **COMPLETE NAME** Benjamin J. Scherlag, Ph.D.

II. **EDUCATION**

B.S.	1954	The City College of New York New York, NY	Biology/Education
M.A.	1961	Brooklyn College Brooklyn, NY	Biology
Ph.D.	1963	State University of New York Downstate Medical Center Brooklyn, NY	Physiology

III. **PROFESSIONAL EXPERIENCE**

**ACADEMIC:**

Regents Professor	2011-present
George Lynn Cross Research Professor	2003-present
Helen Webster Professor of Cardiac Arrhythmias	2000-present
Professor of Medicine	1978-present
University of Oklahoma Health Sciences Center, Oklahoma City, OK	
Associate Professor of Graduate Faculty	1980-present
Adjunct Professor of Physiology	1978-present
Department of Physiology and Biophysics	
University of Oklahoma Health Sciences Center	
Associate Professor of Medicine	1974-1978
University of Miami School of Medicine, Miami, FL	
Lecturer	1960-1967
Post-Graduate, Columbia University	
College of Physicians and Surgeons, New York, NY	1963-1966
Department of Biology, Brooklyn College, New York, NY	
Teaching Assistant	1958-1963
Research Assistant	1956-1958
State University of New York, New York, NY	
Laboratory Assistant	1950-1954
College of Physicians and Surgeons, New York, NY	

**HOSPITAL/AGENCY**

Research Career Scientist	1986-1999
Medical Investigator	1980-1986
Cardiovascular Physiologist	1978-1986
Veterans Administration Medical Center, Oklahoma City, OK	
Cardiovascular Physiologist	1974-1978
Veterans Administration Hospital, Miami, FL	

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Acting Director Research Laboratory	1973-1974
Co-Director, Research Laboratory	1971-1973
Cardiovascular Physiologist Mount Sinai Medical Center, Miami, FL	1968-1974

IV. **MILITARY EXPERIENCE**

Research Physiologist, U.S. Public Health Service, Staten Island, NY	1965-1968
Medical Technician, U.S. Army Medical Corps	1954-1956

V. **LICENSES**

United States Drug Enforcement Agency Researchers License  
Expires February 28, 2013  
Oklahoma Bureau of Narcotics and Dangerous Drugs Researcher License  
Expires October 31, 2013

VI. **RESEARCH AND SCHOLARSHIP**

**Research Grants and Contracts**

**Present:**

Project Title: Treatment of Atrial Fibrillation Using Magnetic Nanoparticles Carrying Botulinum toxin-A

Source: NanoMed Targeting Systems

Principal Investigator: Sunny Po, MD, PhD; Co-PI Benjamin J. Scherlag, PhD

Funding: \$

Study Period: 07/01/2011 – 06/30/2013

In this proposal, we plan to transiently suppress the critical elements of the cardiac autonomic nervous system in order to suppress atrial fibrillation. We will infuse magnetic nanoparticles carrying botulinum toxin-A (BtA) into the coronary artery that supplies these critical elements. The magnetic nanoparticles will be navigated to the targets by an external electromagnet placed over the chest wall of the dogs. Two very novel approaches that had not been reported before are (1) incorporate botulinum toxin-A into magnetic nanoparticles (MNP) and (2) using external electromagnetic to navigate the MNP to the cardiac autonomic nervous system.

Project Title: Atrial Fibrillation in Hyperthyroidism: Active Antibodies to Autonomic Receptors

Source: VA Merit Review, Veterans Affairs Administration

Principal Investigator: David Kem, MD; Co-PI Benjamin J. Scherlag, PhD

Funding: \$

Study Period: 10/01/2010 – 09/30/2013

The proposal examines the electrophysiology interrelationships of thyroid hormone, age and activating autoantibodies to autonomic receptors as a cause of atrial fibrillation

**Past/Completed:**

Heart Rhythm Institute, PI: Benjamin J. Scherlag, PhD, Low-level Vagal Stimulation to Prevent Atrial Fibrillation: The Role of Vasostatin-1, March 1, 2011 – August 2011; The purpose of this study was to examine the potential role of vasostatin-1 in suppressing atrial fibrillation which may provide the basis for the development of new therapeutic targets for atrial fibrillation.

Heart Rhythm Institute, PI: Benjamin J. Scherlag, PhD, Direct Application of Electromagnetic fields to the Atrial Appendage to Provoke or Suppress Atrial Fibrillation, February 1, 2010 – June 30, 2010; The purpose of this study was to validate previous findings that direct application of EMFs to the tissues of the upper chamber of the heart (the atria) provoke AF with a specific values of EMF amplitude and frequency (2.87 microGauss/ 2.0 KHz) or suppress AF with another value of EMF (0.034 microGauss/0.952 Hz).

Heart Rhythm Institute, PI: Benjamin J. Scherlag, PhD, Transcutaneous Electrical Stimulation of the Tragus Suppresses Atrial Fibrillation Inducibility, October 1, 2009 – March 30, 2010; The purpose of this study was to develop a non-invasive model of AF that uses very low level electrical stimulation applied inside the ear canal to achieve a high level of prevention and termination of AF without the perils of drug toxicity or serious complications of heart catheterization and multiple lesions which destroy heart tissue.

St. Jude Medical AF Division, PI: Benjamin J. Scherlag, PhD, Mapping Cardiac Arrhythmias, August 31, 2007 – November 1, 2009; The purpose of the study is to quantify area of the atrium showing fractionated activity during atrial fibrillation.

College of Medicine Alumni Association, PI: Sunny Po, MD, PhD; Co-PI: Benjamin J. Scherlag (10%), Nanoparticle based drug delivery for the treatment of atrial fibrillation, April 1, 2008 – September 1, 2009; The purpose of this study was to inject magnetic nanoparticles carrying a neurotoxin into the coronary artery; the magnetic nanoparticles will be captured by a magnet applied to the critical elements (fat pad) to determine if this approach will potentially lead to the development of a non-invasive treatment for atrial fibrillation when MRI is used to capture the magnetic nanoparticles.

Cardiovascular Therapeutics, PI: Benjamin J. Scherlag (10%), A New Pharmacological Approach for the Treatment of Both Drug Responsive and Drug Refractory Atrial Fibrillation in a Canine Preparation, January 1, 2007 – June 30, 2009; The purpose of this study was to test the drug Ranolazine, anti-arrhythmic therapy, would be effective in the treatment of the macroreentrant form of AF.

BioControl Ltd., PI: Benjamin J. Scherlag (10%), Does Strong Autonomic Stimulation Inhibit Atrial Fibrillation in a Model of Sustained Atrial Fibrillation? July 1, 2007 – June 30, 2008; The purpose of this study was to determine if strong vagal stimulation can terminate macro-reentrant atrial fibrillation.

American Heart Association Grant-in-Aid, Grant #, PI: Sunny Po, MD, PhD, Co-PI: Benjamin J. Scherlag, PhD (30%), Neural Basis of Cardiac Arrhythmias, January 1, 2006 – December 30, 2007, Purpose: Using different stimulation techniques to investigate the neural basis of several common arrhythmias (atrial fibrillation, idiopathic ventricular tachycardia and inappropriate sinus tachycardia) that are difficult to treat. This study focused on developing new treatments for these arrhythmias.

St. Jude Medical CRMD Division, Grant #C7030101, PI: Benjamin J. Scherlag (20%), Subthreshold Stimulation Applied to the Vagosympathetic Trunks: Suppression of Cardiac Ganglia Tonic Activity and Atrial Fibrillation Inducibility, August 1, 2005 – July 31, 2006

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NCCAM/NIH Grant #1 R21 AT001694, 2003-2006, Towards a Non-Invasive Therapy for Atrial Fibrillation, PI: Benjamin J. Scherlag, Ph.D. (50%), March 1, 2005 – March 31, 2006

Purpose: The ultimate objective of this study was to establish a new paradigm for the treatment of cardiac arrhythmias. Specifically, to develop the use of non-invasively applied electromagnetic fields (EMFs) to the nerves innervating the heart in order to suppress the most common cardiac arrhythmia, atrial fibrillation (AF).

Veterans Administration Merit Review, PI: Benjamin J. Scherlag (50%), 1990-1995

Veterans Administration Merit Review, PI: Benjamin J. Scherlag (50%), 1987-1990

Veterans Administration Merit Review, PI: Benjamin J. Scherlag (50%), 1985-1988

Veterans Administration Merit Review, PI: Benjamin J. Scherlag (50%), 1979-1982

NIH Research Grant #HL-32191, PI: Benjamin J. Scherlag (50%), 1984-1987

NIH Grant #HL-18139, PI: Benjamin J. Scherlag (50%), 1975-1980

Florida Heart Association Grant #7/77-AG-617, PI: Benjamin J. Scherlag (50%), 1976-1978

NIH-NHLBI Contract #72-2972-M, PI: Benjamin J. Scherlag (50%), 1972-1975

NIH Research Grant #HE13432-01, PI: Benjamin J. Scherlag (50%), 1970-1972

Florida Heart Association Grant #69-AG-11, PI: Benjamin J. Scherlag (50%), 1969-1970

NIH Research Grant #HE10787, Co-PI: Benjamin J. Scherlag (50%), 1968-1969

NIH Grant #STLGM438-05, Co-PI: Benjamin J. Scherlag (50%), 1963-1965, (post-doctoral fellowship)

Research Training Fellowship, U.S. Public Health Service, Research Foundation #HTSJ282, 1958-1961, (pre-doctoral fellowship)

