

**International Society for Computerized Electrocardiology**  
**43<sup>rd</sup> Annual Conference**  
**The Chateaux Deer Valley, Park City, Utah, USA**  
**Wednesday, April 25 – Sunday, April 29, 2018**

**David G. Strauss, MD, PhD**  
U.S. Food and Drug Administration  
Silver Springs, Maryland, USA  
*Conference Chair*

**Cees A. Swenne, PhD**  
Leiden University Medical Center  
Leiden, The Netherlands  
*Conference Co-Chair*

**CONFERENCE PROGRAM**

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**WEDNESDAY, 25 APRIL 2018**

- 1530-1830      PRE-CONFERENCE TUTORIAL - SERIAL ECG ANALYSIS  
Chair:            Cees Swenne, Leiden University Medical Center, Leiden, The Netherlands  
1530-1550      Chair  
                    *Introduction to the ISCE 2018 Tutorial "Serial ECG Analysis"*  
1550-1625      Daniel Guldenring, School of Engineering, Ulster University, Belfast, United Kingdom  
                    *Lead interchanges and electrode misplacements, diagnostic consequences and automated  
                    correction strategies*  
1625-1700      Arie C. Maan, Leiden University Medical Center, Leiden, The Netherlands  
                    *Diagnostic consequences of analyzing Mason-Likar ECGs, as single ECG and as serial ECG*
- 1700-1720      Break
- 1720-1755      Cees Swenne, Leiden University Medical Center, Leiden, The Netherlands  
                    *Spontaneous ECG Variability*  
1755-1830      Barry Brown, Mortara, a Hill-Rom Company, Milwaukee, Wisconsin, USA  
                    *Could universal ECG comparison be practical in the future?*
- 1830-2030      OPENING RECEPTION, Cash Bar, 1 hosted drink
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**THURSDAY, 26 APRIL 2018**

- 0815-0830      Welcome and Opening Remarks  
                    Conference Chair - David Strauss, U.S. Food and Drug Administration, Silver Spring, Maryland,  
                    USA
- 0830-1035      Session I: Selected abstracts  
Chair            Cees Swenne, Leiden University Medical Center, Leiden, The Netherlands  
0830-0835      Chair  
                    *Overview*  
0835-0850      Teri Kozik, St. Joseph's Medical Center, Stockton, California, USA  
                    *Repolarization Changes in response to ENERGY drinks in a healthy adults during eXercise: The C-  
                    Energy-X Study*  
0850-0905      Discussion

0905-0920 Raymond Bond, Ulster University, Belfast, United Kingdom  
*Automation Bias and Interpreter Uncertainty when Reading 12-lead Electrocardiograms*

0920-0935 Discussion

0935-0950 John Wang, Philips Healthcare, Andover, Massachusetts, USA  
*Criteria for ECG detection of acute Myocardial Ischemia: Sensitivity versus specificity*

0950-1005 Discussion

1005-1020 Daniel Guldenring, School of Engineering, Ulster University, Belfast, United Kingdom  
*A method to transform 12-lead ECGs to non-standard short-distance ECG leads*

1020-1035 Discussion

1035-1055 Break

1055-1230 Session II: Big data, Artificial Intelligence and Machine Learning in Electrocardiography  
Chair  
Jean-Philippe Couderc, University of Rochester, Rochester, New York, USA

1055-1100 Chair  
*Overview*

1100-1115 Long Yu, GE Healthcare, Wauwatosa, Wisconsin, USA  
*P-QRS in machine learning: from raw data understanding to hybrid decision making*

1115-1130 Discussion

1130-1145 D. Masoumeh Haghpanahi, iRhythm Technologies, San Francisco, California, USA  
*Cardiologist-Level Arrhythmia detection with deep neural networks*

1145-1200 Discussion

1200-1215 Jonathan Rubin, Philips Healthcare, Cambridge, Massachusetts, USA  
*Densely connected convolutional networks for detection of atrial fibrillation from short single-lead ECG recordings*

