
Igor R. Efimov, Ph.D., F.A.H.A., F.H.R.S., F.A.I.M.B.E.

Business Address:

Igor Efimov, Ph.D., F.A.H.A., F.H.R.S.
Alisann & Terry Collins Professor and Chairman
Department of Biomedical Engineering
George Washington University
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Washington, DC 20052

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Training:

- 1986 B.Sc./M.Sc. in experimental nuclear physics from Moscow Institute of Physics and Technology, USSR. Experimental part of the project was completed jointly at the Institute of Nuclear Physics, Russian Academy of Sciences, Moscow and at the Institute of High Energy Physics, Protvino, Moscow Region, USSR.
- 4/3/1992 Ph.D. in Biophysics (Biophysics/Biomedical Engineering) from Moscow Institute of Physics and Technology, Moscow, Russia and Institute of Biological Physics, Russian Academy of Sciences, Puschino, Moscow region, Russia.
- 1992-1994 Postdoctoral training. Fast fluorescent imaging and cardiac bioelectricity. University of Pittsburgh, Pittsburgh, PA.
- 1993-1994 Parallel and distributed computational methods and techniques. Pittsburgh Supercomputing Center.

Academic Positions held:

- 2015-present The Alisann & Terry Collins Professor and Chairman, Department of Biomedical Engineering, George Washington University, Washington, DC.
- 2014-present Adjunct Professor, Moscow Institute of Physics and Technology, Moscow, Russia
- 2013-present Visiting Professor, University of Bordeaux Segalen, and L'Institut de rythmologie et modélisation cardiaque (LIRYC), Bordeaux, France.
- 2008-2015 The Lucy and Stanley Lopata Distinguished Professor of Biomedical Engineering, Washington University, St. Louis, MO (Primary Appointment)
- 2010-2015 Professor of Medicine (Cardiology), Washington University School of Medicine
- 2008-2015 Professor of Radiology, Washington University School of Medicine
Professor of Cell Biology and Physiology, Washington University School of Medicine
- 2004-2008 Associate Professor of Biomedical Engineering on the Stanley and Lucy Lopata Endowment, Washington University, St. Louis, MO
Associate Professor of Radiology, Associate Professor of Cell Biology and Physiology, Washington University Medical School, St. Louis, MO

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| 2004-2014 | Adjunct Associate Professor of Biomedical Engineering, Case Western Reserve University, Cleveland OH (secondary appointment) |
| 2002-2004 | Associate Professor of Physiology and Biophysics, Case Western Reserve University, Cleveland OH (secondary appointment) |
| 2000-2004 | Elmer L. Lindseth Associate Professor of Biomedical Engineering, Case Western Reserve University, Cleveland OH |
| 1998-2000 | Assistant Staff, Department of Cardiology, Cleveland Clinic Foundation, Cleveland OH |
| 1998-2000 | Assistant Staff (secondary appointment), Department of Molecular Cardiology, Cleveland Clinic Foundation, Cleveland OH |
| 1999-2000 | Adjunct Assistant Professor of Biomedical Engineering, Case Western Reserve University, Cleveland OH |
| 1994-1998 | Research Associate, Department of Cardiology, The Cleveland Clinic Foundation, Cleveland OH |
| 1992-1994 | Research Associate, Department of Cell Biology and Physiology, School of Medicine, University of Pittsburgh |
| 1987-1992 | Junior researcher and graduate program in the Institute of Biological Physics, Puschino, Russia |
| 1986-1987 | Junior researcher in the Scientific Council for Cybernetics, USSR Academy of Sciences, Moscow, Russia |

Honors and awards:

- Vice Chair, History Committee, Heart Rhythm Society
- 2014 Dean's Faculty Award for Innovation in Research
- Fellow, American Heart Association
- Fellow, Heart Rhythm Society
- Inaugural Fellow, Council on Basic Cardiovascular Sciences, American Heart Association
- Honorary Member, Russian Society for Clinical Electrophysiology, Arrhythmology and Cardiac Pacing
- Chair, Gordon Research Conference on Cardiac Arrhythmia Mechanisms
- Chartered Member, Electrical Signaling, Transporters and Arrhythmia study section, NIH
- Member, Case School of Engineering Executive Committee
- Astor Visiting Fellow, University of Oxford, UK
- Washington University Chancellor's Hartwell Prize for Innovative Research
- The Doris J.W. Escher, MD Lecture in Medicine. Montefiore Medical Center, The University Hospital for the Albert Einstein College of Medicine, New York, NY
- The Walter Lillehei Lecture, University of Minnesota, Minneapolis MN
- The Richard B. and Lynne V. Cheney Lecture, The George Washington University, Washington, DC
- Visiting Professor, University of Bordeaux Segalen, Bordeaux, France
- Visiting Professor, University of Nizhny Novgorod, Russia
- President, Russian American Medical Association
- President, Russian American Scientists Association

- Member, Council of Canadian Academies, The Expert Panel on the Medical and Physiological Impacts of Conducted Energy Weapons
- Member, RosNano Prize Committee, Moscow, Russia

Industry Positions held:

2008-present Cardialen, Inc., Founder, Member of the Board of Directors, Chairman of the Scientific Advisory Board
 2012-2015 Pharus Cardio, Co-founder, Member of the Board of Directors
 2008-2011 Humgenex, Inc., Co-Founder, Member of the Board of Directors
 2005-present Bioelectric, LLC, President and CEO, Founder

Grant Support:

Active:

2013-2017 NIH R01 HL115415, “Low Energy Defibrillation”. Principal Investigator.
 2012-2016 NIH R01 HL114395, “Arrhythmogenic remodeling in human heart failure”. Principal investigator.
 2016-2020 NIH R01 HL126802 ”Exploration of arrhythmogenic triggers and substrates in heart failure”. M-PI. (With N. Trayanova and J. Gorelik)
 2016-2020 NIH R01 HL130212 “Wnt Signaling In Cardiac Conduction And Arrhythmogenesis”. Co-investigator. PI: S. Rentschler, Washington University in St. Louis, MO.
 2013-2017 NIH 2R01HL083048 “Integrated imaging of the form and function of the beating embryonic heart”, Co-investigator, PI: Andrew Rollins, Case Western Reserve University, Cleveland, OH.

Completed:

2012-2015 NIH R43 HL114329, “Low energy ventricular defibrillator”. Principal investigator.
 2012-2014 NIH R21 HL112278, “Opto-Electric Mapping Of Action Potentials”. Principal investigator.
 2008-2013 NIH R01 HL095010 “SUR1 (ABCC8) and Atrial KATP Channels”, Co-investigator, PI: Colin Nichols, Washington University in Saint Louis, MO.
 2008-2013 NIH R01 EB008999 “Advanced ultrasound ablation therapy for atrial fibrillation”, Co-investigator, PI: Cheri Deng, University of Michigan, Ann Arbor, MI
 2008-2013 NIH R01 HL085369, “Structure/function of the pacemaking and conduction system of the heart”, Principal investigator.
 2011-2013 NIH R21 HL108617 “Implantable mouse pacemaker”. Principal investigator.
 2007-2012 NIH, R01 HL67322 "Virtual Electrode Hypothesis of Defibrillation", Principal investigator.
 2007-2012 NIH, R01 HL082729, “Defibrillation Mechanisms in Infarcted Hearts”, Co-PI, PI: Natalia Trayanova, Johns Hopkins University.

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- 2006-2010 NIH, R01 HL083393, “Computational and Experimental Study of Early Cardiac Morphogenesis”. Co-investigator, PI: Larry Taber, Washington University in Saint Louis, MO
- 2006-2011 NIH, R01 GM075200, “Computational Modeling of Developmental Processes”. Co-investigator, PI: Larry Taber, Washington University in Saint Louis, MO
- 2004-2009 NIH, R01 HL074283, “The role of electroporation in defibrillation”, Principal investigator.
- 2007-2009 AHA, Grant-in-Aid. “Structure of the human AV junction”. Principal Investigator,
- 2006-2008 Coulter Foundation, “Low-energy implantable atrial defibrillator”, Principal Investigator.
- 2005-2007 Medtronic, “Electrical Stimulation of AV Node/Bundle of His (ESAB)”, Principal Investigator.
- 2005-2007 Hartwell Foundation, “Low voltage defibrillation in a large animal model”, Principal Investigator.
- 2001-2006 NIH, R01 HL67322 "Virtual Electrode Hypothesis of Defibrillation", Principal investigator. Competitive renewal funded.
- 1999-2005 NIH, R01 HL58808, “Structure-function relationship of the AV node”, Principal investigator.
- 2003-2004 Medtronic, “Understanding Defibrillation Mechanisms Using Optical Mapping”, Principal investigator,
- 2001-2004 Whitaker Foundation Research Grant "Mechanisms of pacing of the Heart: Implications for the optimal waveform and lead design", Principal investigator.
- 1998-2001 NIH, R01 HL56464, “Mechanisms of defibrillation by implantable electrodes”, Principal investigator.
- 1999-2000 NIH, R43, "Burst pacing improves efficacy of defibrillation shocks", Co-investigator.
- 1998-2000 Beginning Grant-in-Aid, American Heart Association, Northeast Ohio Affiliate. “Effects of ischemia on cardiac defibrillation”, Principal Investigator.
- 1997-1998 Proctor & Gamble Pharmaceuticals, Research Grant in Pharmacology, Principal Investigator,
- 1997-2000 NIH, RO1, "Human atrial fibrillation--changes in channel expression" Co-Investigator.
- 1996-1998 Beginning Grant-in-Aid, Northeast Ohio Affiliate American Heart Association. Principal Investigator
- 1993-1994 NSF grant for Supercomputing Resources in the Pittsburgh Supercomputing center. Principal Investigator
- 1993-1994 National Research Council, CAST (Cooperation in Applied Science and Technology) Program. Co-Investigator.

Editorial Board Service

Associate Editor, IEEE Transactions on Biomedical Engineering, 2012-present,
 Associate Editor, American Journal of Physiology: Heart and Circulatory Physiology, 2011-present,
 Editorial Board Member, Circulation Research, 2000-2013,

Editorial Board Member, Biomedical Engineering, 2011-2013,
Editorial Board Member, Intellect & Technology, 2011-2013,
Editorial Board Member, Journal of Cardiovascular Electrophysiology, 1998-2012,
Editorial Board Member, Journal of Molecular and Cellular Cardiology, 2002-2007,
Editorial Board Member, Heart Rhythm Journal, 2005-2010,
Editorial Board Member, Experimental Physiology, 2004-2008,
Guest editor, Journal of Cardiovascular Electrophysiology, 2006.
Guest editor, Journal of Biomechanical Engineering, 2008.

Ad-hoc review:

American Journal of Physiology,
Analytical Chemistry,
Anatomical Records,
Annals of Biomedical Engineering,
Biophysical Journal,
BMC Physiology
Cardiovascular Research,
Cell Calcium,
Chaos,
Circulation,
Circulation Research,
Comparative Biochemistry And Physiology,
Computational and Mathematical Methods in Medicine,
Developmental Dynamics,
Experimental Biology and Medicine,
Experimental Physiology,
EuroPACE,
FASEB Journal,
Heart Rhythm,
IEEE Transactions on Biomedical Engineering,
IEEE Transactions on Medical Imaging,
International Journal for Molecular Science,
Journal of American College of Cardiology,
Journal of Applied Physiology,
Journal of Biological Systems,
Journal of Biomedical Optics,
Journal of Biological Rhythms,
Journal of Cardiovascular Electrophysiology,
Journal of Interventional Cardiovascular Electrophysiology,
Journal of Microscopy Research and Techniques,
Journal of Molecular and Cellular Cardiology,
Medical and Biological Engineering and Computing,
Molecular and Cellular Biochemistry,

Nature,
Nature Nanotechnology,
Nature Clinical Practice Cardiovascular Medicine,
Pacing and Clinical Electrophysiology (PACE),
Pflügers Archiv – European Journal of Physiology,
Physics in Medicine and Biology,
Proceedings of the National Academy of Sciences,
Proceedings of Royal Society (London),
Progress in Biophysics and Molecular Biology,
Recent Patents in Engineering,
Review of Scientific Instruments,
Science,
Tissue Engineering,
Ultrasound in Medicine and Biology.

Professional Service (by year):

- 2015: Member, Research Committee, Heart Rhythm Society (2014-2016)
Vice-Chair, History Committee, Heart Rhythm Society.
Abstract reviewer, Heart Rhythm Society annual sessions.
Abstract reviewer, American Heart Association.
Grant reviewers, NIH: ZRG1 VH-D (NHLBI Systems Biology), ZRG1 MOSS-C (New Innovator Award), ZRG1 BST-F (Academic Research Reinforcement).
- 2014: President, Russian-American Medical Association, (2012-2014).
Member, Research Committee, Heart Rhythm Society (2014-2016).
Vice Chair, History Committee, Heart Rhythm Society.
Leader, Basic Science group, Scientific Sessions Program Committee, Heart Rhythm Association, (2010-2014).
Abstract reviewer, Heart Rhythm Society annual sessions.
Member, Advisory Council for the Center for Living Systems, Moscow Institute of Physics and Technology, Russia.
Grant reviewer, Medical Research Council, UK.
Grant reviewer, Israel Binational Science Foundation, Israel.
- 2013: President, Russian-American Medical Association, (2012-present);
Member, Council of Canadian Academies, The Expert Panel on the Medical and Physiological Impacts of Conducted Energy Weapons (2012-2013); Canada.
Member, History Committee, Heart Rhythm Society.
Leader, Basic Science group, Scientific Sessions Program Committee, Heart Rhythm Association, (2010-2014).
Chartered Member, NHLBI Systems Biology Collaborations special emphasis panel, NIH (term 2009-2013).
Chartered Member, Electrical Signaling, Transporters and Arrhythmia study section, NIH (term 2009-2013).

Member, Committee for the Thesis Prize of IdEx (Initiative of excellence Bordeaux), University of Bordeaux, France.

- 2012: President, Russian-American Medical Association, 2012-present.
Member, Council of Canadian Academies, The Expert Panel on the Medical and Physiological Impacts of Conducted Energy Weapons (2012-2013); Canada.
Member, RosNano Prize Committee, Moscow, Russia;
Member, History Committee, Heart Rhythm Society.
Leader, Basic Science group, Scientific Sessions Program Committee, Heart Rhythm Association, (2010-2014).
Chartered Member, NHLBI Systems Biology Collaborations special emphasis panel, NIH (term 2009-2013).
Chartered Member, Electrical Signaling, Transporters and Arrhythmia study section, NIH (term 2009-2013).
- 2011: Member, History Committee, Heart Rhythm Society.
Leader, Basic Science group, Scientific Sessions Program Committee, Heart Rhythm Association, (2010-2012).
Member, NHLBI Systems Biology Collaborations special emphasis panel, NIH (term 2009-2011).
Member, Electrical Signaling, Transporters and Arrhythmia study section, NIH (term 2009-2012).
Member, Young Investigator Award Subcommittee, Heart Rhythm Society, (term 2009/09-2011/05).
- 2010: Member, History Committee, Heart Rhythm Society.
Member, Scientific Sessions Program Committee, Heart Rhythm Association, (2010-2012).
Member, NHLBI Systems Biology Collaborations special emphasis panel, NIH (term 2009-2011).
Member, Electrical Signaling, Transporters and Arrhythmia study section, NIH (term 2009-2012).
Member, Young Investigator Award Subcommittee, Heart Rhythm Society, (term 2009/09-2011/05).
Member, External Review Committee, Duke University Department of Biomedical Engineering, Durham, NC. 2010/02/07-09.
Consultant, World Bank.
Consultant, RosNano, Russian Federation.
- 2009: Member, NHLBI Systems Biology Collaborations special emphasis panel, NIH (term 2009-2011)
Member, Electrical Signaling, Transporters and Arrhythmia study section, NIH (term 2009-2012)
Member, Young Investigator Award Subcommittee, Heart Rhythm Society, (term 2009/09-2011/05)

Chair of Sessions “Image Based Modeling 1” and “Image Based Modeling 2”,
Workshop: “The Cardiac Physiome: Multi-scale and Multi-physics Mathematical
Modeling Applied to the Heart”. Isaac Newton Institute for Mathematical
Sciences, University of Cambridge, UK. 2009/07/22

Member, Electrical Signaling, Ion Transport, and Arrhythmia Study Section,
Center for Scientific Review, National Institutes of Health (term 7/1/2009-
6/30/2013)

Consultant, World Bank (term 6/3/2009-10/1/2009)

Member, Board of Directors, Russian-American Medical Association

Vice-President, Chair of US Section, Member Board of Directors, Russian-
speaking Academic Science Association

Chair, Session on Heart Failure, Gordon Research Conference on Cardiac
Arrhythmia Mechanisms, February 15-20, 2009, Il Ciocco, Italy,

Committee member, Development of the Program for Ethical and Responsible
Conduct in Science and Scholarship (PERCSS)

- 2008: Biomedical Engineering Society 2008 annual meeting: Cardiovascular Track
Chair, Industrial Liaison Chair
NIH Grant Review Panels: ESTA, ZRG1 CVS-A.
Grant Review Panel: Marsden Fund, New Zealand.
Review: American Heart Association 2008 annual meeting abstracts.
Program committee member, VIII Pan Slavic International Congress on Cardiac
Pacing and Electrophysiology "CARDIOSTIM", Saint Petersburg, Russia, February
14-16, 2008
Session and symposium chair, VIII Pan Slavic International Congress on Cardiac
Pacing and Electrophysiology "CARDIOSTIM", Saint Petersburg, Russia, February
14-16, 2008
Committee member, Development of the Program for Ethical and Responsible
Conduct in Science and Scholarship (PERCSS)
- 2007: Judge, Poster competition, American Heart Association, November 4-7, 2007.
NIH Grant Review Panel, ZRG1 CVS-A (50) R, October 17, 2007
Chair, Organizing committee, III Russian Symposium on Interventional
Arrhythmology and Educational Course of European Cardiac Arrhythmia Society
(ECAS). September 13-14, 2007. Moscow, Russia.
Chair, “Imaging cardiovascular development and physiology” session, Weinstein
Cardiovascular Development Conference, May 10-12, 2007. Indianapolis IN.
Grant review panel, National Institutes of Health. ZHL1 CSR-R.
Chair, Gordon Research Conference on Cardiac Arrhythmia Mechanisms, March
18-23, 2007. Ventura, CA
Chair, Session on Atrial Arrhythmias, Saudi Heart Association, Jeddah, Saudi
Arabia.
- 2006: Fellow of the Heart Rhythm Society
Member, Industry-Foundations Liaison committee, American Physiological
Society

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- Grant review panel, The Netherlands Organization for Health Research and Development
Grant review panel, National Institutes of Health.
Astor Visiting Fellow, University of Oxford, UK
Cardiology Grand Round Lecturer, The Doris J.W. Escher, MD Lecture in Medicine. Montefiore Medical Center, The University Hospital for the Albert Einstein College of Medicine, New York, NY
- 2005: Honorary Member of the Russian Society for Clinical Electrophysiology, Arrhythmology and Cardiac Pacing
Co-chair, Gordon Research Conference on Cardiac Arrhythmia Mechanisms
Grant review panel, National Institutes of Health.
Grant review, National Science Foundation.
Session organizer and chair, Biomedical Engineering Society Annual meeting, Baltimore, MD, September 2005.
Session organizer and chair, 1st All-Russian Arrhythmology Symposium, Moscow, Russia, June 2005.
- 2004: Session chair, “Cardiac conduction system”, American Association of Anatomists annual meeting, Washington, D.C.
Grant review panel, National Institutes of Health. Council BTSS.
Grant review panel: Council for the Earth and Life, Netherlands Organization for Scientific Research (NOW)
- 2003: Elected to co-chair in 2005 and chair in 2007 Gordon Research Conference on Cardiac Arrhythmia Mechanisms
Abstract reviewer, American Heart Association.
Grant review panel, National Medical Research Council, Singapore.
Grant review panel, National Institutes of Health, Council ZRG1 ECS.
Grant review panel, National Institutes of Health, Council ZRG1 CVB.
Grant reviewer, National Sciences and Engineering Research Council of Canada.
- 2002: Grant Reviewer, Swiss National Science Foundation.
Session chair, American Heart Association annual meeting, Chicago, IL.
Grant review panel, National Institutes of Health, Council ZRR1 BT-1.
Grant review panel, National Institutes of Health, Council ZRG1 CVA.
Grant reviewer, National Sciences and Engineering Research Council of Canada.
Session organizer & chair, Biomedical Engineering Society / IEEE Engineering in Medicine and Biology Society joint annual meeting, Huston, TX.
Member of the committee on Young investigator competition, North American Society of Pacing and Electrophysiology, San Diego, CA.
Antagonist, Debate “Action potential duration restitution slope of greater than one is a key determinant of ventricular fibrillation”, North American Society of Pacing and Electrophysiology, San Diego, CA.
- 2001: Session chair, American Heart Association annual meeting, Anaheim, CA.

Inaugural Fellow of the Council on Basic Cardiovascular Sciences of the American Heart Association
 Fellow of the American Heart Association
 Sessions organizer & chair, Biomedical Engineering Society annual meeting, Durham, North Carolina.
 Protagonist, Debate "Virtual electrode polarization induced phase singularity or cross field induced critical points", European Society of Cardiology Annual meeting, Copenhagen, Denmark.
 Grant reviewer, Jewish Hospital Foundation, Louisville Kentucky
 Grant reviewer, The Royal Society of New Zealand, Marsden Fund, New Zealand
 Grant review panel, National Institutes of Health, NHLBI Program Project "Mechanisms and Therapy of Ischemic Sudden Cardiac Arrest".

- 2000-2002 Member, Basic Cardiac Electrophysiology Committee, North American Society of Pacing and Electrophysiology
- 2000: Consultant, Special Emphasis Panel, National Institutes of Health, NHLBI - Specialized Centers of Research (SCOR) in Ischemic Heart Disease in Blacks
- 1999: Consultant, Special Emphasis Panel, National Institutes of Health, NHLBI - Specialized Centers of Research (SCOR) in Ischemic Heart Disease
 American Heart Association, ad-hoc grant reviewer
- 1998: Session Chair, "New Insights into Arrhythmia Mechanisms from Mapping", NASPE (North American Society of Pacing and Electrophysiology) annual meeting. San Diego, CA
 Session Chair, "Modeling – Cardiac Excitation", Computers in Cardiology, Cleveland, OH
 Session Chair, "Fibrillation, Defibrillation, and Devices", Biomedical Engineering Society Annual Meeting, Cleveland, OH

Professional Membership and Service:

Member, Research Committee, Heart Rhythm Society (2014-2016).
 Member, History Committee, Heart Rhythm Society (2009-2013).
 Member, Scientific Sessions Program Committee, Heart Rhythm Association, (2010-2014).
 Chartered Member, NHLBI Systems Biology Collaborations special emphasis panel, NIH (term 2009-2012)
 Chartered Member, Electrical Signaling, Transporters and Arrhythmia study section, NIH (term 2009-2013)
 Member, Young Investigator Award Subcommittee, Heart Rhythm Society, (term 2009/09-2011/05)
 Fellow of the Heart Rhythm Society (2006)
 Member, Industry-Foundations Liaison committee, American Physiological Society (2006-2009)

Fellow of the American Heart Association (2001)
Inaugural Fellow of the Council on Basic Cardiovascular Sciences of the American Heart Association (2001)
Member, Council on Basic Cardiovascular Sciences of the American Heart Association
Member, American Physiological Society (FASEB)
Member, Biomedical Engineering Society
Member, Cardiac Electrophysiology Society
Member, IEEE Engineering in medicine and biology society
Member, Heart Rhythm Society (former North American Society of Pacing and Electrophysiology)
Russian Society for Clinical Electrophysiology, Arrhythmology and Cardiac Pacing, Honorary Member

Patents

1. **Efimov, Igor R.;** Krinski, Valentin I.; Nikolski, Vladimir P.; Method For Low-Voltage Termination Of Cardiac Arrhythmias By Effectively Unpinning Anatomical Reentries. US 8,175,702 B2. May 8, 2012. Priority date Nov 4, 2004.
2. **Efimov, Igor R.;** Hucker, William; Cardiac Pacing Using The Inferior Nodal Extension. US 8,391,995 B2. Mar 5, 2013. Priority date Nov 13, 2006.
3. Wessles, Richard; Sha, Qun; **Efimov, Igor R.;** Low-Energy Atrial Cardioversion Therapy With Controllable Pulse-Shaped Waveforms. US 8,473,051 B1. June 25, 2013. Priority date Dec 29, 2010.
4. **Efimov, Igor R.;** Ripplinger, Crystal M.; Fedorov, Vadim V.; Foyil, Kelley V.; Ambrosi, Christina. Method And Device For Low-Energy Termination Of Atrial Tachyarrhythmias. US 8,509,889 B2. Aug 13, 2013. Priority date Dec 11, 2007.
5. **Efimov, Igor;** Li, Wenwen; Janardhan, Ajit. Method And Device For Three-Stage Atrial Cardioversion Therapy. US 8,560,066 B2. Oct 15, 2013. Priority date Dec 11, 2007.
6. **Efimov, Igor R.;** Krinski, Valentin I.; Nikolski, Vladimir P.; Method For Low-Voltage Termination Of Cardiac Arrhythmias By Effectively Unpinning Anatomical Reentries. US 8,639,325 B2. Jan 28, 2014. Priority date Nov 4, 2004.
7. **Efimov, Igor;** Li, Wenwen; Janardhan, Ajit. Method And Device For Three-Stage Atrial Cardioversion Therapy. US 8,706,216 B2. Apr 22, 2014. Priority date Dec 11, 2007.
8. **Efimov, Igor;** Li, Wenwen; Janardhan, Ajit. Methods And Devices For Three-Stage Ventricular Therapy. US 8,874,208 B2. Oct 28, 2014. Priority date Dec 11, 2007.

