**International Society for Computerized Electrocardiology**  
**43rd 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*  

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**CONFERENCE PROGRAM**

**WEDNESDAY, 25 APRIL 2018**

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<th>Time</th>
<th>Event</th>
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<tr>
<td>1530-1830</td>
<td><strong>PRE-CONFERENCE TUTORIAL - SERIAL ECG ANALYSIS</strong></td>
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<tr>
<td>Chair:</td>
<td>Cees Swenne, Leiden University Medical Center, Leiden, The Netherlands</td>
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<tr>
<td>1530-1550</td>
<td>Chair</td>
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<tr>
<td>1550-1625</td>
<td><em>Introduction to the ISCE 2018 Tutorial “Serial ECG Analysis”</em></td>
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</table>
| 1625-1700  | Daniel Guldenring, School of Engineering, Ulster University, Belfast, United Kingdom  
            *Lead interchanges and electrode misplacements, diagnostic consequences and automated correction strategies* |
| 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**

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<tr>
<th>Time</th>
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| 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                                                                |
| 0835-0850  | *Overview*  
            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* |
<p>| 0850-0905  | Discussion                                                           |</p>
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<thead>
<tr>
<th>Time</th>
<th>Speaker(s)</th>
<th>Title/Abstract</th>
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<tbody>
<tr>
<td>0905-0920</td>
<td>Raymond Bond, Ulster University, Belfast, United Kingdom</td>
<td>Automation Bias and Interpreter Uncertainty when Reading 12-lead Electrocardiograms</td>
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<tr>
<td>0920-0935</td>
<td>Discussion</td>
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<tr>
<td>0935-0950</td>
<td>John Wang, Philips Healthcare, Andover, Massachusetts, USA</td>
<td>Criteria for ECG detection of acute Myocardial Ischemia: Sensitivity versus specificity</td>
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<tr>
<td>0950-1005</td>
<td>Discussion</td>
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<tr>
<td>1005-1020</td>
<td>Daniel Guldenring, School of Engineering, Ulster University, Belfast, United Kingdom</td>
<td>A method to transform 12-lead ECGs to non-standard short-distance ECG leads</td>
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<tr>
<td>1020-1035</td>
<td>Discussion</td>
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<tr>
<td>1035-1055</td>
<td>Break</td>
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<tr>
<td>1055-1230</td>
<td><strong>Session II: Big data, Artificial Intelligence and Machine Learning in Electrocardiography</strong></td>
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<tr>
<td>1055-1100</td>
<td>Chair</td>
<td>Stage</td>
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<tr>
<td>1100-1115</td>
<td>Long Yu, GE Healthcare, Wauwatosa, Wisconsin, USA</td>
<td>P-QRS in machine learning: from raw data understanding to hybrid decision making</td>
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<tr>
<td>1115-1130</td>
<td>Discussion</td>
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<tr>
<td>1130-1145</td>
<td>D. Masoumeh Haghpanahi, iRhythm Technologies, San Francisco, California, USA</td>
<td>Cardiologist-Level Arrhythmia detection with deep neural networks</td>
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<tr>
<td>1145-1200</td>
<td>Discussion</td>
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<tr>
<td>1200-1215</td>
<td>Jonathan Rubin, Philips Healthcare, Cambridge, Massachusetts, USA</td>
<td>Densely connected convolutional networks for detection of atrial fibrillation from short single-lead ECG recordings</td>
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<tr>
<td>1215-1230</td>
<td>Discussion</td>
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<td>1230-1700</td>
<td>Lunch and Afternoon Discussions</td>
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<tr>
<td>1700-1800</td>
<td><strong>Poster Session 1 – cash bar, 1 hosted drink</strong></td>
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<tr>
<td>Salah Al-Zaiti, University of Pittsburgh, Pittsburgh, Pennsylvania, USA</td>
<td>Beyond the ST-Segment: Novel Methods to Quantify Acute Myocardial Ischemia in Patients with Suspected Acute Coronary Syndrome</td>
<td></td>
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<tr>
<td>Jaume Coll-Font, Northeastern University, Boston, Massachusetts, USA</td>
<td>Spatiotemporal Estimation of Activation Times in Cardiac Electrograms</td>
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<tr>
<td>Reza Firoozabadi, Philips Healthcare, Thousand Oaks, California, USA</td>
<td>Assessment of Signal Quality Algorithms in Distributed Systems</td>
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<tr>
<td>Shravani Gangidi, University of Rochester, Rochester, New York, USA</td>
<td>Impact of Pulse Deficit on Detection of AF Rhythms Using Photoplethysmographic Signals in Reference to ECG</td>
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<tr>
<td>Wilson Good, SCI Institute, Salt Lake City, Utah, USA</td>
<td>Novel Metric for Evaluating Ischemic Stress in Electrograms Using a Data-Driven Approach</td>
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<td>Richard Gregg, Philips Healthcare, Andover, Massachusetts, USA</td>
<td>Reducing the impact of low sampling frequency on heart rate variability</td>
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<tr>
<td>Rohit Hadia, Ulster University, Newtownabbey, United Kingdom</td>
<td>K-Nearest Neighbor based QRS delineator for single lead ECGs recorded in lifestyle monitoring Applications</td>
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</table>
Thomas Hilbel, Dept. of Cardiology, University Hospital, Heidelberg, Germany
*Medical and Safety Issues for Wearable Activity and Heartrate Trackers*