#### Teaching Materials Developed

None

#### Other Scholarly Activities and Creative Achievements

##### PATENTS RECEIVED

Dormer KJ, Po SS, **Scherlag BJ**, Pope C; MAGNETICALLY TARGETED TREATMENT FOR CARDIAC DISORDERS, U.S. Patent No. *Pending*

Jacobson JI, **Scherlag BJ**, Yamanashi WS; CARDIOELECTROMAGNETIC TREATMENT, U.S. Patent No. 7,186,209; issued 03/06/2007; assigned to Jacobson Resonance Enterprises

Berlin KD, Garrison GL, Sangiah S, Clarke CR, Chen CL, Lazzara R, **Scherlag BJ**, Patterson ES, Burows GE; NOVEL N-ALKYL AND N-ACYL DERIVATIVES OF 3,7-DIAZABICYCLO-[3.3.1]NONANES AND SELECTED SALTS THEREOF AS MULTI-CLASS ANTIARRHYTHMIC AGENTS, U.S. No. 5,468,858; issued 11/21/95; assigned to Oklahoma State University

**Scherlag BJ**; METHOD FOR ALLEVIATING AND DIAGNOSING SYMPTOMS OF HEART BLOCK, U.S. Patent No. 5,320,642; issued 06/14/94; assigned to University of Oklahoma

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Berlin KD, **Scherlag BJ**, Clarke CR, Otiv SK, Zisman SA, Sangiah S, Mulekar SV; SALTS OF 3-AZABICYCLO[3.3.1]NONANES AND DERIVATIVES AS ANTIARRHYTHMIC AGENTS AND PRECURSORS THEREOF, U.S. Patent No. 5,110,933; issued 05/05/92; assigned to Oklahoma State University

Berlin KD, **Scherlag BJ**, Clarke CR, Otiv SK, Zisman SA, Sangiah S, Mulekar SV; SALTS OF 3-AZABICYCLO[3.3.1]NONANES AS ANTIARRHYTHMIC AGENTS AND PRECURSORS THEREOF, U.S. Patent No. 5,084,572; issued 01/28/92; assigned to Oklahoma State University

Berlin KD, Thompson MD, **Scherlag BJ**, Smith GS; BIS-1,3-DIAZINE HERETOCYCLIC DERIVATIVES AS ANTIARRHYTHMIA AGENTS, U.S. Patent No. 5,043,445; issued 08/27/91; assigned to Oklahoma State University

Berlin KD, Thompson MD, **Scherlag BJ**, Smith GS, 3,7-DIHETERABICYCLO[3.3.1]NONANES AND DERIVATIVES AS ANTIARRHYTHMIC AGENTS, U.S. Patent No. 4,980,468; issued 12/25/90; assigned to Oklahoma State University

Berlin KD, Thompson MD, **Scherlag BJ**, Smith GS; 3,7-DIHETERABICYCLO[3.3.1]NONANES AS ANTIARRHYTHMIC AGENTS, U.S. Patent NO. 4,910,311; issued 03/20/90; assigned to Oklahoma State University

Berlin KD, Thompson MD, **Scherlag BJ**, Smith GS; 3,7-DIHETERABICYCLO[3.3.1]NONANES AND DERIVATIVES AS ANTIARRHYTHMIC AGENTS, U.S. Patent NO. 4,980,468; issued 12/25/90; assigned to Oklahoma State University

Berlin KD, Thompson MD, **Scherlag BJ**, Smith GS; CERTAIN 3-SELENA-7-AZABICYCLO[3.3.1]NONANES AS ANTIARRHYTHMIC AGENTS, U.S. Patent No. 4,778,892; issued 10/18/88; assigned to Oklahoma State University

Berlin KD, Bailey, III BR, **Scherlag BJ**, Holt EM; 3-THIA-7-AZABICYCL[3.3.1]NONANES AND DERIVATIVES AS ANTIARRHYTHMIC AGENTS, U.S. Patent No., 4,581,361; issued 04/08/86; assigned to Oklahoma State University

### **PATENTS PENDING**

Patterson E, Po SS, **Scherlag BJ**, Jackman WM: Invention Disclosure No. 06HSC018, Antiarrhythmic Actions of Cisatracurium

### **SCHOLARLY ACTIVITIES**

Member Ad Hoc Committee on Recording Electrograms, NIH, October 26-27, 1973

Chairman, Research and Development Committee, VA Medical Center, 1982-1983

## VII. PUBLICATIONS

### Peer Reviewed Publications (Refereed journals)

1. Scherlag BJ, Scherlag MA. Letter to the Editor in response to the Ukena et al. article regarding the effects of renal denervation on HR and AV conduction. *Int J Cardiol.* 2013 Sep;168(2):1535
2. Scherlag MA, Scherlag BJ. Letter to the Editor: A Randomized Comparison of Pulmonary Vein Isolation with Versus Without Concomitant Renal Artery Denervation in Patients With Refractory Symptomatic Atrial Fibrillation and Resistant Hypertension. *J Am Coll Cardiol.* 2013 Sep;62(12)
3. Scherlag BJ, Po SS. GP or no GP, is that the question? *Circ Arrhythm Electrophysiol* 2013 Jun;6:458-9.
4. Lo LW, Scherlag BJ, Chang HY, Lin YJ, Chen SA, Po SS. Paradoxical long-term proarrhythmic effects after ablating the "head station" ganglionated plexi of the vagal innervation to the heart. *Heart Rhythm* 2013 May;10:751-7.
5. Stavrakis S, Scherlag BJ, Fan Y, Liu Y, Mao J, Varma V, Lazzara R, Po SS. Inhibition of atrial fibrillation by low-level vagus nerve stimulation: the role of the nitric oxide signaling pathway. *J Interv Card Electrophysiol* 2013 Apr;36:199-208.
6. Yu L, Scherlag BJ, Li S, Fan Y, Dyer J, Male S, Varma V, Sha Y, Stavrakis S, Po SS. Low-level transcutaneous electrical stimulation of the auricular branch of the vagus nerve: A noninvasive approach to treat the initial phase of atrial fibrillation. *Heart Rhythm* 2013 Mar;10:428-35.
7. Embi A, Scherlag BJ, Embi PJ, Menes M, Po SS. Targeted cellular ionic calcium chelation by oxalates: Implications for the treatment of tumor cells. *Cancer Cell Int* 2012 Dec;12:51.
8. Mao J, **Scherlag BJ**, Liu Y, Fan Y, Varma V, Stavrakis S, Po SS. The atrial neural network as a substrate for atrial fibrillation. *J Interv Card Electrophysiol* 2012 Oct;35:3-9
9. He B, **Scherlag BJ**, Nakagawa H, Lazzara R, Po SS. The Intrinsic Autonomic Nervous System in Atrial Fibrillation: A Review. *ISRN Cardiol.* 2012;2012:490674. Epub 2012 Jun 19.
10. Liu Y, **Scherlag BJ**, Yagi T, Patterson E, Jackman WM, Lazzara R, Po SS. Extra- and intracellular recordings from the avjunction: discerning the mechanisms for irregular ventricular responses during supraventricular arrhythmias. *Acta Cardiol* 2012 Apr;67(2):221-9.
11. Stavrakis S, **Scherlag BJ**, Fan Y, Liu Y, Liu Q, Mao J, Cai H, Lazzara R, Po SS. Antiarrhythmic effects of vasostatin-1 in a canine model of atrial fibrillation. *J Cardiovasc Electrophysiol* 2012 Jul;23(7):771-7.
12. Yu L, **Scherlag BJ**, Sha Y, Li S, Sharma T, Nakagawa H, Jackman WM, Lazzara R, Jiang H, Po SS. Interactions between atrial electrical remodeling and autonomic remodeling: how to break the vicious cycle. *Heart Rhythm* 2012 May;9(5):804-9.

13. Moers AM, **Scherlag BJ**, Niu G, Lu Z, Ghias M, Lazzara R, Jackman WM, Po SS. Pharmacological prevention and termination of focal atrial fibrillation. *Europace* 2012 Mar;14(3):426-30.
14. Jackman WM, **Scherlag BJ**. Nature of electrogram fractionation during atrial fibrillation. *Circ Arrhythm Electrophysiol* 2012 Feb;5(1):5-7.
15. Po SS, **Scherlag BJ**. CFAE: "I know it when I see it!" But what does it mean? *J Cardiovasc Electrophysiol* 2012 Jan;23(1):34-5.
16. **Scherlag BJ**, Nakagawa H, Lazzara R, Po SS. Learning without burning: Emerging knowledge of the autonomic innervation of the heart. *Pacing Clin Electrophysiol* 2011;34:1457-9
17. Sha Y, **Scherlag BJ**, Yu L, Sheng X, Jackman WM, Lazzara R, Po SS. Low level right vagal stimulation: Anticholinergic and Antiadrenergic effects. *J Cardiovasc Electrophysiol* 2011;
18. Sheng X, **Scherlag BJ**, Yu L, Li S, Ali R, Zhang Y, Fu G, Nakagawa H, Jackman WM, Lazzara R, Po SS. Prevention and reversal of atrial fibrillation inducibility and autonomic remodeling by low level vagosympathetic nerve stimulation. *J Am Coll Cardiol* 2011;57:563-571
19. Yu L, **Scherlag BJ**, Li S, Sheng X, Lu Z, Nakagawa H, Zhang Y, Jackman WM, Lazzara R, Jiang H, Po SS. Low level vagosympathetic nerve stimulation inhibits atrial fibrillation inducibility: Direct evidence by neural recordings from intrinsic cardiac ganglia. *J Cardiovasc Electrophysiol*, 2011;22:455-463
20. **Scherlag BJ**, Nakagawa H, Jackman WM, Lazzara R, Po SS. Non-pharmacological, non-ablative approaches for treatment of atrial fibrillation: Experimental evidence and potential clinical implications. *J Cardiovasc Transl Res* 2011;4:35-41
21. Lu Y, **Scherlag BJ**. Local electrograms do not reflect the site of onset of atrial fibrillation. *J Electrocardiol* 2010;6:727
22. Yu L, Scherlag BJ, Dormer K, Nguyen K, Pope K, Po SS. Autonomic Denervation using Magnetic Nanoparticles. *Circulation* 2010;122:2563-2569
23. Lu Z, **Scherlag BJ**, Niu G, Lin J, Fung KM, Zhao L, Yu L, Jackman WM, Lazzara R, Jiang H, Po SS. Functional properties of the superior vena cava (SVC)-aorta ganglionated plexus: Evidence suggesting an autonomic basis for rapid SVC firing. *J Cardiovasc Electrophysiol*, 2010;21:1392.
24. Patterson E, **Scherlag BJ**, Lazzara R. Stable patterns of AH block arising from longitudinal dissociation and reentry within the superfused rabbit AV junction. *J Interv Card Electrophysiol*. 2010;28:5-18
25. Lockwood D, Nakagawa H, Peyton MD, Edgerton JR, Scherlag BJ, Sivaram CA, **Po SS**, Beckman KJ, Abedin M, Jackman WM. Linear left atrial lesions in minimally invasive surgical ablation of

