

William H. Sauer, MD

*Curriculum Vitae*

**1. Personal History**

Current Positions: Associate Professor of Medicine  
Director of Cardiac Electrophysiology  
Division of Cardiology  
*University of Colorado School of Medicine*

Clinical Cardiac Electrophysiologist  
*University of Colorado Hospital*  
*Denver Health Medical Center*  
*Denver Veterans Administration Medical Center*  
*Valley View Hospital*

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**2. Education**

Pre-Doctoral Education:

9/1991 – 5/1995	University of Pennsylvania School of Engineering and Applied Sciences and College of Arts and Sciences Bachelor of Science, Bioengineering ( <i>cum laude</i> ) Bachelor of Arts, Biology ( <i>cum laude</i> )
8/1995 – 5/1999	University of Pennsylvania School of Medicine Medical Doctorate Certificate in Clinical Research Methods

Postgraduate Training and Fellowship Appointments:

6/1999 - 6/2001	Resident, Internal Medicine Hospital of the University of Pennsylvania
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University of Pennsylvania School of Medicine

7/2001 - 6/2003      Fellow, Cardiovascular Medicine  
Hospital of the University of Pennsylvania  
University of Pennsylvania School of Medicine

7/2003 – 6/2005      Fellow, Clinical Cardiac Electrophysiology  
Hospital of the University of Pennsylvania  
University of Pennsylvania School of Medicine

7/2005 – 6/2006      Research Fellow  
Division of Cardiovascular Medicine  
University of Pennsylvania School of Medicine

**3. Academic Appointments**

1/2012 – Present      Associate Professor of Medicine  
University of Colorado

1/2008 – Present      Director of Cardiac Electrophysiology  
Division of Cardiology  
University of Colorado

7/2006 – 12/2011      Assistant Professor of Medicine  
University of Colorado

**4. Hospital, Government or Other Professional Positions**

5/2010 – 7/2012      Consultant, MedSolutions, Inc.

1/2009 – 1/2015      Director, University Outreach Arrhythmia Clinic  
Staff Physician, University Outreach Arrhythmia Clinic  
Valley View Hospital, Glenwood Springs, CO

3/2007 – Present      Consultant, ARCA Discovery, Inc.

7/2006 – Present      Director of Cardiac Electrophysiology Laboratories,  
Cardiac and Vascular Center  
University of Colorado Hospital

7/2006 – Present      Staff Electrophysiologist  
Denver Health Medical Center

7/2002 – 6/2006      Staff Physician, Alderfer & Travis Cardiology, P.C. and  
Grandview Hospital, Sellersville, PA

## Summary of Professional Clinical Activity

My clinical responsibilities are centered on my role as Director of Cardiac Electrophysiology at the University of Colorado School of Medicine. Over the past eight years, I have successfully developed an active clinical service at the University of Colorado Hospital and assisted in the development of the clinical programs at Denver Health Medical Center, the Denver Veterans Administration Medical Center, and other outreach practice sites. Although the cardiac electrophysiology program was present when I joined the faculty in July 2006, there was only one faculty member based at Denver Health Medical Center and the atrial fibrillation ablation, ventricular arrhythmia ablation, and lead extraction programs did not exist. With the creation of these expanded clinical services, in addition to the improvement and development of the existing arrhythmia management services, I was able to dramatically increase the clinical volume and recruit and retain nine additional faculty members. An aggressive campaign to increase referral sources, including the creation of arrhythmia outreach clinics and local educational programs also contributed to this growth.

I hold a weekly arrhythmia clinic and am performing procedures in the University of Colorado Hospital Electrophysiology Laboratories two to three times per week. Most of these procedures are ablations of complex arrhythmias (atrial fibrillation and ventricular tachycardia); however, I also perform device implantations, electrophysiologic studies, and ablation of supraventricular tachycardia.

The faculty based at the University of Colorado Hospital share the responsibilities of the inpatient arrhythmia consultative service and the interpretation of system-wide electrocardiograms, outpatient telemetry monitors, and implanted device interrogations throughout the year. In addition, I voluntarily attend on the cardiac intensive care unit teaching service 2 weeks per year.

### **5. Honors, Special Recognitions, and Awards**

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| 1994 | <i>Nassau Award for Undergraduate Research</i><br>Research grant and stipend awarded to the University of Pennsylvania undergraduate with the highest scoring summer research proposal. Research proposal recognized with award: "Identification and Characterization of Fragile-X Related Proteins." Advisor: Gideon Dreyfus, PhD, Department of Biochemistry and Biophysics, University of Pennsylvania School of Medicine. |
| 1995 | <i>National Institutes of Health Minority International Research Training Award</i><br>National award competition granted to undergraduate or medical students from underrepresented minority groups. Travel and stipend provided for research training abroad. Projects awarded:   |

“Characterization of the *Drosophila* RAD-2 gene, Chromosomal in-situ hybridization of the RAD-2 gene.” Advisor: David Finnegan, PhD, Institute of Cell and Molecular Biology, University of Edinburgh.