Steven Leung, Weill Cornell Medicine, NewYork-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

2100-2105 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

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)
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 Marylin 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
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<th>Speaker</th>
<th>Institution</th>
<th>Location</th>
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<tr>
<td>1030-1045</td>
<td>Randall Moorman, University of Virginia, Charlottesville, Virginia, USA</td>
<td>Predictive analytics monitoring at the bedside: Principles and practice</td>
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<tr>
<td>1045-1100</td>
<td>Discussion</td>
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<td>1100-1115</td>
<td>Artur Dubrawski, Carnegie Mellon University, Pittsburgh, Pennsylvania, USA</td>
<td>Reducing data annotation efforts needed for building predictive models at bedside</td>
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<td>1115-1130</td>
<td>Discussion</td>
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<td>1130-1145</td>
<td>Christopher Scully, U.S. Food and Drug Administration, Silver Spring, Maryland, USA</td>
<td>Regulatory Science for Patient Monitoring Predictive Analytics</td>
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<td>1145-1200</td>
<td>Discussion</td>
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<td>1200-1215</td>
<td>ISCE Business Session</td>
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<td>1215-1700</td>
<td>Lunch and Afternoon Discussions</td>
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<td>1700-1800</td>
<td>Poster Session 2 – cash bar, 1 hosted drink</td>
<td>Brittany Bogle, University of North Carolina at Chapel Hill, Chapel Hill, North Carolina, USA</td>
<td>Predicted Outcomes and Cost-Effectiveness of Optimally Designed Drone-Delivered AED Networks in North Carolina: Predicted Outcomes and Cost-Effectiveness</td>
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<td>Jimo Borjigin, University of Michigan, Ann Arbor, Michigan, USA</td>
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<td>Accurate detection of atrial fibrillation and atrial flutter using the electrocardiomatrix technique</td>
<td>Werner Bystricky, AbbVie, Inc., Clinical Pharmacology, North Chicago, Illinois, USA</td>
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<td>T vector velocity distribution: A new biomarker for identifying drug effects on cardiac myocyte ion channels</td>
<td>Willem Dassen, Maastricht University Medical Center, Maastricht, Limburg, The Netherlands</td>
<td>Training the Electrophysiologist of the Future</td>
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<td>Dillon Dzikowicz, University of Rochester, Rochester, New York, USA</td>
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<td>Predicting Heart Rate Recovery Based on Depression, Sleep Quality and Vagal Tone in On-Duty Firefighters</td>
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<td>Dillon Dzikowicz, University of Rochester, Rochester, New York, USA</td>
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<td>Relation between QRS-T Angle and Blood Pressure during Exercise Stress Test in On-Duty Firefighters</td>
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<td>Ziad Faramand, University of Pittsburgh Medical Center, Pittsburgh, Pennsylvania, USA</td>
<td>Understanding the Demographic and Clinical Correlates of Quantitative Repolarization Parameters in Patients with Cardiovascular Risk Factors</td>
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<td>Jorgen Kanters, University of Copenhagen, Copenhagen N, Denmark</td>
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<td>Genetical component of the QT interval is associated with increased mortality in the general population</td>
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<td>Alan Kennedy, B-Secur Ltd, Belfast, United Kingdom</td>
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<td>S. Suave Lobodziński, California State University Long Beach, Long Beach, California, USA</td>
<td>The effect of automated R-wave annotation on Heart Rate Variability Analysis</td>
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<td>Aaron Peace, Department of Cardiology, Altnagelvin Hospital, Western Health and Social Care Trust, United Kingdom</td>
<td>Novel Universal ECG Sensor for Very Long-Term Monitoring</td>
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<td>Dimitrios Poulikakos, Salford Royal NHS Foundation Trust, University of Manchester, Manchester, England</td>
<td>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</td>
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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