persistent atrial fibrillation: Techniques for assessing conduction block across surgical lesions. *Heart Rhythm* 2009;6:S50-63

26. Po SS, Yu L, **Scherlag BJ**. Cardiac autonomic nervous system: A tug of war between the big brain and little brain – friends or foes? *Heart Rhythm* 2009;6:1780-81
27. Li S, **Scherlag BJ**, Yu L, Sheng X, Zhang Y, Ali R, Dong Y, Ghias M, Po SS. Low-level vagosympathetic stimulation: a paradox and potential new modality for the treatment of focal atrial fibrillation. *Circ Arrhythm Electrophysiol.* 2009;2:645-51
28. Ghias M, **Scherlag BJ**, Lu Z, Niu G, Moers A, Jackman WM, Lazzara R, Po SS. The role of ganglionated plexi in apnea-related atrial fibrillation. *J Am Coll Cardiol* 2009;54:2075-83
29. Niu G, **Scherlag BJ**, Lu Z, Ghias M, Zhang Y, Patterson E, Dasari TW, Zacharias S, Lazzara R, Jackman WM, Po SS. An acute experimental model demonstrating 2 different forms of sustained atrial tachyarrhythmias. *Circ Arrhythm Electrophysiol* 2009;2:384-92.
30. Lu Z, **Scherlag BJ**, Lin J, Yu L, Guo JH, Niu G, Jackman WM, Lazzara R, Jiang H, Po SS. Autonomic mechanism for initiation of rapid firing from atria and pulmonary veins: Evidence by ablation of ganglionated plexi. *Cardiovasc Res* 2009;84:245-52
31. Lin J, **Scherlag BJ**, Niu G, Lu Z, Patterson E, Liu S, Lazzara R, Jackman WM, Po SS. Autonomic elements within the ligament of Marshall and inferior left ganglionated plexus mediate functions of the atrial neural network. *J Cardiovasc Electrophysiol* 2009;20:318-324
32. Zhang Y, **Scherlag BJ**, Lu Z, Niu GD, Yamanashi WS, Hogan C, Fields J, Ghias M, Lazzara R, Jackman WM, Po SS. Comparison of atrial fibrillation inducibility by electrical stimulation of either the extrinsic or the intrinsic autonomic nervous systems. *J Interv Card Electrophysiol* 2009;24:5-10
33. Lin J, **Scherlag BJ**, Lu Z, Zhang Y, Liu S, Patterson E, Jackman WM, Lazzara R, Po SS. Inducibility of atrial and ventricular arrhythmias along the ligament of Marshall: Role of autonomic factors. *J Cardiovasc Electrophysiol* 2008;19:955-962
34. Zhou J, **Scherlag BJ**, Niu D, Hou Y, Lu Z, Zhang Y, Ding Y, Lazzara R, Jackman WM, Po SS. Anatomy and physiology of the right interganglionic nerve: Implication for the pathophysiology of inappropriate sinus tachycardia. *J Cardiovasc Electrophysiol* 2008 19:971-976
35. Lu Z, **Scherlag BJ**, Lin J, Niu G, Ghias M, Jackman WM, Lazzara R, Jiang H, Po SS. Autonomic mechanism for complex fractionated atrial electrograms: Evidence by fast fourier transform analysis. *J Cardiovasc Electrophysiol* 2008;19:835-842
36. Patterson E, **Scherlag BJ**, Zhou J, Jackman WM, Lazzara R, Coscia D, Po S. Antifibrillatory actions of cisatracurium: An atrial specific M2 receptor antagonist. *J Cardiovasc Electrophysiol* 2008;19:861-868



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37. Patterson E, Lu Z, Lin J, **Scherlag BJ**, Po SS, Coscia D, Lazzara R. Antifibrillatory properties of mivacurium in a canine model of atrial fibrillation. *J Cardiovasc Pharmacol* 2008;51:293-303
38. Lin J, **Scherlag BJ**, Lu Z, Zhang Y, Liu S, Patterson E, Jackman WM, Lazzara R, Po SS. Inducibility of Atrial and Ventricular Arrhythmias Along the Ligament of Marshall: Role of Autonomic Factors. *J Cardiovasc Electrophysiol* 2008;19(9):955-962
39. Zhou J, **Scherlag BJ**, Niu G, Hou Y, Lu Z, Zhang Y, Ding Y, Lazzara R, Jackman WM, Po SS. Anatomy and Physiology of the Right Interganglionic Nerve: Implications for the Pathophysiology of Inappropriate Sinus Tachycardia. *J Cardiovasc Electrophysiol* 2008;19(9):971-76
40. Lu Z, **Scherlag BJ**, Lin J, Niu G, Ghias M, Jackman WM, Lazzara R, Jiang H, Po SS. Autonomic Mechanism for Complex Fractionated Atrial Electrograms: Evidence by Fast Fourier Transform Analysis. *J Cardiovasc Electrophysiol* 2008;19(8):835-842
41. Patterson E, **Scherlag BJ**, Zhou J, Jackman WM, Lazzara R, Coscia D, Po S. Antifibrillatory Actions of Cisatracurium: An Atrial Specific M(2) Receptor Antagonist. *J Cardiovasc Pharmacol* 2008;51(3):293-303
42. Patterson E, Lu Z, Lin J, **Scherlag BJ**, Po SS, Coscia D, Lazzara R. Antifibrillatory properties of mivacurium in a canine model of atrial fibrillation. *J Cardiovasc Pharmacol* 2008;51(3):293-303.
43. **Scherlag BJ**, Hou YL, Lin J, Lu Z, Zacharias S, Dasari T, Niu G, Ghias M, Patterson E, Jackman WM, Lazzara R, Po SS. An acute model for atrial fibrillation arising from a peripheral atrial site: evidence for primary and secondary triggers. *J Cardiovasc Electrophysiol* 2008;19(5):519-27.
44. Lin J, **Scherlag BJ**, Zhou J, Lu Z, Patterson E, Lazzara R, Jackman WM, Po SS. Autonomic mechanism to explain complex fractionated atrial electrograms (CFAE). *J Cardiovasc Electrophysiol* 2007;18:1197-1205
45. Patterson E, **Scherlag BJ**, Lazzara R, Garrison GL, Berlin KD. Electrophysiologic action of d,l-sotalol and GLG-V-13 in ischemically injured canine epicardium. *J Cardiovasc Pharmacol* 2007;50:304-13
46. Patterson E, Jackman WM, Beckman KJ, Lazzara R, Lockwood D, **Scherlag BJ**, Wu R, Po SS. Spontaneous pulmonary vein firing in man: Relationship to tachycardia-pause early afterdepolarizations and triggered arrhythmia in canine pulmonary veins *in vitro*. *J Cardiovasc Electrophysiol* 2007;18:1067-75
47. Hou Y, **Scherlag BJ**, Lin J, Zhang Y, Lu Z, Truong K, Patterson E, Lazzara R, Jackman WM, Po SS. Ganglionated plexi modulate extrinsic cardiac autonomic nerve input: Effects on sinus rate, atrioventricular conduction, refractoriness and inducibility of atrial fibrillation. *J Am Coll Cardiol* 2007;50:61-68

