Track 6.2: Electrocardiology

Session 6.2.1: Cardiac Cell Electrophysiology

Modelling Pharmacological Block of Rapid Delayed Rectifier Current by E-4031 in Sinoatrial Pacemaker Cells
Dokos, Socrates; Boyett, Mark R.; Cloherty, Shaun L.; Lovell, Nigel H. 1345

A Mathematical Model of the Rabbit Ventricular Myocyte
Daniel, K. N.; Sun, L.; Clark, Jr., J. W.; Spitzer, K.; Giles, W. R. 1347

Development of Transient Outward K+ Current to Simulate Ventricular Action Potentials of Spontaneously Hypertensive Rats
Padmala, Srikanth; Giles, Wayne; Demir, Semahat 1349

Development of Cardiac Ventricular Cell Models for Rat and Mouse
Demir, Semahat S.; Pandit, Sandeep V.; Giles, Wayne R. 1351

Engineering Analysis of Cardiac Electrical Activity in Response to Calmodulin Mutations
Entcheva, Emilia; Alsekhan, Badr A.; Ianuzzi, Allyson; Yue, David T.; Tung, Leslie 1352

Session 6.2.2: Cardiac Nonlinear Dynamics

Phase Space: A New Perspective for Studying Cardiac Reentry
Wikswo, John P.; Woods, Marcella C.; Bray, Mark-Anthony P. 1354

Reentry Formation during Ventricular Fibrillation
Gray, Richard A.; Banville, Isabelle 1356

Dynamical Instability of Cardiac Action Potentials: Cause and Effect
Otani, Niels F.; Li, Mingyi 1358

The Effect of Coupling Resistance on the Entrainment of a Pair Cardiac Cells
Vinet, Alain 1360

Endocardial Detection of Repolarization Alternans
Christini, David J.; Stein, Kenneth M.; Hao, Steven C.; Markowitz, Steven M.; Mittal, Sunee; Slotwiner, David J.; Iwai, Sei; Das, Mithilesh K.; Lerman, Bruce B. 1363

Session 6.2.3: Cardiac Mapping

Remaining Challenges in Direct Cardiac Mapping
Ideker, Raymond E.; Fist, Vladimir; Smith, William M. 1365

Visualization, Analysis and Physiological Interpretation of Three-Dimensional Cardiac Electric Fields
Taccardi, Bruno; Punske, Bonnie B.; MacLeod, Robert S.; Ni, Quan 1366

Electrical Mapping from Exposed Rabbit Right Ventricular Endocardium
Pollard, Andrew E. 1368

Response of Fibrillating Atria to Successful Low Probability of Success Shocks
Wolf, Patrick D.; Park, Sarah A.; Goodman, Amy M. 1370

Mapping of Cardiac Electrical Activity by Means of a 3D Heart-Excitation-Model
He, Bin; Li, Guanglin 1372

Session 6.2.4: Cardiac Mapping (Posters)

Design of Sensors for Three Dimensional Optical and Electrical Measurements in Myocardial Tissue
Smith, William M.; Cressler, John D.; Walcott, Gregory P.; Pollard, Andrew E.; Ellis, Charles D. 1373

Correction of Motion Artifact in Cardiac Optical Mapping Using Image Registration Technique
Rohde, Gustavo K.; Sidorov, Veniamin; Adroubi, Akram; Dawant, Benoit M.; Lin, Shien-Fong 1375

Elevated Potassium Concentration Converts Excitation Mechanism From Make To Break
Sidorov, Veniamin Y.; Woods, Marcella C.; Wikswo, John P. 1377

Filtering of Surface Laplacian Electrocardiograms from Humans to Produce Atrial Activation Patterns
Besio, Walter G.; Tarjan, Peter P. 1379

A Clinical Pilot Study on the Accessory Pathway Localization Accuracy Applying ECG Mapping
Modre, Robert; Tilg, Bernhard; Fischer, Gerald; Hanser, Friedrich; Messnarz, Bernd; Roitinger, Fraiz X.; Hintringer, Florian 1381

Noninvasive Characterization of Myocardial Infarction Activation from Epicardial Potential Reconstruction
Huang, Song; He, Wei; Yao, Degui; Tai, Heng-Ming 1383

Session 6.2.5: Forward-Inverse Problems in Electrophysiology

System and Methods for Electrical-Anatomical Imaging of the Heart
Rao, Liyun; Khoury, Dirar S. 1385
Including Sparse Noisy Epicardial Potential Measurements into Bayesian Inverse Electrocardiography
Serinagaoglu, Yesim; Brooks, Dana H.; Macleod, Robert S. 1387

Interpretation of ECG Signals through Forward and Inverse Modelling
Cheng, Leo K.; Buist, Martin L.; Sands, Gregory B.; Pullan, Andrew J. 1389

A New Spatiotemporal Regularization Method for Estimating the Cardiac Transmembrane Potential
Messnarz, Bernd; Tilg, Bernhard; Modre, Robert; Fischer, Gerald; Hanzer, Friedrich; Wach, Paul 1391

Inverse and Forward Modeling of Interictal Spikes in the EEG, MEG and ECoG
Huiskamp, Geertjan 1393

Solving Bioelectric Field Problems with the BioPSE Software System
Weinstein, David M. 1395

Session 6.2.6: ECG/MCG (Posters)