Invited presentations and lectures:

1. “Experimental mapping of ventricular fibrillation”, 8th Asia Pacific Heart Rhythm Society Scientific Sessions, Melbourne, Australia. 2015/11/22.
2. “Transmural Rotor Mapping: Insights from Optical Studies”, 8th Asia Pacific Heart Rhythm Society Scientific Sessions, Melbourne, Australia. 2015/11/20.

3. “Adrenergic and Metabolic Remodeling of the Failing Heart”, 8th Asia Pacific Heart Rhythm Society Scientific Sessions, Melbourne, Australia. 2015/11/20.
4. “Remodeling of Failing Human Heart”, Department of Bioengineering, University of Utah, Salt Lake City, 2015/11/13.
5. “Pathophysiology of Failing Human Heart”, The 1st International Multidisciplinary From Bench to Bed Conference. Ahmet Yassawi International Kazakh-Turkish University, Shymkent Kazakhstan, 2015/11/08.
6. “Future of implantable cardiac devices”, 6th annual conference of Russian American Science Association, George Washington University, Washington DC, 2015/11/07
7. “Innovation in Biomedical Engineering Industry: A Vision for the Future and how to be a part of it”, 4th CIMES: Innovation in Healthcare Devices Summit: New Technologies in healthcare and dentistry” (“4^o CIMES: Congresso De Inovacao Em Meteriais E Equipamentos Para Saude”), Sao Paulo, Brazil. 2015/10/05.
8. “Future of Implantable Devices: From Implantable Pacemakers to High-Definition Conformal Electronics”, Department of Biomedical Engineering, University of Virginia, Charlottesville, VA. 2015/09/25
9. “Arrhythmogenic Remodeling of Failing Human Heart”, Cardiovascular Research Center, University of Virginia, Charlottesville, VA. 2015/09/24
10. “Future of Implantable Devices: From Implantable Pacemakers to Conformal Electronics”, The George Mason University, Department of Biomedical Engineering Seminar. Fairfax, VA. 2015/09/16.
11. “Low Energy Defibrillation”, The 33rd Congress of the European Section of the International Society for Heart Research, Bordeaux, France, 2015/07/02.
12. “High-definition Conformal Devices”, Federal Drug Administration, Silver Spring, MD, 2015/06/23.
13. “The future technologies for treatment of cardiac arrhythmias”, 6th Symposium of Arrhythmologists, Novosibirsk, Russia, 2015/06/11.
14. “3D MIM (multifunctional integumentary membranes) platform for implantable devices”, 2015 Stanford Biodesign New Arrhythmia Technologies Retreat, Boston, MA, 2015/05/12.
15. “Engineering Biological Pacemaker”, Moscow Institute of Physics and Technology, Dolgoprudny, Russia. 2015/04/29.
16. “High-definition Conformal Devices”, Design of Medical Devices Conference, University of Minnesota, Minneapolis, MN, 2015/04/15.
17. “Arrhythmogenic Remodeling of Failing Human Heart”, The 2nd UCLA Autonomic Nervous System Control of the Heart in Health and Disease Symposium. UCLA, Los Angeles, CA. 2015/03/12.
18. “Autonomic Regulation of Cardiac Excitability: Technology Response”, SPARC Program Workshop, National Institutes of Health, Bethesda MD. 2015/02/25.
19. “Remodeling of failing human heart”, Cardiology Grand Rounds, George Washington University, Washington, DC. 2015/01/14.
20. “Arrhythmogenic and metabolic remodeling of failing human heart”, Baylor College of Medicine, Dan L. Duncan Institute for Clinical and Translational Research, Cardiovascular Research Institute, Houston TX, 2014/12/09.
21. “Arrhythmogenic and metabolic remodeling of failing human heart”, The Davies Heart and Lung Institute, Ohio State University, Columbus, OH, 2014/12/03.

22. “Novel Approaches to Defibrillation”, Arrhythmia Research Summit, American Heart Association Scientific Sessions 2014, Chicago IL, 2014/11/19.
23. “Future Cardiac Implantable Devices: 3D Printed to Size”, The Women’s Society of Washington University, Washington University in Saint Louis, MO, 2014/11/18.
24. “Pathological remodeling of the failing human heart”, The Gordon K. Moe Lecture, 24th Annual Upstate New York Cardiac Electrophysiology Society Meeting, University at Buffalo, The State University of New York, Buffalo NY, 2014/11/03.
25. “Next Generation of Implantable Devices”, Moscow Institute of Physics & Technology, Dolgoprudny, Russia, 2014/10/10.
26. “The Mechanisms of Fibrillation”, Moscow Institute of Physics & Technology, Dolgoprudny, Russia, 2014/10/10.
27. “International Experience of Partnership between Universities and Business in Medicine”, Moscow Office of the World Bank, Moscow, Russia, 2014/10/09.
28. “Arrhythmogenic Remodeling of Failing Human Heart”, Cardiology Grand Rounds, University of Rochester, NY, 2014/09/10.
29. “What is Fibrillation?” The California Heart Rhythm Symposium 2014. The Beverly Hilton, Beverly Hills, CA. 2014/09/06.
30. “Is Low Energy Defibrillation Possible”, Cardiostim 2014, Nice, France, 2014/06/21
31. “Functional Anatomy of the Sinus and AV Node: From Mouse to Man”, University of Milan, Milan, Italy, 2014/06/17.
32. “Metabolic Remodeling of Failing Human Heart”, British Heart Foundation Symposium, Imperial College London, London, UK, 2014/06/05.
33. “Research of the human heart is needed to develop new drugs”, IV International conference PhysTech Bio, Moscow Institute of Physics and Technology, Dolgoprudny, Russia. 2014/05/30.
34. “Novel therapies for the failing human heart”. International Conference “Instabilities and Control of Excitable Networks. Focus on: Cardiac Biophysics and General Aspects of Excitable Media Self-organization”. Moscow Institute of Physics and Technology, Dolgoprudny, Russia. 2014/05/28.
35. “Cardiac Remodeling in the Human Ventricles”, Copenhagen Meeting on Cardiac Arrhythmia, Copenhagen, Denmark, 2014/05/20.
36. “3D MIM (multifunctional integumentary membranes) platform for implantable devices”, Stanford Biodesign New Arrhythmia Technologies Retreat, Stanford, CA, 2014/05/06.
37. “The Mechanism Underlying Remodeling of Transmural Repolarization”, Washington University in Saint Louis, MO, 2014/04/30.
38. “Engineering Healthy Heart”, George Washington University, Washington, DC, 2014/04/22.
39. “Computational mapping inside the black box”, 13th Atrial Fibrillation Symposium, Prague, Czech Republic, 2014/03/15.
40. “Pro-fibrillatory remodeling of failing human heart: excitation-contraction coupling, metabolism, signaling”, Seventh TRM Forum on Computer Simulation and Experimental Assessment of Cardiac Function. Lugano, Switzerland, 2013/12/03.
41. “Pathogenesis: Basic Mechanisms of Atrial Flutter and Fibrillation”, Contemporary Approach to Diagnose and to Treat Atrial Flutter in CAD Patients, International congress and teaching program, Moscow, Russia, 2013/11/22.

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42. “Optocardiography of Failing Human Heart”, Saint Petersburg State University, Russia, 2013/11/18.
 43. “Two centuries of electrotherapy: from VF to AF”, L’Institut de Rythmologie et Modélisation Cardiaque (LIRYC) Workshop, Château Pape Clément, Bordeaux, 2013/10/24.
 44. “Human heart physiology in health and disease”, Cardiac Physiome Society, 2013 Annual Meeting. Bar Harbor, ME, 2013/10/17.
 45. “Arrhythmogenic and autonomic remodeling of failing human heart”, University of Wisconsin at Madison, School of Medicine and Public Health, Madison, WI. 2013/09/17.
 46. “Optical Imaging of the Human Heart”, University of Pennsylvania, Philadelphia. 2013/09/05.
 47. “Low Energy Atrial and Ventricular Defibrillation”, Sorin Group, Paris, France, 2013/07/24.
 48. “Arrhythmogenic and autonomic remodeling of failing human heart”, University of Bonn, Germany, 2013/07/22.
 49. “Arrhythmogenic cardiac remodeling in cardiomyopathies”, Inherited Channelopathies 2013, Moscow, Russia. 2013/06/22.
 50. “Electrophysiological remodeling and arrhythmogenesis by β_1 , β_2 stimulation in human heart failure”, Imperial College London, UK, 2013/06/14.
 51. “Optical mapping of the human heart”, British Heart Foundation Centre of Research Excellence Symposium: Bridging Cardiovascular Science And Bioengineering, London, UK. 2013/06/13.
 52. “Low Energy Atrial Defibrillation”, Heart Rhythm Society annual sessions, Denver, CO. 2013/05/11.
 53. “Electrical Remodeling in the Human Heart”, Heart Rhythm Society annual sessions, Denver, CO. 2013/05/10.
 54. “The Mechanisms: From Multiple Wavelets to Leading Circle and Rotors”, Heart Rhythm Society annual sessions, Denver, CO. 2013/05/09.
 55. “Low Energy Atrial and Ventricular Defibrillation”, Stanford BioDesign, Denver, CO, 2013/05/07.
 56. "Physiology of failing human heart", Calhoun Cardiology Center, University of Connecticut Medical Center, Farmington, CT, 2013/03/12.
 57. "Electrophysiological Properties of the Human Normal and Failing Heart", Gordon Research Conference on Cardiac Arrhythmia Mechanisms, Ventura CA, 2013/02/20.
 58. “Inventing in Academia”, Technology Transfer Workshop, Washington University, St. Louis, MO, 2013/02/08.
 59. “Human Sinus and AV Nodes: Mechanisms of Nodal Arrhythmia”, University of Toronto, Toronto, Canada, 2013/01/31.
 60. “Optical Mapping of the Human Sinus and Atrioventricular Nodes”, Developmental aspects of arrhythmias, Academic Medical Center, University of Amsterdam, Amsterdam, Netherlands, 2012/12/18.
 61. “Russian American Medical and Science Associations: Decade of Experience”, Russian Higher Education – CRDF Global: Developing Global Leaders in Science through Russian-US University Collaboration, CRDF Global, Arlington, VA, 2012/12/11.
 62. “Cardiac Arrhythmia Therapy: Devices vs. Pharmacology”, Case Western Reserve University, Cleveland, OH, 2012/11/19.

63. “Novel Approached to Defibrillation”, University of Minnesota, Minneapolis, MN, 2012/10/15.
64. “Pacemakers of the Heart: from Mouse to Man”, University of Stony Brook, Stony Brook, NY, 2012/10/10.
65. “Arrhythmogenic Remodeling of Failing Human Heart”, Cardiac & Respiratory Physiology Themed Meeting, Physiological Society, University of Manchester, Manchester, UK, 2012/09/05.
66. “Arrhythmogenic Remodeling of Failing Human Heart”, Symposium “Autonomic Nervous System Control of the Heart in Health & Disease”. UCLA, Los Angeles, CA, 2012/07/19.
67. “Physiology of the failing human heart”, Academic Medical Center, University of Amsterdam, the Netherlands. 2012/07/02.
68. “Update on the human heart project”, University of Bordeaux, Bordeaux, France. 2012/06/20.
69. “Arrhythmogenic Remodeling of Failing Human Heart”, Gordon Research Conference on Cardiac Regulatory Mechanisms, Colby-Sawyer College, New London, NH, 2012/06/14.
70. “Update on Repolarization: Dispersion of Repolarization in the Human Heart”, Heart Rhythm Society annual sessions, Boston MA, 2012/05/12.
71. “Novel Mechanisms for Defibrillation: Low-Voltage Multiple Shocks for Atrial Fibrillation and Flutter”, Heart Rhythm Society annual sessions, Boston MA, 2012/05/11.
72. “My perspective on how to develop ideas into products and therapies”, Heart Rhythm Society annual sessions, Boston MA, 2012/05/10.
73. “Low energy atrial and ventricular defibrillation”, Stanford Biodesign New Arrhythmia Technologies Retreat, Boston MA, 2012/05/08.
74. “Using high definition ECG in implantable cardiac devices”, International Society of Computerized Electrocardiography, Birmingham, AL, 2012/04/23.
75. “Fluorescent Imaging of the human heart”, Multi-Modality Cardiovascular Molecular Imaging Symposium at NIH, Bethesda, MD, 2012/04/19.
76. “Arrhythmogenic Remodeling of Failing Human Heart: The Role of $[Ca^{2+}]_i$ ”, UC Davis Cardiovascular Symposium “Systems Approach to Understanding Cardiac Excitation-Contraction Coupling & Arrhythmias”, University of California at Davis, CA, 2012/03/03.
77. “Towards a pain-free atrial defibrillator”, EP Conference. University of Alabama at Birmingham, AL, 2012/02/23.
78. “Arrhythmogenic Remodeling of Failing Human Heart”, Cardiology Grand Rounds. University of Alabama at Birmingham, AL, 2012/02/22.
79. “Mechanisms of ventricular fibrillation and novel approaches to cardioversion and defibrillation”, Cardiostim, St. Petersburg, Russia, 2012/02/17.
80. “Low Energy Cardioversion of Atrial Fibrillation”, Plenary Lecture, Cardiostim, St. Petersburg, Russia, 2012/02/16.
81. “Electrophysiological remodeling of failing human heart”, Virginia Commonwealth University, Richmond, VA, 2012/01/26.
82. “The structure and function of the human sinus node”, Australian Physiological Society, Perth, Australia, 2011/12/05.
83. “Biophotonic imaging of the human heart bioelectricity”, Old Dominion University, Norfolk, VA, 2011/11/28.
84. “The Sinus and AV Nodes of the Heart: from Mouse to Man”, State University of Nizhny Novgorod, Russia. 2011/11/25.

85. “EP remodeling of human atria and ventricles during heart failure: implications for AF”, Symposium: Catheter Ablation Of Atrial Fibrillation In Heart Failure Patients, Moscow, Russia, 2011/11/22.
86. “Optical mapping of the conduction system”, American Heart Association, Orlando, FL, 2011/11/15.
87. “Physics of the heart”, 300th anniversary of Mikhail Lomonosov, Russia Science and Culture Center, Washington, DC. 2011/11/11.
88. “Arrhythmogenic Remodeling in the Human Heart Failure”. Montreal Heart Institute, University of Montreal, Canada, 2011/11/04.
89. “Low voltage therapy of atrial fibrillation”, Academician E.N. Meshalkin Novosibirsk State Research Institute of Circulation Pathology, Novosibirsk, Russia, 2011/10/07.
90. “Arrhythmogenic remodeling of atria and ventricles in patients with heart failure”, Academician E.N. Meshalkin Novosibirsk State Research Institute of Circulation Pathology, Novosibirsk, Russia, 2011/10/07.
91. “Human heart physiology research program – an update”, The EXCITE Seminar, Center for the Investigation of Membrane Excitability Diseases, Washington University in St. Louis, MO, 2011/10/03.
92. “Optical mapping of the sinoatrial and atrioventricular node”, Riley Heart Center Symposium On Cardiac Development, Indianapolis, IN, 2011/09/12.
93. “Electrical activation of the human heart: molecular and functional mapping”, 4th Cardiac Physiome Workshop, Merton College, Oxford, UK, 2011/07/10.
94. “Molecular and functional remodeling of the failing human heart”, British Heart Foundation Centre ElectroCardioMaths Multidisciplinary Programme Symposium: The Electromechanics Of Heart Muscle: Conduction And Arrhythmogenesis. Imperial College, London, 2011/07/07.
95. “Functional Remodeling in Heart Failure”, Heart Rhythm Society, San Francisco, CA, 2011/05/06.
96. “Biophotonic Imaging of the Human Heart”, Heart Rhythm Society, San Francisco, CA, 2011/05/04.
97. “Dual Pathways and Connexin 43 in the Human AV Node”, Andrew L. Wit Symposium, Columbia University, New York City, NY, 2011/05/02.
98. “Structural and functional evidence for discrete exit pathways”, International Society for Computerized Electrocardiography, San Jose, CA, 2011/04/14.
99. “Towards a Pain-free Implantable Atrial Cardioverter”, Visiting Professor, Cleveland Clinic Foundation, 2011/04/11.
100. “Painless defibrillation”, Old Dominion University, Norfolk, VA, 2011/03/18.
101. “Electrophysiology of Failing Human Heart”, Gordon Research Conference on Cardiac Arrhythmia Mechanisms, Galveston, TX. 2011/02/15.
102. “Low voltage atrial defibrillation”, Boston Scientific, Minneapolis, MN, 2011/02/04.
103. “The Sinus and AV Nodes of the Heart: from Mouse to Man”, New York University, New York, NY, 2010/12/17.
104. “Low Voltage Atrial Defibrillation”, Medtronic, Minneapolis, MN, 2010/11/09.
105. “History of Progress Towards Painless Defibrillation”, Department of Biomedical Engineering, University of Michigan at Ann Arbor, MI, 2010/11/04.
106. “Electrophysiological Remodeling of Failing Human Heart”, Department of Molecular and Integrative Physiology, University of Michigan at Ann Arbor, MI, 2010/11/03.

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107. “Biophysics and Bioengineering of the Heart”, State University of Nizhny Novgorod, Russia, 2010/10/15.
 108. “Low voltage defibrillation”, Institute of Applied Physics, Russian Academy of Sciences, Nizhny Novgorod, Russia, 2010/10/12.
 109. “History of Progress Towards Painless Defibrillation”, Department of Cardiology, Rhode Island Hospital, Cardiology Grand Rounds, 2010/10/01.
 110. “Imaging Electrophysiological Remodeling in Failing Human Heart”, Cardiovascular Research Center, Rhode Island Hospital and Brown Medical School, 2010/09/30.
 111. “Electrophysiological Remodeling in Human Cardiomyopathy”, Grand Rounds, Department of Anesthesiology, Washington University School of Medicine, 2010/09/08
 112. “Cardiac electrotherapy”, Nizhny Novgorod State University, Nizhny Novgorod, Russia, 2010/06/29
 113. “Quantitative cardiac physiology”, Nizhny Novgorod State University, Nizhny Novgorod, Russia, 2010/06/28
 114. “Molecular basis of human heart physiology”, Ioffe Physico-technical Institute, Sankt Peterburg, Russia, 2010/06/23
 115. “Sinoatrial excitation”, Cardiosim, Nice, France, 2010/06/17
 116. “Quantitative Cardiac Human Physiology”, Department of Biomedical Engineering, Cornell University, Ithaca, NY, 2010/03/17.
 117. “Biophotonic imaging of the whole heart excitation”, UC Davis Cardiovascular Symposium: Systems Approach to Understanding Cardiac Excitation-Contraction Coupling, University of California, Davis, CA. 2010/02/25.
 118. “Quantitative Human Cardiac Physiology”, Biomedical Engineering Seminar Series, Johns Hopkins School of Medicine and the Whiting School of Engineering, Baltimore, MD. 2010/02/22
 119. “History and Development of Therapy for Sudden Cardiac Death”, Electrical & Systems Engineering Department Seminar, Washington University in St. Louis, MO. 2010/02/05.
 120. “Entrepreneurship in Biomedical Industry and Academia—Challenges, Opportunities, and Ethics”, AHMB BME Honors Society, Washington University, St. Louis, MO. 2010/02/04
 121. “History of Progress Towards Painless Defibrillation”, Research Lyceum Series, St Jude Medical, Sunnyvale, CA 2010/01/22
 122. “History of Progress Towards Painless Defibrillation”, Research Lyceum Series, St Jude Medical, Sylmar, CA 2010/01/21
 123. “Mechanisms of Induction of Ventricular Tachycardia”, Scientific Sessions, American Heart Association, Orlando, FL, 2009/11/18.
 124. “Anatomy and Physiology of the Mammalian Sinus Node”, Scientific Sessions, American Heart Association, Orlando, FL, 2009/11/17.
 125. “Cardiac Pacing and Defibrillation: History and Mechanisms of Antiarrhythmia therapy” Department of Pharmacology, The George Washington University, Washington, DC, 2009/11/11.
 126. “Optical Mapping of the Human Heart. Do Animal Models Predict Clinical Physiology?” Cardiology Grand Rounds, The Richard B. and Lynne V. Cheney Cardiovascular Institute, The George Washington University, Washington, DC, 2009/11/11.
 127. “Low voltage defibrillation”, Cornell University, Ithaca, NY, 2009/11/4.
 128. “Electrical re-engineering of the heart: New treatments of Arrhythmias”, Iowa State University, Ames, IA, 2009/10/27

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129. “Quantitative molecular physiology of the human heart”, Nano-Technology Revolution 2009, Bastia, France, 2009/09/28.
 130. “Functional Anatomy of the Human Sinus and AV Nodes: Nature's Engineering of the Biological Pacemaker”. California Heart Rhythm Symposium, San Francisco, CA, 2009/09/25
 131. “Physiology of the human heart: Do we really know it?” Workshop: “The Cardiac Physiome: Multi-scale and Multi-physics Mathematical Modeling Applied to the Heart”. Isaac Newton Institute for Mathematical Sciences, University of Cambridge, UK. 2009/07/22
 132. “Structure/Function of the Sinus and Atrio-Ventricular Nodes”, “Cardiology Update” lecture series, Washington University Medical School, 2009/06/27
 133. “Pandemics of Cardiovascular Diseases: The emerging role of Nanosciences and Tissue Engineering”, Nano-forum in Science and Education, Hanty-Mansiysk, Russia, 2009/05/22
 134. “New Modalities for Low Voltage Termination of Cardiac Arrhythmias”, Heart Rhythm Society Annual Meeting, Boston, MA, 2009/05/14
 135. “Transgenic Rabbit Model of Hypertrophic Cardiomyopathy: Implications for Human Arrhythmias”, Heart Rhythm Society Annual Meeting, Boston, MA, 2009/05/15
 136. “Optically Mapping the Human Heart”, Heart Rhythm Society Annual Meeting, Boston, MA, 2009/05/16
 137. “Fluorescence Electrophysiology Imaging of the Human Heart”, 2009 Symposium on Multimodality Cardiovascular Molecular Imaging, Society for Nuclear Medicine, National Institutes of Health, Bethesda, MD, 2009/04/30
 138. “Advancing the Understanding of Arrhythmogenesis: From Animal to Human Heart”, UCLA Symposium on Systems Approaches to Cardiac Biology & Medicine, Los Angeles, CA, 2009/02/06
 139. “Human pacemaking and conduction system: from reductionism to integration”, Nora Eccles Treadwell Distinguished Lecture Series, Nora Eccles Harrison Cardiovascular Research and Training Institute, University of Utah, Salt Lake City, Utah, 2008/12/04
 140. “Cardiac protection in hibernating ground squirrels: The role of Connexins and Cadherens”, University of Missouri, Springfield, MO, 2008/11/21
 141. “Functional anatomy of the AV Node: from Rabbit to Human”, Cardiac Electrophysiology Society, New Orleans, LA, 2008/11/08
 142. “Pathogenesis of Ventricular Arrhythmias in Dilated Cardiomyopathy: Insights from Optical Mapping Studies”, 3rd Annual International Symposium on Ventricular Arrhythmias: Pathophysiology and Therapy, Miami, FL, 2008/10/24
 143. “Basic Aspects of Nodal Arrhythmias”, Bakulev Scientific Centre for Cardiovascular Surgery, Russian Academy of Medical Sciences, Moscow Russia, via videoconference, 2008/10/06
 144. “3D structure of the AVJ. Permanent ventricular pacing within the AVJ – possible new perspective treatment of bradysystolic AF”. Aritmija – Lietuva 2008, 9th biannual International symposium. Klaipeda, Lithuania. 2008/09/19
 145. “Design of a biological pacemaker: animal models vs. human SAN and AVN”, National Heart, Lung and Blood Institutes, NIH, Bethesda, MD, 2008/08/19.
 146. “Cardiac protection in hibernating ground squirrels: The role of Connexins and Cadherens”, 13th International Hibernation Symposium, Swakopmund, Namibia, 07/07/2008

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147. “Optical Imaging of Rhythms and Arrhythmias”, Gordon Research Conference on Cardiac Regulatory Mechanisms, New London, NH, 2008/07/23.
 148. “Voltage and calcium imaging in the human failing ventricles”, CARDIOSTIM 2008, Nice, France. 2008/06/18.
 149. “Molecular and structural basis of arrhythmia in the human AV junction: Insights from biophotonic imaging”, Cardiology Grand Rounds, University of Cincinnati College of Medicine, 2008/04/22.
 150. “Functional anatomy of the AV junction”, Cardiac Bioelectricity and Arrhythmia Center, Washington University, Saint Louis, MO, 2008/03/31
 151. “Basic electrophysiological mechanisms of initiation of supraventricular tachyarrhythmia”, VIII Pan Slavic International Congress on Cardiac Pacing and Electrophysiology "CARDIOSTIM", Saint Petersburg, Russia, 2008/02/14.
 152. “New approaches for the low energy cardioversion and defibrillation”, VIII Pan Slavic International Congress on Cardiac Pacing and Electrophysiology "CARDIOSTIM", Saint Petersburg, Russia, 2008/02/15.
 153. “Mechanisms of ventricular fibrillation and a new approach to cardioversion-defibrillation”, VIII Pan Slavic International Congress on Cardiac Pacing and Electrophysiology "CARDIOSTIM", Saint Petersburg, Russia, 2008/02/15.
 154. “Electroporation in the intact heart: implications for defibrillation, arrhythmia and stunning”, Medtronic, Inc., Minneapolis, MN. 2008/01/28.
 155. “Biophotonic Imaging of Atrial Pacemaker Complex”, Cardiovascular Research Seminar, Washington University School of Medicine, St. Louis, MO, 2008/01/24.
 156. “Heterogeneous protein expression in the cardiac pacemaker and conduction system”, Department of Biochemistry and Molecular Biology, Saint Louis University, St. Louis, MO, 2007/12/12.
 157. “Implantable Defibrillation Therapy: A Century of Breakthrough”, St. Louis Chapter of IEEE Engineering in Medicine and Biology Society, St. Louis, MO, 2007/10/10.
 158. “Fundamental mechanisms of AV conduction: ionic channels and gap junctions”, Bakulev Scientific Centre for Cardiovascular Surgery, Russian Academy of Medical Sciences, Moscow Russia, 2007/10/08.
 159. «Basic aspects of AV-nodal tachycardia: Ion Channels, Currents and Gap Junctions», III Russian Symposium on Interventional Arrhythmology and Educational Course of European Cardiac Arrhythmia Society (ECAS). Pathogenesis, Diagnosis And Treatment of Supraventricular Tachyarrhythmias, Moscow, Russia, 2007/09/14
 160. «How to fix a broken heart: Modern Bioengineering Approaches to Cardiovascular Diseases, from Molecules to Patients», Club Bilingua, Moscow, Russia, 2007/09/12
 161. «Brain drain and integration of world academic community», Moscow Institute for Transmission of Information, Russian Academy of Sciences, Moscow, Russia, 2007/09/11
 162. «Multimodal Biophotonic Imaging of Supraventricular Pacemaker and Conduction System», Focused Meeting of The Physiological Society, Cardiac Electrophysiology - with a special celebration of the centenary of the discovery of the sinoatrial and atrioventricular nodes, University of Manchester, Manchester, UK, 2007/09/05
 163. “Atrial Pacemaker Complex: Orchestrating cardiac rhythm”, University of Iowa, Cardiology Grand Rounds speaker, 2007/08/22.