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48. Zhou J, **Scherlag BJ**, Edwards J, Jackman WM, Lazzara R, Po SS. Gradients of atrial refractoriness and inducibility of atrial fibrillation due to stimulation of ganglionated plexi. *J Cardiovasc Electrophysiol* 2007;18:83-90
49. Hou Y, **Scherlag BJ**, Lin J, Zhou J, Song J, Zhang Y, Patterson E, Lazzara R, Jackman WM, Po SS. Interactive atrial neural network: Determining the connection between ganglionated plexi. *Heart Rhythm* 2007;4:56-63
50. Rashid A, Hines M, **Scherlag BJ**, Yamanashi WS, Lovallo W. Effects of caffeine on the inducibility of atrial fibrillation. *J Electrocardiol* 2006;39:421-425
51. Zhou J, **Scherlag BJ**, Yamanashi W, Wu R, Huang Y, Lazzara R, Jackman WM, Po SS. Experimental model stimulating right ventricular outflow tract tachycardia: A novel technique to induced RVOT-VT. *J Cardiovasc Electrophysiol* 2006;17:771-775
52. Patterson E, Lazzara R, Szabo B, Liu H, Tang D, Li YH, **Scherlag BJ**, Po SS. Sodium-calcium exchange initiated by the Ca<sup>2+</sup> transient: An arrhythmia trigger within pulmonary veins. *J Am Coll Cardiol* 2006;47:1196-1206
53. Po SS, **Scherlag BJ**, Yamanashi WS, Edwards J, Zhou J, Wu R, Geng N, Lazzara R, Jackman WM. Experimental model for paroxysmal atrial fibrillation arising at the pulmonary vein-atrial junctions. *Heart Rhythm* 2006;3:201-208
54. Patterson E, **Scherlag BJ**. Delineation of AV conduction pathways by selective surgical transection: Effects on antegrade and retrograde transmission. *J Interv Card Electrophysiol* 2005;13:95-105
55. Po SS, Li YH, Tang D, Liu H, Geng N, Szabo B, Jackman W, **Scherlag B**, Lazzara R, Patterson E. Rapid and stable reentry within the pulmonary vein as a mechanism for paroxysmal atrial fibrillation. *J Am Coll Cardiol* 2005;45:1871-1877.
56. **Scherlag BJ**, Yamanashi WS, Amin R, Lazzara R, Jackman WM. Experimental model of inappropriate sinus tachycardia: Initiation and ablation. *J Interv Card Electrophysiol* 2005;13:21-29
57. **Scherlag BJ**, Nakagawa H, Jackman WM, Yamanashi WS, Patterson E, Po S, Lazzara R. Electrical stimulation to identify neural elements on the heart: Their role in atrial fibrillation. *J Interv Card Electrophysiol* 2005;13:1-6
58. **Scherlag BJ**, Yamanashi WS, Patel U, Lazzara R, Jackman WM. Autonomically induced conversion of pulmonary vein focal firing into atrial fibrillation. *J Am Coll Cardiol* 2005;45:1878-86
59. Patterson E, Po S, **Scherlag BJ**, Lazzara R. Triggered firing in pulmonary veins initiated by *in vitro* autonomic nerve stimulation. *Heart Rhythm* 2005;2:624-631
60. Patterson E, **Scherlag BJ**. Fast pathway-His bundle connections in the rabbit heart. *J Interv Card Electrophysiol* 2004;10:121-129

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61. **Scherlag BJ**, Yamanashi WS, Hou Y, Jacobson JI, Jackman WM, Lazzara R. Magnetism and Cardiac Arrhythmias. *Cardiology in Review* 2004;12:85-96
62. **Scherlag BJ**, Yamanashi WS, Yagi T, Patterson E, Lazzara R, Jackman WM. Variability of AV nodal potentials recorded, *in vivo*: Direct demonstration of dual AV nodal physiology. *J Interv Card Electrophysiol* 2004;10:9-18
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substituents at the 2,6-positions and at the 9-position. Single crystal x-ray diffraction analysis of *N,N*-dibenzyl-9,9-dimethoxy-3,7-diaza-bicyclo[3.3.1]nonane hydroperchlorate, (2-*endo*,3-*exo*,4-*endo*)-2,4-bis(2-chlorophenyl)-7-benzyl-7*H*-3,7-diaza-bicyclo[3.3.1]nonane hydroperchlorate, (2-*endo*,3-*exo*,4-*endo*)-2,4-bis(2-chlorophenyl)-7-benzyl-7*H*-3,7-diazabicyclo[3.3.1]nonane hydroperchlorate, and (2-*endo*,3-*exo*,4-*endo*)-2,4-bis(2-chloro-phenyl)7-benzyl-7*H*-3,7-diazabicyclo[3.3.1]nonane-9-one. Eur J Med Chem 1990;25:1-8

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## Editorials

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### **Original invited lectures and presentations published for distribution**

Lecturer, Transcutaneous vagal stimulation to suppress atrial fibrillation: Microsystems a subsidiary of Biotronik, Lake Oswego, OR. September 6, 2013

Participant/Lecturer, Joint American Heart Association/Cardiac Electrophysiology Society Session: Advances in Atrial Fibrillation 2012: From Bench to Bedside, Los Angeles, CA, November 4, 2012

Lecturer, Cardiovascular Grand Rounds, University of Oklahoma HSC, A Potpourri of Autonomic Modulation: Experimental and Clinical Correlates, September 7, 2012

Chair, Heart Rhythm Society, Session entitled: Neurocardiology in Atrial Fibrillation: How the Brain Regulate the Beating Heart, Boston, MA, May 11, 2012

Chair, Heart Rhythm Society, Session entitled: Cardiac Arrhythmias and the Autonomic Nervous System, Boston, MA, May 11, 2012

Lecturer, Sponsor: St Jude Medical, St Jude Medical Cardiac Rhythm Management Division Facility, Sylmar, CA, Autonomic Modulation of Cardiac Arrhythmias, July 21, 2011

Lecturer, Sponsor: St Jude Medical, St Jude Medical Atrial Fibrillation Division Facility, Sunnyvale, CA, Autonomic Modulation of Cardiac Arrhythmias, July 22, 2011

Lecturer, Cardiovascular Grand Rounds, University of Oklahoma HSC, Autonomic modulation: Are we at the beginning of a revolution in internal medicine, June 11, 2011

Participant/Lecturer, Heart Rhythm Society Core Curriculum Session Anatomic Basis For Cardiac Ablation, The autonomic innervation of the heart – Relevance for the Electrophysiologist, San Francisco, CA, May 6, 2011

Lecturer, Sponsor: St Jude, 8<sup>th</sup> Annual St Jude Fellows Symposium, San Francisco, CA, Atrial autonomic modulation, May 3, 2011

Lecturer, Mayo Clinic Rochester, Minnesota, Autonomics in AF and Experimental Study Design for Testing Novel Therapies, February 16, 2010

Lecturer, Cardiology Grand Rounds, University of Oklahoma HSC, Non-Pharmacologic, Non-Ablative Approach to the Prevention and Treatment of Atrial Fibrillation, October 2, 2009

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Lecturer, Cardiovascular Grand Rounds, Harbor University of California Los Angeles Medical Center, The Autonomic Nervous System and Atrial Fibrillation: The Roles of Pulmonary Vein Isolation and Ganglionated Plexi Ablation, September 29, 2009

Lecturer, Cardiac Arrhythmia Conference, Ronald Reagan Medical Center, University of California Los Angeles, Potential New Modality for the Prevention and Treatment of Atrial Fibrillation, September 30, 2009

Lecturer, Electrophysiology Conference, Heart Rhythm Institute, University of Oklahoma HSC, Cervical Interventions for the Prevention and Inhibition of Atrial Fibrillation, August 20, 2009

Faculty Translator/Chair, Heart Rhythm Society 2009, Session: Translational Electrophysiology: Nerves and Arrhythmias, Boston, MA, May 15, 2009

Faculty Lecturer, American Association for Thoracic Surgery joint session with the Heart Rhythm Society 2009, Neurological approaches to the AF problem: Cervical interventions, Boston, MA, May 13, 2009

Lecturer, Sponsor: St. Jude Medical, AF Division, Electrophysiology Conference, Baylor Heart and Vascular Institute, The dual cardiac conduction systems: Basic and clinical correlates, Dallas, TX, April 29, 2009

Lecturer, Cardiology Fellows Conference, University of Oklahoma HSC, The AV junction: From bench to EP Lab, Oklahoma City, OK, October 20, 2008

Lecturer, Electrophysiology Conference, Heart Rhythm Institute, University of Oklahoma HSC, Atrial Fibrillation: Many site, multiple mechanisms, Oklahoma City, OK, October 15, 2008

Lecturer, Sponsor: St. Jude Medical, AF Division, The importance of the dual cardiac conduction system for the understanding of atrial fibrillation, St. Jude Medical Facility, Minneapolis, MN, September 30, 2008

Lecturer, Cardiovascular Grand Rounds, University of Oklahoma HSC, Reducing the Autonomic Burden is an Effective Therapy for Atrial Fibrillation Ablation: From Experimental Models to Clinical Outcomes, Oklahoma City, OK, February 1, 2008

Lecturer, Sponsor: AtriCure, Inc., Is there a simpler method for treating atrial fibrillation? Kaiser Permanente, San Francisco, CA, January 9, 2008

Lecturer, Sponsor: AtriCure, Inc., Is there a simpler method for treating atrial fibrillation? Walnut Creek General Hospital, Walnut Creek, CA, January 10, 2008

Lecturer, Western Canada EP Society, Sponsor: St. Jude Medical AF Division, The Intrinsic Cardiac Nervous System and its Relation to Catheter Ablation Procedures for Atrial Fibrillation, Pan Pacific, Vancouver, Canada, April 27, 2007

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Lecturer, Nebraska Heart OR Live Webcast, Sponsor: AtriCure, Neurally Based Focal and Myocardially Based Macroreentrant Atrial Fibrillation: Two Forms of Sustained Atrial Fibrillation in One Acute Preparation, Lincoln, Nebraska, March 15, 2007

Lecturer, Society of Thoracic Surgeons (STS), Sponsor: AtriCure, Inc, The Intrinsic Autonomic Nervous System and Atrial Fibrillation: Endocardial vs. Epicardial Perspective, San Diego, CA, January 29, 2007

Presenter, 2007 Boston Atrial Fibrillation Symposium, Neural-Based Focal and Myocardial-Based Macroreentrant Atrial Fibrillation: Two Models of Sustained Atrial Fibrillation in a Single, Acute Preparation, Boston, MA, January 11-13, 2007