ECG Lead Selection and Reconstruction: Application of Model-Based Study to Actual Measurement Datasets
Takano, Noriyuki; Puurtinen, Hanna-Greta; Kauppinen, Pasi; Nousiainen, Juha; Hyttinen, Jari; Malmivuo, Jaakko 1397

Fetal Bedside Magnetocardiograph
Dunajski, Zbigniew; Palko, Tadeusz J. 1399

Dense Electrical Map Reconstruction from ECG/MCG Measurements with Known Fiber Structure and Standard Activation Sequence
Debreuve, Eric; Gullberg, Grant T. 1401

Adaptive Reduction of Motion Artifact in the Electrocardiogram
Tong, David A.; Bartels, Keith A.; Honeyager, Kevin S. 1403

Autoregressive Modeling and Classification of Cardiac Arrhythmias
Srinivasan, Narayanan; Ge Ding, Fei; Krishnan, Shankar M. 1405

Estimation of Low Level Alternans using Periodicity Transform – Simulation and European ST/T Database Studies
Thiagarajan; Srikanth; Lin, Dongping; Kanaan, Nabil; Gu, Huajin 1407

Wave Propagation from Medical Implants - Influence of Body Shapes on Radiation Pattern
Johnson, Anders J. 1409

Session 6.2.7: Large-Scale Models of the Electrical Activity of the Heart

The Role of Vagal Stimulation on Atrial Arrhythmogenesis
Vigmond, Edward J.; Kuo, Samuel; Trayanova, Natalia A. 1411

Assessing Shock Efficacy as a Function of Arrhythmia Complexity in a Slab of the Canine Heart
Eason, James; Hillebrenner, Matthew; Campbell, Craig; Trayanova, Natalia 1413

Monophasic Action Potentials in Murine Heart: A Model Study
Tranquillo, Joseph V.; Franz, Michael R.; Knollmann, Bjorn C.; Henriquez, Craig S. 1415

Filament Dynamics in a Computational Model of Re-entrant Fibrillation in Anatomically Detailed Canine Ventricular Anatomy
Clayton, Richard H.; Holden, Arun V. 1417

A Method for Rapid Simulation of Propagating Wavefronts in Three-Dimensional Cardiac Muscle with Spatially-Varying Fiber Orientations
Feldman, Andrew B.; Murphy, Sean P.; Coolahan, James E. 1419

Two-Dimensional Pseudospectral Modeling of Cardiac Reentry
Yan, Rongqi; Ng, Kwong T. 1421

Session 6.2.8: Cardiac Defibrillation I

Recent Findings About the Mechanism of Defibrillation
Ideker, Raymond E.; Chattipakorn, Nippon 1423

Biphasic Defibrillation in a Model of the Rabbit Heart
Aguel, Felipe; Campbell, Craig A.; Trayanova, Natalia A. 1424

Effect of Shock Timing on Cardioversion Efficacy
Evans, Frederick G.; Ideker, Raymond E.; Gray, Richard A. 1426

Averaging Over Depth during Optical Mapping of Electroporation
Janks, Deborah L.; Roth, Bradley J. 1428

Virtual Electrode-Induced Phase Singularity in a Rabbit Model of Chronic Myocardial Infarction
Cheng, Yuanna; Zhuang, Shaowei; Nikolski, Vladimir; Efimov, Igor R.; Wallick, Don W. 1430
Session 6.2.9: Cardiac Defibrillation II

**Effect of Tissue Damage on Virtual Electrode Polarization Pattern**
Sambelashvili, A. T.; Nikolski, V. P.; Wollenzien, B. R.; Efimov, I. R. 1432

**The Influence of Stretch-Activated Channels on Defibrillation**
Weihi, Li; Eason, James C.; Kohl, Peter; Trayanova, Natalia A. 1434

**Error Minimization in Electric Field Mapping During Defibrillation**
Deale, O. Carlton; Ng, Kwong T.; Kim-Van Housen, Ellen J.; Lerman, Bruce B. 1436

**Left Ventricular Volume Changes After Defibrillation**
de Jongh, Amy L. 1438

**Comparison of Three Biphasic Defibrillation Waveforms: Garvich Waveform is More Efficient**
Qu, Fujian; Nikolski, Vladimir P.; Wollenzien, Brian R.; Efimov, Igor R. 1439

**Biventricular Defibrillation with Sequential Shocks Using Patient-Derived Computational Models**
Mocanu, Daniel; Kettenbach, Joachim; Sweeney, Michael O.; Kikinis, Ron; KenKnight, Bruce H.; Eisenberg, Solomon R. 1441

**A Patient-Specific Computational Study of Transvenous Defibrillation**
Mocanu, Daniel; Kettenbach, Joachim; Sweeney, Michael O.; Kikinis, Ron; KenKnight, Bruce H.; Eisenberg, Solomon R. 1443

Session 6.2.10: Arrhythmias and Defibrillation (Posters)

**Prediction of Tachyarrhythmia Episodes**
Thong, Tran; Goldstein, Brahm 1445

**Model Study of Transitions in Cardiac Reentry Dynamics Following a Two-Stimulations Protocol**
Comtois, Philippe; Vinet, Alain 1447

**Inflammation Depresses Electrical Conduction in Normal Heart Tissue**
Tselentakis, E. Victor; Gaudette, Glenn R.; Saltman, Adam E. 1449

**Effects of Lidocaine on Shock-induced Vulnerability and Defibrillation**
Li, Li; Nikolski, Vladimir; Wollenzien, Brian R.; Efimov, Igor R. 1451