- 1998 *Charles H. Hovies Scholarship*  
One-year partial tuition scholarship awarded to a University of Pennsylvania School of Medicine student demonstrating superior academic achievement in the clinical sciences.
- 2001 *Edward W. Holmes Resident Research Award*  
Awarded to the resident physician training at the University of Pennsylvania Health System with the highest score assigned to original research papers submitted for competition. Project recognized with award: “Cigarette Yield and the Risk of Myocardial Infarction in Smokers.”
- 2002 *Astra-Zeneca Young Investigator Award*  
National competition among residents, fellows, and junior faculty for recognition of outstanding original research. Awards are given to highest scoring presentations among selected finalists based on presentation to panel of faculty judges. Project recognized with award (2<sup>nd</sup> Place): “The Effect of Antidepressants and Their Relative Affinity for the Serotonin Transporter on the Risk of Myocardial Infarction.”
- 2002 *ACCF/Bristol-Myers Squibb Scholar Award*  
National competition for expenses related to attendance at the American College of Cardiology Scientific Sessions. Twenty cardiology fellows are selected based on major involvement in research activities leading to presentations and publications during cardiovascular-related subspecialty training.
- 2002 *Stanley E. Bradley Fellow Research Award*  
Awarded to the physician training in a subspecialty within the Department of Internal Medicine at the University of Pennsylvania with the highest score assigned to original research papers submitted for competition. Project recognized with award: “Selective Serotonin Reuptake Inhibitors and Myocardial Infarction.”
- 2003 *Astra-Zeneca Young Investigator Award*

National competition among residents, fellows, and junior faculty for recognition of outstanding original research in the field of cardiovascular medicine. Awards are given to highest scoring presentations among selected finalists based on presentation to a panel of faculty judges. Project recognized as finalist for award: “Thiazolidinediones and Prevention of Myocardial Infarction.”

- 2004 *Elizabeth Barrett-Connor Research Award*  
International competition among residents, fellows, and junior faculty for recognition of outstanding original research in the area of cardiovascular epidemiology. Five finalists compete at the American Heart Association Scientific Sessions. Awards are given to the highest scoring presentations as judged by a panel of faculty from the American Heart Association Council on Epidemiology and Prevention. Project recognized as finalist for award: “Insulin Sensitizing Drug Use is Associated with a Reduced Risk of Myocardial Infarction in Type 2 Diabetics.”
- 2005 *Mary E. Groff Fellowship Award in Clinical Research Methods*  
Competitive scholarship including stipend and full tuition for students enrolled in the Clinical Research Certificate Program at the Center for Clinical Epidemiology and Biostatistics, University of Pennsylvania School of Medicine. Selection is based on the candidate’s potential for future contributions to clinical research.
- 2005 *Cardiovascular Medicine Distinguished Fellow Teaching Award*  
Recognition awarded to the physician training as a fellow in the Department of Internal Medicine, Cardiovascular Medicine Division for contribution to medical student, resident, and fellow education at the University of Pennsylvania.
- 2006 *St. Jude Medical Thomas Lewis Award*  
International competition among residents, fellows, and junior faculty for recognition of outstanding original research in the area of cardiac electrophysiology. Awards are given to the highest scoring presentations as judged by a panel of faculty at the Madrid Arrhythmia Symposium. Project recognized with award: “Assessment of Non-Pulmonary Vein Triggers of Atrial Fibrillation”
- 2006 *Heart Rhythm Society Fellows Clinical Research Award*

International competition among cardiac electrophysiology fellows for recognition of outstanding original clinical research in the area of cardiac electrophysiology. The award was given to the highest scoring abstract submitted to the Heart Rhythm Society Scientific Sessions. Project recognized with award: "A Novel Pacing Maneuver to Identify the Presence of a Slowly Conducting Concealed Accessory Pathway"

- 2007 *University of Colorado Hospital President's Award for World Class Care*  
Awarded for recognition of clinical excellence at the University of Colorado Hospital.
- 2007 *University of Colorado Denver, Department of Medicine Research Award*  
Awarded to the faculty member with the highest scoring research presentation. Project recognized with award: "The Homozygous Arg389 Beta1-adrenergic Receptor Genotype is Associated with Improved Sudden Death Protection with Bucindolol Compared to Gly389 Carriers."
- 2008 *Elected to Fellow of the American College of Cardiology*
- 2009 *Elected to Fellow of the Heart Rhythm Society*
- 2010 *University of Colorado Division of Cardiology Outstanding Faculty Award*
- 2009 - 2016 *5280 Magazine Best Doctors in Denver (Cardiac Electrophysiology)*  
Annual award based on survey results from physicians practicing in the Denver metropolitan area.
- 2010 - 2016 *Castle Connolly Top Doctor*  
National recognition of physicians based upon unsolicited nominations.