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164. "New approaches to defibrillation and resynchronization therapies learned from optical mapping", Division of Cardiology Grand Rounds at Weill Cornell Medical College, New York NY, 2007/05/14.
 165. "Biophotonic Imaging of Embryonic Heart", Weinstein Cardiovascular Development Conference, Indianapolis IN, 2007/05/11.
 166. "New approaches to device therapy of cardiac arrhythmias: insights from optical imaging", Lillehei Institute Grand Round, University of Minnesota, Minneapolis MN. 03/06/2007
 167. "Sinoatrial and Atrioventricular Nodal Structure and Function", Saudi Heart Association XVIII annual meetings, Jeddah, Saudi Arabia, 02/07/2007
 168. "New Advances Towards Painless Defibrillation", Saudi Heart Rhythm Society Satellite Symposium, Saudi Heart Association XVIII annual meetings, Jeddah, Saudi Arabia, 02/07/2007
 169. "Optical Imaging of Arrhythmias", University of Missouri, St. Louis, 01/12/2007
 170. "New approaches to device therapy of cardiac arrhythmias: insights from optical imaging", Duke University, Department of Biomedical Engineering, Speaker for Bioengineering Leaders Seminar Series, 01/08/2007
 171. "The structure/function relationship in the AV node". Fifth International Workshop on Computer Simulations and Experimental Assessment of Electrical Excitation, Beau-Rivage Palace, Lausanne, Switzerland. 12/11/2006
 172. "New strategies for resynchronization and defibrillation therapies: insights from the rabbit heart", Brigham and Women's Hospital, Harvard University Medical School, Boston, MA. 12/07/2006
 173. "Optical imaging of cardiac arrhythmias: The Bermuda triangle of the AV junction". Division of Engineering and Applied Sciences, Harvard University, Cambridge MA. 12/06/2006
 174. "Optical mapping of cardiac electrical activity", Mathematical Biosciences Institute, Ohio State University, Columbus, OH. 10/06/2006
 175. "Reentrant arrhythmias", Mathematical Biosciences Institute, Ohio State University, Columbus, OH. 09/28/2006
 176. "Hibernating ground squirrel", Kavli Institute for Theoretical Physics. University of California at Santa Barbara. Cardiac Dynamics workshop. 08/03/2006
 177. "Pacemaking and conduction system of the heart", Saint Jude Medical, Los Angeles, CA. 07/31/2006
 178. "Towards painless defibrillation", Saint Jude Medical, Los Angeles, CA. 07/31/2006
 179. "Low voltage defibrillation", Kavli Institute for Theoretical Physics. University of California at Santa Barbara. Cardiac Dynamics workshop. 07/27/2006
 180. "Structure/function of the supraventricular pacemaking and conduction system of the rabbit heart". American Association of Anatomists, FASEB annual meeting. San Francisco, CA. 04/04/2006
 181. "Imaging arrhythmias in 3D: the final frontier", Oxford University, Oxford, UK. 03/17/2006
 182. "Towards painless defibrillation: virtual electrode theory of electrical stimulation of the heart", Oxford University, Oxford, UK. 03/15/2006
 183. "Structure/function relationship of the pacemaking and conduction system of the heart", Oxford University, Oxford, UK. 03/13/2006
 184. "Imaging Cardiac Arrhythmias", Department of Biomedical Engineering, Saint Louis University, St. Louis, MO. 02/18/2006

185. "History and mechanisms of defibrillation: toward painless defibrillation", Cardiology Grand Round Lecturer, Albert Einstein College of Medicine and Montefiore Medical Center, New York, NY. 02/14/2006
186. "Imaging arrhythmias: toward painless defibrillation", Cardiac Bioelectricity and Arrhythmia Center, Washington University, St. Louis, MO. 10/17/2005
187. "Optical mapping of the conduction system of the heart", Mammalian Myocardium 2005, Bristol, UK. 07/20/2005
188. "Mechanisms of defibrillation", 1st Russian Arrhythmology Congress, Moscow, Russia. 06/18/2005
189. "Optical Mapping of Cardiac Conduction: the Role of Connexins", University of Medicine and Dentistry of New Jersey, Newark. 05/17/2005
190. "Optical mapping of the AV junction", 30th annual meeting of the International Society of Computerized Electrocardiography, Kauai, Hawaii. 04/15/2005
191. "Optical mapping of cardiac arrhythmias", Imaging Science Seminar. Washington University in St. Louis, MO. 03/25/2005
192. "Mechanisms of Cardiac Conduction and Vulnerability to Arrhythmias: Protection in Hibernation?" University of Alaska, Fairbanks, Alaska. 03/04/2005
193. "The mechanisms of stimulation and defibrillation: virtual electrodes and electroporation", Indo-US Frontiers of Science Symposium, U.S. National Academy of Sciences and Indian Institute of Science, Bangalore, India. 01/09/2005
194. "Molecular determinants of cardiac conduction: the role of connexins", University of Minnesota, Duluth, MN. 12/13/2004
195. "On history and mechanisms of defibrillation", Medtronic, Minneapolis, MN. 10/11/2004
196. "Structure-function relationship in the AV junction", National Institute of Aging, National Institutes of Health, Baltimore, MD. 10/07/2004
197. "Structure-function relationship in the AV junction", Conference "Cardiac Cellular Electrophysiology: From funny currents to the current Physiome", September 2-5, 2004, Montpellier, France. 09/03/2004
198. "Cardiac conduction and resistance to ventricular fibrillation in Siberian hibernator *Citellus undulatus*: Does the switch from Cx43 to Cx45 improve safety of slow conduction?", International symposium "Life in the cold 2004", July 25 – 31, 2004, Vancouver, BC – Seward, Alaska. 07/31/2004
199. "The role of cellular uncoupling and electroporation in defibrillation", Fourth International Workshop on Computer Simulation and Experimental Assessment of Electrical Cardiac Function and Second Salon Scientifique de Cap d'Ail From Gene to Life, June 14-15, 2004, Cap d'Ail, France. 05/15/2004
200. "Molecular Basis of Triggers and Substrates in Atrial Fibrillation: Role of the AV junction", Heart Rhythm Association annual meeting, San Francisco, CA. 05/21/2004
201. "Are Virtual Electrode-Induced Graded Responses Important in the Mechanisms of Ventricular Vulnerability and Defibrillation?" Heart Rhythm Association annual meeting, San Francisco, CA. 05/20/2004
202. "Structure-function relationship of the AV junction", American Association of Anatomists, Washington, D.C. 04/19/2004
203. "The role of intercellular communications in the AV junction", University of Pittsburgh, PA. 02/24/2004

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204. “The role of connexin diversity and remodeling in cardiac conduction and arrhythmogenesis”, Cardiac Rhythm Management Laboratory, University of Alabama at Birmingham, AL 01/26/2004
 205. “Molecular mechanisms of AV conduction”, Burdenko Hospital, Moscow, Russia. 12/25/2003
 206. “The role of heterogeneity of connexins in the AV junction and infarction border zone: substrate for focal and reentrant activity”, Medtronic Technical Forum, Minneapolis, MN. 12/17/2003
 207. “Molecular and structural basis of conduction in the AV junction”, Cardiology Journal Club, University Hospitals of Cleveland. 11/21/2003
 208. “Mechanisms of fibrillation and defibrillation”, Bakulev Scientific Centre for Cardiovascular Surgery, Russian Academy of Medical Sciences, Moscow Russia. 10/27/2003
 209. “Molecular mechanisms of propagation and arrhythmias”, Bakulev Scientific Centre for Cardiovascular Surgery, Russian Academy of Medical Sciences, Moscow Russia. 10/23/2003
 210. “What do we know about mechanisms of vulnerability and defibrillation?”, Kavli Institute for Theoretical Physics, University of California, Santa Barbara, CA. 10/08/2003
 211. “Century of Defibrillation”, Burdenko Hospital, Moscow, Russia. 06/20/2003
 212. “Virtual electrodes in defibrillation”, Heart Rhythm Society (NASPE) annual meeting, Washington, D.C. 05/15/2003
 213. “Mechanisms of cardiac pacing and defibrillation”, Marquette University, Milwaukee, WI. 03/21/2003
 214. “Mechanisms of cardiac defibrillation”, Cornell University, Ithaca, NY. 03/11/2003
 215. “Century of Defibrillation”, XIIth World Congress on Cardiac Pacing and Electrophysiology, Hong Kong, China. 02/20/2003
 216. “Models of cardiac excitation”, Xth International Workshop “Mathematical Models of Living Systems”. Puschino, Russia. 01/25/2003
 217. “On ways of interaction between Russian and Western Science Communities”, International Conference “Intellectual bridge Russia-West: Problems and Perspectives”. Dubna, Russia. 12/25/2002
 218. “Active bidomain modeling and fluorescent imaging of virtual electrode induced scroll waves”, 3rd International Workshop on Computer simulation and Experimental Assessment of Electrical Cardiac Function. Lausanne, Switzerland. 12/05/2002
 219. “The mechanisms of stimulation and defibrillation: virtual electrodes, electroporation and electrode-tissue interface”, Biomedical Engineering Department Seminar, Washington University, St. Louis, MO. 10/17/2002
 220. “Mechanisms of Stimulation and Defibrillation: Virtual Electrodes, Electroporation and Electrode Tissue Interface”, Technical Forum (EP chapter), Medtronic, Minneapolis, MN. 9/27/2002
 221. “Stimulation with a Single Electrode”, 13th International Congress Cardiostim-2002, Nice, France. 6/20/2002
 222. “Shocking experience: electrically induced virtual electrodes and scroll waves in the heart”, Massachusetts Institute of Technology, Boston, MA. 5/30/2002

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223. "Action potential duration restitution slope of greater than one is not always a key determinant of ventricular fibrillation", Annual meeting of North American Society of Pacing and Electrophysiology, San Diego, CA. 5/11/2002
 224. "The core of reentry", Annual meeting of North American Society of Pacing and Electrophysiology, San Diego, CA. 5/09/2002
 225. "Shocking experience: Electrical Stimulation of the Heart", Biomedical Engineering Department Seminar, CWRU, Cleveland, OH. 4/25/2002
 226. "Mechanisms of cardiac stimulation and defibrillation", Heart Failure and Electrophysiology Seminar Series, Cleveland Clinic Foundation, Cleveland, OH. 4/09/2002
 227. "Mechanisms of cardiac stimulation and defibrillation", Department of Physiology and Biophysics, Case Western Reserve University, Cleveland, OH. 3/21/2002
 228. "Mechanisms of defibrillation", Department of Cardiology, University Hospitals, Cleveland, OH. 3/1/2002
 229. "Mechanisms of fibrillation", Department of Cardiology, University Hospitals, Cleveland, OH. 2/25/2002
 230. "Virtual electrode hypothesis of defibrillation ", Queenstown, New Zealand. 8/19/2001
 231. "Virtual electrode hypothesis of defibrillation: three-dimensional aspects", University of Leeds, UK. 7/13/2001
 232. "Mechanisms of vulnerability and defibrillation", University of Oxford, UK. 7/8/2001
 233. "Virtual electrode polarization induced phase singularity or cross-field induced critical points", Copenhagen, Denmark. 6/21/2001
 234. "Mechanisms of cardiac stimulation and defibrillation: new insights from fluorescent imaging", McGill University, Montreal, Canada. 6/6/2001
 235. "Fluorescent Imaging of the Heart", University of Montreal, Montreal, Canada. 6/4/2001
 236. "Mechanisms of defibrillation", Department of Cardiology, University Hospitals, Cleveland, OH. 3/2/2001
 237. "Mechanisms of fibrillation", Department of Cardiology, University Hospitals, Cleveland, OH. 2/26/2001
 238. "Virtual Electrode Theory of Defibrillation", Second International Workshop on Computer simulation and Experimental Assessment of Electrical Cardiac Function. Lausanne, Switzerland. 5/12/2000
 239. "A century of fibrillation. Ventricular Fibrillation: Initiation, Maintenance and Termination", Cardiosim 2000, Nice, France. 6/25/2000
 240. "Electric Stimulation of the Heart: New Mechanistic Insights from Fluorescent Imaging In Vitro", Medtronic, Inc., Minneapolis, MN. 2/7/2000
 241. "Fluorescent Imaging Of The Vortex Core In The Rabbit Heart ", BMES-EMBS meeting, Atlanta, GA. 10/12/1999
 242. "Role of Critical Points in Defibrillation", XI World Symposium on Cardiac Pacing and Electrophysiology, Berlin, Germany. 6/28/1999
 243. "Mechanisms of Fibrillation and Defibrillation", Department of Molecular Cardiology, Cleveland Clinic Foundation, Cleveland, OH. 5/1/1999
 244. "Mechanisms of defibrillation", Tulane University, New Orleans, LA. 4/19/1999
 245. "Mechanisms of defibrillation", Metro Hospital Research Center, Cleveland OH. 2/2/1999
 246. "ICD therapy for sudden cardiac death", Department of Anesthesiology, Cleveland Clinic Foundation, Cleveland OH. 1/19/1999

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247. “Optical mapping of supraventricular conduction”, Medical University of South Carolina, Charleston SC. 10/30/1998
 248. “Mechanisms of defibrillation: role of heart structure”, Medical University of South Carolina, Charleston SC. 10/28/1998
 249. “Virtual electrode-induced wavefronts and phase singularities: mechanisms of defibrillation failure”, Biomedical Engineering Society meeting, Cleveland, OH. 10/13/1998
 250. “Genesis and dynamics of shock-induced spiral waves”, Biomedical Engineering Society meeting, Cleveland, OH. 10/13/1998
 251. “Mechanisms of defibrillation”, Department of biomedical Engineering, Case Western Reserve University, Cleveland, OH. 9/29/1998
 252. “Mechanisms of internal defibrillation”, Department of Physics, Ohio University, Athens, OH. 9/14/1998
 253. “Genesis of phase singularity by virtual electrode effect during defibrillation”, Optical Mapping Symposium, Phoenix, AZ. 4/25/1998
 254. “Virtual electrodes induced phase singularity: a basic mechanisms of defibrillation failure”, Guidant Corp., Minneapolis, MN. 3/13/1998
 255. “Virtual electrodes-induced phase singularity: a basic mechanisms of defibrillation failure”, St. Jude Medical CRMD, Sunnyvale, CA. 3/1/1998
 256. “Effects of biphasic shocks on transmembrane polarization: virtual electrodes and critical points”, University of Alabama, Birmingham, AL. 1/16/1998
 257. “Virtual electrodes induced phase singularity: a basic mechanisms of defibrillation failure”, Case Western Reserve University, Cleveland, OH. 1/7/1998
 258. “Optical mapping of electrical activity during defibrillation”, Krannert Institute of Cardiology, Indiana University, Indianapolis, IN. 3/21/1997

Teaching:

- 2015, Spring: BME 301B: Quantitative Physiology II, Course master
BME 1010: Introduction to BME, Course master
- 2014, Spring: BME 301B: Quantitative Physiology II, Course master
BME 573: Applied Bioelectricity, Course master
BME 5901: Integrative Cardiac Electrophysiology, 25%
- 2013, Spring: BME 301B: Quantitative Physiology II, Course master
BME 5909: Physiology of the Heart, Course master
- 2012, Spring BME 301B: Quantitative Physiology II, Course master
BME 573: Applied Bioelectricity, Course master
BME 5909: Physiology of the Heart, Course master
- 2011, Fall Biol 5146, Principles and Applications of Biological Imaging
BME 140, Introduction to Biomedical Engineering
- 2011, Spring BME 301B, Quantitative Physiology II, Course master
- 2010, Fall Biol 5146, Principles and Applications of Biological Imaging
BME 140, Introduction to Biomedical Engineering
- 2010, Spring BME301B, Quantitative Physiology II, Course master
BME 573: Applied Bioelectricity, Course master
BME594 Integrative Cardiac Electrophysiology, Instructor (1/3 lectures)
- 2009, Spring BME 301B, Quantitative Physiology II, Course master

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- 2008, Fall Biol 5146, Principles and Applications of Biological Imaging
BME 140, Introduction to Biomedical Engineering
- 2008, Spring BME 301B, Quantitative Physiology II, Course master
BME 573, Applied Bioelectricity, Course master
- 2007, Fall Biol 5146, Principles and Applications of Biological Imaging
BME 140, Introduction to Biomedical Engineering
- 2007, Sprint BME 301B, Quantitative Physiology II, Course master.
- 2006, Spring BME 301B, Quantitative Physiology II, Course master.
BME 573, Applied Bioelectricity, Course master.
- 2005, Fall BME 301B, Quantitative Physiology II.
BME 140, Introduction to Biomedical Engineering.
- 2005, Spring BME 471, Bioelectric Phenomena, Instructor.
BME 301B, Quantitative Physiology II.
- 2004, Fall BME 140, Introduction to Biomedical Engineering.
- 2004, Spring EBME 452, Tissue and Organ Systems Physiology. Organizer.
- 2003, Fall EBME 105, Introduction to Biomedical Engineering. Organizer.
EBME 313. Biomedical Engineering Laboratory.
EBME 417. Structure and Function of Excitable Cells.
- 2003, Spring EBME 452, Physiological Processes II. Organizer.
ENGR 210, Introduction to Circuits and Instrumentation.
- 2002, Fall EBME 105, Introduction to Biomedical Engineering. Organizer.
EBME 313, Biomedical Laboratory.
- 2002, Spring EBME452, Physiological Processes II.
ENGR 210, Introduction to Circuits and Instrumentation.
PHOL 518, Integrative Approaches to Cardiovascular Research.
EBME 417, Structure and Function of Excitable Cells.
- 2001, Fall EBME 105, Introduction into Biomedical Engineering.
EBME 313, Biomedical Engineering Laboratory.
- 2001, Spring EBME 452, Physiological Processes II.
ENGR 210, Introduction to Circuits and Instrumentation.
EBME 314, Biomedical Engineering Laboratory.
PHOL 518, Integrative Approaches to Cardiovascular Research.
EBME 417, Structure and Function of Excitable Cells.
- 2000, Fall EMBE 403, Biomedical Transducers and Instrumentation.
EBME 314, Biomedical Engineering Laboratory.
- 1999 EBME 314, Biomedical Engineering Laboratory.
- 1995 Advanced graduate course in Cardiac Electrophysiology and
Electropharmacology, Ohio State University.
- 1993-1994 Undergraduate students project adviser, University of Pittsburgh.
- 1981-1983 Evening School of Physics and Technology of Moscow Institute of Physics and
Technology, Moscow, Russia. Taught calculus, physics, and differential equations
for advanced high school students.
- 1980-1985 Krasnoyarsk State University, Natural Sciences Summer School, Krasnoyarsk,
Russia. Taught physics, classical mechanics, calculus, differential equations to
advanced high school students.

1980-2000 Jugged Krasnoyarsk Province, and Moscow City, Russia, and Northeast Ohio, USA Science and Engineering Fairs for high school students.

University service

2012-present Member, BME Graduate Program Committee, Washington University
 2012-present Member, Study section, Institute of Clinical and Translational Sciences, Washington University School of Medicine, St. Louis MO.
 2012-present Member, Search committee, Associate Vice Chancellor for Innovation, Washington University in Saint Louis.
 2011-present Member, RAC Subcommittee for Entrepreneurship, Washington University School of Medicine.
 2008-2012 Member, Information Technology Advisory Committee, School of Engineering and Applied Sciences, Washington University in Saint Louis
 2004-2012 Member, Imaging Training Program Committee, Washington University
 2004-2012 Member, BME Undergraduate Program Committee, Washington University
 2000-2004 Member, Graduate Education Committee, Biomedical Engineering Department, Case Western Reserve University.
 2001-2004 Freshman student adviser, Case School of Engineering, Case Western Reserve University.
 2001-2004 Member, Imaging faculty search committee, Biomedical Engineering Department, Case Western Reserve University.
 2001-2003 Member, Case School of Engineering Executive Committee.

Laboratory members research awards and prizes

1. Katherine Holzem, 1st Prize in Poster competition at the Cardiac Arrhythmia Mechanisms Gordon Research Conference, Il Chiocco, Italy, 2015.
2. Fu Siong Ng, MD, PhD, European Cardiac Arrhythmia Society, 1st Prize for best presentation, 2014.
3. Ajit Janardhan, MD, PhD, Heart Rhythm Society, Young Investigator Competition Finalist, May 2013.
4. Joseph Marmarstien, SURF fellowship, Washington University in Saint Louis, April 2013.
5. Saraha Gutbrod, Whitaker Foundation, Whitaker International Program Summer grant. 2013.
6. Katherine Holzem, Research grant, American Medical Association, 2013.
7. Jacob Laughner, 1st Prize at the Washington University School of Medicine 1st Annual Cardiovascular research Day Poster Presentation. 2012/12/07.
8. Katherine Holzem, National Institutes of Health, National Research Service Award, 2012-2015. Score 10, Percentile 1%.
9. Ajit Janardhan, MD, PhD, Dr. Manohar Sai Gowda Memorial Young Investigator Cardiovascular Research Award for “Low-Energy Multi-Stage Electrotherapy Cardioverts AF With Lower Energy Than a Single Biphasic Shock: In Vivo Results and Mechanism Revealed by Optical Mapping In Vitro”, Kansas City Heart Rhythm Symposium.
10. Matt Sulkin, American Heart Association Predoctoral Fellowship, 7/1/2012-6/30/2014.
11. Katherine Holzem, American Heart Association Predoctoral Fellowship, 7/1/2012-6/30/2014.