1215-1230 Discussion

1230-1700 Lunch and Afternoon Discussions

1700-1800 Poster Session 1 – cash bar, 1 hosted drink  
Salah Al-Zaiti, University of Pittsburgh, Pittsburgh, Pennsylvania, USA  
*Beyond the ST-Segment: Novel Methods to Quantify Acute Myocardial Ischemia in Patients with Suspected Acute Coronary Syndrome*  
Jaume Coll-Font, Northeastern University, Boston, Massachusetts, USA  
*Spatiotemporal Estimation of Activation Times in Cardiac Electrograms*  
Reza Firoozabadi, Philips Healthcare, Thousand Oaks, California, USA  
*Assessment of Signal Quality Algorithms in Distributed Systems*  
Shravani Gangidi, University of Rochester, Rochester, New York, USA  
*Impact of Pulse Deficit on Detection of AF Rhythms Using Photoplethysmographic Signals in Reference to ECG*  
Wilson Good, SCI Institute, Salt Lake City, Utah, USA  
*Novel Metric for Evaluating Ischemic Stress in Electrograms Using a Data-Driven Approach*  
Richard Gregg, Philips Healthcare, Andover, Massachusetts, USA  
*Reducing the impact of low sampling frequency on heart rate variability*  
Rohit Hadia, Ulster University, Newtownabbey, United Kingdom  
*K-Nearest Neighbor based QRS delineator for single lead ECGs recorded in lifestyle monitoring Applications*

Thomas Hilbel, Dept. of Cardiology, University Hospital, Heidelberg, Germany

*Medical and Safety Issues for Wearable Activity and Heart Rate Trackers*

Steven Leung, Weill Cornell Medicine, New York-Presbyterian Queens, New York, New York, USA

*Left Arm-Left Leg Lead Reversal Revisited*

Michele Pelter, University of California San Francisco, San Francisco, California, USA

*Is Ischemic Pre-Conditioning Present in Acute Coronary Syndrome Patients with Moderate to Severe Sleep Disordered Breathing?*

Sukardi Suba, University of California San Francisco, San Francisco, California, USA

*Are True Accelerated Ventricular Rhythm Alarms Clinically Actionable or Lead to Untoward Patient Outcomes?*

Iolanna Utochkina, Chelyabinsk Regional Clinical Hospital, Chelyabinsk, Russia

*Heart rate variability as a predictor of outcome in acute stroke*

Mercedes Weir, Virginia Commonwealth University, North Lauderdale, Florida, USA

*ECG Characteristics of Sleep Apnea Patients Undergoing Endoscopy with Deep Sedation*

Yu-Ching Yang, University of Rochester, Rochester, New York, USA

*Heart Rate Recovery, Blood Pressure Recovery, and 24-hour Heart Rate among Firefighters*

Jessica Zegre-Hemsey, University of North Carolina, Chapel Hill, Chapel Hill, North Carolina, USA

*Methods of Interpreting Prehospital Electrocardiograms in North Carolina: A Statewide Report*

Brian Zenger, University of Utah, Salt Lake City, Utah, USA

*PFEIFER: A MATLAB Based Platform for Preprocessing and Autofiducializing Experimental Electrogram Recordings*

1800-1900

Dinner

1900-2050

Session III: Device Therapies for Heart Failure and Sudden Cardiac Death (Part 1 - Academic/FDA Perspective and LBBB Challenge)

Chair

Robbert Zusterzeel, U.S. Food and Drug Administration, Silver Spring, Maryland, USA

Co-Chair

Brett Atwater, Duke University Hospital, Durham, North Carolina, USA

1900-1905

Chair

*Overview of heart failure and overview of session*

1905-1920

Brett Atwater, Duke University Hospital, Durham, North Carolina, USA

*Cardiac Resynchronization Therapy: Life-Extending Therapy for Heart Failure Patients*

1920-1935

Discussion

1935-1950

Kimberly Selzman, U.S. Food and Drug Administration, Silver Spring, Maryland, USA

*FDA Perspective on Assessing the Clinical Benefit of ICD and CRT Devices*

1950-2005

Discussion

2005--2020

Robbert Zusterzeel, U.S. Food and Drug Administration, Silver Spring, Maryland, USA

*The International Society for Computerized Electrocardiology ECG Initiative on the Detection of Left Bundle Branch Block*