## **6. Membership in Professional Organizations**

National Societies:

American Board of Internal Medicine  
*Cardiovascular Disease Examination*  
*Faculty Reviewer, 2007 - Present*

American Heart Association  
*Early Career Member, 2006 - Present*

Heart Rhythm Society  
*Member, 2005 – Present*  
*Fellow, 2009 – Present*

American College of Cardiology  
*Fellow-in-Training Representative, 2001-2005*  
*Member, 2005 – Present*  
*Fellow, 2008 – Present*

Heart Failure Society of America  
*Member, 2010 – Present*

International Society for Holter and Noninvasive Electrocardiology  
*Member, 2010 – Present*

International Society for Electrocardiology  
*Member, 2010 - Present*

Local Societies:

Colorado Chapter of the Sudden Cardiac Arrest Association  
*Chairman of Medical Advisory Board, 2008 – Present*  
*Member, 2008 - Present*

Colorado Chapter of the American College of Cardiology  
*Member, 2006- Present*

Philadelphia County Medical Society  
*Member, 1999-2006*

Pennsylvania Chapter of the American College of Cardiology  
*Fellow Representative to the Executive Council, 2002-2004*  
*Chairman of Fellows-in-Training Council, 2002-2004.*  
*Member, 2002 – 2006*

**7. Major Committee and Service Responsibilities**

Committees at the University of Pennsylvania:

1/1997 – 1/1999	School of Medicine Admissions Committee <i>Student Member</i>
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1/1997 – 1/1999	University Honorary Degree Committee <i>Representative from the School of Medicine</i>
1/1997 – 1/1998	Internal Review Committee Evaluating the Department of Pathology and Laboratory Medicine <i>Student Representative</i>
6/2000 – 7/2001	Intensive Care Units Staffing Committee <i>Resident Physician Representative</i>
3/2001 – 6/2005	Drug Utilization and Effects Committee <i>Fellow Representative</i>
7/2006 – Present	Alumni Secondary School Committee, Undergraduate Admissions Office <i>Representative from Colorado</i>

Committees at the University of Colorado and University of Colorado Health:

9/2015 – Present	Technology Assessment Committee <i>University Hospital Representative</i>
5/2010 – Present	Cardiac and Vascular Center Information Systems Governance Council <i>Faculty Member</i>
4/2010 – Present	Cardiac and Vascular Center Patient Safety Council <i>Faculty Member</i>
3/2009 – Present	Cardiac and Vascular Center Strategic Planning Committee <i>Team Leader, Complex Electrophysiology</i>
7/2006 – Present	Cardiac and Vascular Center Quality Assessment and Improvement Committee <i>Representative, Section of Electrophysiology</i>
9/2006 – Present	School of Medicine Admissions Committee <i>Faculty Member</i>
7/2006 – 6/2008	Fitzsimons Transition Committee <i>Representative, Division of Cardiology</i>

Committees at the Heart Rhythm Society:



5/2016 – Present	Scientific and Clinical Documents Committee <i>At-Large Member</i>
5/2014 – 5/2016	Governance Committee <i>At-Large Member</i> <i>Awards Subcommittee Member</i>
5/2013 – 5/2014	Cardiac Sarcoidosis Expert Consensus Clinical Document <i>Writing Committee Chair</i>
5/2012 – 5/2014	Continuing Medical Education Committee <i>At-Large Member</i>
7/2007 – Present	Scientific Sessions Program Committee <i>Abstract Grader (Provocative Cases)</i>
5/2009 – 5/2012	Education Committee <i>At-Large Member</i>
5/2007 – 5/2009	Health Policy Committee <i>At-Large Member</i>

Committees at the American College of Cardiology:

3/2010 – Present	Scientific Sessions Program Committee <i>Abstract Grader (Ventricular Arrhythmia Ablation)</i>
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**8. Licensure and Board Certification**

Specialty Certification:

Diplomat, American Board of Internal Medicine (2002)  
Cardiovascular Diseases (2006)  
Clinical Cardiac Electrophysiology (2007)

International Board of Heart Rhythm Examiners  
Certified Cardiac Device Specialist (2011)

Licensure:

Commonwealth of Pennsylvania (2002)  
State of Colorado (2006)

## 9. Inventions, Intellectual Property and Patents Held or Pending

**Sauer WH**, Cazares SM, Li D. *Therapy Delivery for Identified Tachyarrhythmia Episode Types*.

Filing Number US60/861,594; Application No. 20080125824;

Filing Date: November 29, 2006

Patent Date: May 10, 2011

Patent Number: 7,941,208 B2

**Sauer WH**, Nguyen DT. *Partiality Insulated Focused Radiofrequency Ablation Catheter*.

Filing Number. 2874.08PR; Application No. Pending

Filing Date: November 14, 2014

Patent Date: February 10, 2015

Patent Number: Pending

**Sauer WH**, Nguyen DT. *Constructs, Agents and Methods for Facilitated Ablation of Cardiac Tissue*.

Provisional Application No. 62/331,745

Filing Date: May 4, 2016

Patent Number: Pending

**Sauer WH**, Nguyen DT. *Facilitation of Cardiac Ablation Using Electrically and Thermally Conductive Nanomaterials*. Filed with University of Colorado Technology Transfer Office 2013

**Sauer WH**, Nguyen DT. *Structural Reinforcement and Electrophysiologic Enhancement of Infarcted Myocardium Using Carbon Nanotubes and Nanomaterials*. Filed with University of Colorado Technology Transfer Office 2013

**Sauer WH**, Nguyen DT. *A Novel Cardiac Ablation Catheter Using Nanoparticle Mediated Radiofrequency Energy Delivery*. Filed with University of Colorado Technology Transfer Office 2013

**Sauer WH**, Sung RK. *Bipolar Electrical Sensing and Radiofrequency Emitting Needle*. Filed with University of Colorado Technology Transfer Office 2013