Presenter, 2007 Boston Atrial Fibrillation Symposium, Facilitation of Atrial Fibrillation by Communication Between Autonomic Ganglionated Plexi, Boston, MA, January 11-13, 2007

Lecturer, Boca Raton Community Hospital, Sponsor: AtriCure, Neural Basis of Atrial Fibrillation, Boca Raton, FL, December 12, 2006

Participant, Live Case & Lecture Seminar, Center for Surgical Innovation, University of Cincinnati, Sponsor: AtriCure, Cincinnati, OH, November 26-27, 2006

Presenter, Pivotal Research in Cardiology in the Elderly (PRICE), PRICE IV Symposium, Comparison of Two Forms of Neurally Induced Atrial Fibrillation: How Does it Relate to Aging and Atrial Fibrillation, Chicago, IL, November 11, 2006

Lecturer, Atrial Fibrillation: The State of the Art, Cedars-Sinai Medical Center, The Cardio-Cardiac Reflex: Its Role in the Induction, Maintenance and Ablation of Paroxysmal Atrial Fibrillation, Marina del Rey, CA October 27-29, 2006

Lecturer, Cardiology Fellows Conference, University of Oklahoma HSC, The Physiology and Pathophysiology of the AV Junction, Oklahoma City, OK, October 16, 2006

Lecturer, Surgical Treatment Options for Atrial Fibrillation, Medical City Dallas Hospital, Sponsor: AtriCure, The Intrinsic Autonomic Nervous System and Atrial Fibrillation: Endocardial and Epicardial Perspectives, Dallas, TX, October 9, 2006

Lecturer, Cardiology Grand Round, Northwestern University, Sponsor: AtriCure, Common Mechanisms Underlying Sustained Focal Atrial Fibrillation from Pulmonary Veins and other Atrial Sites, Chicago, IL, September 22, 2006

Lecturer, Cardiovascular Grand Rounds, University of Oklahoma HSC, Neurally Based and Myocardial Based Atrial Fibrillation Correspond to Drug Resistant and Drug Responsive AF, Respectively, Oklahoma City, OK, September 15, 2006

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Lecturer, Electrophysiology Conference, Ohio State University, Sponsor: AtriCure, Ablation of Focal Atrial Fibrillation by Targeting Neural Elements on the Heart, Columbus, OH, August 18, 2006

Lecturer, Baricelli Inn, Sponsor: AtriCure, Empirical vs. Mechanistic Basis for Atrial Fibrillation Ablation: Basic and Clinical Correlates, Cleveland, OH, July 6, 2006  
Lecturer, Heart Rhythm Society Meeting, Role of the Atrial Neural Network in the Initiation and Maintenance of Atrial Fibrillation, Boston, MA, May 19, 2006

Lecturer, New Leaders in Cardiology and Electrophysiology, Interactive Neural Network: Its Role in Atrial Fibrillation Initiation, Maintenance and Ablation, Boston, MA, May 15, 2006

Lecturer, Cardiovascular Grand Rounds, University of Pennsylvania School of Medicine, Neural Basis of Atrial Fibrillation: Initiation, Maintenance and Ablation, Philadelphia, PA, May 11, 2006

Lecturer, International Society of Computerized Electrocardiology, Neural Basis of Atrial Fibrillation: Initiation, Maintenance and Ablation, Niagara on the Lake, Ontario, Canada, April 26, 2006

Lecturer, Cardiovascular Grand Rounds, Good Samaritan Hospital, Neural Basis of Atrial Fibrillation: Basic and Clinical Correlates, Corvallis, OR, March 29, 2006

Lecturer, Cardiac Clinical Conference, St. Charles Medical Center, Neural Basis of Atrial Fibrillation: Basic and Clinical Correlates, Bend, OR, March 28, 2006

Lecturer, 5<sup>th</sup> Atrial Fibrillation Symposium, Properties of the Atrial Neural Network: Its Role in Atrial Fibrillation Induction and Maintenance, Barcelona, Spain, March 22-24, 2006

Lecturer, Centre Hospitalier Universitaire, EP Fellows and Faculty Conference, Empirical vs. Mechanistic Basis for Ablation of Atrial Fibrillation: Basic and Clinical Correlates, Rennes, France, March 19, 2006

Lecturer, Centre Hospitalier Universitaire, Cardiovascular Grand Rounds, Atrial Fibrillation of the Autonomic Nervous System, , Rennes, France, March 18, 2006

Lecturer, Sponsored by AtriCure, Inc, Dinner Symposium, Properties of the Atrial Neural Network: Its Role in Atrial Fibrillation Induction and Maintenance, Mineola, NY, March 8, 2006

Lecturer, Boston Atrial Fibrillation Symposium, St. Jude Symposium, Role of Ganglionated Plexi in Initiation of Pulmonary Vein Triggered Firing and AF Maintenance, Boston, MA, January 12, 2006

Lecturer, Western Canadian EP Fellow Symposium, Pulmonary Vein Isolation, Complex Fractionated Electrogram, Ganglia Ablation: Which Approach is Best for AF Cure?, Vancouver, British Columbia, Canada, December 10, 2005

Lecturer, Cardiology Grand Rounds, Hermann Hospital, Empirical vs. Mechanistic Basis for Ablation of Atrial Fibrillation: Basic and Clinical Correlates, Houston, TX, December 8, 2005

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Lecturer, Northwest EP Society Chapter Meeting, Pulmonary Vein Isolation, Complex Fractionated Electrogram, Ganglia Ablation: Which Approach is Best for AF Cure?, Spokane, WA, November 9, 2005

Lecturer, St. Charles Medical Center, Atrial Fibrillation and the Autonomic Nervous System, Bend, OR, November 8, 2005

Lecturer, Guidant Corporation, Neural Basis of Atrial Fibrillation: In Vivo Studies, San Jose, CA, October 20, 2005

Lecturer, Cardiovascular Therapeutics, Neural Basis of Atrial Fibrillation: In Vivo Studies, Palo Alto, CA, October 3-4, 2005

Lecturer, Mid Ohio Cardiovascular Center, Columbus, Ohio, Neural Basis of Atrial Fibrillation, Sponsor: AtriCure, Inc, August 31, 2005

Lecturer, Cardiology Grand Rounds, University of Florida Gainesville, Neural Basis of Atrial Fibrillation, June 24, 2005

Lecturer, 9<sup>th</sup> Annual Arrhythmia Symposium, Seoul, Korea, Neural Basis of Atrial Fibrillation, June 12, 2005

Lecturer, 9<sup>th</sup> Annual Arrhythmia Symposium, Seoul, Korea, Experimental Model Simulating Right Ventricular Outflow Tract Tachycardia: Initiation and Control by Autonomic Blockade, June 11, 2005

Lecturer, St. Jude Medical, Cardiac Rhythm Management Division, Neural Basis of Atrial Fibrillation, Sylmar, CA, June 8, 2005

Lecturer, Monthly Educational Program, Center for Surgical Innovation, University of Cincinnati, Cincinnati, OH, Cardiac Autonomics and Cardiac Arrhythmias, May 16, 2005

Participant, Center for Surgical Innovation, University of Cincinnati, Cincinnati, OH, Live Case Closed Chest Procedure with Dr. Randall Wolf, May 16, 2005

Presenter, Heart Rhythm Society, New Orleans, LA, Experimental Model for Apnea Induced Atrial Fibrillation, May 6, 2005

Lecturer, Cardiovascular Grand Rounds, Texas Heart Institute at St. Luke's Episcopal Hospital, Houston, TX, Neural Basis of Atrial Fibrillation and Other Arrhythmias, February 25, 2005

Lecturer, St. Jude Medical, CRMD Division, Austin, TX, Neural Basis of Atrial Fibrillation and Other Arrhythmias, February 23, 2005

Participant, Boston Atrial Fibrillation Symposium, Boston, MA, January 13-17, 2005

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Lecturer, Field Clinical Engineers, St. Jude Medical, Naples, FL, Pulmonary Vein Isolation, Autonomic Denervation, Complex Fractionated Electrogram Ablation: Which is the Better for AF cure?, October, 23, 2004

Lecturer, Cardiology Grand Rounds, St. Francis Medical Center, Philadelphia, PA, Cardiac Autonomics and Cardiac Arrhythmias, October 22, 2004

Lecturer, 2004 Interventional EP Symposium, Mont Tremblant, Ottawa, Ontario, Canada, Cardiac Autonomics and Cardiac Arrhythmias, October 2, 2004

Lecturer, Atrial Fibrillation Summit, Cleveland Clinic, Cleveland, OH, Cardiac Autonomics and Cardiac Arrhythmias, October 1, 2004

Lecturer, Cardiovascular Grand Rounds, Duke University Medical Center, Durham, NC, Cardiac Autonomics and Cardiac Arrhythmias, September 20, 2004

Lecturer, Cardiovascular Grand Rounds, St. Luke's-Roosevelt Hospital, New York, NY, Cardiac Autonomics and Cardiac Arrhythmias, August 11, 2004

Lecturer, AtriCure, Inc, West Chester, OH, Cardiac Autonomics and Cardiac Arrhythmias, July 18-19, 2004

Lecturer, Medicine Grand Rounds, University of Oklahoma Health Sciences Center, Oklahoma City, OK, Cardiac Autonomics and Cardiac Arrhythmias, July 7, 2004

Lecturer, Electrophysiology Conference, University of Oklahoma Health Sciences Center, Oklahoma City, OK, The Neural Basis for Atrial Fibrillation, June 17, 2004

Lecturer, Heart Rhythm Society Meeting, San Francisco, CA, Navigating the AF Revolution, Sponsored by Endocardial Solutions, Mapping the Earliest Activation Site during Autonomically Induced Atrial Fibrillation, May 20, 2004