Session 6.2.11: Arrhythmias and Reentry

**Determination of the Conduction Paths from the Left to the Right Atrium Using Frequency Analysis of Atrial Electrograms in Two Canine Models of Atrial Fibrillation**
Ryu, Kyungmoo; Sahadevan, Jayakumar; Khrestian, Celeen M.; Stambler, Bruce S.; Waldo, Albert L. 1453

**Analysis of Electrically-Induced Reentrant Circuits Using Nonlinear Dynamics Tools**
Larson, Claire; Dragnev, Lubomir; Eason, James; Trayanova, Natalia 1455

**Role of Action Potential Shortening in Arrhythmia Induction: Implications for External Defibrillation**
Iyer, Anand N.; Gray, Richard A. 1457

**Effects of Electroporation on Cellular Responses**
Nikolski, Vladimir P.; Sambelashvili, Alexandre T.; Wollenzien, Brian R.; Efimov, Igor R. 1459

**Ventricular Wall Thickness and Volume During Hemodynamic Collapse Produced by AC Leakage Current**
Hoffmeister, B. K.; Sheals, B. S.; de Jongh, A. L.; Malkin, R. A. 1461

Track 6.3: Pulmonary Systems

Session 6.3.1: Pulmonary Mechanics: From Organ to Cell

**Mechanics and Gas Mixing in Constricted Lungs**
Wilson, Theodore A.; Aanfi, Ron C.; Beck, Kenneth C. 1462

**Micromechanics of the Connective Tissue Matrix of the Lung**
Suki, Bhas; Brewer, K.; Cavalcante, F. S. A.; Sakai, H.; Alencar, A. M.; Majumdar, A. 1464

**The Unifying Role of Cytoskeletal Prestress in Micromechanics of the Adherent Cell**
Stamenovic, Dimitrije; Toic-Norrelykke, Iva-Marija; Fredberg, Jeffrey J.; Wang, Ning 1466

**Feeling the Squeeze: Does Airway Constriction Stimulate the Bronchial Epithelium?**
Tschumperlin, Daniel; Drazen, Jeffrey 1468

**Lung Inflation: Can You Get Too Much of a Good Thing?**
Margulies, Susan S.; Cavanaugh, Kenneth J.; Fisher, Jacob L. 1470

**Soft Science: Living Cells, Soft Glasses and Mechanics of the Cytoskeleton**
Fredberg, Jeffrey J. 1472
Session 6.3.2: Pulmonary Mechanics (Posters)

Tracking Severity and Distribution of Lung Disease During Mechanical Ventilation: Applications to Bronchoconstriction and Respiratory Distress Syndrome
Bellardine, C. L.; Ingenito, E. P.; Hoffman, A.; Lopez, F.; Sanborn, W.; Lutchen, K. R.

Respiratory Airflow Estimation by Acoustical Means
Hossain, Ijina; Moussavi, Zahra.

Respiratory Resistance Measurements with the Airflow Perturbation Device
Johnson, Arthur T.; Scott, William H.; Koh, Frank C.; Silverman, Nischom K.

Unsteady Flow in a 3-D Collapsible Tube with Uniform Wall Thickness

Diagnosis of Pulmonary Complications based on Airway Pressure-Flow Waveforms
Visaria, Rachana; Westenskow, Dwayne

The Effects of Epithelial Surface Topography on Cell Stretches during Airway Reopening
Jacob, Anne-Marie; Gaver, Donald P.

Session 6.3.3: Transport Phenomena In the Lungs: Recent Advances

Ion Transport in Lung Cells: from Cellular Homeostasis to Pulmonary Gas Exchange
Bidani, Akhil; Luo, Chuan; Clark, John W.; Heming, Thomas A.

Noninvasive Measurement Of Small-Solute Pulmonary Microvascular Permeability Using A Multicompartment Indicator
Conrad, Steven A.; Bidani, Akhil

Characterizing Nitric Oxide Exchange Dynamics During Tidal Breathing: Theory
Condorelli, Peter; George, Steven C.

Dynamic Surface Tension Effects During Airway Reopening
Gaver, Donald P.; Brennan, Rebecca; Zimmer, M.

Computational Fluid Dynamics Simulation of Airflow and Aerosol Deposition in Human Lungs
Mishchyi, Natalya; Annapragada, Ananth

Distributions of V/Q Heterogeneity during Broncho-Constriction Measured with PET: Contribution of Sub-Resolution Heterogeneity to Gas Exchange Impairment
Venegas, Jose G.

Session 6.3.4: Mini-symposium: Neurophysiological Basis of Sleep-disordered Breathing

Endogenous Inputs to the Respiratory System in Wakefulness and Sleep
Orem, John M.

Visualization of Respiratory-Related Neural Activity during Sleep
Harper, Ronald M.; Henderson, Luke A.; Macey, Paul M.; Macey, Katherine E.

Integrative Control of Respiration in the Sleep Apnea Syndrome
Remmers, John E.; Topor, Zbigniew; Poulin, Marc

Session 6.3.5: Respiratory Pattern Dynamics: Mechanisms and Analysis

Ionic Current Model of a Hypoglossal Motoneuron
Purvis, Liston K.; Wilson, Christopher G.; Butera, Robert J.

A Model of the Rat Phrenic Motor Neuron
Amini, Behrang; Clark, Jr., John W.; Bidani, Akhil; Zwischenberger, Joseph B.

Review of Central Respiratory Pattern Generation Models
Butera, Robert J.