2020-2035

Radovan Smisek, The Czech Academy of Sciences, Institute of Scientific Instruments, Brno, Czech Republic, and Brno University of Technology, Brno, Czech Republic

*Fully Automatic Detection of Strict Left Bundle Branch Block*

2035-2050

Discussion

- 2050-2100 Break
- 2100-2205 Session IV: Device Therapies for Heart Failure and Sudden Cardiac Death (Part 2 – Industry Perspective)  
Chair Robbert Zusterzeel, U.S. Food and Drug Administration, Silver Spring, Maryland, USA  
Co-Chair Brett Atwater, Duke University Hospital, Durham, North Carolina, USA
- 2100-2105 *Overview*  
Chair
- 2105-2120 Mark Brown, Medtronic, Mounds View, Minnesota, USA  
*What do we mean when we say an ICD is undersensing VF?*
- 2120-2135 Discussion
- 2135-2150 Amy Brisben, Boston Scientific, Marlborough, Massachusetts, USA  
*How the S-ICD (Subcutaneous Implantable Cardiac Defibrillator) Senses Cardiac Signals to Maximize VF Sensitivity and Minimize Cardiac Over-sensing*
- 2150-2205 Discussion
- 2205-2305 POSTER SESSION 1 – Continuing Discussion, cash bar
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**FRIDAY, 27 APRIL 2018**

- 0830-1005 Session V: Predictive Analytics for Patient Monitoring in Critical Care Medicine: Balancing Alarm Fatigue (part 1) With Novel Predictive Algorithms (part 2)  
Part 1 – Alarm Fatigue
- Chair Marilyn Hravnak, University of Pittsburgh, Pittsburgh, Pennsylvania, USA  
Co-Chair Christopher Scully, U.S. Food and Drug Administration, Silver Spring, Maryland, USA
- 0830-0835 Chair  
*Overview*
- 0835-0850 Marilyn Hravnak, University of Pittsburgh, Pittsburgh, Pennsylvania, USA  
*A Call to Alarms: Current State and Future Directions in the Battle Against Alarm Fatigue*
- 0850-0905 Discussion
- 0905-0920 Bradford Winters, Johns Hopkins University, Baltimore, Maryland, USA  
*Clinical Approaches and Assessment Metrics for Alarm Fatigue*
- 0920-0935 Discussion
- 0935-0950 Xiao Hu, University of California San Francisco, San Francisco, California, USA  
*Precise Patient Monitoring with Few False Alarms*
- 0950-1005 Discussion
- 1005-1025 Break
- 1025-1200 Session VI: Predictive Analytics for Patient Monitoring in Critical Care Medicine: Balancing Alarm Fatigue (part 1) With Novel Predictive Algorithms (part 2)  
Part 2 – Novel Predictive Algorithms
- Chair Randall Moorman, University of Virginia, Charlottesville, Virginia, USA  
Co-Chair Christopher Scully, U.S. Food and Drug Administration, Silver Spring, Maryland, USA
- 1025-1030 Chair  
*Overview*