Presenter, Heart Rhythm Society Meeting, San Francisco, CA, Limiting the Number and Extent of Radiofrequency Applications for Ablation of Atrial Fibrillation, May 18, 2004

Lecturer, Heart Rhythm Society Meeting, San Francisco, CA, New Leaders in Cardiology and Electrophysiology, Sponsored by Medtronic, Local Cardiac Denervation: A New Paradigm for Ablation of Cardiac Arrhythmias, May 17, 2004

Lecturer, Cardiac Electrophysiology Conference, University of Oklahoma Health Sciences Center, Oklahoma City, OK, Didactic Lecture – Anatomy of the AV Junction, April 23, 2004

Lecturer, St. Jude/Daig Division, Minneapolis, MN, Local Cardiac Denervation: A New Paradigm for Ablation of Cardiac Arrhythmias, April 21, 2004

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Lecturer, Cardiovascular Grand Rounds, University of Oklahoma Health Sciences Center, Oklahoma City, OK, Magnet Therapy and the Autonomic Nervous System, April 9, 2004

Lecturer, Northwest Electrophysiology Society, Sunriver, Oregon, Local Cardiac Denervation: A New Paradigm for Terminating Atrial Fibrillation, April 3, 2004

Lecturer, American College of Cardiology, Complimentary and Alternative Medicine Session, New Orleans, LA, Magnetic Therapy and the Autonomic Nervous, March 10, 2004

Chair, American College of Cardiology, Complimentary and Alternative Medicine Session, New Orleans, LA, March 10, 2004

Lecturer, Department of Medicine Research Seminar, University of Oklahoma Health Sciences Center, Oklahoma City, OK, Local Cardiac Denervation: A New Paradigm for Terminating Atrial Fibrillation, February 23, 2004

Lecturer, Cardiology Grand Rounds, Massachusetts General Hospital, Boston, MA, Local Cardiac Denervation: A New Paradigm for Terminating Atrial Fibrillation, December 3, 2003

Lecturer, Norman Regional Hospital, Norman, OK, New Trends in Cardiac Care, Electrophysiology Studies, November 7, 2003

Lecturer, Biosense Webster/Cardiac Arrhythmia Research Institute AF Symposium, University of Oklahoma Health Sciences Center, Oklahoma City, OK, Autonomic Denervation at the Pulmonary Vein-Atrial Junction Prevents Inducibility of Atrial Fibrillation, October 3, 2003

Lecturer, Biosense Webster/Cardiac Arrhythmia Research Institute AF Symposium, University of Oklahoma Health Sciences Center, Oklahoma City, OK, Local Cardiac Denervation: A New Paradigm for Ablation of Cardiac Arrhythmias, October 3, 2003

Lecturer, Biosense Webster/Cardiac Arrhythmia Research Institute AF Symposium, University of Oklahoma Health Sciences Center, Oklahoma City, OK, Intrinsic Cardiac Nervous System Determines AF Initiation and Perpetuation, October 3, 2003

Lecturer, Medical Grand Rounds, University of Oklahoma Health Sciences Center, Oklahoma City, OK, Past and Future Research of AV Nodal Conduction, June 11, 2003

Lecturer, Cardiovascular Grand Rounds, University of Oklahoma Health Sciences Center, Oklahoma City, OK, Atrial Fibrillation: Past, Present and Future, April 11, 2003

Lecturer, 2<sup>nd</sup> Atrial Fibrillation Symposium, Hamburg (Nroderstedt), Germany, Effects of Cardiac Autonomic Nervous System, March 6-7, 2003

Lecturer, Electrophysiology Conference, University of Oklahoma Health Sciences Center, Cardiac Arrhythmia Research Institute, Oklahoma City, OK, Autonomics and Atrial Fibrillation, January 10, 2003



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Lecturer, Electrophysiology Conference, University of Oklahoma Health Sciences Center, Cardiac Arrhythmia Research Institute, Oklahoma City, OK, AV Nodal Ablation, November 2002

Lecturer, Cardiology Fellows Conference, University of Oklahoma Health Sciences Center, Oklahoma City, OK, AV Nodal Physiology and Pathophysiology, October 21, 2002

Lecturer, Development of Clinical Electrophysiology: A look back and a look ahead, Congress of the Slovak Society of Cardiology, Bratislava, Slovakia, October 11-13, 2001

Lecturer, Stimulation and ablation of atrial fibrillation in the normal dog heart: The role of the autonomic nervous system in atrial fibrillation, Michigan State University, Lansing, MI, September 2001

Chairman, International Society for Computerized Electrocardiology, New technologies, new concepts: How ablation has changed our ideas of basic and clinical electrophysiology, Hutchinson Island, FL, April 21-26, 2001

Chairman, International Society for Computerized Electrocardiology, Jos Willems Young Investigator Awards Competition, Hutchinson Island, FL, April 21-26, 2001

Lecturer, University of Mississippi, Starkville, MS, The effects of autonomic nerve stimulation and electromagnetic field stimulation on induction of atrial fibrillation, April 18-20, 2001

Lecturer, Electrophysiology Conference, University of Oklahoma Health Sciences Center, Cardiac Arrhythmia Research Institute, The effects of low-level electromagnetic fields on vulnerability for atrial fibrillation, March 13, 2001

Lecturer, The American Institute of Stress, 11<sup>th</sup> International Congress on Stress, a) The application of low-level electromagnetic fields to autonomic nerve inputs to the heart: Effects on heart rate and atrioventricular conduction, b) Use of low-level electromagnetic fields and vagosympathetic stimulation to detect and induce the paroxysmal atrial fibrillation syndrome, Kohala Coast, Hawaii, November 26-December 1, 2000

Lecturer, Cardiosim 2000, Fifth Biennial World Congress on Cardiac Arrhythmias, Session: Anatomy of Arrhythmias, "Anatomy of AV Conduction," Nice, France, June 14-17, 2000

Lecturer, Annual Scientific Meeting of the Taiwan Cardiac Society, a) "The role of the autonomic nervous system in the paroxysmal atrial fibrillation syndrome," b) "Evidence for a 3<sup>rd</sup> AV nodal input," Taipei, Taiwan, May 27-28, 2000

Chairman, International Society for Computerized Electrocardiology, Jos Willems Young Investigator Awards Competition, Fish Camp, CA, April 29, 2000

Chairman, International Society for Computerized Electrocardiology Conference, Jos Willems Young Investigator Awards Competition, Nara, Japan, April 22, 1999

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Chairman, International Society for Computerized Electrocardiology Conference, Jos Willems Young Investigator Awards Competition, Keystone Resort, CO, April 18, 1998

Lecturer, Department of Medicine, University of Oklahoma Health Sciences Center, Electrophysiology Seminar, "AVN and Hb Potentials, Better Than Hb Potentials Alone", Oklahoma City, OK, April 9, 1998

Lecturer, Department of Medicine, University of Oklahoma Health Sciences Center, Research Seminar, "The Soul Hypothesis," Oklahoma City, OK, June 6, 1997

Guest Lecturer, Oklahoma Medical Research Foundation, Goddard Auditorium, "Politics and Technology in the 21st Century: New Solutions to Old Problems", Oklahoma City, OK, May 29, 1997

Chairman, International Society for Computerized Electrocardiology Conference, Jos Willems Young Investigator Awards Competition, Palm Coast, FL, April 26, 1997

Lecturer, Department of Medicine, University of Oklahoma Health Sciences Center, Electrophysiology Seminar, "Cryoablation and mapping of SAN, SP, AVN and Hb", Oklahoma City, OK, February 6, 1997

Lecturer, Department of Medicine, University of Oklahoma Health Sciences Center, Research Seminar, "The Atrio-Ventricular Junction Before and After the Advent of Radiofrequency Catheter Ablation," Oklahoma City, OK, January 27, 1997

Guest Lecturer, Division of Cardiology, Henry Ford Hospital, "Changing Concepts of A-V Conduction", Detroit, MI, September 11, 1996

Guest Lecturer, Section of Cardiology, University of Michigan School of Medicine, "Changing Concepts of A-V Conduction", Ann Arbor, MI, September 10, 1996

Panelist, Core Curriculum, Basic Cardiac Electrophysiology Course for Fellows and Clinical Electrophysiologists III, "Anatomy and Pathophysiology". North American Pacing and Electrophysiology, Seattle, WA, May 17, 1996

Chairman, International Society for Computerized Electrocardiology Conference, Young Investigator Awards Competition, Chandler, AZ, April 24, 1996

Lecturer, Department of Medicine, University of Oklahoma Health Sciences Center, "Hi/Lo, Fast/Slow, Early/Late Potentials: A Survey of SP Electrophysiology", Oklahoma City, OK, February 19, 1996

Guest Lecturer, Central Oklahoma Mensa, "Life after Death", Moore, OK, January 20, 1996

Guest Lecturer, Oklahoma Medical Research Foundation, Goddard Auditorium, "To See Without Eyes: The Near-Death Experience in the Blind," Oklahoma City, OK, July 22, 1995

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Lecturer, Department of Medicine, University of Oklahoma Health Sciences Center, Electrophysiology Seminar, "The AV Junction: What's Old, What's New, What's True?" Oklahoma City, OK, May 10, 1995

Chairman, North American Society of Pacing and Electrophysiology, Clinical Tutorial #38, "New and Different Concepts of Cardiac Stimulation", Boston, MA, May 4, 1995

Chairman, International Society for Computerized Electrocardiology Conference, Young Investigator Awards Competition, Fernandina, FL, April 26, 1995