Generation of Respiratory Rhythm: Models and Mechanisms
Smith, Jeffrey C.

Afferent Neurodynamic and Neurologic Control of the Respiratory Rhythm
Poon, Chi-Sang; Young, Daniel L.

Neural Control of Airflow Profile During Hypoxia in Sleep and Wakefulness
Lovering, Andrew T.

Session 6.3.6: Gas Exchange/Transport (Posters)

Modeling the Effect of Biophysical Parameters on Mass Transport in Capillary Networks
Goldman, Daniel
An Experiment-Based Model of Oxygen Transport in Capillary Networks under Normal and Septic Conditions
Goldman, Daniel; Bateman, Ryon M.; Ellis, Christopher G. 1517

Application of Normalised Phase Iii Slope Analysis for Assessing Small and Large Airways Contribution in Pulmonary Models
Tawhai, Merryn H.; Hunter, Peter J. 1519

Estimation of Noise-Corrected Pulmonary Blood Flow Heterogeneity Using Positron Emission Tomography
Winkler, Tilo; Martinez, Marta; Layfield, Dominic; Venegas, Jose G. 1521

Pathophysiology of Nasal Airconditioning
Elad, David; Naftali, Sara; Rosenfeld, Moshe; Wolf, Michael 1523

Session 6.3.7: Cardiopulmonary Systems (Posters)

Effects of Arousal from Sleep on Autonomic Cardiovascular Control in Obstructive Sleep Apnea Syndrome
Blasi, Anna; Jo, Javier A.; Baydur, Ahmet N.; Juarez, Ricardo H.; Khoo, Michael C. K. 1525

Pitch Analysis in Snoring Signals from Simple Snorers and Patients with Obstructive Sleep Apnea
Solà-Soler, Jordi; Jané, Raimon; Fiz, José Antonio; Moren, José 1527

Detection of Respiratory Sounds Within the Ear Canal
Pressler, Gary A.; Mansfield, Jeffrey P.; Pasterkamp, Hans; Wodicka, George R. 1529

Electronic Auscultation Based on Wavelet Transformation in Clinical Use
Penzel, T.; Gross, V.; Hadjileontiadis, L.; Koehler, U.; Vogelmeier, C. 1531

Pneuma - A Comprehensive Cardiorespiratory Model
Fan, Hsing-Hua; Khoo, Michael C. K. 1533

A Closed-loop Model of Human Gas Exchange
Lu, K.; Clark, J. W.; Ghorbel, F. H.; Ware, D. L.; Bidani, A. 1535

Optimization of the total cavopulmonary connection using a compliant-walled computational model
Lucas, Carol L.; Masters, Jonathan C.; Ketner, Mark; Bleiweis, Mark S.; Mill, Michael; Yoganathan, Ajit 1537

Pulmonary Blood Flow Regulation with Contactless Energy
Díaz, J.; Lopez, Juan M.; Comas, Juan V.; López, M. J. 1538

Mathematical Analysis of Alveolar Macrophage Ph Regulation
Luo, Chuan; Clark, John W.; Heming, Thomas A.; Bidani, Akhil 1540

Session 6.3.8: Bioengineering Applications in Sleep-disordered Breathing

Auto-CPAP (APAP) for Treatment of Obstructive Sleep Apnea
Berry, Richard B. 1542

Upper Airway Mechanics: The Influence of Gender
Malhotra, Atul; Huang, Yaqi; White, David P. 1544

Automated Detection of Respiratory Phenotypes During Sleep
Schneider, Hartmut; Patil, Susheel P.; Gladmon, Elizabeth A.; Haeussler, Siegfried; Wagner, Mirko; Smith, Phillip L.; Schwartz, Alan R. 1546

Detection and Relief of Upper Airway Obstruction in a Dog Model
Durand, Dominique M.; Sahin, M.; Haxiu, M.; Yoo, P. B. 1548

An Investigation of The Mean Electrical Axis Angle and Respiration During Sleep
Behbehani, Khosrow; Vijendra, Sridhar; Burk, John R.; Lucas, Edgar A. 1550

Peripheral Arterial Tonometry Monitors Changes of Autonomous Nervous System in Sleep Apnea
Penzel, Thomas; Fricke, Ralf; Brandenburg, Ulrich; Becker, Heinrich F.; Vogelmeier, Claus 1552

Detection Of Autonomic Abnormality In Obstructive Sleep Apnea Using A Nonlinear Model Of Heart-Rate Variability
Jo, J. A.; Khoo, M. C. K.; Blasi, A.; Baydur, A.; Juarez, R. 1554

Track 6.4: Cardiopulmonary Replacement & Assist Devices

Session 6.4.1: Circulatory Assist Devices I

Left Ventricular Assist Devices for Destination Therapy in End-Stage Heart Failure: the Rematch Trial
Farrar, David J. 1556

A Trial for Destination Therapy – Investigation of Non-Transplant-Eligible Patients who are Inotrope Dependant (INTrEPID)
Mussivand, Tofy 1558

xxxvii
The LionHeart Left Ventricular Assist System
Snyder, Alan J.; Rosenberg, Gerson; Weiss, William; Paes, Walter E.; Lewis, Jeffrey P.; Frank, Daniel; Zintak, Helene; Scholl, Shelley 1560

The Cleveland Clinic/Foster Miller Magscrew Pulsatile Blood Pump Program
Smith, William A.; Fukamachi, Kiyotaka; Weber, Stephan; Harasaki, Hiroaki; Doi, Kazuyoshi; Schenk, Soren; Vitale, Nicholas; Hirschman, Gordon; Donahue, Arthur 1561