**Sauer WH**, Sung RK. *Cooled Radiofrequency Ablation Catheter with Retractable Needle*. Filed with University of Colorado Technology Transfer Office 2013

**Sauer WH**, Nguyen DT. *Electromagnetic Radiofrequency Ablation Catheter*. Filed with University of Colorado Technology Transfer Office 2015

## 10. Review and Referee Work

8/2006 – Present      Manuscript Reviewer, *Heart Rhythm*

9/2006 – Present	Manuscript Reviewer, <i>Pacing and Clinical Electrophysiology</i>
2/2007 – Present	Manuscript Reviewer, <i>Journal of Cardiovascular Pharmacology</i>
3/2007 – Present	Manuscript Reviewer, <i>Expert Opinion on Pharmacotherapy</i>
4/2007 – Present	Manuscript Reviewer, <i>Journal of Cardiovascular Electrophysiology</i>
7/2007 – Present	Abstract Reviewer, Heart Rhythm Society Scientific Sessions, <i>Heart Rhythm Supplement</i>
9/2007 – Present	Manuscript Reviewer, <i>Pharmacoepidemiology and Drug Safety</i>
1/2008 – Present	Manuscript Reviewer, <i>American Journal of Cardiology</i>
2/2008 – Present	Manuscript Reviewer, <i>American Heart Journal</i>
7/2008 – Present	Abstract Reviewer, American Heart Association Scientific Sessions Abstract Reviewer, <i>Circulation Supplement</i>
1/2009 – Present	Manuscript Reviewer, <i>Journal of the American College of Cardiology</i>
7/2009 – Present	Abstract Reviewer, American College of Cardiology Scientific Sessions, <i>Journal of the American College of Cardiology Supplement</i>
1/2010 – Present	Manuscript Reviewer, <i>Circulation</i>
9/2010 – Present	Associate Editor, <i>The Journal of Innovations in Cardiac Rhythm Management</i>
9/2014 – Present	Associate Editor, <i>Heart Rhythm Case Reports</i>
1/2015 – Present	Manuscript Reviewer, <i>Circulation: Arrhythmia and Electrophysiology</i>
3/2015 – Present	Manuscript Reviewer, <i>Journal of the American College of Cardiology: Clinical Electrophysiology</i>

## 11. Invited Extramural Lectures and Presentations

### National and International Meetings (selected)

“Younger Age at Time of Symptom Onset is Associated with the Presence of Non-Pulmonary Vein Triggers of Atrial Fibrillation.” *American Heart Association Scientific Sessions*. New Orleans, Louisiana, November 8, 2004

“Increasing Left Ventricular Pacing Output Decreases Interventricular Conduction Time in Patients with Biventricular Pacing Systems.” *Heart Rhythm Scientific Sessions*. New Orleans, Louisiana, May 9, 2005

“A Novel Pacing Maneuver to Identify the Presence of a Concealed Accessory Pathway.” *Heart Rhythm Scientific Sessions*. Boston, Massachusetts, May 12, 2006

“Left Ventricular Lead Proximity to the Anterolateral Papillary Muscle Insertion Site is Associated with Reduction of Mitral Regurgitation in Patients with Left Ventricular

Dysynchrony.” *American Heart Association Scientific Sessions*. Dallas, Texas, November 12, 2005

“Left Ventricular Lead Positioning over Infarcted Myocardium Results in Less Improvement in Ejection Fraction in Patients with Ischemic Cardiomyopathy and Cardiac Resynchronization Therapy.” *American College of Cardiology Annual Scientific Sessions*. Atlanta, Georgia, March 12, 2006.

“Normalization of Left Ventricular Ejection Fraction after Cardiac Resynchronization Therapy is More Frequent in Patients with Non-Ischemic Cardiomyopathy.” *American College of Cardiology Scientific Sessions*. Atlanta, Georgia, March 13, 2006

“Heart Failure: Pathophysiology of Ventricular Dyssynchrony.” Session Moderator. *American Heart Association Scientific Sessions*. Chicago, Illinois, November 12, 2006

“Implantable Cardioverter-Defibrillator and Cardiac Resynchronization Therapy Technology: Latest Developments.” Session Moderator. *Heart Rhythm Scientific Sessions*. Denver, Colorado, May 10, 2007

“Dual Chamber Sequential Extrastimulation Will Extend AV Nodal Refractoriness and Reveal a Concealed Accessory Pathway.” *Heart Rhythm Scientific Sessions*. Denver, Colorado, May 11, 2007

“Implantable Pacing and Defibrillation Lead Management.” *Saitama Pacing Conference*. Tokyo, Japan, December 14, 2007

“Strategies to Reduce Sudden Death beyond ICD Implantation.” *Seventeenth Annual Cardiovascular Conference*, Beaver Creek, Colorado, February 10, 2008

“Core Curriculum: Shock Updates.” Session Moderator. *Heart Rhythm Scientific Sessions*. San Francisco, California, May 16, 2008

“Sudden Death Risk Stratification in Cardiac Sarcoidosis.” *Heart Rhythm Scientific Sessions*. Boston, Massachusetts, May 14, 2009