- 1030-1045 Randall Moorman, University of Virginia, Charlottesville, Virginia, USA  
*Predictive analytics monitoring at the bedside: Principles and practice*
- 1045-1100 Discussion
- 1100-1115 Artur Dubrawski, Carnegie Mellon University, Pittsburgh, Pennsylvania, USA  
*Reducing data annotation efforts needed for building predictive models at bedside*
- 1115-1130 Discussion
- 1130-1145 Christopher Scully, U.S. Food and Drug Administration, Silver Spring, Maryland, USA  
*Regulatory Science for Patient Monitoring Predictive Analytics*
- 1145-1200 Discussion
- 1200-1215 ISCE Business Session
- 1215-1700 Lunch and Afternoon Discussions
- 1700-1800 Poster Session 2 – cash bar, 1 hosted drink
- Brittany Bogle, University of North Carolina at Chapel Hill, Chapel Hill, North Carolina, USA  
*Predicted Outcomes and Cost-Effectiveness of Optimally Designed Drone-Delivered AED Networks in North Carolina: Predicted Outcomes and Cost-Effectiveness*
- Jimo Borjigin, University of Michigan, Ann Arbor, Michigan, USA  
*Accurate detection of atrial fibrillation and atrial flutter using the electrocardiomatrix technique*
- Werner Bystricky, AbbVie, Inc., Clinical Pharmacology, North Chicago, Illinois, USA  
*T vector velocity distribution: A new biomarker for identifying drug effects on cardiac myocyte ion channels*
- Willem Dassen, Maastricht University Medical Center, Maastricht, Limburg, The Netherlands  
*Training the Electrophysiologist of the Future*
- Dillon Dzikowicz, University of Rochester, Rochester, New York, USA  
*Predicting Heart Rate Recovery Based on Depression, Sleep Quality and Vagal Tone in On-Duty Firefighters*
- Dillon Dzikowicz, University of Rochester, Rochester, New York, USA  
*Relation between QRS-T Angle and Blood Pressure during Exercise Stress Test in On-Duty Firefighters*
- Ziad Faramand, University of Pittsburgh Medical Center, Pittsburgh, Pennsylvania, USA  
*Understanding the Demographic and Clinical Correlates of Quantitative Repolarization Parameters in Patients with Cardiovascular Risk Factors*
- Jorgen Kanters, University of Copenhagen, Copenhagen N, Denmark  
*Genetical component of the QT interval is associated with increased mortality in the general population*
- Alan Kennedy, B-Secur Ltd, Belfast, United Kingdom  
*The effect of automated R-wave annotation on Heart Rate Variability Analysis*
- S. Suave Lobodzinski, California State University Long Beach, Long Beach, California, USA  
*Novel Universal ECG Sensor for Very Long-Term Monitoring*
- Aaron Peace, Department of Cardiology, Altnagelvin Hospital, Western Health and Social Care Trust, United Kingdom  
*Decision Making Analysis of Patients ‘Turned Down’ for Primary Percutaneous Coronary Interventions Due to Inapplicable Referrals: A Need for Enhanced Performance in Human and Machine ECG Interpretation*
- Dimitrios Poulikakos, Salford Royal NHS Foundation Trust, University of Manchester, Manchester, England

*Associations of T Wave Morphology and Heart Rate Variability with Major Cardiac Events and Mortality in Hemodialysis patients*

Adelita Tinoco, University of California San Francisco, San Francisco, California, USA

*ECG Derived Cheyne-Stokes Respirations and Periodic Breathing a Comparison of 12 versus 7 Leads in Hospitalized Patients*

Peter van Dam, Lucerne University, Institute for Medical Engineering, Lucerne, Switzerland

*The Anatomical View on Mean QRS Axis*

John Wang, Philips Healthcare, Andover, Massachusetts, USA

*Basic Statistical Concepts Used in Clinical Tests Interpretation and Decision Support: A Review*

Yu-Ching Yang, University of Rochester, Rochester, New York, USA

*Heart Rate Recovery and Cardiovascular Risk Factors among Firefighters*

1800-1900

Dinner

1900-1910

ISCE Endowment

Robert Lux and Helaina Kravitz

1910-2000

Kenichi Harumi Plenary Address

Peter Clemmensen, Region Sjælland - Nykøbing Falster Hospital, Nykøbing Falster, Denmark

*The Standard EKG in Acute Coronary Syndrome*

2000-2010

Break

2010-2215

Session VII: Jos Willems Early Career Investigators Competition

Chair

Mary G. Carey, University of Rochester, Rochester, New York, USA

Co-Chair

Shen Luo, StarCare Medical, LLC, Madison, Wisconsin, USA

2010-2015

Chair

*Overview*

2015-2030

Elien Engels, Maastricht University, Maastricht, The Netherlands

*Improved response to cardiac resynchronization therapy using multipoint pacing cannot solely be explained by better resynchronization*

2030-2045

Discussion

2045-2100

Elyar Ghafoori, University of Utah, Salt Lake City, Utah, USA

*Atrial Fibrillation Observed On Surface ECG Can Be Atrial Flutter*

2100-2115

Discussion

2115-2130

Jonas Isaksen, University of Copenhagen, Copenhagen, Denmark

*T-wave morphology in type 1 diabetes mellitus*

2130-2145

Discussion

2145-2200

Ran Xiao, University of California San Francisco, San Francisco, California, USA

*Identification of Ischemic ST Changes through Deep Learning*

2200-2215

Discussion

2215-2315

POSTER SESSION 2 – Continuing Discussion, cash bar

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## **SATURDAY, 28 APRIL 2018**