12. Vadim V. Fedorov, Ph.D., Best Science Award for his abstract presentation at the American Heart Association Scientific Sessions in November 2009.
13. William Hucker, MD, PhD, Spencer T. and Ann W. Olin Fellowship in Medical Sciences, Washington University, 2009.
14. Roger Chang, Summer Undergraduate Research Fellowship, 2008.
15. Geran KostECKi, Summer Undergraduate Research Fellowship, 2008.
16. Hyuliya Aferol, Summer Undergraduate Research Fellowship, 2008.
17. Vadim V. Fedorov, Ph.D., American Heart Association Beginning Grant-In-Aid, 01/2008-12/2009, 0860047Z, "The role of substrates in atrial fibrillation mechanisms: implications for painless defibrillation therapy".
18. Crystal Ripplinger, 2nd place – Gordon Research Conference on Cardiac Arrhythmia Mechanisms Poster Competition, Organ/Tissue-level Category 2007.
19. Geran KostECKi, Summer Undergraduate Research Fellowship, 2007.
20. Vadim V. Fedorov, Ph.D, 1st Runner-up, American Association of Anatomists, Presley-Zeiss Postdoctoral Fellowship Award Presentation - "Functional and structural optical imaging of the rabbit sinoatrial node" 2006 Experimental Biology Conference, San Francisco, CA.
21. William Hucker, 1st runner-up, American Association of Anatomists Langman Award for Best Graduate Presentation – "A multi-imaging approach to study the structure and function of the atrioventricular junction". 2006 Experimental Biology Conference, San Francisco, CA.
22. William Hucker, Whitaker Graduate Fellowship from the Whitaker Foundation, 2004–2006.
23. Crystal Ripplinger, 2nd place – Gordon Research Conference on Cardiac Arrhythmia Mechanisms Poster Competition, Organ/Tissue-level Category, "Low-Voltage Termination of Ventricular Reentrant Arrhythmias" 2005.
24. Crystal Ripplinger, 1st place – Design of Medical Devices Conference Poster Competition, Cardiovascular Category (Midwest Biomedical Engineering Society Meeting): "Novel approach for low-voltage termination of anatomically defined reentry" 2005.
25. Crystal Ripplinger, 1st place – Washington University Graduate Research Symposium Post Competition: "Novel approach for low-voltage termination of anatomically defined reentry" 2005
26. Crystal Ripplinger, AHA Predoctoral Fellowship, "Unpinning and low-voltage termination of reentrant arrhythmias in the right ventricular endocardium", 07/01/2005-06/30/2007. 1% percentile.
27. Christina Ambrosi, Imaging Sciences Pathway Fellowship, NIH, 10/1/2006-7/31/2008.
28. Sangita Sudharshan, Hoopes Summer Research Fellowship, 2006.
29. Jennifer Hadley, Howard Hughes Medical Institute Summer Research Fellowship, 2006.
30. Kristy Ratkowski, Howard Hughes Medical Institute Summer Research Fellowship, 2005.

Graduate students (name degree start date, completion date)

1. John Qiao, 2013-present.
2. Christopher Gloschat, 2012-present.
3. Chaoyi Kang, 2012-present.
4. Sarah Gutbrod, Fall, 2010-2015.
5. Matthew Sulkin, 2010-present.
6. Katherine Holzem, 2009-2015.

7. Di Lang, Ph.D., 2008-2013, Current position: postdoctoral fellow, University of California at Davis, CA.
8. Jacob Laughner, 2009-2013, Current position: senior scientist, Boston Scientific, Minneapolis, MN.
9. Christina Ambrosi, Ph.D., 2006 – 2011, Current position: postdoctoral research associate, Stony Brook University, NY.
10. Kelley Foyil, M.Sc. 2006-2008
11. Wenwen Li, Ph.D., 2007 – 2011. Current position: project scientist, St. Jude Medical.
12. Qing Lou, Ph.D., 2007 – 2011. Current Position: postdoctoral research associate, Ohio State University, Columbus, OH.
13. William Hucker, MD/PhD, 09/2004-11/2007. Current position: Residency and Cardiology Fellowship, Harvard Medical School.
14. Crystal M. Ripplinger, PhD, 09/2004-02/2008. Current position: Assistant Professor of Pharmacology, University of California, Davis, CA.
15. Fujian Qu, DSc, 09/2001-05/2006. Current position: Senior Scientist, Saint Jude Medical, Los Angeles, CA.
16. Li Li, PhD, 09/2000-08/2005. Current position: Instructor, University of Utah, Salt Lake City, UT.
17. Alexandre T. Sambelashvili, PhD, 09/ 2000–02/2004. Current position: Principle Scientist, Medtronic, Minneapolis, MN.

Graduate students rotation (name degree start date, completion date)

1. Wandu Zhu, Spring 2014
2. Tedan Hu, Fall 2013
3. Austin Cocciolone, Fall 2013
4. Yun (John) Qiao, 2012
5. Erina Ghosh, rotation, Fall 2008
6. Casey Donahoe, rotation, Spring 2008
7. Mohit Sharma, rotation, Spring 2008
8. Benjamin Filas, rotation, 2006-2007
9. Metasebya Solomon, rotation, Fall 2006
10. Cionne Wolfe, rotation, Fall 2006
11. Brain White, MD/PhD, rotation, Summer 2005

Undergraduate student research supervision

1. Joseph Marmarstein, 2012-present
2. Eli Madden, 2011-present
3. Connie Shao, 2011-present
4. Birce Onal, 2011-2012
5. Sophia Cui, 2010-2012
6. Colleen Rhoades, 2010-2012
7. Alice Ndikumana, 2010
8. Paul Kalish, 2009-2010
9. Vinod Ravikumar, 2009-2012

10. Stefanie Tanenhaus, 2008-2009
11. Gregory Holton, 2008
12. Hyuliya Aferol, 2008-2009
13. Anubodh (Sunny) Varshney, 2007-2008
14. Geran Kostecki, 2007-2009
15. Roger Chang, 2006-2009
16. Sangita Sudharshan, 2005-2007
17. Jacob Laughner, 2005-2007
18. Matt Hemphill, 2005-2008
19. Jennifer Hadley, 2005-2008
20. Kateline Gruber, 2005
21. Karl Zelik, 2005-2007
22. Kristy Ratkowski, 2005
23. Megan McCain, 2004-2006
24. Andreas Fritz, 2002-2003
25. Camellia Banerjee, 2003-2004
26. Daniel Johnson, 2001-2002
27. Douglas Goldstein, 2001-2002

Postdoctoral trainees and advisees

1. Bastian Boukens, Research Associate. Current.
2. Fu Siong NH, MD, Research Associate. Current position: Cardiology fellow, Imperial College London, UK.
3. HeyJin Hwang, MD, Visiting Professor.
4. Deborah Janks, PhD, Research Associate. Current Position: Research Associate, Washington University in Saint Louis, MO.
5. Ajit Janadrhan, MD, PhD, Cardiology Fellow.
6. Alexey Glukhov, PhD., Research Associate. Current Position: Postdoctoral Researcher, Imperial College London.
7. Vadim Fedorov, PhD, Research Assistant Professor. Current Position: Assistant professor of Physiology, Ohio State University, Columbus, OH.
8. Vladimir Nikolski, Ph.D., Research Assistant Professor. Current Position: Principle Scientist, Medtronic.
9. Alena Nikolskaya, PhD, Research Associate. Current Position: Senior Scientist, Medtronic.
10. Noriko Niwa, MD, Research Associate. Current Position: Research Associate, Washington University School of Medicine.
11. Yuanna Cheng, M.D., Ph.D., Research Associate. Current Position: Scientific Review Administrator, NIH.
12. Gil Bub, Ph.D., Research Associate. Current Position: Research Associate, University of Oxford, UK.
13. Florence Rothenberg, M.D., Research Associate. Current Position: Assistant Professor of Medicine (Cardiology), University of Cincinnati, OH.
14. Ayman S. Al-Khadra, M.D. Clinical Fellow. Current Position: President, Saudi Heart Rhythm Society. Staff Cardiologist, King Fahd Armed Forces Hospital, Jeddah, Kingdom of Saudi Arabia

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15. Stephane Garrigue, MD, Clinical Fellow. Current Position, Associate Professor University of Bordeaux, France.

Thesis committees:

1. Smiruthi Ramasubramanian,
2. Jiajing Xu,
3. Erik Zellmer,
4. Arie Krumholz
5. Amanda Smith,
6. Ya-Jian Cheng,
7. Piyush Karande,
8. Junjie Zhang,
9. Ramya Vijayakumar,
10. Li Li,
11. Junjie Zhang,
12. Urvi Lee,
13. Yang Li,
14. Yu Wang,
15. Christine Fleming,
16. Manojit Pramanik,
17. Kwang Hyun Song,
18. Chulhong Kim,
19. Song Hu,
20. Neelesh Soman,
21. Hua Pan,
22. Thomas O'Hara,
23. Namit Gaur,
24. Ben Filas,
25. Lina El-Esber,
26. Keith Decker,
27. Raj Kothapalli.

Books:

1. The Health Effects of Conducted Energy Weapons. The Expert Panel of the Medical and Physiological Impacts of Conducted Energy Weapons. Council of Canadian Academies, 2013. ISBN 978-1-926558-63-9.
2. **Efimov I.R.**, Kroll, M.W., Tchou, P.J., Eds., Cardiac Bioelectric Therapy: Mechanisms and Practical Implications, Springer, 2008. ISBN 978-0-387-79402-0.

List of peer-reviewed research publications (Web of Science h-index: 37. Google Scholar: Citations 6712; h-index 47; h-index (since 2010) 35):

1. Fast, V.G., **Efimov, I.R.** & Krinsky, V.I., "Transition from circular to linear rotation of a vortex in an excitable cellular medium", *Phys. Let.* **151A**(3-4), 1990, 157-161.

2. Fast, V.G. & **Efimov, I.R.** "Stability of vortex rotation in an excitable cellular medium", *Physica* **49D**, 1991, 75-81.
3. Krinsky, V.I., Biktashev, V.N. & **Efimov, I.R.**, "Autowave principles for parallel image processing", *Physica* **49D**, 1991, 247-253.
4. Burashnikov, A.Y., **Efimov, I.R.**, Fast, V.G., Karasaeva, A.H. & Pertsov, A.M, "Isolated coronary perfused right rat ventricle as a model of ischemic and reperfusion arrhythmias", *Kardiologiia* **31(7)**, 1991, 58-61 (in Russian).
5. Krinsky, V.I., **Efimov, I.R.** & Jalife, J. "Vortices with linear cores in excitable media", *Proc. R. Soc. Lond.*, **438A**, 1992, 645-655.
6. Krinsky, V.I. & **Efimov, I.R.**, "Vortices with linear cores in mathematical models of excitable media", *Physica* **188A**, 1992, 55-60.
7. Salama, G, Kanai, A. & **Efimov I.R.**, "Subthreshold stimulation of Purkinje fibers interrupts ventricular tachycardia in intact hearts. Experimental study with voltage-sensitive dyes and imaging techniques," *Circ. Res.*, 1994, **74**: 604-619.
8. **Efimov I.R.**, Huang D.T., Rendt J.M. & Salama G., "Optical mapping of repolarization and refractoriness from intact heart", *Circulation*, 1994, **90**: 1469-1480.
9. **Efimov, I.R.**, Krinsky, V.I. & Jalife, J., "Dynamics of Rotating vortices in the Beeler-Reuter model of cardiac tissue", *Chaos, Solitons and Fractals*, 1995, **5**: 513-526.
10. **Efimov, I.R.**, Ermentraut, B., Rendt, G.M., Salama, G., "Activation and Repolarization are Governed by Different Structural Characteristics of Ventricular Myocardium: experimental study with Voltage-Sensitive Dyes and Numerical Simulations". 1995, *J. Cardiovasc. Electrophysiol.*, 1996, **7**:512-530.
11. **Efimov, I.R.**, Fahy, G.J., Cheng, Y., Van Wagoner, D.R., Tchou, P.J., Mazgalev, T.N., "High Resolution Fluorescent Imaging of Rabbit Heart Does Not Reveal a Distinct Atrioventricular Nodal Anterior Input Channel (Fast Pathway) During Sinus Rhythm", *J. Cardiovasc. Electrophysiol.*, 1997, **8**: 295-306.
12. Fahy, G., **Efimov, I.**, Cheng, Y.N., Kidwell, G.A., Tchou, P., Mazgalev, T., "Mechanism of atrioventricular nodal facilitation in the rabbit heart: Role of the distal AV node", *Am J Physiol*, 1997, **272**: H2815-H2825.
13. Cheng, Y., Mowrey, K., **Efimov, I.R.**, Van Wagoner, D.R., Tchou, P.J., Mazgalev, T., "Effects of 2,3-Butanedione Monoxime on the Atrial-Atrioventricular Nodal Conduction in Isolated Rabbit Heart", *J. Cardiovasc. Electrophysiol.*, 1997, **8**:790-802.
14. Tchou, P.J., Cheng, Y.N., Mowrey, K., **Efimov, I.**, Van Wagoner, D.R., Mazgalev, T.N., "Relation of the Atrial Input Sites to the Dual Atrioventricular Nodal Pathways: Crossing of Conduction Curves Generated with Posterior and Anterior Pacing", *J Cardiovasc. Electrophysiol.* 1997, **8**:1133-1144.
15. **Efimov, I.R.**, Cheng, Y., Van Wagoner, D.R., , Mazgalev, T., Tchou, P.J., "Transmembrane Voltage Change Produced by Real and Virtual Electrodes During Monophasic Defibrillation Shock Delivered by an Implantable Electrode", *J. Cardiovasc. Electrophysiol.*, 1997, **8**:1031-1045.
16. Mazgalev, T., Mowrey, K., **Efimov, I.**, Fahy, G., Van Wagoner, D.R., Cheng, Y.N., Tchou, P., "Mechanism of atrioventricular nodal facilitation in the rabbit heart: Role of the proximal AV node", *Am. J. Physiol.* 1997, **273**:H1658-H1668.
17. Salama, G., Kanai, A.J., Huang, D., **Efimov, I.R.**, Girouard, S.D., Rosenbaum, D.S., "Hypoxia and Hypothermia Enhance Spatial Heterogeneities of Repolarization in Guinea

- Pig Hearts: Analysis of Spatial Correlation of Optically recorded Action Potential Durations”, *J. Cardiovasc. Electrophysiol.* 1998, **9**:164-183.
18. **Efimov, I.R.**, Cheng, Y., Van Wagoner, D.R., Mazgalev, T.N., Tchou, P.J., Virtual electrode-induced phase singularity: a basic mechanism of defibrillation failure. *Circulation Research*, 1998, **82**: 918-925.
 19. **Efimov, I.R.**, Mazgalev, T.N., “High-resolution three-dimensional fluorescent imaging reveals multilayer conduction pattern in the atrioventricular node”. *Circulation*, 1998, **98**: 54-57.
 20. **Efimov IR**, What is the role of the atrio-ventricular node if the AV delay occurs before it? *Am. J. Physiol.* 1998, **44**(5): H1905-H1906. Letter to editor.
 21. Entcheva, E., Eason, J., **Efimov, I.R.**, Cheng, Y., Malkin, R., Claydon, F., “Virtual electrode effects in transvenous defibrillation - modulation by structure and interface: Evidence from bidomain simulations and optical mapping”, 1998, *J. Cardiovasc. Electrophysiol.*, 1998, **9**: 949-961.
 22. Cheng, Y., Van Wagoner, D.R., Mazgalev, T.N., Tchou, P.J., **Efimov, I.R.**, "Voltage-Sensitive Dye RH421 Increases Contractility of Cardiac Muscle", *Can. J. Physiol. Pharmacol.*, 1998 **76**(12): 1146-50.
 23. Yamanouchi, Y., **Efimov, I.R.**, Mowrey, K.A., Mazgalev, T.N., Wilkoff, B.L., Tchou, P.J., “Biventricular shocking leads improves defibrillation efficacy”, 1999, *J. Cardiovasc. Electrophysiol.*, **10**: 561-565.
 24. **Efimov, I.R.**, Sidorov, V.Y., Cheng, Y., Wollenzier, B., Evidence of 3D Scroll Waves with Ribbon-Shaped Filament as a Mechanism of Ventricular Tachycardia in the Isolated Rabbit Heart, *J. Cardiovasc. Electrophysiol.*, 1999, **10**: 1052-1062.
 25. Anderson RH, Mazgalev TN, **Efimov IR**, Three-dimensional imaging of atrioventricular node. *Circulation*, 1999 **99**: 2219-22. Letter to editor.
 26. Cheng, Y., Mowrey, K.A., Van Wagoner, D.R., Tchou, P.J., **Efimov, I.R.**, Virtual Electrode Induced Re-excitation: a Mechanism of Defibrillation, *Circ. Res.*, 1999, **85**: 1056-1066
 27. Nikolski, V. **Efimov, I.R.**, Virtual Electrode Polarization of Ventricular Epicardium During Bipolar Stimulation, *J. Cardiovasc. Electrophysiol.*, 2000, **11**(5): 605
 28. **Efimov, I.R.**, Cheng, Y., Yamanouchi, Y., Tchou, P.J., Direct Evidence of the Role of Virtual Electrode Induced Phase Singularity in Success and Failure of Defibrillation, 2000, *J. Cardiovasc. Electrophysiol.*, **11**: 861-868.
 29. **Efimov, I.R.**, Aguel, F., Cheng, Y., Wollenzier, B., Trayanova, N., Virtual Electrode Polarization in the Far Field: Implications for External Defibrillation, *Am. J. Physiol.*, 2000, **279**: H1055-H1070.
 30. **Efimov, IR**, A Shocking Experience: Ionic Modulation of Virtual Electrodes in Defibrillation, *Circ. Res.*, 2000, **87**: 429-430. Editorial.
 31. **Efimov, IR**, Gray, RA, Roth, BJ. Virtual Electrodes and De-excitation: New Insights into Fibrillation Induction and Defibrillation, *J. Cardiovasc. Electrophysiol.*, 2000, **11**: 339-353. Review.
 32. **Efimov, I.R.**, Sidorov, V.Yu. Optical Mapping of Electrical Activity in the Heart, *Kardiologiya*, 2000, **8**: 38-52 (in Russian).
 33. Cheng, Y. Nikolski, V., **Efimov, I.R.**, Reversal of Repolarization Gradient does not Reverse the Chirality of Shock-Induced Reentry in the Rabbit Heart. 2000, *J. Cardiovasc. Electrophysiol.*, 2000, **11**: 998-1007.

34. Al-Khadra, A., Nikolski, V., **Efimov, I.R.**, The Role of electroporation in defibrillation, *Circulation Research*, 2000, **87**: 797-804.
35. Yamanouchi, Y., Cheng, Y., Tchou, P.J., **Efimov, I.R.**, The Mechanisms of Vulnerable Window: The Role of Virtual Electrodes and Shock Polarity, *Can J. Physiol. Pharmacol.*, 2001, **79**: 25-33.
36. Nikolski V, **Efimov I.R.**, Fluorescent Imaging of a Dual-Pathway Atrio-Ventricular Nodal Conduction System, *Circulation Research*, 2001, **88**: e23-30.
37. Gupta, M., Rollins, A.M., Izatt, J.A., **Efimov, I.R.**, Imaging of the atrio-ventricular node using optical coherence tomography, *J. Cardiovasc. Electrophysiol.*, 2002, **13**: 95.
38. Sambelashvili A, Efimov IR, Pinwheel experiment re-revisited, *J Theor Biol*, 2002, **214**(2): 147-153.
39. Nikolski V., Sambelashvili A.T., **Efimov I.R.**, Mechanisms of make and break excitation revisited: Paradoxical break excitation during diastolic stimulation, *Am. J. Physiol.*, 2002, **282**(2): H565-575.
40. **Efimov IR**, Sambelashvili A, Nikolski V, The progress in studies of mechanisms of electrical stimulation of the heart. Part 1. Point stimulation. *J. Arrhythmology*, 2002, **26**: 91-96. Review.
41. **Efimov IR**, Cheng Y, Sambelashvili A, Nikolski V, The progress in studies of mechanisms of electrical stimulation of the heart. Part 2. Arrhythmogenesis. *J. Arrhythmology*, 2002, **28**: 79-83. Review.
42. **Efimov IR**, Cheng Y, Sambelashvili A, Nikolski V, The progress in studies of mechanisms of electrical stimulation of the heart. Part 3. Defibrillation. *J. Arrhythmology*, 2002. **29**: 75-80. Review.
43. **Efimov IR**, Virtual electrodes in virtual reality of defibrillation. *J. Cardiovasc. Electrophysiol.*, 2002, **13**(7): 680-681. Editorial.
44. Mowrey K.A., Cheng Y., Tchou P.J., **Efimov I.R.**, Kinetics of Defibrillation Shock-Induced Response: Design Implications of the Optimal Defibrillation Waveform, *EuroPACE*, 2002, **4**(1): 27-39.
45. Dumitrescu, C., Narayan, P., **Efimov, I.R.**, Cheng, Y., Radin, M.J., McCune, S.A., Altschuld, R.A. Mechanical alternans and restitution in failing SHHF rat left ventricles. *Am. J. Physiol.*, 2002, **282**(4): H1320-1326.
46. Dumitrescu, C., Narayan, P., Cheng, Y., **Efimov, I.R.**, Altschuld, R.A. Phase I and phase II of short-term mechanical restitution in perfused rat left ventricles. *Am. J. Physiol.*, 2002, **282**(4): H1311-1319.
47. Cheng Y., Mowrey K.A., Nikolski V., Tchou P.J., **Efimov I.R.**, Mechanisms of shock-induced arrhythmogenesis during acute global ischemia, *Am. J. Physiol.*, 2002, **282**(6): H2141-51.
48. Nikolski V., Sambelashvili A., **Efimov I.R.**, Anode Break Excitation During End-Diastolic Stimulation is Explained by Half-Cell Double Layer Discharge. *IEEE Trans. BME*, 2002, **49**(10): 1217-1220.
49. Nikolski V.P., Jones S.A., Lancaster M.K., Boyett M.R., **Efimov I.R.**, The role of the Cx43 in the Dual-Pathway electrophysiology of the AV Node and AV Nodal Reentry, *Circ. Res.*, 2003, **92**(4):469-75.
50. Garrigue S, Reuter S, **Efimov IR**, Mazgalev TN, Jais P, Haissaguerre M, Clementy J., Optical mapping technique applied to biventricular pacing: potential mechanisms of ventricular arrhythmias occurrence. *Pacing Clin Electrophysiol* 2003, **26**(1 Pt 2): 197-205

51. Sambelashvili A., Nikolski V., **Efimov I.R.**, Nonlinear effects in subthreshold virtual electrode polarization, *Am. J. Physiol. Heart Circ. Physiol.* 2003, **284**(6):H2368-H2374.
52. Li L., Nikolski V., **Efimov I.R.**, The effect of lidocaine on shock-induced vulnerability. *J. Cardiovasc. Electrophysiol.*, 2003, **14**: S237-S248.
53. Dobrzynski H., Nikolski V.P., Sambelashvili A.T., Yamamoto M., Boyett M.R., **Efimov I.R.**, The site of origin and molecular substrate of AV junctional rhythm in the rabbit heart. *Circ. Res.* 2003, **93**: 1102-1110.
54. **Efimov IR**, Fibrillation or Neurillation: Back to the future in our concepts of sudden cardiac death? *Circ. Res.* 2003, **92**(10):1062-4. Editorial.
55. **Efimov IR**, Mowrey KA, Cheng Y, Tchou PJ, EuroPACE, 2003, 5(3): 243-244. Letter to editor.
56. **Efimov IR**, Nikolski VP, Diastolic shocking experience: do virtual anodes exist only during systole? *J. Cardiovasc. Electrophysiol.*, 2003, **14**(11): 1223-4. Editorial.
57. Cheng Y., Li L., Nikolski V.N., Tchou P.J., **Efimov I.R.**, Shock-induced arrhythmogenesis is enhanced by 2,3-butanedione monoxime as compared with cytochalasin D, *Am. J. Physiol.*, 2004, **286**(1): H310-H318.
58. Nikolski V.P., Sambelashvili A., Krinsky V.I., **Efimov I.R.**, Effects of Electroporation on Optically Recorded Cellular Responses to High-Intensity Electrical Shocks. *Am. J. Physiol.* 2004, **286**(1): H412-8.
59. **Efimov IR**, Nikolski VP, Salama G, Optical imaging of the heart, *Circ. Res.* 2004, 95(1): 21-33. Review.
60. **Efimov IR**, Nikolski VP, Rothenberg F, Greener ID, Li J, Dobrzynski H, Boyett M, Structure-function relationship in the AV junction. *Anat Rec.* 2004; 280A(2): 952-65. Review.
61. Rothenberg F, **Efimov IR**, Watanabe M. Functional imaging of the embryonic pacemaking and cardiac conduction system over the past 150 years: technologies to overcome the challenges. *Anat Rec.* 2004; 280A(2): 980-9. Review
62. Sambelashvili A., Nikolski V., **Efimov I.R.**, Virtual electrode theory explains pacing threshold increase caused by cardiac tissue damage, *Am. J. Physiol.*, 2004, **286**: H2183–H2194.
63. Takagi S., Pumir A., Pazo D., **Efimov I.**, Nikolski V., Krinsky V., Unpinning and removal of a rotating wave in cardiac muscle. *Phys. Rev. Lett.*, 2004, **93**: 058101.
64. Takagi S., Pumir A., Pazo D., Efimov I., Nikolski V., Krinsky V., A physical approach to remove anatomical reentries: a bidomain study. *J. Theor. Biol.*, 230(4): 489-497, 2004.
65. Pazo D, Kramer L, Pumir A, Kanani S, **Efimov IR**, Krinsky V, Pinning force in active media, *Phys. Rev. Lett.*, 2004, 93(16): 168303.
66. Sambelashvili A., **Efimov I.R.**, Dynamics of virtual electrode-induced scroll-wave reentry in a 3D bidomain model. *Am. J. Physiol.* 2004: 287(4): H1570-81.
67. Jenkins M., Wade R.S., Rollins A.M., **Efimov I.R.**, Optical Coherence Tomography imaging of the Purkinje Network. *J. Cardiovasc. Electrophysiol.*, 2005, 16: 1-2.
68. Qu F., Zarubin F., Nikolski V.N., **Efimov I.R.**, The Gurvich defibrillation waveform has lower defibrillation threshold than the Zoll waveform and the truncated exponential waveform in the rabbit heart, *Can. J. Physiol. Phar.* 2005, 83(2): 152-160.
69. Rothenberg F., Nikolski V.P., Watanabe M., **Efimov I.R.**, Electrophysiology and anatomy of embryonic rabbit hearts before and after septation, *Am. J. Physiol.*, 2005, 288: H344-51.