Guest Lecturer, Department of Medicine, Division of Cardiology, Los Angeles County Harbor-UCLA Medical Center, Grand Rounds, "When Scientists Waffle: Is There an Atrial Conduction System?" February 10, 1995

Lecturer, Department of Medicine, University of Oklahoma Health Sciences Center, Research Seminar, "When Scientist Vacillate: Is there an Atrial Conduction System?" Oklahoma City, OK, October 24, 1994

Lecturer, Department of Medicine, University of Oklahoma Health Sciences Center, Electrophysiology Seminar, "Rediscovering the A-V Conduction System", Oklahoma City, OK, October 19, 1994

Guest Lecturer, Oklahoma Medical Research Foundation, Goddard Auditorium, "Cardiac Arrhythmias: Detection-Diagnosis-Cure: The Development of Clinical Electrophysiology in the 20th Century," Oklahoma City, OK, October 13, 1994

Guest Lecturer, University of Szent-Gyorgyi Albert University Medical School, Department of Medicine, "The Development of Clinical Electrophysiology in the 20th Century - From Concept to Cure", Budapest, Hungary, September 5, 1994

Guest Lecturer, International Society of Internal Medicine Congress, "The Development of Clinical Electrophysiology in the 20th Century - From Concept to Cure", Budapest, Hungary, August 31, 1994

Chairman, North American Society of Pacing and Electrophysiology, Clinical Tutorial #58, "New and Different Concepts of Cardiac Stimulation (A)," May 12, 1994

Chairman, International Society for Computerized Electrocardiology Conference, Young Investigator Awards Competition, Santa Barbara, CA, April 27, 1994

Lecturer, Department of Medicine, University of Oklahoma Health Sciences Center, Electrophysiology Seminar, "Electrophysiology of the Atrio-nodal Inputs and Exits in the Normal Dog Heart: New Technology and Concepts", Oklahoma City, OK, September 15, 1993

Guest Lecturer, Pacemaker and Triggered Rhythms Symposium, "Triggered Rhythms in Experimental Ischemia and Infarction: Mechanisms of 'Non-Reentrant' Ventricular Ectopic Beats", Keystone, Colorado, August 15, 1993

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Guest Lecturer, American College of Veterinary Internal Medicine, "Radiofrequency Catheter Ablation of a Concealed Posteroseptal Accessory Pathway to Treat Incessant Supraventricular Tachycardia in a Dog", Washington, DC, May 19, 1993

Chairman, North American Society of Pacing and Electrophysiology, "New and Different Concepts of Cardiac Stimulation", San Diego, California, May 6, 1993

Chairman, International Society for Computerized Electrocardiology Conference, Young Investigator Awards Competition, April 27, 1993

Guest Lecturer, Department of Physiology, University of Oklahoma Health Sciences Center, Advanced Cardiovascular Course, "Mechanisms and Management of Ventricular Tachycardia", Okla. City, Oklahoma, January 19, 1993

Guest Lecturer, Radiofrequency Catheter Ablation of Arrhythmias Course, "Animal Models of Ventricular Tachycardia", Okla. City, Oklahoma, January 16, 1993

Guest Lecturer, Oklahoma Medical Research Foundation, Goddard Auditorium, "The Characterization and Localization of Heaven: The Near Death Experience", December 17, 1992

Guest Lecturer, Department of Physiology, University of Oklahoma Health Sciences Center, "Cardiac Electrophysiology", Okla. City, Oklahoma, October 2, 1992

Guest Lecturer, Research Corporation Technologies, "Use of Subthreshold Stimulation to Unmask or Correct A-V Conduction Defects", Tucson, Arizona, June 10, 1992

Guest Speaker, Department of Medicine, Electrophysiology Seminar, "Mechanisms of Arrhythmias: What Have We Learned From the Harris Dog Model?" Northwestern University Medical Center, Chicago, Illinois, May 12, 1992

Participant, American College of Cardiology 41st Annual Scientific Session, Dallas, Texas, Course entitled, "Arrhythmogenesis, Pacing, Ablation", Abstract entitled, "Induction of Manifest, Concealed and Latent Pre-excitation in the Normal Dog Heart," April 14, 1992

Guest Lecturer, Radiofrequency Catheter Ablation of Arrhythmias Course, "Animal Models of Ventricular Tachycardia", Okla. City, Oklahoma, April 11, 1992

Guest Lecturer, Veterinarians, "New Technology for the Treatment and Cure of Cardiac Arrhythmias", Applewoods, Okla. City, Oklahoma, February 13, 1992

Guest Lecturer, 1992 Class of Leadership Oklahoma City, "The Development of Catheter Ablation of Cardiac Arrhythmias", Oklahoma Medical Hospital, Okla. City, Oklahoma, February 13, 1992

Guest Lecturer, Department of Medicine, Research Seminar, University of Oklahoma Health Sciences Center, "Induced Ventricular Preexcitation: Determination by Mapping in the A-V Junction", December 16, 1991

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Guest Lecturer, Michigan State University, Department of Physiology, "History of Reentry: Mechanisms of Arrhythmias and Its Clinical Implications", November 21, 1991

Guest Lecturer, Radiofrequency Catheter Ablation of Arrhythmias Course, "Animal Models of Ventricular Tachycardia", Okla. City, Oklahoma, November 9, 1991

Guest Lecturer, Systeme Nerveux Autonome et Rythmes Cardiaques Autonomic Modulation of Cardiac Rhythms, "Evidence for Accessory A-V and V-A Connections in the Normal Canine Heart: Response to Autonomic Nervous Stimulation", Montréal, Québec, Canada, October 25, 1991  
Guest Lecturer, Medtronics, "Cardiac Pacing Using Subthreshold Stimulation", April 30, 1991

Guest Lecturer, Radiofrequency Catheter Ablation of Arrhythmias Course, "Animal Models of Ventricular Tachycardia", Okla. City, Oklahoma, April 19, 1991

Guest Lecturer, Oklahoma Medical Research Foundation, Goddard Auditorium, The Soul Hypothesis, Oklahoma City, OK, February 21, 1991

Guest Lecturer, 4th Interamerican Congress of Clinical Pharmacology and Therapeutics and 1st Interamerican Conference on Cardiovascular Medical Therapy, "Re-entry Arrhythmias Effects of Antiarrhythmic Drugs on Damaged Tissues", Mexico City, Mexico, September 19, 1990

Guest Lecturer, Hokkaido University School of Medicine, Department of Cardiovascular Medicine, "The A-V Junction: Past, Present and Future", Sapporo, Japan, May 25, 1990

Guest Lecturer, Tsukuba Symposium on Pacing and Electrophysiology, Round Table Workshop, "Are the Present Methods for Classifying Antiarrhythmic Drugs Useful?", Tsukuba City, Japan, May 24, 1990

Lecturer, Critical Care Medicine Course, University of Oklahoma Health Sciences Center, Department of Medicine, "Basic Physiology: Electrical Activity of the Heart," Okla. City, OK, March 4, 1990

Guest Lecturer, The Medical Society of the General Hospital of Mexico, "Ventricular Reentry: Basic and Clinical Updates," Mexico City, Mexico, February 22-24, 1990

Co-Chairman, International Symposium on Current Concepts in the Study and Management of Atrial Arrhythmias, "Evaluation in Man", December 6-8, 1989

Guest Lecturer, International Symposium on Current Concepts in the Study and Management of Atrial Arrhythmias, "Autonomic Effects on V-A Conduction in Hearts with A-V Block", Lyon, France, December 6-8, 1989

Guest Lecturer, University of Pittsburgh-Electrophysiology Conference, Pittsburgh, PA, December 1-4, 1989

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Guest Lecturer, XII Congress of the International Society for Heart Research, "Derangements of Latent Ventricular Automaticity Caused by Myocardial Ischemia," Ann Arbor, MI, May 14-18, 1989

Lecturer, Critical Care Medicine Course, University of Oklahoma Health Sciences Center, Department of Medicine, "Basic Physiology: Electrical Activity of the Heart," Okla. City, OK, March 5, 1989

Guest Lecturer, Joint Research Conference, Departments of Medicine and Pediatrics, University of Oklahoma Health Sciences Center, "Ectopic Conduction: A New Phenomenon of Abnormal A-V Transmission," Okla. City, OK, September 26, 1988

Guest Lecturer, American Heart Association, Scientific Writers Forum, "New Antiarrhythmic Drugs," Okla. City, OK, August 30, 1988

Guest Speaker, International Workshop on Adrenergic System and Ventricular Arrhythmias in Myocardial Infarction, "Experimental Model of Sudden Cardiac Death: Electrophysiological Mechanisms and Role of Adrenergic Influences," Heidelberg, West Germany, June 12-14, 1988

Guest Lecturer, Norwich-Eaton Pharmaceutical Company, "Properties of a New Class of Antiarrhythmic Agents," Syracuse, New York, May 16, 1988

Guest Speaker, Engineering Foundation Conference, "Computerized Interpretation of the Electrocardiogram," "Advantages of Experimental Models that Mimic Clinical Arrhythmias," Palm Coast, FL, April 10-15, 1988

Lecturer, Critical Care Medicine Course, University of Oklahoma Health Sciences Center, Department of Medicine, "Basic Cardiac Electrophysiology," Okla. City, OK, March 6, 1988

Guest Lecturer, The Montreal Cardiac Society, "The Concept of Reentry: Full Circle After 100 Years," Montreal, Canada, September 29, 1987

Guest Lecturer, University of Montreal, "New Methodologies in the Study of Reentry: An Evaluation," Montreal, Ca Guest Lecturer, Royal Victoria Hospital, "New Forms of Anomalous Conduction in the A-V Junction," Montreal, Canada, September 28, 1987