Kenichi Harumi Plenary Address
Peter Clemmensen, Region Sjaelland - Nykoebing Falster Hospital, Nykoebing Falster, Denmark
The Standard EKG in Acute Coronary Syndrome
1910-2000

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

SUNDAY, 29 APRIL 2018

0830-1005 Session VIII: Identifying, Diagnosing and Guiding Invasive Treatment for Atrial Fibrillation
From Wearable Devices to Electrocardiographic Imaging to Guide Ablation
Part 1: ECG and Wearable Devices for Detecting Heart Rate, A-fib and Other Waveforms

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  Overview
0835-0850  Kais Gadhoumi, University of California San Francisco, San Francisco, California, USA  Photoplethysmography in wristband and fingertip pulse oximeter: Are we measuring the same pathophysiological dynamics?
0850-0905  Discussion
0905-0920  Marco Peluso, Quardio, Inc., San Francisco, California, USA  Diagnostic value and convenience of wearable ECG technology - an industry perspective
0920-0935  Discussion
0935-0950  Linda Ricci, U.S. Food and Drug Administration, Silver Spring, Maryland, USA  Updates on wearable medical devices
0950-1005  Discussion
1005-1020  Break

1020-1155  Session IX: Identifying, Diagnosing and Guiding Invasive Treatment for Atrial Fibrillation From Wearable Devices to Electrocardiographic Imaging to Guide Ablation
Part 2: Electrocardiographic Imaging (inverse solution) – Application to Atrial Fibrillation
Chair  Rob MacLeod, University of Utah, Salt Lake City, Utah, USA
1020-1025  Chair  Overview
1025-1040  Miguel Rodrigo Bort, Universitat Politècnica de València, València, Spain  Noninvasive Estimation of Highest Dominant Frequency Regions during Atrial Fibrillation by Electrocardiographic Imaging
1040-1055  Discussion
1055-1110  Joaquin Azpilicueta, EP Solutions, Yverdon-les-Bains, Switzerland  Role of ECGi in the outcome of arrhythmia patients: wishes of a clinical cardiologist
1110-1125  Discussion
1125-1140  John Sapp, Dalhousie University, Halifax, Nova Scotia, Canada  Rapid 12-lead Automated Localization Method: Comparison to Electrocardiographic Imaging (ECGI) in Patient-specific Geometry
1140-1155  Discussion
1155-1700  Lunch and Afternoon Discussions

1700-1900  Session X: Update on International Initiatives and Standards
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  Overview
1705-1720  Jose Vicente, U.S. Food and Drug Administration, Silver Spring, Maryland, USA  Update on the ECG component of the CiPA initiative
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