Development of a Specialized Bioengineering Service-Based Organization to Augment the Clinical Application of Artificial Organ Technology
Winovich, Stephen; Schaub, Richard; Severyn, Donald; Stone, Robert; Lohmann, Douglass; Korosec, Robert; Borovetz, Harvey 1563

Session 6.4.2: Circulatory Assist Devices II: Control

Current Strategies for Control of Turbdynamic Blood Pumps
Antaki, James F.; Boston, J. Robert; Simaan, Marwan; Wu, Zhongjun 1564

An Adaptive Controller for Left Ventricular Assist Device
Wu, Yi; Allaire, Paul; Tao, Gang 1565

Time-Varying Stroke Volume Using Sonomicrometry with Direct Cardiac Compression (dcc)
Martinez-Coll, Alfredo A.; Nguyen, Hung T.; Zieliinski, Robert; Huang, YiFei; Plekhanov, Sergeii; Hunyor, Stephen N. 1567

Evolutionary Design of a Fuzzy Controller for the Third-Aortic Balloon Pump
Weller, Peter; Morrow, Darren; LeFevre, Jacques 1569

Estimation of Physiological Parameters during Animal Experiment with Left Ventricular Assist System
Kosaka, Ryo; Sankai, Yoshiyuki; Jikuya, Tsuyoshi; Yamane, Takashi; Tsutsui, Tatsuo 1571

In vivo Evaluation of Pressure Head and Flow Rate Estimation on a Continuous-Flow Artificial Heart
Tanaka, Akira 1573

Closed-Loop Fuzzy Control of Resuscitation of Hemorrhagic Shock in Sheep
Ying, Hao; Bonnerup, Chris A.; Kirschner, Robert A.; Deyo, Donald J.; Michell, Michael W.; Kramer, George C. 1575

Analysis of Chronically Recorded Autonomic Nerve Signals for the Control of Artificial Heart Systems
Sakozaki, Takaomi; Mitsu, Mie; Tsuchiya, Takashi; Saito, Itsuro; Wagatsuna, Akira; Ohkura, Michiko; Chinzei, Tsuneo; Imachi, Kou; Mabuchi, Kunihiko 1577

Session 6.4.3: Artificial Lung

Arterio Venous Carbon Dioxide Removal (avco2r) for Severe Respiratory Failure
Zwiskenberger, J. B.; Wang, D.; Alpar, S. K.; Savage, C.; Deyo, D. J.; Schmalstieg, F. C.; Bidani, A. 1579

Development of the Mc3 Biolung
Chambers, Sean D.; Merz, Scott L.; McGillicuddy, John W.; Bartlett, Robert H. 1581

Paracorporeal Artificial Lung as a Bridge to Recovery or Lung Transplant
Zwiskenberger, J. B.; Wang, D.; Savage, C.; Deyo, D. J.; Bidani, A.; Chambers, S. 1583

A Closed-Loop Model of the Ovine Cardiovascular System
Qian, Junhui; Clark, John W.; Lu, Kun; Ghorbel, Fathi; Zwischenberger, Joseph B.; Bidani, Akhil 1585

Hemodynamic Consequences of Artificial Lung Attachment in a Porcine Model
Perlman, Carrie E.; Cook, Keith E.; Seipel, Ralf; Backer, Carl L.; Mavroudis, Constantine; Hernandez, Jose; Mockros, Lyle F. 1587

Development of a Pumping Artificial Lung
Gartner, M.J.; Litwak, P.; Borovetz, H.S.; Griffith, B.P. 1589

Session 6.4.4: Artificial Hearts, Blood Pumps, and Valves (Posters)

Development of High Resolution Particle Image Velocimetry for Use in Artificial Heart Research
Hochareon, Pramote; Manning, Keefe B.; Fontaine, Arnold A.; Deutsch, Steven; Tarbell, John M. 1591

Numerical and Experimental Measurements of the Flow through Mechanical Heart Valves in the Natural and Artificial Heart
Einav, Shmuel; Avrahami, Idit; Rosenfeld, Moshe 1593

Tracking Strain in Ventricular Assist Devices
Behr, Marek; Arora, Dhruv; Pasquali, Matteo 1595

Mock Circulatory System for Testing Cardiovascular Devices

Flow Induced Platelet Activation in Mechanical Heart Valves - in vitro Studies
Yin, Wei; Bluestein, Danny; Jesty, Jolyon; Perrotta, Peter 1599
Permanent Arterial Blood Filtration for Embolic Stroke Prevention - the Hemodynamics of a New Concept
Grad, Ygael; Nishri, Boaz; Harris, Dagan; Einav, Shmuel; Lieber, B. Baruch; Yodfat, Ofer

Detection of Circulating Platelet Microaggregates and Surface Microthrombi during Continuous Flow LVAD: Evidence for Shear-Induced Platelet Activation
Linnweber, Joerg; Chow, Thomas W.; Kawamura, Masaki; Nose, Y.; Mouke, Joel L.