“Core Curriculum: Controversies in Cardiac Resynchronization Therapy.” Session Moderator. *Heart Rhythm Scientific Sessions*. Boston, Massachusetts, May 15, 2009

“Arrhythmias Related to Infiltrative Heart Disease.” *Nineteenth Annual Cardiovascular Conference*, Beaver Creek, Colorado, February 7, 2010

“Implantable Cardioverter Defibrillators in Patients Older than 65: Is it Justified?” *Heart Rhythm Society Scientific Sessions*, Denver, Colorado, May 14, 2010

“Basic Electrophysiology Concepts Applied to Clinical Practice.” *EP 101 Boston Scientific Fellows Education Program*, Boston, Massachusetts, June 4, 2010

“The Evolving Role of Ventricular Tachycardia Ablation.” *Twentieth Annual Cardiovascular Conference*, Beaver Creek, Colorado, February 13, 2011

“Left Atrial Appendage Occlusion Devices: Current Status and EP Perspective.” *Twentieth Annual Cardiovascular Conference*, Beaver Creek, Colorado, February 16, 2011

“Catheter Ablation for Treatment of Ventricular Tachycardia Related to Sarcoidosis.” *Heart Rhythm Society Scientific Sessions*, San Francisco, California, May 5, 2010

“Arrhythmogenic Right Ventricular Cardiomyopathy versus Cardiac Sarcoidosis: Diagnosis and Management.” *Heart Rhythm Society Scientific Sessions*, San Francisco, California, May 6, 2011

“Programming to Avoid Unnecessary Shocks,” and “Ablation of Premature Ventricular Ectopy.” *21st Annual Cardiovascular Conference*, Beaver Creek, Colorado, February 14, 2012

“Meet the Experts: The Risks versus Benefits of Defibrillation Threshold Testing.” *American College of Cardiology Annual Scientific Sessions*, Chicago, Illinois, March 24, 2012

“Management of Sudden Death Risk in Cardiac Sarcoidosis: Who Needs an Implantable Cardiac Defibrillator?” *Heart Rhythm Society Scientific Sessions*, Boston, Massachusetts, May 10, 2012

“How To Session: Heart Failure Physicians Learn to Read the ICD/CRT Device Reports.” *Heart Failure Society of America Scientific Sessions*, Seattle, Washington, September 11, 2012.

“Diagnosis and Therapy of Cardiac Sarcoidosis.” *Heart Failure Society of America Scientific Sessions*, Seattle, Washington, September 12, 2012.

“Electrophysiologic Consequences of Cardiac Sarcoidosis.” *World Association of Sarcoidosis and Granulomatous Diseases Annual Meeting*, Cleveland, Ohio, October 6, 2012

“Cardiac Sarcoidosis: Electrophysiologic Manifestations and Treatment.” *American College of Cardiology Scientific Sessions*. San Francisco, California, March 11, 2013

“The Use Of Cardiac Magnetic Resonance Imaging In The Management Of Patients with Suspected Sarcoidosis.” *American College of Cardiology Scientific Sessions*, San Francisco, California, March 11, 2013

“Interpretation of Intracardiac Ventricular Electrograms During Ventricular Tachycardia Ablation in Cardiac Sarcoidosis.” *Heart Rhythm Society Scientific Sessions*, Denver, Colorado, May 10, 2013

“Ablation of Atrial Flutter” and “Ablation of Atrial Tachycardia” *EP 101 Boston Scientific Fellows Education Program*, Boston, Massachusetts, June 3, 2013

“Defibrillator Programming: Mode, Rate, Detection, and Therapy” *Heart Failure Society of America Scientific Sessions*, Orlando, Florida, September 21, 2013

“Combined Heart Failure Society of America and Heart Rhythm Society Session: Implementing the Best Cardiac Implanted Electrical Device Therapy for Your Patient” *Heart Failure Society Scientific Sessions*, Orlando, Florida, September 21, 2013

“Sudden Death Risk Stratification and Role of the Implantable Cardiac Defibrillator in Cardiac Sarcoidosis” *8<sup>th</sup> International Symposium on Ventricular Arrhythmias*, Philadelphia, Pennsylvania, October 19, 2013

“Prevention and Management of Complications during Complex Ablation” and “Understanding the Role of Entrainment in Arrhythmia Diagnosis.” *Biosense-Webster Fellows Educational Conference at EP Live*, Austin, Texas, March 2, 2014.

“2014 HRS Expert Consensus Statement on the Diagnosis and Management of Arrhythmias Associated with Cardiac Sarcoidosis: Indications for Implantable Cardiac Defibrillator Implantation.” *Heart Rhythm Society Scientific Sessions*, San Francisco, California, May 14, 2014

“Cardiac Sarcoidosis: When is an Implantable Cardiac Defibrillator Indicated.” *Heart Rhythm Society Scientific Sessions*, San Francisco, California, May 15, 2014

“Approach to the Diagnosis and Ablation of Left Atrial Flutter after Atrial Fibrillation Ablation.” *CardioStim 2014*, Nice, France, June 18, 2014

“HRS Consensus Statement: Management of Arrhythmias in Cardiac Sarcoidosis” *9<sup>th</sup> International Symposium on Ventricular Arrhythmias*, New York City, New York, October 24, 2014