-
70. Dobrzynski H., Li J., Tellez J., Greener I.D., Nikolski V., Wright S., Parsons S., Jones S.A., Lancaster M.K., Yamamoto M., Honjo H., Takagishi Y., Kodama I., **Efimov I.R.**, Billeter R., Boyett M.R., Three-dimensional model of the sinoatrial node including distribution of different cell types and a specialized exit pathway, *Circulation*, 2005, 111(7): 846-54.
 71. Qu F., Li L., Nikolski V.P., Sharma V., **Efimov I.R.**, Mechanisms of Superiority of Ascending Ramp Waveforms: New Insights into Mechanisms of Shock-induced Vulnerability and Defibrillation, *Am. J. Physiol.*, 2005, 289(2):H569-77.
 72. Li L, Nikolski VP, Wallick DW, **Efimov IR**, Cheng Y, Mechanisms of enhanced shock-induced arrhythmogenesis in the rabbit heart with healed myocardial infarction, *Am. J. Physiol.*, 2005, 289(3):H1054-68.
 73. Rodríguez B, Li L, Eason JC, **Efimov IR**, Trayanova N, Role of ventricular anatomy in vulnerability to electric shocks, *Circ. Res.*, 2005, 97(2): 168-75.
 74. Rozenshtraukh LV, Fedorov VV, Aliev RR, Glukhov AV, Mikheeva TV, Reznik AV, **Efimov IR**. [Pattern of Excitation in Isolated Heart of Hibernator Ground Squirrel *Citellus undulatus*.] *Kardiologiya*. 2005; 45(4): 4-10. In Russian.
 75. Fedorov VV, Li L, Glukhov A, Shishkina I, Aliev RP, Mikheeva T, Nikolski VP, Rosenshtraukh LV, **Efimov I.R.** Hibernator *Citellus undulatus* maintains safe cardiac conduction and is protected against tachyarrhythmias during extreme hypothermia: possible role of Cx43 and Cx45 upregulation. *Heart Rhythm.*, 2005, 2(9): 966-75.
 76. Deng, CX, Qu F, Nikolski VP, Zhou Y, **Efimov IR**, Fluorescent real-time monitoring of cardiac high-intensity focused ultrasound ablation. *Ann. Biomed. Eng.*, 2005, 33(10): 1417-1424.
 77. **Efimov IR**, Fedorov VV, Chessboard of atrial fibrillation: Reentry or focus? Single or multiple source(s)? Neurogenic or myogenic? *Am. J. Physiol*, 2005, 289(3): H977-9. Editorial.
 78. Nikolski VP, **Efimov IR**, Electroporation of the heart. *Europace*. 2005(Suppl 2): 146-54. Review.
 79. Hucker WJ, Nikolski VP, **Efimov IR**, Optical mapping of the atrioventricular junction. *J. Electrocardiology*, 2005, 38S: 121-5. Review.
 80. Rothenberg F, **Efimov IR**, Three-Dimensional Anatomy of the Conduction System of the Early Embryonic Rabbit Heart, *Anatomical records*, 2006 288A:3-7.
 81. **Efimov IR**, Ripplinger CM, Tornado in a dish: revealing the mechanisms of ventricular arrhythmias in engineered cardiac tissues, *Cardiovascular Research*, 2006, 69(2): 307-8, Editorial.
 82. **Efimov IR**, Fedorov VV, Precordial thump and commotio cordis: The yin and yang of mechanoelectric feedback in the heart, *Heart Rhythm*, 2006, 3(2): 187-188. Editorial.
 83. Jenkins MW, Rothenberg F, Roy D, Nikolski VP, Watanabe M, Wilson DL, **Efimov IR**, Rollins AM, Embryonic Cardiography using Gated Optical Coherence Tomography, *Optics Express*, 2006, 14(2): 736-748.
 84. Ripplinger CM, Krinsky VI, Nikolski VP, **Efimov IR**, Mechanisms of unpinning and termination of ventricular tachycardia: Implications for low voltage defibrillation. *Am. J. Physiol.*, 2006, 291(1): H184-92.
 85. Kroll MW, **Efimov IR**, Tchou PJ, Present understanding of shock polarity for internal defibrillation: the obvious and non-obvious clinical implications. *Pacing Clin. Electrophysiol.* 2006 Aug; 29(8):885-91.

-
86. Fedorov VV, Hucker WJ, Dobrzynski H, **Efimov IR**, Postganglionic nerve stimulation induces temporal inhibition of excitability in rabbit sinoatrial node. *Am J Physiol Heart Circ Physiol*. 2006 Aug; 291(2): H612-23.
 87. Boyett MR, Inada S, Yoo S, Li J, Liu J, Tellez J, Greener ID, Honjo H, Billeter R, Lei M, Zhang H, **Efimov IR**, Dobrzynski H. Connexins in the sinoatrial and atrioventricular nodes. *Adv. Cardiol*. 2006; 42:175-97.
 88. **Efimov IR**, Ripplinger CM, Virtual electrode hypothesis of defibrillation. *Heart Rhythm*. 2006 Sep;3(9): 1100-2. Epub 2006 Mar 10.
 89. Nikolskaya AV, Nikolski VP, **Efimov IR**, Gene printer: laser-scanning targeted transfection of cultured cardiac neonatal rat cells. *Cell Commun Adhes*. 2006 Jul-Aug; 13(4):217-22.
 90. Yoo S, Dobrzynski H, Fedorov VV, Xu SZ, Yamanushi TT, Jones SA, Yamamoto M, Nikolski VP, **Efimov IR**, Boyett MR. Localization of Na⁺ Channel Isoforms at the Atrioventricular Junction and Atrioventricular Node in the Rat. *Circulation*. 2006; 114(13): 1360-71.
 91. Sharma V, Qu F, Nikolski VP, DeGroot P, **Efimov IR**, Direct Measurements of Membrane Time Constant During Defibrillation Strength Shocks, *Heart Rhythm*, 2007, 4(4): 478-86.
 92. Fedorov VV, Lozinsky IT, Sosunov EA, Anyukhovskiy EP, Rosen MR, Balke WC, **Efimov IR**, Application of blebbistatin as an excitation-contraction uncoupler for electrophysiological study of rat and rabbit hearts, *Heart Rhythm*, 2007 May;4(5):619-26.
 93. **Efimov IR**, Innovation in optical imaging: looking inside the heart, *Heart Rhythm*, 2007 Jul;4(7): 925-6. Editorial.
 94. Ryu K, Li L, Khrestian C, Matsumoto N, Sahadevan J, Ruehr M, Van Wagoner D, **Efimov IR**, Waldo, A. Effects of Sterile Pericarditis on Connexins 40 and 43 in the Atria: Correlation with Abnormal Conduction and Atrial Arrhythmias. *Am. J. Physiol. Heart Circ. Physiol*. 2007, 293(2): H1231-41.
 95. Van Der Heyden MAG, Kok B, Kouwenhoven EN, Toien O, Barnes BM, Fedorov VG, **Efimov IR**, Opthof T, Cloning, sequence analysis and phylogeny of Connexin43 isolated from American black bear heart. *DNA sequence*. 2007, 18(5): 380-4.
 96. Qu F, Ripplinger CM, Nikolski VP, Grimm C, **Efimov IR**, Three Dimensional Panoramic Imaging of Cardiac Arrhythmias in the Rabbit Heart. *J. Biomed. Opt*. 2007, 12(4): 044019.
 97. Hucker WJ, Sharma V, Nikolski VP, **Efimov IR**, Atrio-Ventricular Conduction with and without AV Nodal Delay: Two Pathways to the Bundle of His in the Rabbit Heart. *Am. J. Physiol. Heart Circ. Physiol*. 2007, 293(2): H1122-30.
 98. Hucker WJ, Nikolski VP, **Efimov IR**, Autonomic Control and Innervation of the AV Junctional Pacemaker. *Heart Rhythm*, 2007, 4:1326 –1335.
 99. Filas BA, **Efimov IR**, Taber LA, Optical Coherence Tomography as a Tool for Measuring Morphogenetic Deformation of the Looping Heart, *Anatomical Records*, 2007, 290(9): 1057-68.
 100. Glukhov AV, Egorov IuV, Fedorov VV, **Efimov IR**, Rozenshtaukh LV. The effect of hypothermia on the wavelength and vulnerability to ventricular arrhythmias in mammals. *Ross Fiziol Zh Im I M Sechenova*. 2007 Mar; 93(3): 289-99. Russian.

101. Bishop MJ, Rodriguez B, Qu F, **Efimov IR**, Gavaghan DJ, Trayanova NA, Synthesis Of Optical Recordings During Arrhythmia And Defibrillation: An Inquiry Into The Role Of Photon Scattering In Signal Distortion. *Biophys. J.*, 2007, 93(10): 3714-26.
102. Ripplinger CM, Li W, Hadley J, Chen J, Rothenberg F, Lombardi R, Wickline SA, Marian AJ, **Efimov IR**, Enhanced transmural fiber rotation and Cx43 heterogeneity are associated with an increased upper limit of vulnerability in a transgenic rabbit model of human hypertrophic cardiomyopathy, *Circulation Research*, 101(10): 1049-57, 2007. PMID: 17885214
103. Hucker WJ, McCain ML, Laughner JI, Iaizzo PA, **Efimov IR**, Connexin 43 Expression Delineates Two Discrete Pathways in the Human Atrioventricular Junction, *Anat. Rec.*, 2008, 291(2): 204-15.
104. Hucker WJ, Fedorov VV, Foyil KV, Moazami N, **Efimov IR**, Optical Mapping of the Human Atrioventricular Junction, *Circulation*, 2008, 117(11): 1474-7.
105. Fedorov VV, Kostecki G, Hemphill M, **Efimov IR**, Atria are more susceptible to electroporation than ventricles: Implications for atrial stunning, shock-induced arrhythmia and defibrillation failure, *Heart Rhythm J.*, 2008, 5(4): 593-604. PMID: 18362029.
106. Fedorov VV, Nikolski VP, **Efimov IR**. Effect of electroporation on cardiac electrophysiology. *Methods Mol Biol.* 2008; 423: 433-48. PMID: 18370220.
107. Li J, Greener ID, Inada S, Nikolski VP, Yamamoto M, Billeter R, **Efimov IR**, Dobrzynski H, Boyett MR, Computer three-dimensional reconstruction of the atrioventricular node, *Circ. Res.*, 2008 Apr 25; 102(8): 975-85. PMID: 18309098.
108. Varma N, Efimov I. Right pectoral implantable cardioverter defibrillators: role of the proximal (SVC) coil. *Pacing Clin Electrophysiol.* 2008 Aug;31(8):1025-35. PMID: 18684259
109. Kim SC, Vasanji A, **Efimov IR**, Cheng Y, Spatial Distribution and Extent of Electroporation by Strong Internal Shock in Intact Structurally Normal and Chronically Infarcted Rabbit Hearts, *JCE*, 2008, 19(10): 1080-9. PMID: 18479336.
110. Fleming C, Ripplinger CM, Webb B, **Efimov IR**, Rollins AM, Quantification of Cardiac Fiber Orientation Using Optical Coherence Tomography, *J Biomed. Opt.*, 2008, 13(3): 030505. PMID: 18601522.
111. Hucker WJ, Ripplinger CM, Fleming CP, Fedorov VV, Rollins AM, **Efimov IR**, Bimodal Biophotonic Imaging of the Structure-Function: Relationship in Cardiac Tissue, *J. Biomed. Opt.*, 2008 Sep-Oct; 13(5): 054012.
112. **Efimov IR**, Nature Versus Nurture in Cardiac Conduction: Toward Integrative Paradigm of Cardiac Tissue Engineering, *Circ. Res.*, 2008; 103: 119-121. PMID: 18635826.
113. Lou Q, Ripplinger CM, Bayly PV, **Efimov IR**, Quantitative Panoramic Imaging of Epicardial Electrical Activity. *Ann. Biomed. Eng.* 2008; 36(10): 1649-58. PMID: 18654852.
114. Fedorov VV, Glukhov AV, Sudharshan S, Egorov Y, Rosenshtraukh LV, **Efimov IR**, Electrophysiological mechanisms of antiarrhythmic protection during hypothermia in winter hibernating versus nonhibernating mammals. *Heart Rhythm*, 2008 Nov; 5(11): 1587-96. PMID: 18984537
115. Glukhov AV, Egorov IuV, **Efimov IR**, Rozenshtraukh LV. Spatiotemporal characteristics of activation of the heart of hibernating and non-hibernating mammals during hypothermia. *Kardiologiya*. 2008; 48(12): 34-41. In Russian.

-
116. Mowrey KA, **Efimov IR**, Cheng Y, Membrane time constant during internal defibrillation strength shocks in intact heart: Effects of Na⁺ and Ca²⁺ channel blockers, *JCE*, 2009, 20(1): 85-92. PMID: 18775052.
 117. Ripplinger CM, Lou Q, Li W, Hadley J, **Efimov IR**, Panoramic Imaging Reveals Basic Mechanisms Of Induction and Termination of Ventricular Tachycardia in Rabbit Heart with Chronic Infarction: Implications for Low Voltage Cardioversion, *Heart Rhythm*, 2009 Jan; 6(1): 87-97. PMID: 18996057.
 118. Lombardi R, Rodriguez G, Chen SN, Ripplinger CM, Li W, Chen J, Willerson JT, Betocchi S, Wickline SA, **Efimov IR**, Marian AJ, Resolution of Established Cardiac Hypertrophy and Fibrosis and Preventions of Heart Failure in a Transgenic Rabbit Model of Human Cardiomyopathy Through Thiol-sensitive Mechanisms, *Circulation*. 2009 Mar 17; 119(10):1398-407. Epub 2009 Mar 2. PMID: 19255346
 119. **Efimov IR**, Chronaxie of Defibrillation: A pathway toward further optimization of defibrillation waveform? *J Cardiovasc Electrophysiol*. 2009 Mar; 20(3): 315-7. PMID: 19175836.
 120. Fedorov VV, Schuessler RB, Hemphill M, Ambrosi CM, Chang R, Voloshina AS, Brown K, Hucker WJ, **Efimov IR**, Structural and Functional Evidence for Discrete Exit Pathways that Connect the Canine Sino-Atrial Node and Atria, *Circ Res*. 2009 Apr 10; 104(7): 915-23. PMID: 19246679
 121. **Efimov IR**, Naum Lazarevich Gurvich (1905-1981) and his contribution to the history of defibrillation. *Cardiol J*. 2009; 16(2): 190-3. PMID: 19387971
 122. Li W, Ripplinger CM, Lou Q, **Efimov IR**, Multiple Monophasic Shocks Improve Electrotherapy of Ventricular Tachycardia in a Rabbit Model of Chronic Infarction. *Heart Rhythm*, 2009, 6: 1020-1027. PMID: 19560090.
 123. Tereshchenko LG, Faddis MN, Fetis BJ, Zelik KE, **Efimov IR**, Berger RD, Transient Local Injury Current in Right Ventricular Electrogram after ICD Shock Predicts Heart Failure Progression, *J. Am. Coll. Cardiol*. 2009; 54(9): 822-8. PMID: 19695461.
 124. Cakulev I, **Efimov IR**, Waldo AL, Cardioversion: History, Present and Future, *Circulation*, 2009; 120; 1623-1632. PMID: 19841308
 125. Ambrosi CM, Moazami N, Rollins AM, **Efimov IR**, Virtual Histology of the Human Heart Using Optical Coherence Tomography, *JBO*, 2009 Sep-Oct; 14(5): 054002. PMID: 19895104.
 126. Glukhov AV, Flagg TP, Fedorov VV, **Efimov IR**, Nichols CG, Differential KATP channel pharmacology in intact mouse heart. *J Mol Cell Cardiol*. 2010 Jan; 48(1): 152-60. PMID: 19744493.
 127. **Efimov IR**, Fedorov VV, Joung B, Lin SF, Mapping Cardiac Pacemaker Circuits: Methodological Puzzles of the Sino-Atrial Node Optical Mapping, *Circ Res*. 2010, 106(2):255-71. PMID: 20133911
 128. Gronich N, Kumar A, Zhang Y, **Efimov IR**, Soldatov NM, Molecular remodeling of ion channels, exchangers and pumps in atrial and ventricular myocytes in ischemic cardiomyopathy, *Channels*, 2010, 18;4(2). PMID: 20090424.
 129. Kurian T, Ambrosi C, Hucker W, Fedorov VV, **Efimov IR**, Anatomy and Electrophysiology of the Human AV Node, *Pacing Clin. Electrophysiol. Review*. 2010, 33(6): 754-62. PMID: 20180918

130. Glukhov AV, Fedorov VV, Lou Q, Ravikumar VK, Kalish PW, Schuessler RB, Moazami N, **Efimov IR**, Transmural Dispersion Of Repolarization In Failing And Non Failing Human Ventricle. *Circ Res*. 2010; 106(5): 981-91. PMID: 20093630.
131. Fedorov VV, Chang R, Glukhov AV, KostECKI G, Janks D, Schuessler RB, **Efimov IR**, Complex interactions between the sinoatrial node and atrium during reentrant arrhythmias in the canine heart. *Circulation*. 2010; 122(8): 782-9. PMID: 20697021
132. Fedorov VV, Glukhov AV, Chang R, KostECKI G, Aferol H, Hucker WJ, Wuskell J, Loew LM, Schuessler RB; Moazami N, **Efimov IR**. Optical mapping of the isolated coronary-perfused human sinus node, *JACC*, 2010; 56 (17), 1386-1394. PMID: 20946995.
133. Kurian TK, Efimov IR. Mechanisms of fibrillation: neurogenic or myogenic? Reentrant or focal? Multiple or single? Still puzzling after 160 years of inquiry. *J Cardiovasc Electrophysiol*. 2010, 21(11): 1274-5. PMID: 20550608
134. Glukhov AV, Fedorov VV, Anderson ME, Mohler PJ, **Efimov IR**, Functional Anatomy Of The Murine Sinus Node: High-Resolution Optical Mapping Of Ankyrin-B Heterozygous Mice, *AJP*, 2010 Aug; 299(2): H482-91. PMID: 20525877.
135. Ambrosi CM, Ripplinger CM, **Efimov IR**, Fedorov VV. Termination of sustained atrial flutter and fibrillation using low energy multiple shock therapy. *Heart Rhythm*. 2011 Jan; 8(1): 101-8. PMID: 20969974.
136. Greener I, Monfredi O, Inada I, Chandler N, Tellez J, Atkinson A, Taube MA, Billeter R, Anderson R; **Efimov IR**, Molenaar P, Sigg D, Sharma V, Boyett M, Dobrzynski H, Molecular architecture of the human specialized atrioventricular conduction axis. *JMCC*, 2011, 50(4): 642-51. PMID: 21256850.
137. Lou Q, Fedorov VV, Glukhov AV, Fast VG, Moazami N, **Efimov IR**, Heterogeneity and Remodeling of Transmural Ventricular Excitation-Contraction Coupling in Human Heart Failure. *Circulation*, 2011, 123(17): 1881-90, PMID: 21502574.
138. Fedorov VV, Glukhov AV, KostECKI G, Chang R, Janks D, Schuessler RB, Moazami N, Nichols CG, **Efimov IR**. Effects of KATP channel openers diazoxide and pinacidil in coronary-perfused atria and ventricles from failing and non-failing human hearts. *JMCC*, 2011, Aug; 51(2):215-25. PMID: 21586291.
139. Lou Q, Li W, Efimov IR. Multiparametric Optical Mapping of the Langendorff-perfused Rabbit Heart. *J. Vis. Exp*. 2011, 55: e3160, DOI: 10.3791/3160.
140. Lang D, Sulkin M, Lou Q, Efimov IR. Optical Mapping of Action Potentials and Calcium Transients in the Mouse Heart. *J. Vis. Exp*. 2011, 55: e3275, DOI: 10.3791/3275.
141. Fedorov VV, Ambrosi CM, KostECKI G, Hucker WJ, Glukhov AV, Wuskell J, Loew LM, Moazami N, **Efimov IR**, Anatomic Localization and Autonomic Modulation of AV Junctional Rhythm in Failing Human Hearts, *Circ Arrhythm Electrophysiol*. 2011; 4(4): 515-25. PMID: 21646375.
142. Bordas R, Gillow K, Lou Q, **Efimov IR**, Gavaghan D, Kohl P, Grau V, Rodriguez B, Full Rabbit-Specific Ventricular Model of Cardiac Electrophysiological Function including Specialized Conduction System, *Progress in Biophysics and Molecular Biology*, 2011, 107(1): 90-100. PMID: 21672547.
143. Swaminathan PD, Purohit A, Soni S, Voigt N, Singh MV, Glukhov AV, Gao Z, He JB, Luczak ED, Joiner MA, Kutschke W, Yang J, Donahue JK, Weiss RM, Grumbach IM, Ogawa M, Chen PS, **Efimov IR**, Dobrev D, Mohler PJ, Hund TJ, Anderson ME,

- Oxidized CaMKII causes cardiac sinus node dysfunction in mice, *JCI*, 2011, Aug 1; 121(8): 3277-88. PMID: 21785215.
144. Lang D, Glukhov AV, Efimova T, **Efimov IR**. Cardiac Arrhythmia in Calcium-dependent Tyrosine Kinase Pyk2 Knock-out Mice, *Am J Physiol Heart Circ Physiol*. 2011 Sep; 301(3): H975-83. PMID: 21666110.
145. Quinn TA, Granite S, Alessie MA, Antzelevitch C, Bollensdorff C, Bub G, Burton RAB, Cerbai E, Chen PS, Delmar M, DiFrancesco D, Earm YE, **Efimov IR**, Egger M, Entcheva E, Fink M, Fischmeister R, Franz MR, Garny A, Giles WR, Hannes T, Harding SE, Hunter PJ, Iribe G, Jalife J, Johnson CR, Kass RS, Kodama I, Koren G, Lord P, Markhasin VS, Matsuoka S, McCulloch AD, Mirams GR, Morley GE, Nattel S, Noble D, Olesen SP, Panfilov AV, Trayanova NA, Ravens U, Richard S, Rosenbaum DS, Rudy Y, Sachs F, Sachse FB, Saint DA, Schotten U, Solovyova O, Taggart P, Tung L, Varró A, Volders PG, Wang K, Weiss JN, White E, Wilders R, Winslow RL, Kohl P, Minimum Information about a Cardiac Electrophysiology Experiment (MICEE): Standardised Reporting for Model Reproducibility, Interoperability, and Data Sharing, *Prog. Biophys. Mol. Biol.* 2011 Oct;107(1):4-10. PMID: 21745496
146. Lang D, Petrov V, Lou Q, Osipov G, **Efimov IR**, Spatio-temporal control of the heart rate in the rabbit heart. *Journal of Electrocardiology*, 2011, 2011 Nov-Dec; 44(6): 626-34. PMID: 21937057.
147. Li W, Janardhan AH, Fedorov VV, Sha Q, Schuessler RB, **Efimov IR**, Low Energy Multi-Stage Atrial Defibrillation Therapy Terminates Atrial Fibrillation With Less Energy Than a Single Shock. *Circulation: Electrophysiology and Arrhythmia*, 2011, 4(6): 917-25. PMID: 21980076.
148. Smith AW, Segar CE, Nguyen PK, MacEwan MR, **Efimov IR**, Elbert DL, Long term culture of HL-1 cardiomyocytes in modular poly(ethylene glycol) microsphere-based scaffolds crosslinked in the phase separated state. *Acta Biomaterialia*. 2012 Jan; 8(1): 31-40. PMID: 21920469.
149. Lou Q, Li W, **Efimov IR**, The Role of Dynamic Instability and Wavelength in Arrhythmia Maintenance Revealed by Panoramic Optical Imaging with Blebbistatin versus 2,3-Butanedione Monoxime, *AJP*, 2012, 302(1): H262-9. PMID: 22037192.
150. Wang YT, Popović ZB, **Efimov IR**, Cheng Y. Longitudinal Study of Cardiac Remodelling in Rabbits Following Infarction. *Can J Cardiol*. 2012 Mar-Apr; 28(2): 230-238. PMID: 22265993.
151. Laughner JI, Sulkin MS, Wu Z, Deng CX, **Efimov IR**, Mechanisms for Failure of HIFU Ablation in Cardiac Tissue, *Circ Arrhythm Electrophysiol*, 2012; 5(2): 409-16. PMID: 22322367.
152. Glukhov AV, Fedorov VV, Kalish PW, Ravikumar VK, Lou Q, Janks D, Schuessler RB, Moazami N, **Efimov IR**, Arrhythmogenic remodeling in human end-stage non-ischemic left ventricular cardiomyopathy, *Circulation*. 2012; 125(15): 1835-47. PMID: 2241207.
153. Lou Q, Janardhan A, **Efimov IR**. Remodeling of calcium handling in human heart failure. *Adv Exp Med Biol*. 2012; 740:1145-74. PMID: 22453987.
154. Nikolaidou T, Aslanidi OV, Zhang H, **Efimov IR**. Structure-Function Relationship in the Sinus and Atrioventricular Nodes. *Pediatr. Cardiol*. 2012, Aug; 33(6): 890-9. PMID: 22391764.