Bladeless Blood Pump: Feasibility of the design as an LVAD device
Iwaniec, Anna; Gharib, Morteza

Track 6.5: Blood Pressure Control & Heart-Rate Variability

Session 6.5.1: Autonomic Control of Blood Pressure
Systolic Blood Pressure of the Postextrasystolic Beat Characterizes Cardiovascular Dysfunctions
Voss, Andreas; Baier, Vico; Hopfe, Jens; Schirdewan, Alexander; Leder, Uwe

Frequency Dependent Response of Cardio-Vascular System to Foot Based Vibration While in the Seated Position
Madhavan, Guruprasad; Villanueva, Jr., Azael; Mcleod, Kenneth J.

Study of Heart Rate and Blood Pressure Variability during the Haemodialysis Treatment
Signorini, Maria G.; Arrigo, Girolamo; Cerutti, Sergio

Under-estimation of Baroreflex Sensitivity Through A Closed Loop Model Due to non-Gaussian Property of Blood Pressure Distribution
Nakao, Mitsuyuki

Analysis of Interactions Between Heart Rate and Blood Pressure in Chronic Hypertensive Pregnancy
Voss, Andreas; Baumert, Mathias; Baier, Vico; Stepan, Holger; Walther, Thomas; Faber, Renaldo

Session 6.5.2: Heart Rate Variability
Fetal Heart Rate Variability: Clinical Experts versus Computerized System Interpretation
Jezewski, Janusz; Wrobel, Janusz; Horoba, Krzysztof; Gacek, Adam; Sikora, Jerry

Sleep Staging Based on the Analysis of Heart Rate Variability with Hidden Markov Models
Zhuang, Zhi; Gao, Shangkai; Gao, Xiaorong

A System for Automated Analysis of RR-Series Applied to Identification of Patients with Neurocardiogenic Syncope
Dickhaus, Hartmut; Maiier, Christoph; Bauch, Matthias; Renghausen, Ute; Khalil, Markus; Hessling, Gabriele; Ulmer, Herbert E.

Methods of Quantifying Respiratory Modulation in Human PR Electrocardiographic Intervals
Shouldice, Redmond B.; Heneghan, Conor; Nolan, Philip

Heart Rate Variability during High and Low Estrogen during the Menstrual Cycle
Ribeiro, L. Christine; Meek, Janice V.

The Effects of in Utero Cocaine-Exposure on the Heart Rate and Heart Rate Variability of Near and Full Term Infants Following Orthostatic Stress
John, Vijay; Neuman, Michael R.; Talati, Ajay J.

Theme 7. Sensors, Instrumentation and BioMEMS

Track 7.1: Micro/Nanoengineering for Biotechnology Applications

Session 7.1.1: Devices for Genomics and Proteomics
High Throughput Screening Using Enzyme Assay Microarrays
Gosalia, Dhaval N.; Diamond, Scott L.

The Optimization of Quill-Pin Printed Protein and DNA Microarrays
Smith, Jason T.; Reichert, W. Monty

A Silicon Micromachined Pin for Contact Droplet Printing
Tsai, Jane G.

Polydimethylsiloxane Nanostructures Fabrication by Fiber Machining for Single Molecular Studies Applications
Fujii, Teruo; Leclerc, Eric; Mita, Yoshio

A Surface Plasmon and Guided Mode Microscope for the Micro- to Nano-Thickness Imaging
Pyo, Hyeon-Bong
**Session 7.1.2: Microanalytical Devices I**

**Conventional Analytical Methods:**
- Electrophoresis, Chemical Reactors and Detection

**Integration of “On-Chip” Electrochemical Detection in a Microfabricated Capillary Electrophoresis Device**
Roussel, Thomas J.

**Towards Portable Flow Cytometry: Study on the Use of Air-Sheath-Based Volume-Efficient Two-Phase Microfluidic Systems**
Huh*, Dongeun; Tkaczyk, Alan H.; Wei, Hsien-Hung; Grotberg, James B.; Takayama, Shuichi

**An Autonomous Microneedle-based Bio-Analysis System**
Chandarsekaran, Shankar

**A Rapid, Near Infrared, Whole Blood Immunoassay Using Metal Nanoshells**
Hirsch, Leon R.; Halas, N. J.; West, J. L.

**Session 7.1.3: Cell-based Sensors I**

**Feel the Force: Using an Array of Posts to Map Single Cell Generated Traction Forces**
Tan, John L.; Tien, Joe; Bhadriaui, Kiran; Pirone, Dana; Gray, Darren; Chen, Christopher S.

**A Biosensor Platform Based on a Cantilever with a Precisely Patterned Environmentally Sensitive Hydrogel**
Hilt, J. Zachary; Bashir, Rashid; Peppas, Nicholas A.; Gupta, Amit K.

**Nanoengineered Biophotonic Hybrid Device**
Pizziconi, Vincent B.; LaBelle, Jeff T.; Montano, Gabe A.; Blankenship, Robert E.

**Nanoengineered Polyelectrolyte Microcapsules as Fluorescent Potassium Ion Sensors**
Brown, Jonathan Q.; Lvov, Yuri M.; McShane, Michael J.

**Nano-scale Engineering of LDL-Retentive Substrates**
Chuari, Evangelia; Moghe, Prabhas V.

**Session 7.1.4: Microanalytical Devices II (Posters)**

**Modelling and Fabrication of Mirrors Used in Microspectrometers for Infrared Analysis of Biological Fluids**
Chinmayeika, S.; Besser, R. S.; McShane, M. J.

**Micro-Spectrometer for Infrared Analysis of Gases and Biological Fluids**
Srivastava, Rohit; Sheny, Gururaj; Forrest, Scott; Besser, Ronald S.; McShane, Michael J.