Guest Speaker, International Symposium, "20 Years of Programmed Electrical Stimulation of the Heart: Where to Go From Here," "New Forms of Anomalous Conduction in the A-V Junction," Maastricht, The Netherlands, June 1-5, 1987

Lecturer, Critical Care Medicine Course, University of Oklahoma Health Sciences Center, Department of Medicine, "Basic Physiology," Okla. City, OK, March 1987

Guest Lecturer, The University of Texas Health Sciences Center at Houston and The Houston Electrophysiology Society, "Mechanisms of Ventricular Arrhythmias in the Ischemic Myocardium," Houston, TX, August 27, 1986

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Guest Lecturer, University of Oklahoma Health Sciences Center, Okla. City, OK, Practical Lecture to Cardiology Fellows, "Basic Research," July 30, 1986

Guest Speaker, International Symposium, "Ventricular Tachycardias: From Mechanism to Therapy," Vittel, France, May 4-9, 1986

Guest Speaker, Moffit Hospital, University of California, "Triggers and Substrates for Sudden Cardiac Death," San Francisco, CA, April 11, 1986

Guest Speaker, Engineering Foundation Conference, "Computerized Electrocardiography," Santa Barbara, CA, April 6-10, 1986

Lecturer, Critical Care Medicine Course, University of Oklahoma Health Sciences Center, Department of Medicine, "Basic Physiology: Electrical Activity of the Heart," Okla. City, OK, March 3, 1986

Co-Chairman, American Heart Association Scientific Sessions, "Basic Research: Electrophysiology of Cardiac Arrhythmias," Washington, DC, November 1985

Guest Speaker, 79th Annual Oklahoma State Medical Association Meeting, "Mechanisms of Arrhythmias - Cellular and Anatomic," Skirvin Plaza, Okla. City, OK, May 2, 1985

Co-Chairman, Engineering Foundation Conference, "Computerized Electrocardiography," Santa Barbara, CA, April 21-26, 1985

Co-Chairman, 34th Annual Scientific Sessions of the American College of Cardiology, "Basic Pharmacology and Electrophysiology," Anaheim, CA, March 12, 1985

Co-Chairman, 34th Annual Scientific Sessions of the American College of Cardiology, "Mechanisms of Arrhythmias," Anaheim, CA, March 11, 1985

Guest Speaker, San Francisco General Hospital, "1887-1978: One-hundred Years of Reentry," visit with Dr. Ruey Sung, San Francisco, CA, April 24, 1985

Guest Lecturer, University of Oklahoma Health Sciences Center, Practical Lecturer to Cardiology Fellows on Basic Research, Okla. City, OK, July 30, 1985

Guest Lecturer, Oklahoma State University, Visit with Drs. K.D. Berlin and Williams, Stillwater, OK, July 26, 1985

Guest Lecturer, University of Oklahoma Health Sciences Center, Practical Lecture to Cardiology Fellows on Basic Research, Okla. City, OK, July 25, 1984

Guest Speaker, International Workshop of New Progress in the Identification of Patients at Risk of Ventricular Tachyarrhythmias, Altenberg, West Germany, August 31-September 3, 1981

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Guest Speaker, International Symposium on Holter Monitoring Technique, Cologne, West Germany, May 11-13, 1983

Guest Speaker, Engineering Foundation Conference, "Computerized Interpretation of the Electrocardiogram VIII," Banff, Canada, April 1983

Guest Speaker, University of Michigan, Department of Pharmacology, Ann Arbor, MI, May 19-21, 1982

Guest Speaker, Presbyterian University of Pennsylvania Medical Center, February 1982

Guest Speaker, Pritzker Institute of Medical Engineering Conference, Illinois, Institute of Technology, Chicago, IL, August 18-21, 1981

Co-Chairman, Second International Teaching Conference and Symposium on Cardiac Arrhythmias, Florence, Italy, June 15-19, 1981

Guest Speaker, Postgraduate Course for Cardiologist of the South of France, University of Marseilles, Marseilles, France, June 11, 1981

Participant, International Symposium on the Signal Averaging Technique in Clinical Cardiology, Cologne, West Germany, May 7-9, 1981

Guest Speaker, Grand Rounds and Seminar on Cardiac Physiology, University of Virginia, Charlottesville, Virginia, April 7-8, 1981

Guest Speaker, XI Congresso Interamericano de Cardiologia, San Juan, Puerto Rico, September 7-13, 1980

Co-Director, Inaugural International Teaching Conference on Cardiac Arrhythmias, Tel-Aviv, Israel, October 22-November 1, 1978

Participant, Symposium of Ventricular Tachycardia, Copenhagen, Denmark, May 25-27, 1978

Participant, San Pedro and Peninsula Hospital, Conference on Clinical Electrophysiology: The State of the Art, San Pedro, CA, March 6-9, 1978

Participant, 27th Annual Scientific Session of the American College of Cardiology, Fireside Panel, Anaheim, CA, March 6-9, 1978

Co-Director, American Heart Association and University of Miami, 2nd Annual Course on "Cardiac Arrhythmias," Miami, FL, January 6-8, 1978

Participant, University of Illinois, College of Medicine and American Heart Association, Course entitled, "The Electrophysiological Basis for Diagnosis and Treatment of Cardiac Arrhythmias," October 26-28, 1977



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Participant, American Heart Association, Course entitled, "Myocardial Infarction Arrhythmias," Miami Beach, FL, January 16-18, 1977

Co-Chairman, American Heart Association, Scientific Sessions on Electrophysiology, Miami Beach, FL, November 16, 1976

Co-Director, Electrophysiology Conference, University of Miami School of Medicine, Miami Beach, FL, November 14, 1976

25th Annual Scientific Session of American College of Cardiology for panel entitled, "From Concept to Clinical Application," Moderator: Dr. T.N. James, New Orleans, LA, February 23-26, 1976

32nd Brazilian Congress of Cardiology, "Electropharmacology of the Myocardial Ischemia," Chairman: Dr. Luiz V. Decourt, Sao Paulo, Brazil, July 4-10, 1976

Course on Cardiac Arrhythmias, The University of Kansas Medical Center, Dr. M. Dunn, Kansas City, KS, May 6-7, 1976

8th Annual Society of Cardiopulmonary Technologist Conference, Moderator: Ned Greenletch, Miami Beach, FL, May 8-9, 1975

Workshop on Conducting System of the Heart, The Cardiologische Kliniek, Wilhelmina Gasthuis, Chairman: Dr. Hein Wellens, Amsterdam, The Netherlands, April 28-30, 1975

Cardiac Muscle Society Symposium, American College of Cardiology of Myocardial Ischemia: A Challenge of the Basic Scientist and the Clinician," Chairman: Dr. Arnold Schwartz, Houston, TX, February 1975

International Symposium on His Bundle Electrocardiography, Mount Sinai Medical Center, Director: Dr. O.S. Narula, Miami, FL, January 9-11, 1974

43rd Scientific Session, American Heart Association Symposium: "Renaissance in Electrophysiology-Electrocardiography," Moderator: Dr. Leo Horan, Atlantic City, NJ, November 1970. Course on Cardiac Arrhythmias, Medical College of Virginia, Director: Dr. C.L. Baird, Jr., Virginia Beach, VA, June 8-10, 1972

19th Annual Scientific Session of American College of Cardiology for Panel entitled, "Identification and Significance of Cardiac Conduction Defects," Moderator: Dr. T.N. James, New Orleans, LA, February 1970

## VIII. PROFESSIONAL SERVICE

1. Service to professional societies.

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Board of Directors, International Society of Computerized Electrocardiology, 1987-2000  
Chairman, Young Investigator Awards Competition, International Society of Computerized Electrocardiology, 1987-2003

2. Editorial services

Member, Editorial Board, Journal of Cardiovascular Electrophysiology, 1996-2001  
Member, Editorial Board, Cardiologia, 1995-present  
Member, Publications Committee, North American Society of Pacing and Electrophysiology, 1993-2000  
Member, Tape Editorial Board Committee, North American Society of Pacing and Electrophysiology, 1990-Present  
Editorial Consultant, Journal of Electrocardiology, 1988-present

3. Invited and special lectures of clinical and service relevance

4. Consultantships

AtriCure, Inc  
Guidant Corp.  
Symphony Medical  
Biosense Webster, Inc  
BioControl, Ltd

5. Professional service to the community

6. Other

**IX. MEMBERSHIPS, HONORS, AWARDS and SPECIAL RECOGNITION**

1. Scholarly, Professional and Scientific Memberships

American Physiological Society  
American Heart Association  
American College of Cardiology (Fellow)  
North American Society of Pacing and Electrophysiology (Founding Member)  
Oklahoma Academy of Science  
Oklahoma Cardiac Society  
International Society for Computerized Electrocardiography (Founding Member)

2. Awards, Honors, Special Recognition

Office of Technology Development, University of Oklahoma, Innovator Award: Nanomagnetic Drug Delivery, 2011

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North American Society of Pacing and Electrophysiology, Pioneers in Cardiac Pacing and Electrophysiology Award, 1989

North American Society of Pacing and Electrophysiology, Mark C. Lidwell Traveling Fellowship Award, 1989

Special Contribution Award for unique contribution to the Veterans Administration, September 28, 1988

Service Award, 20 years of service to the United States Government, September 19, 1988

Veterans Administration Research Career Scientist Award, 1986

Outstanding Performance Award, Veterans Administration Medical Center, 1984

Oklahoma Academy of Scientist Merit Award, 1983