0830-1005

Session VIII: Identifying, Diagnosing and Guiding Invasive Treatment for Atrial Fibrillation

	<u>From Wearable Devices to Electrocardiographic Imaging to Guide Ablation</u>
	<u>Part 1: ECG and Wearable Devices for Detecting Heart Rate, A-fib and Other Waveforms</u>
Chair	Michele Pelter, University of California San Francisco, San Francisco, California, USA
Co-Chair	Loriano Galeotti, U.S. Food and Drug Administration, Silver Spring, Maryland, USA
0830-0835	Chair
	<i>Overview</i>
0835-0850	Kais Gadhomi, University of California San Francisco, San Francisco, California, USA <i>Photoplethysmography in wristband and fingertip pulse oximeter: Are we measuring the same pathophysiological dynamics?</i>
0850-0905	Discussion
0905-0920	Marco Peluso, Quardio, Inc., San Francisco, California, USA <i>Diagnostic value and convenience of wearable ECG technology - an industry perspective</i>
0920-0935	Discussion
0935-0950	Linda Ricci, U.S. Food and Drug Administration, Silver Spring, Maryland, USA <i>Updates on wearable medical devices</i>
0950-1005	Discussion
1005-1020	<u>Break</u>
1020-1155	<u>Session IX: Identifying, Diagnosing and Guiding Invasive Treatment for Atrial Fibrillation</u> <u>From Wearable Devices to Electrocardiographic Imaging to Guide Ablation</u> <u>Part 2: Electrocardiographic Imaging (inverse solution) – Application to Atrial Fibrillation</u>
Chair	Rob MacLeod, University of Utah, Salt Lake City, Utah, USA
1020-1025	Chair
	<i>Overview</i>
1025-1040	Miguel Rodrigo Bort, Universitat Politècnica de València, València, Spain <i>Noninvasive Estimation of Highest Dominant Frequency Regions during Atrial Fibrillation by Electrocardiographic Imaging</i>
1040-1055	Discussion
1055-1110	Joaquin Azpilicueta, EP Solutions, Yverdon-les-Bains, Switzerland <i>Role of ECGi in the outcome of arrhythmia patients: wishes of a clinical cardiologist</i>
1110-1125	Discussion
1125-1140	John Sapp, Dalhousie University, Halifax, Nova Scotia, Canada <i>Rapid 12-lead Automated Localization Method: Comparison to Electrocardiographic Imaging (ECGI) in Patient-specific Geometry</i>
1140-1155	Discussion
1155-1700	<u>Lunch and Afternoon Discussions</u>
1700-1900	<u>Session X: Update on International Initiatives and Standards</u>
Chair	Fabio Badilini, AMPS LLC, New York, New York, USA and University of California San Francisco, San Francisco, California, USA
Co-Chair	Brian Young, GE Healthcare, Wauwatosa, Wisconsin, USA
1700-1705	Chair
	<i>Overview</i>
1705-1720	Jose Vicente, U.S. Food and Drug Administration, Silver Spring, Maryland, USA <i>Update on the ECG component of the CiPA initiative</i>
1720-1735	Discussion

- 1735-1750 Brian Young, GE Healthcare, Wauwatosa, Wisconsin, USA  
*Updates to IEC/AAMI ECG standards, a New Hybrid standard*
- 1750-1805 Discussion
- 1805-1820 Jean-Philippe Couderc, University of Rochester, Rochester, New York, USA  
*Existing and emerging ECG databases: the good, the bad, and the ugly*
- 1820-1835 Discussion
- 1835-1850 Fabio Badilini, AMPS LLC, New York, New York, USA and University of California San Francisco, San Francisco, California, USA  
*Exchange of digital ECGs: do we have enough formats?*
- 1850-1905 Discussion
- 1915-2200 Dinner Banquet  
- Poster Awards  
- Jos Willems Early Career Investigators Competition Awards  
- President's Remarks  
- Conference Chair's Remarks
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**SUNDAY, 29 APRIL 2018**

0730-900 Closing Breakfast