-
155. Ambrosi CM, Fedorov VV, Schuessler RB, Rollins AM, **Efimov IR**, Quantification of Fiber Orientation in the Canine Atrial Pacemaker Complex using Optical Coherence Tomography. *JBO*, 2012 Jul; 17(7):071309. PMID: 22894470.
 156. Rantner LJ, Arevalo HJ, Constantino JL, **Efimov IR**, Plank G, Trayanova NA, Three-Dimensional Mechanisms of Increased Vulnerability to Electric Shocks in Myocardial Infarction: Altered Virtual Electrode Polarizations and Conduction Delay in the Peri-Infarct Zone. *J. Physiol.*, 2012 Sep 15; 590: 4537-51. PMID: 22586222.
 157. Wang YT, **Efimov IR**, Cheng Y, Electroporation Induced by Internal Defibrillation Shock with and without Recovery in Intact Rabbit Hearts, *AJP: Heart and Circulatory Physiology*, 2012 Aug; 303(4): H439-49. PMID: 22730387.
 158. Laughner JI, Zhang S, Li H, Shao CC, **Efimov IR**. Mapping cardiac surface mechanics with structured light imaging. *AJP: Heart and Circulatory Physiology*. 2012 Sep; 303(6): H712-20. PMID: 22796539.
 159. Laughner JI, Ng FS, Sulkin MS, Arthur MA, **Efimov IR**. Processing and Analysis of Cardiac Optical Mapping Data Obtained with Potentiometric Dyes. *AJP: Heart and Circulatory Physiology*. 2012 Oct; 303(7): H753-H765. PMID: 22821993.
 160. Janardhan AH, Li W, Fedorov VV, Gutbrod SR, Yeung M, Walldorf M, Schuessler RB, **Efimov IR**. A Multi-Stage Electrotherapy To Terminate Ventricular Tachycardia With Lower Energy than a Biphasic Shock When Anti-Tachycardia Pacing Fails. *JACC*, 2012; 60(23): 2393-8.
 161. Egorov YV, Glukhov AV, **Efimov IR**, Rosenshtraukh LV, Hypothermia-induced spatially discordant action potential duration alternans and arrhythmogenesis in non-hibernating versus hibernating mammals. *AJP: Heart and Circulatory Physiology*. 2012, Oct 15;303(8):H1035-46. Epub 2012 Aug 10. PMID: 22886418.
 162. Holzem KM, **Efimov IR**, Arrhythmogenic remodelling of activation and repolarization in the failing human heart. *Europace*, 2012 Nov; 14. PMID: 23104915.
 163. Pietka TA, Sulkin MS, Kuda O, Wang W, Zhou D, Yamada KA, Yang K, Su1 X, Gross RW, Nerbonne JM, **Efimov IR**, Abumrad NA, CD36 influences myocardial Ca²⁺ homeostasis and phospholipid metabolism: Conduction anomalies in CD36 deficient mice during fasting. *JBC*, 2012 Nov 9; 287(46): 38901-12. PMID: 23019328.
 164. Lou Q, Janks DL, Holzem K, Lang D, Onal B, Ambrosi CM, Fedorov VV, Wang IW, **Efimov IR**. Right Ventricular Arrhythmogenesis in Failing Human Heart: The Role of Conduction and Repolarization Remodeling. *AJP: Heart and Circulatory Physiology*; 2012 Dec; 303(12): H1426-34. PMID: 23042951.
 165. Liu M, Gu L, Sulkin M, Liu H, Jeong EM, Greener I, Xie A, **Efimov IR**, Dudley SC, "Mitochondrial Dysfunction Causing Cardiac Sodium Channel Downregulation in Cardiomyopathy", *JMCC*, 2013 Jan; 54:25-34.
 166. Ambrosi CM, Yamada KA, Nerbonne JM, **Efimov IR**, Gender Dependent Differences in Molecular Electrophysiological Targets in Failing and Nonfailing Human Hearts, *PLOS ONE*; 2013;8(1): e54635.
 167. Takasu O, Gaut JP, Watanabe E, To K, Fagley E, Sato B, Jarman S, **Efimov IR**, Janks DL, Srivastava A, Bhayani SB, Drewry A, Swanson PE, Hotchkiss RS, Mechanisms of Cardiac and Renal Dysfunction in Patients Dying of Sepsis. *Am. J. of Respiratory and Critical Care Medicine*. 2013 Mar 1; 187(5):509-17. PMID: 23348975.
 168. Walmsley J, Rodriguez JF, Mirams GR, Burrage K, **Efimov IR**, Rodriguez B, mRNA expression levels in failing human hearts predict cellular electrophysiological

- remodeling: A population-based simulation study. *PLoS One*. 2013; 8(2): e56359. Epub 2013 Feb 20. PMID: 23437117.
169. Luo M, Guan X, Luczak ED, Lang D, Kutschke W, Zhan G, Yang J, Glynn P, Sossalla S, Swaminathan PD, Weiss RM, Yang B, Rokita AG, Maier LS, **Efimov IR**, Hund TJ, Anderson ME, Diabetes increases mortality after myocardial infarction by oxidizing CaMKII, *JCI*, 2013, Mar 1; 123(3): 1262-74. Epub 2013 Feb 15. PMID: 23426181.
170. Zhang S, Wang Y, Laughner J, **Efimov IR**, 3D absolute shape measurement of live rabbit hearts with a superfast two-frequency phase-shifting technique. 2013 Mar 11; 21(5): 5822-32. PMID: 23482151.
171. Glukhov AV, Uchida K, **Efimov IR**, Nichols CG. Functional roles of KATP channel subunits in metabolic inhibition. *JMCC*, 2013 Sep; 62: 90-8. PMID: 23624089.
172. Smith AW, Hoyne JD, Nguyen PK, McCreedy DA, Aly H, **Efimov IR**, Rentschler S, Elbert DL, Direct reprogramming of mouse fibroblasts to cardiomyocyte-like cells using Yamanaka factors on engineered poly(ethylene glycol) (PEG) hydrogels. 2013, 34(28): 6559–6571. PMID: 23773820.
173. Gutbrod S, **Efimov IR**, Two centuries of resuscitation, *JACC*, 2013; 62(22): 2110-1.
174. Laughner JI, Marrus SB, Zellmer ER, Weinheimer CJ, MacEwan MR, Cui SX, Nerbonne JM, **Efimov IR**. A Fully Implantable Pacemaker for the Mouse: From Battery to Wireless Power, *PLOS One*, 2013, 8(10): e76291.
175. Sulkin MS, Widder E, Shao C, Holzem KM, Gloschat C, Gutbrod SR, **Efimov IR**, 3D Printing Physiology Laboratory Technology. *AJP: Heart*, 2013 Dec;305(11):H1569-73.
176. Rutledge C, Ng FS, Sulkin MS, Greener I, Sergeyenko A, Liu H, Gemel J, Beyer E, Sovari A, **Efimov IR**, Dudley S. c-Src Kinase Inhibition Reduces Arrhythmia Inducibility and Gap Junction Remodeling after Myocardial Infarction. *JACC*, 2014 Mar 11; 63(9): 928-34. PMID: 24361364.
177. Chung HJ, Sulkin MS, Kim JS, Goudeseune C, Chao HY, Song JW, Yang SU, Hsu YY, Ghaffari R, **Efimov IR**, Rogers JA. Ultrathin, Stretchable, Multiplexing pH Sensor Arrays on Biomedical Devices With Demonstrations on Rabbit and Human Hearts Undergoing Ischemia. *Advanced Healthcare Materials. Biomaterials*. 2014 Jan; 3(1): 59-68.
178. Janardhan AH, Gutbrod SR, Li W, Lang D, Schuessler RB, **Efimov IR**, Multi-Stage Electrotherapy Delivered Through Chronically Implanted Leads Terminates Persistent Atrial Fibrillation with Lower Energy than a Single Biphasic Shock. *JACC*, 2014 Jan 7-14; 63(1): 40-8. PMID: 24076284.
179. Gutbrod S, **Efimov IR**, A Shocking Past: A Walk Through Generations Of Defibrillation Development. *IEEE Trans Biomed Eng*. 2014 May;61(5):1466-73. PMID: 24759279.
180. Boukens BJ, **Efimov IR**, A Century Of Optocardiography. *IEEE Rev Biomed Eng*. 2014; 7: 115-25. PMID: 24158521.
181. Arakel EC, Brandenburg S, Uchida R, Zhang H, Lin YW, Kohl T, Schrul B, Sulkin MS, **Efimov IR**, Nichols CG, Lehnart SE, Schwappach B. Tuning the electrical properties of the heart by differential trafficking of KATP ion channel complexes. *J. Cell Science*, 2014 May 1; 127(Pt 9): 2106-19.
182. Xu L, Gutbrod SR, Bonifas AP, Su Y, Sulkin MS, Lu N, Chung HJ, Jang KI, Liu J, Ying M, Lu C, Webb RC, Kim JS, Laughner JI, Cheng H, Liu Y, Ameen A, Jeong JW, Kim GT, Huang Y, **Efimov IR**, Rogers JA. 3D multifunctional integumentary membranes for

- spatiotemporal cardiac measurements and stimulation across the entire epicardium. *Nature Communications*. 2014 Feb 25; 5: 3329. PMID: 24569383.
183. Ng FS, Holzem KM, Koppel AC, Wit AL, Peters NS, **Efimov IR**. Adverse Electrophysiological Response To Ischemia-Reperfusion In Human Heart Failure Is Associated With Remodeling Of Metabolic Gene Expression. *Circulation: E&A*. 2014 Oct; 7(5): 875-82.
 184. Gutbrod SR, Sulkin MS, Rogers JA, **Efimov IR**. Patient-Specific Flexible and Stretchable Devices for Cardiac Diagnostics and Therapy. *Prog Biophys Mol Biol*. 2014 Aug; 115(2-3): 244-5.
 185. Holzem KM, Madden EJ, **Efimov IR**. Human cardiac systems electrophysiology and arrhythmogenesis: iteration of experiment and computation. *Europace*. 2014 Nov; 16 Suppl 4:iv77-iv85. doi: 10.1093/europace/euu264. PMID: 25362174.
 186. Sulkin MS, Boukens BJ, Tetlow M, Gutbrod SR; Ng FS, **Efimov IR**, Mitochondrial depolarization and electrophysiological changes during ischemia in the rabbit and human heart. *AJP: Heart & Circulatory Physiology*, 2014 Oct 15; 307(8): H1178-86.
 187. Sulkin MS, Yang F, Holzem KM, Van Leer B, Bugge C, Laughner JI, Green K, **Efimov IR**, Nanoscale Three-Dimensional Imaging of the Human Myocyte, *J Struct Biol*. 2014 Oct; 188(1): 55-60. PMID: 25160725.
 188. Wu Z, Kumon RE, Laughner JI, **Efimov IR**, Deng CX, Electrophysiological Changes Correlated with Temperature Increases Induced by High-Intensity Focused Ultrasound Ablation. *Ultrasound in Medicine and Biology*. 2015 Feb; 41(2): 432-48.
 189. Gillers B, Aly H, Valenta T, Basler K, Christoffels VM, **Efimov IR**, Boukens BJ, Rentschler S. Canonical Wnt Signaling regulates atrioventricular junction programming and electrophysiological properties. *Circulation Research*. 2015 Jan 30;116(3):398-406.
 190. Lang D, Kang C, Holzem K, Xiao M, Hwang HJ, Ewald GA, Yamada KA, **Efimov IR**, Arrhythmogenic remodeling of β_2 versus β_1 adrenergic signaling in human failing heart. *Circulation: A&E*, 2015 Apr;8(2): 409-19.
 191. Gutbrod SR, Walton R, Gilbert S, Jaïs P, Hocini M, Haïssaguerre M, Dubois R, Bernus O, **Efimov IR**, Quantification of the transmural dynamics of atrial fibrillation by simultaneous endocardial and epicardial optical mapping in acute sheep model. *Circulation: Arrhythmia and Electrophysiology*, 2015; 8: 456-465.
 192. Xu L, Gutbrod SR, Ma Y, Petrossians A, Liu Y, Webb RC, Fan JA, Yang Z, Xu R, Whalen JJ 3rd, Weiland JD, Huang Y, **Efimov IR**, Rogers JA. Materials and Fractal Designs for 3D Multifunctional Integumentary Membranes with Capabilities in Cardiac Electrotherapy. *Adv Mater*. 2015 Mar 11;27(10):1731-7.
 193. Ripplinger CM, **Efimov IR**, Dual Vm/Ca Imaging of Premature Ventricular Contractions Bridging the Gap of Anatomical Scales, *Circulation: Arrhythmia and Electrophysiology*, 2015, in press.
 194. Child N, Bishop MJ, Hanson B, Coronel R, Opthof T, Boukens BJ, Walton RD, **Efimov IR**, Bostock J, Hill Y, Rinaldi CA, Razavi R, Gill J, Taggart P. An activation-repolarization time metric to predict localized regions of high susceptibility to re-entry. *Heart Rhythm*. 2015 in press.
 195. Kurian T, Doshi A, Kessman P, Nguyen B, Edwards J, Pieper S, **Efimov I**, Janardhan AH, Sanchez M. Rotors in Patients with Persistent Atrial Fibrillation: Case Report of a Left Atrial Appendage Rotor Identified by a Novel Computational Mapping Algorithm

- Integrated into 3-Dimensional Mapping and Termination of Atrial Fibrillation with Ablation. *Card Electrophysiol Clin.* 2015 in press.
196. Bear L, Cuculich PS, Bernus O, **Efimov I**, Dubois R. Introduction to Noninvasive Cardiac Mapping. *Card Electrophysiol Clin.* 2015 in press.
197. Holzem KM, Gomez JF, Glukhov AV, Madden EJ, Koppel AC, Ewald G, Trenor B, **Efimov IR**, Reduced Response to IKr Blockade and Altered hERG1a/1b Stoichiometry in Human Heart Failure. *JMCC*, 2015, in press.
198. Holzem KM, Marmorstein JT, Madden EJ, **Efimov IR**, Diet-induced obesity promotes altered signaling, exacerbating cardiac hypertrophy after pressure overload. *Physiological Reports*, 2015, in press.
199. Boukens BJ, Sulkin MS, Gloschat CR, Ng FS, Vigmond E, **Efimov IR**. Transmural APD gradient synchronizes repolarization in the human left ventricular wall. *Cardiovasc. Res.* 2015, in press.
200. Koh A, Gutbrod SR, Meyers JD, Lu C, Webb RC, Shin G, Li Y, Kang SK, Huang Y, **Efimov IR**, Rogers JA. Ultrathin Injectable Sensors of Temperature, Thermal Conductivity, and Heat Capacity for Cardiac Ablation Monitoring. *Adv Healthc Mater.* 2015; PMID: 26648177

List of original research publications in review and in preparation:

201. Holzem KM, Vinnakota KC, Ravikumar VK, Madden EJ, Dikranian K, Ewald GA, Beard DA, **Efimov IR**. Metabolic remodeling in human heart failure from disrupted substrate delivery and not mitochondrial dysfunction. *JACC*, 2015, in review.
202. Nadadur RD, Broman MT, Boukens B, Mazurek S, Bekeny J, van den Boogaard M, Zhang M, Wu CW, Christoffels V, Martin JF, Efimov IR, Weber CR, McNally EM, Moskowitz IR. A TBX5 driven gene regulatory network controls atrial rhythm. *Nature Med.* 2015, to be submitted.
203. Dobrzynski H, Atkinson A, Taube MA, Treloar AM, Borbas Z, Ambrosi CM, **Efimov IR**. Molecular basis of dysfunction of the human atrioventricular node in heart failure; *PLOS One*. 2015 revisions submitted.
204. Zellmer ER, MacEwan MR, Laughner JI, **Efimov IR**, Moran DW, Novel Low-component Class E Oscillator for Efficient Wireless Power Transmission. *IEEE TBME*, 2015, under revisions.
205. Sulkin MS, Laughner JI, Rogge M, Philpott JM, **Efimov IR**, Dual cryo-radiofrequency ablation enhances lesion depth in beating human ventricular preparations. 2015, under revisions.

Book chapters and book reviews:

1. **Efimov IR** & Krinsky VI, "Cycloidal dynamics of vortices in the Beeler-Reuter model of heart", *Preprint NCBI*, Pushchino, USSR, 1991 (in Russian).
2. **Efimov IR**, Efimova TB, "An action of ACh on spiral wave dynamics in rabbit atria", *Preprint PNC*, Pushchino, Russia, 1992 (in Russian).

3. Mazgalev TN, Van Wagoner DR, **Efimov IR**, “Mechanisms of AV nodal Excitability and Propagation”, in “Cardiac Electrophysiology: From Cell to Bedside”, Zipes & Jalife, eds., W.B. Saunders Co., 3rd edition, 1999, p. 196-205.
4. **Efimov IR**, Mazgalev T, Fluorescent imaging of electrical activity in the atrioventricular node of rabbit heart, Eds. T. Mazgalev, P. Tchou, Futura, 2000, p. 295-319.
5. Mazgalev TN, **Efimov IR**, Optical Mapping of Impulse Propagation in the Atrioventricular Node. in “Optical Mapping of Cardiac Excitation and Arrhythmia”, eds. Jalife J, Rosenbaum D.S., Futura Publishing Co., 2001, p. 157-176.
6. **Efimov IR**, Cheng Y, Virtual electrode induced wavefronts and phase singularities: mechanisms of internal defibrillation, in “Optical Mapping of Cardiac Excitation and Arrhythmia”, eds. Jalife J., Rosenbaum D.S., Futura Publishing Co., 2001. p. 407-432.
7. **Efimov IR**, Virtual electrode hypothesis of stimulation of the heart, in “Computer Simulations and Experimental Assessment of Cardiac Electrophysiology”, eds. Kappenberger L., Blanc O., Virag N., Futura Publishing Co., 2001, p. 173-181.
8. **Efimov IR**, Cheng Y, Optical mapping of cardiac stimulation: Fluorescent imaging with a photodiode array. In: “Quantitative Electrophysiology”, eds. Cabo C., Rosenbaum D.S., 2002, p. 583-621.
9. **Efimov IR**, Biermann M, Zipes D, Fast Fluorescent Mapping of Electrical Activity in the Heart: Practical Guide to Experimental Design and Applications. In “Cardiac Mapping”, 2nd edition, eds. Shenasa M., Borggreffe M., Breithardt G., Futura Publishing Co., 2003, p. 131-156.
10. **Efimov IR**, Nikolski VP, Bub G, “Optical mapping”. In “Encyclopedia of biomaterials and biomedical engineering”, eds. Wnek G., Bowlin G., Marcel Dekker Inc., New York, 2004, p. 1131-1142.
11. **Efimov IR**, Nikolski VP, “Mechanisms of AV nodal Excitability and Propagation”, in “Cardiac Electrophysiology: From Cell to Bedside”, Zipes & Jalife, eds., W.B. Saunders Co., 4th edition, 2004, p. 203-212.
12. Fedorov VV, Aliev RR, Glukhov AV, Resnik AV, Anufriev A, Nakipova OV, Kolaeva SG, Rosenschtrakh LV, **Efimov IR**, Cardiac conduction and resistance to ventricular fibrillation in Siberian hibernator ground squirrel *Citellus Undulates*. In Barnes BM and Carey HV, eds: Life in Cold: Evolution, Mechanisms Adaptation, and Application. XII International Hibernation Symposium. Biological Paper of the University of Alaska 27:543-555, 2004.
13. Krinski VI, Pumir A, **Efimov IR**, Models of cardiac muscle, *Encyclopedia for Nonlinear Science*. ed. Alwyn Scott. New York and London: Routledge, 2004.
14. Ripplinger CM, Salama G, **Efimov IR**, Optical Cardiovascular Imaging, in “Cardiovascular Molecular Imaging”, CRC press. Ed. R. Gropler. 2007
15. Fedorov VV, Nikolski VP, **Efimov IR**. Effect of electroporation on cardiac electrophysiology. Chapter 43. In: Electroporation protocols: Experimental and clinical medicine. Ed. Shulin Li, Humana Press, 2008, pp. 433-448.
16. **Efimov IR**, Review of “Cardiovascular Disease, Methods and Protocols: V.2. Molecular Medicine”. Ed. Qing K. Wang, 2006, Humana Press. In “The Physiologist”, 2007, June.
17. Ripplinger CM, **Efimov IR**, “The Virtual Electrode Hypothesis of Defibrillation”. Chapter 4.4. In “Cardiac Bioelectric Therapy: Mechanisms and Practical Implications”, Editors: Efimov IR, Kroll MW, Tchou PJ, Springer, 2008. ISBN 978-0-387-79402-0. pp. 331-356.

18. Nikolski VP, **Efimov IR**, “The Role of Electroporation”. Chapter 5.3. In “Cardiac Bioelectric Therapy: Mechanisms and Practical Implications”, Editors: Efimov IR, Kroll MW, Tchou PJ, Springer, 2008. ISBN 978-0-387-79402-0. pp. 441-455.
19. Hucker WJ, Dobrzynski H, **Efimov IR**, “Mechanisms of AV Nodal Excitability and Propagation”, Chapter 24, Cardiac Electrophysiology: From Cell To Bedside, 5th Edition, Editors: Douglas P. Zipes, and Jose Jalife. Saunders, Elsevier Science, 2009, ISBN 978-1-4160-5973-8. pp. 249-258.
20. Dobrzynski H, Monfredi O, Greener ID, Atkinson A, Inada S, Taube MA, Fedorenko O, Li J, Yanni J, Molenaar P, Anderson RH, **Efimov IR**, Boyett MR, Molecular basis of the electrical activity of the atrioventricular junction and Purkinje fibres. Chapter 17. In “Heart Rate and Rhythm: Molecular Basis, Pharmacological Modulation and Clinical Implications”, Eds: Tripathi ON, Ravens U, Sanguinetti MC. Springer. 2011.
21. Lou Q, Janardhan AJ, **Efimov IR**, Remodeling of Calcium Handling in Human Heart Failure, Ed. Md. Shahidul Islam. "Calcium Signaling", Advances in Experimental Medicine and Biology. 740: 1145-74. Springer, 2012.
22. Glukhov AV, Egorov YV, **Efimov IR**, Rosenshtraukh LV. “Cardiac Electrical Alternans and Ventricular Fibrillation During Hypothermia in Non-Hibernating Versus Hibernating Animals: Role of Propagation Velocity and Dispersion of Repolarization”. Leaving in the seasonal world. 2012.
23. Janardhan AH, Lang D, **Efimov IR**, Optical Mapping of the SA node and AV node. Chapter 9. In Cardiac Mapping, Ed: M. Shenasa, Wiley-Blackwell, 2013.
24. Hwang HJ, Ng FS, **Efimov IR**. Mechanisms of Atrioventricular Nodal Excitability and Propagation. In DP Zipes and J Jalife, Eds., Cardiac Electrophysiology From Cell to Bedside (6th ed, pp 275-286). Elsevier Saunders. ISBN: 978-1-4557-2856-5. 2014.
25. Bear L, Bernus O, **Efimov IR**, Cuculich FS, Dubois R. Introduction to Non-Invasive Cardiac Mapping. Chapter 1, in “Cardiac Electrophysiology Clinics” Eds. Shah, Haissaguerre, and Hocini. 2015, in press.

Newspaper and journal articles and interviews:

1. **Efimov I**, Senichev Y, Figovski O, Avdulov N, Popov O, Kalinichev A, Necessity of Science, *Moscow News*, 1999, 2: 17.
2. **Efimov IR**, Could the big picture be seen at a distance? *Yabloko Rossii*, 1999, **33**(67):3
3. **Efimov IR**, Is it possible to overcome the crisis in Russian science, *Novosti RFFI (News of the Russian Foundation for Basic Research)*, 1999, 5(15).
4. **Efimov IR**. Is it possible to overcome the crisis in Russian science, *Vestnik RFFI*, 2000, 1(19).
5. **Efimov IR**, Great cardiologist committed suicide, *News of Economics and Politics*, August 8, 2000.
6. **Efimov IR**, Pandora's box for humanity, *Moscow News*, August 15-21, 2000, 32: 18.
7. **Efimov IR**, *Science and patriotism*, Versty newspaper, 2001, October 23.
8. **Efimov IR**, Russian Scientific Diaspora, *Nezavisimaya Gazeta*, 2003, February 26.
9. **Efimov IR**, “Intellectual Russia – Where is it?” *Troitsky Variant*, 12(802), 2008, April 1.
10. **Efimov IR**, “Russian Academy will degenerate without generation change”. *Troitsky Variant*, 4N(812), 2008, May 27.

11. **Efimov IR**, “What are the chances of resurrection of Russian University?” Column. GZT.RU, 2010, April 22.
12. **Efimov IR**, “Affairs of the heart. Why do Russians die so early?” Column. GZT.RU. 2010, May 6.
13. **Efimov IR**, “Russia needs its Diaspora”, Column. GZT.RU. 2010, May 18.
14. **Efimov IR**, “How much does the science cost?” Column. GZT.RU. 2010, June 4.
15. **Efimov IR**, “Four patriotic ideas for emigrants”, Column. GZT.RU. 2010, July 1.
16. **Efimov IR**, “Cynicism”, Column. GZT.RU. 2010, August 3.
17. **Efimov IR**, “Jeszcze Rosja nie zginęła”, Column. GZT.RU. 2010, September 21.
18. **Efimov IR**, “What’s it worth – honor and dignity of Russian science?” Column. GZT.RU. 2010, October 28.
19. **Efimov IR**, “Big grants of Ministry of Science and Education: First results”, Column. GZT.RU. 2010, December 7.
20. **Efimov IR**, “Crisis of higher education”, Column. GZT.RU. 2010, December 16.