**Micro-Thermocouple Probe for Measurement of Cellular Thermal Responses**
Kakuta, Naoto; Suzuki, Takaaki; Saito, Takashi; Yamada, Yukio, Mabuchi, Kunihiko

**Electroplating for Three Dimensional Lab-on-a-Chip Electrodes and Microstructures**
Pai, Rekha S.; Roussel, Thomas; Crain, Mark M.; Jackson, Douglas J.; Baldwin, Richard P.; Keyston, Robert S.; Naber, John F.; Walsh, Kevin M.

**Microcuvette for Integration with Infrared Spectrometer for Biofluid Analysis**
Shenoy, Gururaj U.; Srivastava, Rohit; Forrest, Scott; Besser, Ronald S.; McShane, Michael J.

**Effects of Geometrical Factors of Coplanar Electrodes on Biomedical Measurements as Exemplified by the Electrical Impedance Measurement of Saline and Blood**
Deng, Lihong; Karagiannoglou, Stelios H.; Sakkas, Wassilis I.; Barbenel, Joseph C.

**Nonlinear Dielectric Spectroscopy of Living Cell Suspensions**
Claycomb, James R.; Prodan C.; Nawarathna D.; Miller, Jr., John H.

**In Situ Synthesis of Oligonucleotide Arrays by Using the Molecular Stamp Method**
Zuhong, Lu

**Session 7.1.5: Cell-Based Sensors II (Posters)**

**Compact Fluorescence Sensors Based on III Nitrides**
Starikov, David; Benkabou, Fatima; Medelci, Nasr; Bensoucla, Abdelhak

**Experimental Study on Irreversible Electrical Breakdown of Tumor Cell under Steep Pulsed Electric Fields**
Sun, Caixin; Yao, Chenguo; Mi, Yan; Xiong, Lan; Liao, Ruijin; Hu, Lina; Hu, Ya

**Electrode Roughness Effect on the Electrode-Electrolyte Interface Dc Current-Potential Curves**
Felice, Carmelo J.; Ruiz, Gabriel R.; Madrid, Rossana E.; Valentinuzzi, Max E.

**Nanoengineered Fluorescent Sensors containing Enzyme Assays**
Nayak, Suman R.; Guice, Kyle; Lvov, Yuri; McShane, Michael J.
Track 7.2: Micro/Nanotechnology for Cell & Tissue Engineering Applications

Session 7.2.1: Cells in Microfluidic Environments

"Microcanals" for Modulation of the Microfluidic Environment of Cultured Cells
Hsu, Chia-Hsien; Neils, Christopher M.; Tourovskaia, Anna; Folch, Albert 1681

Microfluidic Electrochemical Cell to Pattern Conducting Polymer Substrates for the Study of Nerve Guidance
Shim, Jeongsup; Cui, Xinyan; Martin, David C.; Takayama, Shuichi 1684

The Electric Slide: Dielectrophoresis for High Precision Cell Patterning
Gray, Darren S.; Chen, Christopher S. 1686

Fabrication of Culture-Based Biochips for Detecting Microorganisms in Environmental Samples
Eluru, Hima Bindu; Jing, Gaoshan; Polaczyk, Amy; Kinkle, Brian; Oerther, Daniel B.; Papautsky, Ian 1688

The NanoPhysiometer: BioMEMS for High Bandwidth Detection of Cellular Activity in Subnanoliter Volumes
Baudenbacher, Franz; Monroe, W. Todd; Werdich, Andreas; Clifford, David; Wikswo, John P. 1690

Micro-Electric Impedance Spectra of Isolated Cells Recorded in Micro-Channels
Ayliffe, H. E.; Brown, S. D.; Rabbitt, R. D. 1692

Session 7.2.2: Tissue Substrates and Biomimetic Systems (Posters)

Nanostructured and Aligned Scaffold Material for Articular Cartilage Regeneration
Jun, Grace E.; Park, Kinam; Webster, Thomas J. 1694

Bioartificial Liver Support System
Li, Ming; Sun, Junhong; Huo, Rongling; Zao, Yiyang; Mu, Zhongxue; Feng, Hueifen 1696

Session 7.2.3: Tissue Constructs & Biomimetic Substrates

Integration of Living Cells into Microsystems Technology
Toner, Mehmet 1698

Two to Tango: Micropatterned Substrates to Control Cell-Cell Interactions
Nelson, Celeste M.; Lim, Emerson A.; Chen, Christopher S. 1700

Kondabatni, Kishore K.; Hua, Feng; Cui, Tianhong; Lvov, Yuri; McShane, Michael J. 1702

Semiconductor-Neural Interfaces
Winter, Jessica O.; Flynn, Christine; Liu, Timothy S.; Belcher, Angela; Korgel, Brian; Schmidt, Christine 1704

Simultaneous Neurite Elicitation and Elongation from Neurons Using a Microfabricated Post Array
de Silva, Mauris N.; Baldi, Antonio; Pass, Joseph N.; Ziaie, Babak; Odde, David J. 1706

Dielectrophoretic Cell Patterning Within Tissue Engineering Scaffolds
Albrecht, Dirk R.; Sah, Robert L.; Bhatia, Sangeeta N. 1708

Session 7.2.4: Biosensors

Nanostructured Fluorescent Biosensor for Glucose Detection
Grant, Patrick S.; Lvov, Yuri; McShane, Michael 1710

Nanoengineered Microcapsules for the Fluorescent Sensing of Oxygen
Guice, Kyle B.; McShane, Michael J. 1712