“Management of Special Etiologies of Heart Failure: Cardiac Sarcoidosis” *American Heart Association Scientific Sessions*, Chicago, Illinois, November 19, 2014

“Ventricular Tachycardia and Sudden Cardiac death in Cardiac Sarcoidosis” *Heart Rhythm Society Scientific Sessions*, Boston, Massachusetts, May 13, 2015

“Leveraging Scientific Advances to Better Understand Cardiac Sarcoidosis and Improve Outcomes” *National Institutes of Health Cardiopulmonary Scientific Workshop*, Bethesda, MD, September 1, 2015

“Treatment of Ventricular Arrhythmias in Cardiac Sarcoidosis” *American Heart Association Scientific Sessions*, November 14, 2015

“Predicting Recurrence after Ablation of Ventricular Tachycardia: Who is at Special Risk?” *7<sup>th</sup> Annual Euro VT/VF Meeting*, Berlin, Germany, December 4, 2015

“Facilitated Radiofrequency Ablation.” *Stanford Biodesign Arrhythmia Technologies Retreat*, Palo Alto, California, May 4, 2016

“Implanted Defibrillators in Patients with Cardiac Sarcoidosis and Syncope.” *Heart Rhythm Society Scientific Sessions*, San Francisco, California, May 5, 2016

“Expert Advice and Practical Approach to Cardiac Ablation For Early Career: Practical Steps in Starting a New Clinical Cardiac Electrophysiology Service Line and Laboratory.” *Heart Rhythm Society Scientific Sessions*, San Francisco, California, May 6, 2016

“Cardiac Sarcoidosis.” *American Thoracic Society Scientific Sessions*, San Francisco California, May 15, 2016

“Ablation of Atrial Tachycardia and Atrial Flutter.” *EP 101 Boston Scientific Fellows Education Program*, Boston, Massachusetts, June 4, 2016

“Indications for ICD Therapy in Cardiac Sarcoidosis.” *CardioStim 2016*, Nice, France, June 9, 2016

“Different Substrate Mapping and Ablation Strategies for Patients with Unstable Ventricular Tachycardia.” *CardioStim 2016*, Nice, France, June 10, 2016

“Mapping of Ventricular Tachycardia’s: Fast Ventricular Tachycardia and Ventricular Fibrillation.” *CardioStim 2016*, Nice, France, June 10, 2016

“Ablation of Ventricular Tachycardia Related to Cardiac Sarcoidosis.” *Japanese Heart Rhythm Society*, Sapporo, Japan, July 14, 2016

#### Local and Regional Meetings (selected)

“Antiarrhythmic Drug Therapy for Atrial Fibrillation: Before and After Ablation.” *EP in Aspen V*. Aspen, Colorado, October 5, 2007

“Improving the Safety and Efficacy of Atrial Fibrillation Ablation.” *University of Colorado Hospital Division of Cardiology Grand Rounds*. Aurora, Colorado, March 21, 2008.

“Which Arrhythmias can be Ablated without the Need for Drug Trials.” *EP in Aspen VI*. Aspen, Colorado, September 12, 2008.

“Syncope in Young Adults.” *Wardenberg Student Health Continuing Medical Education Series*. Boulder, Colorado, August 25, 2009.

“Ablative Techniques for Atrial Fibrillation and Ventricular Tachycardia,” and “Device Therapy for Treatment of Congestive Heart Failure.” *University of Kansas Continuing Medical Education Heart Conference*. Hays, Kansas, September 11, 2009

“Treatment Strategies for the Management of Atrial Fibrillation.” *Rocky Mountain Hospitalists Conference*. Denver, Colorado, October 6, 2009

“Prevention of Sudden Death in Patients who already have an Implanted Defibrillator.” *University of Miami Cardiology Grand Rounds*, Miami, Florida, October 13, 2009

“Electrogram Analysis for Arrhythmia Detection and Cardiovascular Health.” *Medtronic Cardiac Rhythm Disease Management Research Conference, Mounds View*, Minnesota, January 4, 2010

“Strategies for Improving Survival in Patients with Ventricular Arrhythmias and an Implanted Cardioverter Defibrillator.” *Beth Israel Deaconess Medical Center Electrophysiology Conference*, Boston, Massachusetts, April 21, 2010

“Debate Protagonist: Catheter Ablation Should be offered to Anyone Who Receives an ICD Shock.” *EP in Aspen 2010*, Aspen, Colorado, August 21, 2010.