Proceedings & Abstracts:

1. Fast VG & **Efimov IR**, "The mechanism for termination of reentry in myocardium: model and experimental studies", *Circulation*, 1991, 84:II-498.
2. **Efimov IR**, Huang DT, Rendt JM & Salama G, "A new technique to map refractory periods in heart", *Biophys. J.* 1993, 65:II-306.
3. **Efimov IR**, Ermentraut B, Huang DT, Rendt GM, Salama G, "Activation and repolarization are governed by different structural characteristics of ventricular myocardium: experimental study with voltage-sensitive dyes and numerical simulations". *Circulation*, 1993, 88:II-623.
4. **Efimov, I.R.**, Huang, D.T., Rendt, J.M. & Salama G., "Mapping of Refractory periods with voltage-sensitive dyes", *IEEE EMBS*, 1993, **15**: 703-704.
5. Rendt, J.M., **Efimov, I.R.**, Huang, D.T. & Salama, G., "Sulfhydryl oxidation increases $[Ca^{2+}]_i$ in isolated guinea pig myocytes and causes arrhythmias in whole heart. *Circulation*, 1993, 88:II- 372.
6. Salama, G., Huang, D., **Efimov, I.**, Changes in activation and repolarization patterns during cardiac hypoxia, no-flow ischemia, and partial-flow ischemia measured with voltage-sensitive dyes and imaging techniques. Proc. of Intern. Physiological Soc., 3:109 abstr. 174-198, 1993.
7. **Efimov I.R.**, Rendt, J.M., & Salama, G., “Optical maps of Intracellular $[Ca^{2+}]_i$ transients and Action Potentials from the Surface of Perfused Guinea Pig Hearts”. *Circulation*, 1994, 90:II, I-632.
8. Huang, D.T., **Efimov, I.R.**, Rendt, J.M. & Salama, G., “Comparison of Partial vs No-flow Ischemia on the Spatial Heterogeneities of Activation and Repolarization Measured with Potentiometric Dyes in Perfused Hearts.” *Circulation*, 1994, 90:II, I-524.
9. **Efimov, I.R.**, Efimova, T., “Spiral Waves Dynamics: Dependence on Excitability and Refractoriness”, *PACE*, 1995, **18**: 878.
10. Mazgalev, T., Cheng, Y.N., **Efimov, I.**, Tchou, P., “Effect of 2,3-Butanedione Monoxime on the AV Conduction in Isolated Heart”, *Circulation*, 1995: **92**(II), I-301.

11. Mazgalev, T.N., Fahy, G.J., **Efimov, I.**, Cheng, Y., Kidwell, G.A., Tchou, P.J., “Modification of the Distal AV Nodal Cellular Response is not the Mechanism for the Phenomenon of Facilitation”, *PACE*, 1996, **19**:395.
12. **Efimov, I.**, Fahy, G.J., Mazgalev, T., Tchou, P.J., “Memory of Differential Effect of Rapid Pacing on Repolarization in Rabbit Ventricular Epicardial Base Versus Apex: Evidence From High Resolution Fluorescent Imaging”, *Circulation*, 1996, **94**(II):II-32.
13. Fahy, G.J., **Efimov, I.**, Cheng, Y., Kidwell, G.A., Tchou, P.J., Mazgalev, T.N., “Reversible peri-nodal cooling reveals dual AV nodal physiology in continuous AV nodal conduction curves”, *Circulation*, 1996, **94**(II):1646.
14. **Efimov, I.**, Fahy, G.J., Mazgalev, T., Tchou, P.J., “High Resolution Fluorescent Imaging of Rabbit Heart Does Not Reveal a Distinct Atrioventricular Nodal Anterior Input Channel (Fast Pathway) During Sinus Rhythm”, *Circulation*, 1996, **94**(II):1647.
15. **Efimov, I.**, Van Wagoner, D.R., Cheng, Y.N., Mazgalev, T.N., Tchou, P.J., “High resolution mapping of electrical activity of human atrial preparations using voltage-sensitive dyes and fluorescent imaging techniques”, *J. Investigative Medicine*, 1996, **44**(7):373A.
16. Fahy, G., **Efimov, I.**, Cheng, Y.N., Kidwell, G.A., Tchou, P., Mazgalev, T., “Mechanism of atrioventricular nodal facilitation”, *J. Investigative Medicine*, 1996, **44**(7).
17. **Efimov, I.R.**, Mowrey, K., Yamanouchi, Y., Cheng, Y., Van Wagoner, D.R., Tchou, P., Mazgalev, T., “High Resolution Fluorescent Imaging with Voltage-Sensitive Dye Reveals Nonuniform Cellular Responses to Fields Generated by an Implantable Defibrillation Lead”, *J. Am. Coll. Cardiol.*, 1997, **29**(2): 475A.
18. Fahy, G.J., **Efimov, I.**, Cheng, Y., Tchou, P.J., Mazgalev, T., “An unexpected pattern of anterior AV Nodal Input (“Fast Pathway”) and Atrial Septal Activation During Sinus Rhythm”, *J. Am. Coll. Cardiol.*, 1997, **29**(2): 255A
19. **Efimov, I.R.**, Cheng, Y., Mowrey, K., Van Wagoner, D.R., Mazgalev, T., Tchou, P.J., “High Resolution Fluorescent Imaging Reveals “Virtual Electrode” Phenomenon During Application of Monophasic Shock from Implantable Cardiac Defibrillator Lead in Isolated Rabbit Heart”, *PACE*, 1997, 20(4) II: 1080.
20. Van Wagoner, D.R., Pond, A.L., Cheng, Y., **Efimov, I.R.**, Mazgalev, T., Nerbonne, J.M., “ I_{Kr} currents and H-erg proteins are present in rat cardiac myocytes”, *PACE*, 1997, 20(4) II: 1196.
21. **Efimov, I.R.**, Cheng, Y., Van Wagoner, D.R., Mazgalev, T., Tchou, P.J., “Differential effect of second phase of defibrillation shock on areas positively and negatively polarized by the first phase: evidence from high-resolution fluorescent imaging”, *Circulation*, 1997 **96**(8): I-719.
22. Mazgalev, T.N., Mowrey, K.A., Chung, M.K., **Efimov, I.R.**, Cheng, Y., Tchou, P.J., “R-R interval distribution during atrial fibrillation: are dual pathways involved?”, *Circulation*, 1997, **96**(8): I-522.
23. Mazgalev, T.N., Mowrey, K.A., Cheng, Y., **Efimov, I.R.**, Tchou, P.J., “AV Nodal Oscillations During Fixed His-Stimulus Pacing Protocol”, *Circulation*, 1997, **96**(8): I-9.
24. Van Wagoner, D.R., Lamorgese, M., Kirian, P., Cheng, Y., **Efimov, I.R.**, Mazgalev, T.N., “Calcium current density is reduced in atrial myocytes isolated from patients in chronic atrial fibrillation”, *Circulation*, 1997, **96**(8): I-180.
25. Cheng, Y., Van Wagoner, DR, **Efimov, IR.**, "Propagation of Post-shock Electrical Activity: Dependence on Negative Regional Polarization", *PACE*, 1998, **21**(4) II: 941.

26. **Efimov, IR**, Van Wagoner, DR, "Mechanisms of Arrhythmogenesis During Atrial Fibrillation: Relationship Between Remodeling and the Critical Mass of Fibrillation", *PACE*, 1998, **21**(4) II: 823.
27. **Efimov, IR**, Mazgalev, T, Van Wagoner, DR, Tchou, PJ, "Optical Mapping Reveals Two-Layer Conduction Pattern in the AV Node", *PACE*, 1998, **21**(4) II: 824.
28. **Efimov, IR**, Cheng, Y, Van Wagoner, DR, Mazgalev, T, Tchou, PJ, "Shock-Induced Critical Points: A Mechanism of Defibrillation Failure", *PACE* 1998, **21**(4) II: 962.
29. Garrigue, S, Yamanouchi, Y, Mowrey, KA, **Efimov, IR**, Van Wagoner, DR, Cheng, Y, Wilkoff, BL, Tchou, PJ, Mazgalev, T, "Post Ganglionic Vagal Stimulation of the Atrioventricular Node Reduces Ventricular Rate During Atrial Fibrillation", *PACE*, 1998, **21**(4) II: 878.
30. Cheng, Y, Van Wagoner, DR, **Efimov, IR**, "Propagation of Post-shock Electrical Activity: Dependence on Negative Regional Polarization", *Arch. Des Maladies Du Coeur et des Vaisseaux*, 1998, 91 III: 34
31. Garrigue, S, Mazgalev, T, Mowrey, K, **Efimov, I**, van Wagoner, D, Tchou, P, Role of the Site of Initiation of Atrial Fibrillation on the Ventricular Rate After "Slow Pathway" Ablation in the Rabbit Heart, *Arch. Des Maladies Du Coeur et des Vaisseaux*, 1998, 91 III: 35.
32. Mazgalev, T, Garrigue, S, Mowrey, K, **Efimov, I**, van Wagoner, D, Tchou, P, Model of Functional Posterior-Anterior Intra-Atrial Block Reveals Limitation of "Slow Pathway" Ablation for Ventricular Rate Slowing in Atrial Fibrillation, *Arch. Des Maladies Du Coeur et des Vaisseaux*, 1998, 91 III: 36.
33. Garrigue, S, Mazgalev, T, Yamanouchi, Y, Mowrey, K, **Efimov, I**, van Wagoner, D, Wilkoff, B, Tchou, P, Mazgalev, T, Post-Ganglionic Vagal Stimulation Applied on the Atrioventricular Node: A New Tool for Ventricular Rate Slowing during Atrial Fibrillation, *Arch. Des Maladies Du Coeur et des Vaisseaux*, 1999, 91 III: 303.
34. **Efimov, IR**, Cheng, Y, Mechanisms of Defibrillation By ICD: Optical Mapping study, *Arch. Des Maladies Du Coeur et des Vaisseaux*, 1998, 91 III: 344.
35. Cheng Y, Van Wagoner DR, Mazgalev T, Tchou P, **Efimov IR**. Voltage-Sensitive Dye RH421 Enhances Contractility of Rat Heart Muscle. *J. Investigative Medicine* 1998; 46 (7): 269A.
36. **Efimov IR**, Cheng Y. Virtual Electrode Induced Wave Front and Phase Singularity: Mechanisms of Defibrillation Failure. *Ann. Biomed. Eng.* 1998; 26 (1): S-16.
37. Mazgalev, TN, **Efimov IR**, Fluorescent imaging of the AV node: a new frontier. *Ann. Biomed. Eng.* 1998; 26 (1): S-17.
38. Entcheva, E, **Efimov IR**. Mechanisms of 3D scroll generation by virtual electrode polarization. *Ann. Biomed. Eng.* 1998; 26 (1): S-22.
39. Garrigue, SX, **Efimov, IR**, Tchou, PJ, Mazgalev, TN. Voltage-sensitive dyes imaging reveals different patterns of AV nodal propagation depending on pacing site and prematurity, *Circulation*, 1998, **98**(17): I-824
40. Cheng Y, Tchou P, **Efimov IR**. Spatio-temporal Characterization of Electroporation during Defibrillation. *Biophys. J.* 1999, 76 (1): A85.
41. **Efimov, IR**, Cheng, Y., Entcheva, E., Experimental evidence of 3d scroll waves in the heart. *Biophys. J.* 1999, 76 (1), A267

42. Mowrey KA, Yamanouchi Y, Tchou PJ, Mazgalev TN, **Efimov IR**. Kinetics of defibrillation shock-induced response: implications to design of the optimal defibrillation waveform. *J Am Coll Cardiol* 1999 33:106A.
43. Yamanouchi Y, Cheng, Y, Tchou PJ, **Efimov IR**. Mechanism of the difference of defibrillation efficacy of anodal versus cathodal monophasic waveform. *J Am Coll Cardiol* 1999 33:106A.
44. Yamanouchi Y, **Efimov IR**, Hills DG, Mowrey KA, Mazgalev TN, Wilkoff BL, Tchou PJ, Biventricular defibrillation lead system significantly improved defibrillation efficacy, *PACE*, 1999 22(4-II):699.
45. **Efimov, I.R.**, Cheng, Y., Sidorov, V.Y., Wollenzier, B., Fluorescent Imaging Of The Vortex Core In The Rabbit Heart, *Proc. of BMES/EMBS Conference*, 1999 p. 155.
46. Garrigue S, **Efimov IR**, Tchou PJ, Mazgalev TN, Voltage-sensitive dye mapping of conduction patterns reveals optimal stimulation sites for biventricular pacing in the guinea pig heart during ischemia, *PACE* 1999 22(4-II):750.
47. **Efimov IR**, Cheng Y, Sidorov VY, Tchou PJ, Three-dimensional scroll-waves of electrical activity underlie mechanisms of ventricular arrhythmia: evidence from optical mapping, *PACE* 1999 22(4-II): 832.
48. Cheng Y, Van Wagoner DR, Tchou PJ, **Efimov IR**, Defibrillation Shock-Induced Waves of Re-Excitation: Implications to Upper And Lower Limits Of Vulnerability, *PACE* 1999 22(4-II) 809.
49. Cheng Y, Tchou PJ, **Efimov IR**, ICD Shock Induced Arrhythmogenesis: Cross Field Induced Critical Points or Virtual Electrode Induced Phase Singularities? *PACE* 1999 22(4-II): 809.
50. Al-Khadra AS, Cheng Y, Tchou PJ, **Efimov IR**, Electroporation in Defibrillation: Difference In Susceptibility between Endocardium and Epicardium, *PACE* 1999 22(4-II): 834.
51. **Efimov IR**, Tchou PJ, Mazgalev TN, Optical mapping reveals two-layered conduction during retrograde activation in the atrio-ventricular node. *PACE* 1999 22(4-II): 832.
52. Garrigue, S., **Efimov, I.**, Tchou, P., Mazgalev, T., Optimal Stimulation sites for Biventricular Pacing Revealed by In-Vitro Voltage-sensitive Dye mapping of Conduction Patterns During Ischemia. *PACE* 1999, 22(6-II): A55.
53. **Efimov IR**, Yamanouchi Y, Cheng Y, Tchou PJ, Direct Evidence of the Role of Virtual Electrode Induced Phase Singularity in Success and Failure of Defibrillation: Optical Mapping Study, *Circulation*, 1999, 100(18): I-840.
54. **Efimov IR**, Cheng Y, Wollenzier B, Tchou PJ, Mechanism of external defibrillation failure and success: virtual-electrode induced phase singularity and re-excitation, *Circulation*, 1999, 100(18): I-839.
55. Cheng Y, Lamorgese M, **Efimov IR**, Mazgalev T, Tchou P, Van Wagoner DR, In vitro effect of azimilide (NE-10064) and its metabolites on action potential duration of isolated guinea pig ventricular myocytes, *Biophys. J.*, 2000, 78(1): 223A.
56. Al-Khadra AS, Nikolski V, Wollenzier B, Tchou PJ, **Efimov IR**, Experimental Evidence of Electroporation in Rabbit Atria: Implications for Post-Cardioversion Dysfunction, *PACE*, 2000, 23(4-II): 684.
57. Al-Khadra AS, Nikolski V, **Efimov IR**, Electroporation and Conduction Failure in Endocardial Bundles in Response to Defibrillation Shocks, *PACE*, 2000, 23(4-II): 706.

58. Cheng Y, Mowrey K, Tchou PJ, **Efimov IR**, Mechanisms of biphasic defibrillation: implications for waveform optimization, *PACE*, 2000, 23(4-II): 729.
59. Nikolski V, Wollenzier B, **Efimov IR**, Virtual electrodes during bipolar cardiac stimulation, *PACE*, 2000, 23(4-II): 706.
60. Aguel F, Trayanova N, **Efimov IR**, External Defibrillation Model of Anatomically Accurate Rabbit Ventricles, *PACE*, 2000, 23(4-II): 616.
61. Nikolski V., **Efimov, I.R.**, Fluorescent imaging of a dual-pathway conduction system of the AV-node, *Circulation*, 2000, 102(18): II-3.
62. Cheng Y, Nikolski V, **Efimov IR**, Virtual electrode induced transmural and midmyocardial scroll-waves during internal defibrillation shocks, *Circulation*, 2000, 102(18): II-340.
63. Dumitrescu C, McCune SA, Hohl CM, Altschuld RA, **Efimov I**, Excitation-contraction uncoupling in failing SHHF rat hearts: Further evidence from electrical restitution kinetics. *Biophys. J.*, 78: (1) 2225, 2000.
64. Cheng Y, Nikolski V, **Efimov IR**, Virtual electrode induced arrhythmogenesis during acute global ischemia in the rabbit heart. *Circulation*, 2000, 102(18): II-339.
65. Al-Khadra AS, Efimov IR, Prevention of fibrillation by a preconditioning DC shock, *European Heart Journal* 2000; 21: 180.
66. Mowrey KA, Cheng Y, Wollenzier B, Tchou PJ, **Efimov IR**, Kinetics of Shock Induced Transmembrane Polarization: Implications for Defibrillation Waveform Optimization, *European Heart Journal* 2000; 21: 197.
67. Gupta M, Rollins AM, Nikolski V, Izatt JA, **Efimov IR**, A demonstration of the structure-function relationship of the atrio-ventricular node using optical coherence tomography and fluorescent imaging, *PACE*, 2001, 24(II): 568.
68. Garrigue S, Efimov IR, Jais P, Haissaguerre M, Clementy J, Voltage-Sensitive Dye Mapping Technique Applied to Biventricular Pacing During Ischemia : Role of the Voltage Output, the Interventricular Delay, Pacing Sites on Ventricular Arrhythmias Occurrence, *PACE*, 2001, 24(II): 539.
69. Nikolski V, Sambelashvili A, **Efimov IR**, Anode break excitation: search for hyperpolarization activated ionic currents, *J Molecular Cell Card*, 2001, 33(6): A85.
70. Nikolski V, Sambelashvili A, **Efimov IR**, Anodal break excitation during diastolic stimulation is explained by a half-cell potential, *Annals of Biomedical Engineering*, 2001, 29(1): S-48.
71. Sambelashvili A, Nikolski V, **Efimov IR**, Topology of the scroll-wave filaments induced by virtual electrode polarization in 3D bidomain model, *Annals of Biomedical Engineering*, 2001, 29(1): S-49.
72. Cheng Y, Nikolski V, **Efimov IR**, Effect of cytochalasin D and 2,3-Butanedione monoxime on shock-induced vulnerability in rabbit heart, *Annals of Biomedical Engineering*, 2001, 29(1): S-49.
73. Rollins AM, Gupta M, Choma M, **Efimov IR**, Izatt, JA, Optical coherence tomography and functional fluorescence imaging of the atrio-ventricular node, *Annals of Biomedical Engineering*, 2001, 29(1): S-114.
74. Mowrey, KA, Cheng, Y, **Efimov, IR**, Optimal Defibrillation Waveform Design: Relation to Kinetics of Shock Induced Transmembrane Response to Shock Delivery Phase, 2001, *EuroPACE*, 2 (suppl): B85

75. Nikolski V, Sambelashvili A, **Efimov IR**, Evidence of virtual electrode polarization during subthreshold stimuli, *Circulation*, 2001, 104 (17): II-4.
76. Nikolski V, **Efimov IR**, Fluorescent imaging of three types of atrioventricular-nodal reentry, *Circulation*, 2001, 104 (17): II-49 - II-50.
77. **Efimov IR**, Optical studies of AV-nodal arrhythmias, *Journal of Arrhythmology*, 2002, 25(A): 8.
78. **Efimov IR**, Theory of virtual electrodes in defibrillation, *Journal of Arrhythmology*, 2002, 25(A): 8.
79. Mowrey, KA, Cheng, Y, **Efimov, IR**, Kinetics of Shock Induced Transmembrane Polarization: Effect of Ischemia, 2002, *JACC*, 39: 120A.
80. Sambelashvili A, **Efimov IR**, Topology and Dynamics of Virtual Electrode Induced Scroll Wave Reentry, *PACE*, 2002, 24: 605
81. Nikolski V, Jones S, Lancaster M, Boyett MR, **Efimov IR**, Connexin 43 staining reveals the substrate for AV-nodal dual pathway conduction, *PACE*, 2002, 24: 673
82. Cheng Y, Zhuang S, Nikolski V, **Efimov IR**, Wallick DW, Virtual electrode-induced phase singularity in a rabbit model of chronic myocardial infarction, *EuroPACE*, 2002, 3: A150.
83. Sambelashvili A, **Efimov IR**, Topology and Dynamics of Virtual Electrode Induced Scroll Wave Reentry, *EuroPACE*, 2002, 3: A167.
84. Garrigue S, **Efimov IR**, Jaïs P, Haïssaguerre M, Clementy J, Optical Mapping Technique Applied to Biventricular Pacing: Potential Mechanisms of Ventricular Arrhythmias Occurrence, *EuroPACE*, 2002, 3 :A223.
85. Nikolski V, Sambelashvili A, **Efimov IR**, Effect of Tissue Damage on Virtual Electrode Polarization Pattern, *EuroPACE*, 2002, 3: A167.
86. Nikolski VP, Sambelashvili AT, **Efimov IR**, Effects of electroporation on cellular responses to high-intensity electrical shocks. Proc. of the Second Joint EMBS/BMES Conference, Houston, TX, USA, October 23-26, 2002, p. 1459-1460.
87. Sambelashvili AT, Nikolski VP, Wollenzier BR, **Efimov IR**, Effect of tissue damage on virtual electrode polarization pattern. Proc. of the Second Joint EMBS/BMES Conference, Houston, TX, USA, October 23-26, 2002, p.1432-1433.
88. Cheng Y, Zhuang S, Nikolski V, **Efimov IR**, Wallick DW, Virtual electrode-induced phase singularity in a rabbit model of chronic myocardial infarction. Proc. of the Second Joint EMBS/BMES Conference, Houston, TX, USA, October 23-26, 2002, p. 1430-1431.
89. Li L, Nikolski V, Wollenzier BR, **Efimov IR**, Effects of lidocaine on shock-induced vulnerability and defibrillation. Proc. of the Second Joint EMBS/BMES Conference, Houston, TX, USA, October 23-26, 2002, p. 1451-1452.
90. Qu F, Nikolski V, **Efimov IR**, Comparison of three biphasic defibrillation waveforms: the Gurvich waveform is more efficient. Proc. of the Second Joint EMBS/BMES Conference, Houston, TX, USA, October 23-26, 2002, p. 1439-1440.
91. Nikolski VP, Sambelashvili A, **Efimov IR**, Effect of nifedipine on electroporation, *PACE*, 2003, 26(2)-II: S12.
92. Sambelashvili AT, Nikolski V, **Efimov IR**, Bidomain reconstruction of scroll-wave reentry from surface optical signals, *PACE*, 2003, 26(2)-II: S12.
93. Cheng Y, Zhuang S, Nikolski V, **Efimov IR**, Wallick DW, Mechanism of cardiac vulnerability in a chronic myocardial infarct rabbit model, *PACE*, 2003, 26(2)-II: S224.