Immuno-Surface Fabrication for Biosensor Optimization
Danczyk, R. C.; Baker, A. R.; Gabu, A.; Ladisch, M. R.; Webster, T. J.; Rundell, A. E. 1714

Development of Aluminum Nitride-Based Acoustic Wave Sensors
Xu, Jianzeng 1716

Capacitive Sensors for the Characterization of Proteins and Amminoacid Adsorption
Baglio, Salvatore 1718

Fabrication of a Biosensor with Embedded Waveguides for Sensing in Microchannels
Deverkadra, Ravi R.; McShane, Michael J. 1720
Track 7.3: Bioinstrumentation: Sensors and Systems

Session 7.3.1: Physiological Measurements & Rehabilitation

**Monitoring of Venous Oxygen Saturation Using a Novel Vibratory Oximetry Sensor**
Shaltis, Phillip A.; Asada, H. Harry 1722

**Design of an Integrated Sensor for In-Vivo Simultaneous Electrocontractile Cardiac Mapping**
Schnitz, B. A.; Kramer, Nicolle R.; Malkin, R. A. 1724

**Effect of Physical Stress to Electrogastrogram**
Iwamura, Shinngo 1726

**Magnetic Vector Analysis of Gastrointestinal Electrical Control Activity**
Myers, Andrew G.; Bradshaw, Leonard A.; McDowell, James G.; Richards, William O. 1728

**An Integrated Computer-based System to Study Neuromuscular Disorders of the Upper Limb**
Nazeran, Homer; Jaberzadeh, Shapour 1730

**Head Pointer Based on Ultrasonic Position Measurement**
Ebisawa, Y.; Nunoshita, Masaoki 1732

Session 7.3.2: Bioinstrumentation (Posters)

**The Retinal Illuminance in Trolands Caused by Luminance and Color of PC Monitors**
Suaste-Gómez, Ernesto; Zañiga-López, Arturo 1734

**Simulation of Equivalent Circuits for MRI Surface Coils**
Mantaras, Carla M.; Rodriguez, Alfredo O. 1736

**Pulse Oximeter for Homecare**
Lopera, Juan M.; Díaz, Juan; Prieto, Miguel J.; Nuño, Fernando 1738

**An In Vivo Detector for Radiolabeled Compounds**
Suddarth, Steve A.; Bolick, Natasha G.; Wheeler, Ken T.; Wargin, Bill A.; Scarantino, Charles W.; Black, Robert D. 1740

**Period Domain Analysis in Fetal Pulse Oximetry**
Reuss, James L.; Bahri, Dennis E. 1742

**Magnetic Induction Heating System for Local Hyperthermia Research**
Hernandez-Mier, Yahir; Vera-Hernandez, Arturo; Leija-Salas, Lorenzo 1744

**Body Electrical Impedance Measurements**
Patterson, Robert P. 1746

**Simulation Study for the Non-Contact Measurement of the Impedance of Biological Tissue Using an Axial Gradiometer**
Riedel, Claudia H.; Golombeck, Marc-André; Dössel, Olaf 1748

**Hematocrit Measurement by Dielectric Spectroscopy**
Cervantes, Daniel O.; Treo, Ernesto F.; Felice, Carmelo J.; Tirado, Mónica; Valentinuzzi, Max E. 1750

**Design of a Plug-and-Play Pulse Oximeter**
Yao, Jianchu; Warren, Steve 1752

**Artifact Reduction for Continuous Thermodilution Measurement of Cardiac Output**
Hamilton, Patrick S.; Chow, Chi-Ming; Guerrero, J. L.; Supple, Greg; Silver, Lissa P.; Aim, Roberto; Sullivan, Suzanne; Levine, Robert A.; Curley, Michael G. 1754

**Adaptive Noise Cancelling of Motion Artifact in Stress ECG Signals**
Raya, Mary Anne D.; Sison, Luis G. 1756

**Method for Monitoring Acceleration of the Trunk during Gait**
Villanueva, Demetrio; Trujillo, Arturo; Fermon, Elías; Cardiel, Eladio; Hedz, Pablo-Ro. 1758

**Design, Construction and Evaluation of an Electrical Impedance Tomography (EIT) System. Applications on Cerebral Tissue in Rats.**
Gaona, Andres G.; Aguilón, Miguel A.; López, Edith R.; Sánchez, Rafael C.; Leal, Erika R.; Zapata, Angel R. 1760

**Bench Testing and Computer Modeling of Electromagnetic Coupling for a Hearing Implantable Device**
Ethiraj, Raajkumar; Gan, Rong Z. 1762

**Detection of Feature Points in Video-Based Eye-Gaze Detection**
Ebisawa, Yoshihiko; Tsukahara, Shin-ichi; Ishima, Daisuke 1764

**Design of a Liver Tissue Biosensor**
Capitano, Adam T.; Roberts, J. L.; Griffith, L. G. 1766

**Comparison Between Saliva and Gingival Crevicular Fluid as an Index for Liver Function**
Yamaguchi, Masaki; Kawabata, Yuji; Kashii, Yoshihiro; Osaka, Tatsuhiko 1767

**Characterization and Adaptive Filtering of Motion Artifacts in Pulse Oximetry Using Accelerometers**
Relente, Andrei R.; Sison, Luis G. 1769

**Online Classification of Lung Sounds Using DSP**
Aismadi, Sameer S.; Kahya, Yasemin P. 1771