“Management of Atrial Fibrillation.” *Rocky Mountain Hospitalists Conference*. Denver, Colorado, October 6, 2011

“Anesthesia Considerations for Complex Arrhythmia Ablation.” *University of Colorado Hospital Department Anesthesia Grand Rounds*. Aurora, Colorado, August 19, 2012

“Diagnosis and Management of Cardiac Sarcoidosis.” *Sentara Health Cardiology Grand Rounds*, Norfolk, Virginia, September 17, 2013

“Challenges in the Management of Arrhythmias Related Cardiac Sarcoidosis.” *Mount Sinai Medical Center Cardiology Grand Rounds*, Miami Beach, Florida, February 26, 2014

“Innovative Strategies for Improving the Safety and Efficacy of Cardiac Ablation.” *Department of Medicine Innovation Research and Innovation Conference*. Aurora, Colorado, March 13, 2014



“Diagnosis and Management of Cardiac Sarcoidosis” *Stanford University School of Medicine Division of Cardiology Research Conference*, Palo Alto, California, January 12, 2015

## 12. Teaching Record

### Summary of Professional Teaching Activity

An important aspect of my professional life is the education of medical students, residents, and fellows. I consider it a privilege to be able to participate in medical education and take this responsibility seriously. The vast majority of time devoted to teaching revolves around my role as fellowship director for the clinical cardiac electrophysiology training program. Although there are two electrophysiology fellows enrolled in the program, residents and general cardiology fellows interested in arrhythmia management participate in the daily educational activities that I have established. Every morning, there is a structured conference devoted to arrhythmia education and includes the core curriculum lecture series, device management conference, arrhythmia management conference, electrophysiologic study case conference, mortality and morbidity conference, research conference, and journal club. I devote a total of 8 hours per week to didactic teaching during this time. In addition to this, every clinical activity that I am involved with includes the active participation of a trainee who is supervised by me. Each procedure includes teaching of electrophysiologic principles and techniques. Additional teaching responsibilities include mentoring junior faculty in the training of complex procedures, organizing local community educational programs, and directing an annual continuing medical education program (Colorado Arrhythmia Symposium in Boulder).

### Graduate Medical Education Lectures and Presentations

A list of lectures given as part of weekly Arrhythmia Clinical Case Conference, Device Management Conference, Cardiac Electrophysiology Core Lecture Conference, Cardiac Electrophysiology Journal Club, Cardiac Electrophysiology Research Conference, and Electrocardiography Conference can be provided upon request.

### Educational Administration Positions

9/2008 – Present	Director, Colorado Arrhythmia Symposium Continuing Medical Education Program
7/2008 – Present	Director, Clinical Cardiac Electrophysiology Fellowship Program, University of Colorado
7/2006 – Present	Director, Cardiac Electrophysiology Conference, University of Colorado Hospital

7/2006 – 6/2011 Course Director, Cardiac Electrophysiology for General Cardiology Fellows, University of Colorado Hospital

7/2006 – 6/2011 Director, Electrocardiography Conference, University of Colorado Hospital

Teaching Awards

- 2005 *Cardiovascular Medicine Distinguished Fellow Teaching Award*  
Recognition awarded to the physician training as a fellow in the Department of Internal Medicine, Cardiovascular Medicine Division for contribution to medical student, resident, and fellow education at the University of Pennsylvania.
- 2010 *University of Colorado Division of Cardiology Teaching Award*  
Awarded to the faculty member in the University of Colorado Division of Cardiology for contributions to education as determined by cardiology fellows

### 13. Research and Scholarship

#### Summary of Professional Research and Scholarly Activity

I have received training and gained experience in a wide array of research methods including those used in molecular genetics, observational clinical research, clinical trials, outcomes assessment, and engineering/biophysics experimentation. Since my specialization in cardiology and cardiac electrophysiology, I have focused my research and scholarship on the diagnosis and treatment of cardiac arrhythmias. Under this overarching theme, I have identified 3 broad and overlapping areas where I have initiated projects with a goal of generating new knowledge and technology as a contribution to science and education in the field of cardiovascular medicine.

- 1) *Diagnosis of Cardiac Arrhythmias and Identification of Patient Populations Responsive to Treatment.* I have written several manuscripts and case reports describing techniques used in the clinic or electrophysiology laboratory for diagnosing cardiac arrhythmias in order to guide therapy. These projects include the identification and characterization of certain high-risk populations such as those with certain genetic polymorphisms, cardiac sarcoidosis, hypertrophic cardiomyopathy, and congenital heart disease. I have specifically focused on cardiac sarcoidosis as a rare and under-recognized arrhythmogenic disorder and have developed or established of several collaborative projects characterizing this arrhythmogenic disease.
- 2) *Clinical Assessment of Catheter Ablation Strategies for the Treatment for Cardiac Arrhythmias.* As an extension of my clinical expertise and interest in catheter ablation, I have collected and analyzed data for the purpose of evaluating and improving the safety and efficacy of this procedure. Projects include evaluating the use of ICD technology and stored electrograms for guiding ablation of ventricular arrhythmias, clinical application of novel ablation strategies, as well as observational research on procedural outcomes.
- 3) *Development of New Technologies for Cardiac Ablation.* I am interested in the application of biophysical and engineering principles used in the cardiac electrophysiology laboratory to improve cardiac ablation. I have established the University of Colorado Ablation Biophysics Laboratory (2013) and the Anschutz Medical Campus Large Animal Cardiovascular Catheterization Laboratory (2015) where we are evaluating established and experimental ablation technologies. A number of innovative therapeutic advances are presently in development in this laboratory including strategies to enhance or facilitate energy delivery to improve ablation efficacy and safety.