-
94. Cheng Y, Mowrey KA, **Efimov IR**, Effect of calcium channel blocker nifedipine on the modulation of shock-induced responses, *PACE*, 2003, 26(2)-II: S226.
 95. Qu F, Fritz A, Cheng Y, Nikolski V, **Efimov IR**, Panoramic Imaging of Electrical Activity in the Rabbit Heart, *PACE*, 2003, 26: 946
 96. Rodriguez B, Campbell C, Li Li, Eason JC, **Efimov IR**, Trayanova N, Effect of Electrode Polarity on Shock-Induced Arrhythmogenesis, *PACE*, 2003, 26: 978
 97. Sambelashvili AT, **Efimov IR**, Bidomain-Assisted Reconstruction of Scroll-Wave Filament from Optical Signals, *PACE*, 2003, 26: 997
 98. Mowrey KA, **Efimov IR**, Cheng Y, Kinetics of Shock Induced Transmembrane polarization : Effects of Nifedipine and lidocaine, *PACE*, 2003, 26: 1066
 99. Nikolski V, Boyett MR, **Efimov IR**, Atrioventricular Junctional Rhythm originates in the Posterior AV Nodal Extension (Slow-Pathway) and Is If Current-Dependent, *PACE*, 2003, 26: 1108.
 100. Li L, Nikolski V, Wallick D, **Efimov IR**, Cheng Y, Redistribution of Cx43 Expression in the Endocardial Infarction Border Zone Is Associated With Increased Arrhythmogenesis in the Rabbit Heart. *Circulation*, 2003, 108(17): IV-189.
 101. Dobrzynski H, Nikolski VP, Sambelashvili AT, Boyett MR, **Efimov IR**, The site of origin and molecular substrate of AV junctional rhythm in the rabbit heart, *Circulation*, 2003, 108(17): IV-240.
 102. Qu F, Nikolski VP, **Efimov IR**, Deng CX. Fluorescent Real-Time Monitoring of Cardiac Focal Ablation with HIFU in vitro, Proceedings of the 3rd International Symposium of therapeutic Ultrasound, 240-245, 2003.
 103. Fritz A, Qu F, Nikolski V, **Efimov IR**, Fluorescent Imaging and Surface Reconstruction of a beating Rabbit Heart. *Ann BME*, 2003.
 104. Jenkins MW, Pederson CJ, Wade RS, Nikolski VP, Cheng Y, **Efimov IR**, Rollins AM, Three-dimensional OCT imaging of endocardial architecture, *Photonics West 2004*, Proceedings, p. 61.
 105. Dobrzynski H, Li J, Nikolski VP, **Efimov IR**, Boyett MR. Molecular mapping and cellular organization of the mammalian sinoatrial node. 2004. *J. Physiol.* Subm.
 106. Boyett MR, Dobryznski H, Li J, Tellez J, Greener ID, Billeter R, Nikolski V, **Efimov I**. Connexins and SA and AV node function, *J Mol. Cell. Card.*, 2004, subm.
 107. Ryu K, Li L, Khrestian CM, Matsumoto N, Sahadevan J, Ruehr, ML, Van Wagoner, DR, **Efimov IR**, Waldo AL. New Insights into Pericarditis: Transmural Gradient of Connexins 40 and 43 Contributes to Abnormal Conduction and Atrial Arrhythmias. *Circulation* 2004; 110 (Supp.III):291
 108. Fedorov VV, Glukhov AV, Aliev RR, Mikheeva TV, Anufriev AI, Rosenshtraukh LV, **Efimov IR**. Cardiac conduction and resistance to hypothermia cardiac arrest in siberian hibernator ground squirrel *Citellus Undulatus*. Thesis of XXV Congress of the European Society of Cardiology. Germany, Munich, August 28 – September 1, 2004. *European Heart Journal* 2004.
 109. Qu F, Nikolski V, Zhou Y, **Efimov IR**, Deng CX. Fluorescent real-time monitoring of HIFU cardiac focal ablation. The 147th meeting of the Acoustical Society of America, May 2004 (New York, NY)
 110. Fedorov VV, Kuryshev Y, Glukhov AV, Aliev RR, Ivanova IM, Nikolski VP, Rosenshtraukh LV, **Efimov IR**. Cellular uncoupling due to gap junction remodeling is

- associated with safe conduction during hypothermia in hearts of Siberian hibernating ground squirrel *Citellus undulatus*. *Circulation* 110 (17): 98-99, 2004.
111. Ryu K, Li L, Khrestian CM, Matsumoto N, Sahadevan J, Ruehr, ML, Van Wagoner, DR, **Efimov IR**, Waldo AL. Pericarditis Induced Remodeling of Connexins 40 and 43 Contributes to Abnormal Atrial Conduction and Arrhythmogenesis. *Heart Rhythm* 2005; 2(1S): S69.
 112. Richards M, Nikolski VP, Green KG, **Efimov IR**, Saffitz JE. Connexin 43 expression and conduction velocity are reduced in plakoglobin-deficient mice: implications for arrhythmogenesis in Naxos disease. *Heart Rhythm* 2005; 2(1S): S47.
 113. Li L, Fedorov V, Glukhov A, Nikolski VP, Rosenschtraukh LV, **Efimov IR**. Connexin 43 and 45 remodeling improves conduction safety in hibernating ground squirrel *Citellus Undulatus*. *Heart Rhythm* 2005; 2(1S): S70.
 114. Ripplinger CM, Krinski VI, Nikolski VP, **Efimov IR**. Novel approach for low-voltage termination of anatomically defined reentry. *Heart Rhythm* 2005; 2(1S): S142.
 115. Richards M, Nikolski VP, Green KG, Zemljic-Harpf AE, **Efimov IR**, Ross RS, Saffitz JE. Ventricular arrhythmias in a mouse model of vinculin-related cardiomyopathy, *Heart Rhythm* 2005; 2(1S): S178.
 116. Hucker WJ, Nikolski VP, **Efimov IR**, Modulation of AV junctional rhythm by subthreshold stimulation: the role of posterior nodal extension. *Heart Rhythm* 2005; 2(1S): S179.
 117. Rodriguez B, Li L, Eason JC, **Efimov IR**, Trayanova NA. Role of ventricular anatomy in vulnerability to electric shocks. *Heart Rhythm* 2005; 2(1S): S257.
 118. Nikolskaya AV, Nikolski VP, **Efimov IR**. Gene printer: Laser-scanning targeted transfection of cultured cardiac neonatal rat cells. *Circulation*, 2005, 112(17): II-9.
 119. Hucker WJ, White BR, Zelik K, **Efimov IR**. A multi-imaging approach to study the structure and function of the atrioventricular junction. *FASEB Journal* 20(5), Part II, 2006
 120. **Efimov IR**, Hucker WJ, Fedorov VV, Dobrzynski H. Structure/function of the supraventricular pacemaking & conduction system of the rabbit heart. *FASEB Journal* 20(5-partII), Abstr. A1301-2.
 121. Fedorov VV, Hucker WJ, Dobrzynski H, **Efimov IR**. Functional and structural optical imaging of the rabbit sinoatrial node. *FASEB Journal* 20(5), Part II, A1304.
 122. Glukhov AV, Fedorov VV, Egorov Y, Rosenschtraukh LV, **Efimov IR**, Electrophysiological mechanisms of resistance to hypothermic ventricular fibrillation in the heart of hibernator *Citellus undulatus*. *Heart Rhythm* 3(1S), Supplement, 2006: S221.
 123. Fedorov VV, Dobrzynski H, Hucker WJ, **Efimov IR**. Postganglionic nerve stimulation induces temporal inhibition of excitability and unidirectional conduction block in the rabbit sinoatrial node. *Heart Rhythm* 3(1S), Supplement, 2006, S222
 124. Kuo S, Niwa N, Ashihara T, Nikolski VP, Fedorov VV, **Efimov IR**, Trayanova NA. Role of Electroporation in Initiation of Spontaneous Ectopic Postshock Activations. *Heart Rhythm* 3(1S), Abstr. Supplement 2006. S222-3.
 125. Hucker WJ, Laughner JL, Fedorov VV, **Efimov IR**. Molecular Characteristics of the Rabbit Supraventricular Pacemaking and Conduction System. *Heart Rhythm* 3(1S): S311, 2006.

126. Hucker WJ, Sharma V, **Efimov IR**. Bypassing the Compact Atrioventricular Node in the Normal Rabbit Heart: Implications for Synchronized Ventricular Pacing. *Circulation*, 114(18): II-200. 2006.
127. McCain ML, Hucker WJ, **Efimov, IR**. Heterogeneity of Cell to Cell Communication in the Human Atrio-Ventricular Junction. *Circulation*, 114(18): II-291, 2006.
128. Hucker WJ, Laughner JI, Fedorov VV, **Efimov IR**. Autonomic Innervation and Coupling in the Rabbit Supraventricular Pacemaking and Conduction System. *Heart Rhythm* 3(5), Supplement, S311, 2006.
129. Fedorov VV, Hucker WJ, Dobrzynski H, **Efimov IR**. Optical mapping of vagally-induced temporal inhibition of excitability and unidirectional conduction block in the rabbit sinoatrial node. *Heart Rhythm*, 3(5), Supplement, S222, 2006.
130. Kim S, Chang Liao ML, Vasanji A, **Efimov IR**, Cheng Y. Impact of electroporation by strong internal shocks on intact structurally normal hearts and chronically infarcted hearts. *Biophys. J.* 2007, Supplement: 285a.
131. Ripplinger CM, Li W, Hadley J, Chen J, Rothenberg F, Lombardi R, Wickline SA, Marian AJ, **Efimov IR**. Increased fiber rotation and transmural Cx43 heterogeneity are associated with an increased upper limit of vulnerability in a transgenic rabbit model of human hypertrophic cardiomyopathy. *Heart Rhythm*, 4(5S): S161, May 2007.
132. Tice BM, Ripplinger CM, Plank G, Prassl AJ, **Efimov IR**, Trayanova NA. Models of endocardial microstructure from optical coherence tomography imaging. *Heart Rhythm*, 4(5S): S158, May 2007.
133. Hucker WJ, Laughner JI, **Efimov IR**, Structure to Function: Optical Coherence Tomography as a Means to Interpret Complex Electrophysiological Recordings. *Heart Rhythm*. (2007) May; 4 (5): S8.
134. Panescu D, Kroll MW, **Efimov IR**, Sweeney JD. Finite Element Modeling of Electric Field Effects of TASER Devices on Nerve and Muscle. *Conf Proc IEEE Eng Med Biol Soc.* 2006; 1: 1277-1279.
135. Lombardi R, Rodriguez G, Chen S, Ripplinger CM, Li W, **Efimov IR**, Marian AJ. Treatment with anti-oxidant N-acetylcysteine attenuates cardiac hypertrophy and fibrosis and improves susceptibility to cardiac arrhythmias in the β -myosin heavy chain-Q403 transgenic rabbit model of human hypertrophic cardiomyopathy. *Circulation*, 2007.
136. Fedorov VV, Constantino JL, Nikolski VP, Trayanova NA, **Efimov IR**. Biophysical Society 2007, Baltimor, MD, USA, March 3-7. *Biophys. J.*, Suppl., 2007. 285A.
137. Fedorov VV, Glukhov AV, Egorov Y, Rosenshtraukh LV, **Efimov IR**, Natural mechanisms of resistance to ventricular fibrillation during hypothermia: comparative study of a hibernator *Citellus undulatus* versus rabbit. *Experimental Biology* 2007, Washington, DC, USA, April 28-May 2. *FASEB Journal* 21(6): Abstr.1368
138. Fedorov VV, Lozinsky IT, Sosunov EA, Anyukhovskiy EP, Rosen MR, Balke WC, **Efimov IR**. Blebbistatin as a novel and selective cardiac excitation-contraction uncoupler. *Heart Rhythm* 2007, Denver, Colorado, USA, May 9-12. *Heart Rhythm* 4(5S), Abstr. Supplement 2007. S6-7.
139. Fedorov VV, Schuessler RB, Lall S, Ripplinger CM, Sakamoto SI, **Efimov IR**. Low voltage defibrillation of sustained ventricular tachycardia in infarcted canine hearts. *Heart Rhythm* 2007, Denver, Colorado, USA, May 9-12. *Heart Rhythm* 4(5S), Abstr. Supplement 2007. S171.

-
140. Fedorov VV, Schuessler RB, Hucker WJ, Ambrosi CM, Foyil KV, Ripplinger CM, **Efimov IR**. Dual-modal biophotonic imaging of the canine sino-atrial nodal structure and function. American Heart Association, November 4-7, 2007. Orlando, Florida USA. *Circulation*; 116 (16), Abstr. Suppl November 2007. II -119
 141. Fedorov VV, Hemphill M, Kostecki G, Li L, **Efimov IR**. Low electroporation threshold, conduction block, focal activity and reentrant arrhythmia in the rabbit atria: possible mechanisms of stunning and defibrillation failure. American Heart Association, November 4-7, 2007. Orlando, Florida USA. *Circulation*; 116 (16), Abstr. Suppl November 2007. II -279.
 142. Ambrosi CM, Hucker BJ, Fedorov VV, Wuskell J, Loew LM, Moazami N, **Efimov IR**, Biomodal Biophotonic Imaging of the Human Atrioventricular Junction. *Heart Rhythm*, 2008, 5: S58.
 143. Fedorov VV, Hucker WJ, Ambrosi CM, Foyil KV, Glukhov AV, Schuessler RB, Moazami N, **Efimov IR**, Arrhythmogenesis due to alternans of anisotropy in isolated coronary-perfused human ventricle with dilated cardiomyopathy. *Heart Rhythm*, 2008, 5: S112.
 144. Fedorov VV, Ripplinger CM, Voloshina AS, Ambrosi CM, Hucker BJ, Wolfe C, Foyil KV, Schuessler RB, **Efimov IR**, Sino-atrial reentry is a mechanism of atrial flutter. *Heart Rhythm*, 2008, 5: S59
 145. Fedorov VV, Glukhov AV, Sudharshan S, Egorov Y, Rosenshtraukh LV, **Efimov IR**, Cardiac gap junction enhancement prevents conduction disturbances and arrhythmias in winter-hibernating mammals. *Heart Rhythm*, 2008, 5: S60.
 146. Foyil KV, Fedorov VV, Ripplinger CM, Schuessler RB, **Efimov IR**, Demonstration and mechanisms of low-voltage multiple pulse defibrillation in a canine model of atrial flutter and fibrillation. *Heart Rhythm*, 2008, 5: S111.
 147. Lou Q, Li W, **Efimov IR**, Panoramic Imaging of Shock-induced Arrhythmia, *Proc. BMES*, 2008
 148. Lou Q, Ripplinger CM, Bayly PV, **Efimov IR**, Epicardial Conduction Velocity Estimation in Intact Rabbit Hearts, *Proc. BMES*, 2008.
 149. Glukhov AV, Flagg TP, Fedorov VV, **Efimov IR**, Nichols CG. Regional Effects of Katp Channel Openers Reflect Distinct Atrial and Ventricular Katp Channel Structure in the Murine Heart. *Circulation*, Oct 2008; 118: S341.
 150. Glukhov AV, Fedorov VV, Foyil KV, Moazami N, **Efimov IR**, Transmural Dispersion of Repolarization in Human Ventricular Wall. *Circulation*, Oct 2008; 118: S397.
 151. Fedorov VV, Ambrosi CM, Hucker WJ, Glukhov AV, Foyil KV, Wuskell J, Loew L, Moazami N, **Efimov IR**, Human AV Junctional Pacemaker Shift Due to Cholinergic and Adrenergic Stimulations: Optical Imaging with a Novel Long Wavelength Voltage-Sensitive Dye. *Circulation*, Oct 2008; 118: S520.
 152. Fedorov VV, Glukhov AV, Kostecki G, Chang R, Schuessler RB, Nichols CG, Moazami N, **Efimov IR**, KATP channel openers diazoxide and pinacidil induce reentrant arrhythmias in both atria and ventricles of myopathic human hearts, *Heart Rhythm*, 2009, 6(5): S359
 153. Li W, Ripplinger CM, Lou Q, **Efimov IR**, Multiple Monophasic Shocks Improve Electrotherapy of Ventricular Tachycardia in a Rabbit Model of Chronic Infarction, *Heart Rhythm*, 2009, 6(5): S91-92

154. Glukhov AV, Zhou DJ, Fedorov VV, Abendschein DR, Gross RW, **Efimov IR**, Role of different isoforms of phospholipase A2 in ischemia/reperfusion induced arrhythmogenesis in intact murine heart, *Heart Rhythm*, 2009, 6(5): S170
155. Ambrosi CM, Foyil KV, Ripplinger CM, Fedorov VV, **Efimov IR**, Multiple low energy shock therapy terminates atrial flutter more effectively than ATP, *Heart Rhythm*, 2009, 6(5): S421
156. Glukhov AV, Fedorov VV, Tanenhaus SJ, Schuessler RB, Moazami N, **Efimov IR**, Optical mapping of transmural dispersion of repolarization in the normal and failing human ventricle, *J. Mol. Cell. Cardiol*, 2009, Transactions of conference, Page 26
157. Lou Q, **Efimov IR**. Enhanced susceptibility to alternans in a rabbit model of chronic myocardial infarction. *Conf Proc IEEE Eng Med Biol Soc*. 2009; 1: 4527-30. PMID: 19964643
158. Ambrosi CM, Ripplinger CM, **Efimov IR**, Fedorov VV, Multiple low energy shock therapy terminates atrial flutter and fibrillation more effectively than ATP, *Proc. Cardiac Electrophysiology Soc*. 2009.
159. Fedorov VV, KostECKI G, Chang R, Glukhov AV, Schuessler RB, **Efimov IR**, The role of sinoatrial node function and structure in the mechanism of acetylcholine-induced atrial flutter and fibrillation. *J. Mol. Cell. Cardiol*, 2009, Transactions of conference, p. 25-26
160. Fedorov VV, Glukhov AV, KostECKI G, Chang R, Aferol H, Hucker WJ, Wuskell J, Loew LM, Moazami N, Schuessler RB, **Efimov IR**. The origin of heartbeat in the human sinus node: evidence of sino-atrial exit pathways. *Circulation*. 2009; 120: S673 - S674.
161. Li W, Fedorov VV, Schuessler RB, **Efimov IR**, Low-Voltage Multiple Pulse Termination of Ventricular Tachycardia in 4-day Infarct Canine Hearts. *Circulation*, 2009; 120: S631.
162. Lou Q, Fedorov VV, Glukhov AV, Fast VG, Moazami N, **Efimov IR**, Simultaneous Transmural Mapping of Voltage and Calcium in the Human Heart, *Circulation*. 2009; 120: S667
163. Zhang S, Gong Y, Laughner J, Lou Q, **Efimov IR**, and van der Weide D, "High-resolution, superfast 3-D imaging using a phase-shifting method," OSA Topical Meeting on Digital Image Processing and Analysis (DIPA), Tucson, AZ, June 7-10, 2010.
164. Fedorov VV, Glukhov AV, KostECKI G, Janks DL, Chang R, Moazami N, Schuessler RB, **Efimov IR**. Sinus node reentry: the critical role of the sino-atrial conduction pathways. *Heart Rhythm* 2010, Denver, Colorado, USA, May 12-15. *Heart Rhythm* 2010, 7(5S): S168.
165. Fedorov VV, Glukhov AV, KostECKI G, Janks DL, Chang R, Moazami N, Schuessler RB, **Efimov IR**. Pectinate muscles as substrates for induction and maintenance of flutter and fibrillation in the human coronary perfused atria. *Heart Rhythm* 2010, Denver, Colorado, USA, May 12-15. *Heart Rhythm* 2010; 7(5S): S292.
166. Glukhov AV, Fedorov VV, Ravikumar VK, Kalish PW, Schuessler RB, Moazami N, **Efimov IR**. Heterogeneous loss of Connexin 43 protein during heart failure does not promote dispersion of repolarization in the human heart. *Heart Rhythm* 2010, Denver, Colorado, USA, May 12-15. *Heart Rhythm* 2010; 7(5S): S417-S418.
167. Glukhov AV, Fedorov VV, Anderson ME, Mohler PJ, **Efimov IR**. Functional anatomy of the murine sinoatrial node: Evidence from high-resolution optical mapping of

- Ankyrin-B knock-out mice. *Heart Rhythm* 2010, Denver, Colorado, USA, May 12-15. *Heart Rhythm* 2010; 7(5S): S417.
168. Laughner JI, Gong Y, Filas BA, Zhang S, **Efimov IR**, Structured Light Imaging of Epicardial Mechanics, *Conf. Proc. IEEE Eng. Med. Biol. Soc.*, 2010, pp. 5157-5160.
169. **Efimov IR**, Fedorov VV, Glukhov A, Lou Q, Ambrosi C, Janks D, Huckler WJ, Kurian T, Schuessler RB, Moazami N, Multiscale Imaging of the Human Heart: Building the Foundation for Human Systems Physiology and Translational Medicine. *Conf. Proc. IEEE Eng. Med. Biol. Soc.*, 2010. Pp. 5177-5180.
170. Li W, Fedorov VV, Sha Q, Schuessler RB, **Efimov IR**, "Novel Multiple-Stage Low-voltage Atrial Defibrillation Therapy in a Canine Vagally-Mediated Atrial Fibrillation Model." *Circulation*. 2010; 122: A17259.
171. Fedorov VV, Schuessler RB, Levin M, Li W, Janks DL, Silva J, Kurian T, Van Hare G, Moise SN, **Efimov IR**. "Structure/function of the accessory pathway in a heritable canine model of Wolff-Parkinson-White syndrome." *Circulation*. 2010; 122: A11131.
172. Lang D, Glukhov A, Holzem K, Efimova T, **Efimov IR**. "Genetic Suppression of Calcium-Dependent Tyrosine Kinase Pyk2 Increases Vulnerability to Ventricular Tachyarrhythmia." *Circulation*. 2010; 122: A12973.
173. Ambrosi CM, Nerbonne JM, **Efimov IR**. Gender Dependent Differences in Molecular Electrophysiological Targets in Failing and Nonfailing Human Hearts, *Heart Rhythm*. (2011) May; 8(5): S320.
174. Janardhan AH, Li W, Gutbrod S, Weimar T, Watanabe Y, Kazui T, Yeung M, Schuessler RB, **Efimov IR**. Low-Energy Three-Stage Electrotherapy Delivered Through Endocardial Leads Terminates Ventricular Tachycardia With Higher Efficacy Than Anti-Tachycardia Pacing. *Circulation*. 2011;124(21): A15917.
175. Janardhan AH, Li W, Gutbrod S, Weimar T, Watanabe Y, Kazui T, Yeung M, Sha Q, Cuculich P, Schuessler R, **Efimov IR**. Low-Energy Three-Stage Electrotherapy Delivered Through Implantable Leads Reduces the Cardioversion Threshold in a Canine Model of Persistent Atrial Fibrillation. *Circulation*. 2011;124(21): A16129.
176. Lou Q, Li W, Fedorov VV, **Efimov IR**, Panoramic Imaging Reveals Mechanisms of Resistance to Ventricular Arrhythmias under Blebbistatin as compared to 2,3-Butanedione Monoxime (BDM), *Biophysical society 55th annual meeting 2011*, *Biophysical Journal*, vol. 100, issue 3, pp. 435a-435a.
177. Lou Q, Janks D, Fedorov VV, Wang I, **Efimov IR**, Dispersion of Repolarization in the Right Ventricle of Failing Human Heart, *Heart Rhythm*, 2011, 8(5), S468.
178. Janardhan AH, Li W, Lang D, Gutbrod SR, Schuessler RB, **Efimov IR**. Mechanism of Low Energy Multi-stage Electrotherapy for Cardioversion of AF Revealed by Optical Mapping. *Heart Rhythm*. (2012) May; 9(5): S402.
179. Ng FS, Janks D, Wit AL, Peters NS, **Efimov IR**. Adverse Impact of Heart Failure on the Electrophysiological Response to Ischemia-Reperfusion in Humans. *Circulation* 2012; 126 (21 Suppl): A14395.
180. Zhang S, Wang Y, Laughner JI, **Efimov IR**, Measuring Dynamic 3d Micro-Structures Using A Superfast Digital Binary Phase-Shifting Technique, *Proceedings of the ASME 2013 International Manufacturing Science and Engineering Conference, MSEC2013-1088*, June 10-14, 2013, Madison, Wisconsin, USA.
181. Ng FS, Holzem KM, Koppel AC, Wit AL, Peters NS, **Efimov IR**. Adverse Electrophysiological Response To Ischemia-Reperfusion In Human Heart Failure Is

- Associated With Remodeling Of Metabolic Gene Expression. *Heart Rhythm*. 2013; 10(5): S3-S4.
182. Lang D, Holzem, KM, Kang C, Xiao M, **Efimov IR**. β 1- And β 2-adrenergic Remodeling In Human Left Ventricle During Heart Failure. *Heart Rhythm*. 2013; 10(5): S4.
183. Ng FS, Sulkin MS, Peters NS, **Efimov IR**. Functional Remodeling of Gap Junction Coupling in Intact Myocardium in Human End-stage Heart Failure. *Heart Rhythm*. 2013; 10(5): S104.
184. Sulkin MS, Ng MS, Tetlow M, **Efimov IR**. Simultaneous Optical Mapping Of Transmembrane And Inner Mitochondrial Membrane Potential Reveal Spatiotemporal Patterns During Low-flow Ischemia In Human, Canine, And Rabbit Myocardium . *Heart Rhythm*. 2013; 10(5): S328-S329.
185. Laughner JI, Marrus SB, Weinheimer CJ, Zellmer E, MacEwan MR, Nerbonne JM, **Efimov IR**. A Fully Implantable Pacemaker Design For Mice: From Battery To Wireless Power. *Heart Rhythm*. 2013; 10(5): S330.
186. Janardhan AH, Li W, Gutbrod SR, Lang D, Schuessler RB, **Efimov IR**. Towards Pain-free Atrial Cardioversion. *Heart Rhythm*. 2013; 10(5): S484-S485.
187. Gutbrod SR, Walton RD, Gilbert SH, Dubois R, Bernus O, **Efimov IR**. Simultaneous endocardial and epicardial optical mapping explores the conservation of arrhythmia dynamics through the transmural depth in a sheep model of acetylcholine-induced atrial fibrillation. *Heart Rhythm* 2014; 11(5S): S7.
188. Boukens BJ, Sulkin M, Ng F, **Efimov IR**. Transmural APD gradient synchronizes repolarization in the human left ventricular wall. *Heart Rhythm* 2014; 11(5S): S9.
189. Sulkin M, Tetlow M, Boukens BJ, **Efimov IR**. Optical imaging of transmembrane and mitochondrial potential unmask different spatiotemporal responses to targeted metabolic inhibition versus low-flow ischemia in explanted rabbit hearts. *Heart Rhythm* 2014; 11(5S): S252.
190. Boukens BJ, Gloschat C, Cocciolone A, **Efimov IR**. Delayed activation and low expression of Cx43 and SCN5A underlie fractionated electrograms in the human RVOT. *Heart Rhythm* 2014; 11(5S): S337.
191. Sulkin M, Rogge M, Philpott J, **Efimov IR**. Dual surgical radiofrequency-cryoablation combinations provide different lesion depth and size on beating human tissue preparations. *Heart Rhythm* 2014; 11(5S): S371.
192. Holzem KM, **Efimov IR**. Electrophysiologic properties and 3-dimensional structure of the human Purkinje fiber-ventricular muscle junction. *Heart Rhythm* 2014; 11(5S): S497.