## 14. Grant Support

1/2015 – 1/2017	Establishment of the Anschutz Medical Campus Large Animal Cardiovascular Catheterization Laboratory (Principle Investigator and Director) Funding Source: University of Colorado School of Medicine Academic Enrichment Fund Total Direct Costs: \$140,000
9/2014 – 1/2017	Bioscience Discovery and Evaluation Grant (BDEG) – Innovative Strategies for Improving the Safety and Efficacy of Cardiac Ablation (Principle Investigator) Funding Source: State of Colorado Total Direct Costs: \$190,000
7/2014 – 6/2018	GENETIC-AF: A Genotype-Directed Comparative Effectiveness Trial of Bucindolol and Metoprolol CR/XL for the Prevention of Recurrent Symptomatic Atrial Fibrillation in Patients with Heart Failure (Steering Committee Member and Site Investigator) Funding Source: Arca Biopharma, Inc. Total Direct Costs: \$90,000 (estimated)
1/2014 – 12/2016	Longitudinal Surveillance Study of the 4-SITE Lead/Header System (Site Investigator) Funding Source: Boston Scientific, Inc. Total Direct Costs: \$180,000 (estimated)
9/2013 – 8/2016	Novel and Experimental Therapeutic Applications of Radiofrequency Energy to Myocardium at the University of Colorado Ablation Biophysics Laboratory (Lab Director and Principle Investigator) Funding Source: Biosense-Webster, Inc. Total Direct Costs: \$397,459
9/2011 – 8/2016	Human Trial of Allosteric Modulator Alpha-7 Nicotinic Receptors in Schizophrenia (Co-Investigator: Arrhythmia and Electrocardiographic Safety Assessment – 5% Effort) Funding Source: NIH 1U01MH094247-01 Total Direct Costs: \$2,237,158
1/2012 – 6/2015	ASPIRE: Early Ablation Therapy for the Treatment of Ischemic Ventricular Tachycardia in Patients with Implantable Cardioverter Defibrillators

(Principle Investigator)  
Funding Source: Biosense-Webster, Inc.  
Total Direct Costs (estimated): \$54,000

9/2012 – 6/2014      CARTO 3 System and Real Time Intracardiac Ultrasound  
for Ablation of Drug Refractory Recurrent Symptomatic  
Paroxysmal AF: Acute Procedural Outcomes Study  
(Site Investigator)  
Funding Source: Biosense-Webster, Inc.  
Total Direct Costs (estimated): \$30,000

9/2012 – 6/2014      Amplatzer Cardiac Plug Randomized Clinical Trial  
(Site Investigator)  
Funding Source: St. Jude Medical (AGA)  
Total Direct Costs: \$118,300

7/2012 – 6/2014      Catheter Ablation for Prevention of Inappropriate Shocks  
Randomized Controlled Trial (CAPRIS)  
(National Principle Investigator and Steering Committee  
Chair; Event Adjudication Committee Chair)  
Funding Source: Biosense-Webster, Inc.  
Total Direct Costs: \$597,600

7/2010 – 1/2015      PainFree SmartShock Technology Study  
(Co-Investigator)  
Funding Source: Medtronic, Inc.  
Total Direct Costs (estimated): \$36,000

7/2010 – 6/2015      Outcomes of Sleep Disorders in Older Men  
(Co-Investigator: Arrhythmia Outcomes Adjudication –  
5% Effort)  
Funding Source: NIH R01 HL071194-01A1  
Total Direct Costs: \$1,509,815

7/2009 – 6/2014      Shock-Less Implantable Cardioverter-Defibrillator Study  
(Co-Investigator)  
Funding Source: Medtronic, Inc.  
Total Direct Costs (estimated): \$36,000

7/2008 – 6/2014      Cardiac Electrophysiology Fellowship Training Grant  
Funding Sources: Boston Scientific, St. Jude Medical,  
and Medtronic.  
(Fellowship Director)  
Total Direct Costs: \$520,000

1/2009 – 10/2016	<p>Colorado Arrhythmia Symposium Continuing Medical Education Conference  (Program Director)  Funding Sources: Medtronic, Boston Scientific, St. Jude Medical, Biosense-Webster, Sanofi-Aventis  Total Direct Costs: \$508,000</p>
5/2009 – 12/2012	<p>Evaluation of Sudden Death Risk in Cardiac Sarcoidosis  (Principle Investigator)  Funding Source: Medtronic, Inc.  Total Direct Costs: \$70,080</p>
5/2010 – 5/2011	<p>Amplatz Cardiac Plug Feasibility Trial  (Site Investigator)  Funding Source: AGA Medical, Inc.  Total Direct Costs: \$21,430</p>
7/2007 – 6/2010	<p>Registry of AT/AF Episodes in the CRM Device  Population: RATE Registry  (Site Investigator)  Funding Source: St. Jude Medical, Inc.  Total Direct Costs: \$33,750</p>
6/2007 – 6/2010	<p>Evaluation of Cardiac Resynchronization Non-Responder Study (Principle Investigator)  Funding Source: Medtronic, Inc.  Total Direct Costs: \$63,650</p>
3/2008 – 12/2008	<p>Lead Impedance Pilot Study  (Principle Investigator)  Funding Source: Medtronic, Inc.  Total Direct Costs: \$12,200</p>
6/2007 – 6/2008	<p>Rhythm ID Going Head to Head Trial  (Site Investigator)  Funding Source: Boston Scientific, Inc.  Total Direct Costs: \$42,750</p>

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