

COMPUTERS IN CARDIOLOGY 2007

*September 30 - October 3, 2007
Durham, North Carolina, USA*

**Computers in Cardiology 2007
Durham, North Carolina, USA**

Table of Contents

1:	Rosanna Degani Young Investigators Award	Chairs	P Macfarlane H Ostrow
<hr/>			
	Development of a Method for Left Ventricular Shape Evaluation Based on Surfaces Obtained by Real-Time 3D Echocardiographic Images		1
	F Maffessanti, C Corsi, RM Lang, EG Caiani		
	A Multilead Approach to T-Wave Alternans Detection Combining Principal Component Analysis and the Laplacian Likelihood Ratio Method		5
	V Monasterio, JP Martínez		
	Location of Myocardium at Risk in Comparison between Single Photon Emission Computed Tomography, Resonance Imaging and Electrocardiography		9
	JFA Ubachs, APM Gorgels, E Hedström, H Arheden, RH Selvester, SAM Knippenberg, GS Wagner, H Engblom		
	Co-Registration of Doppler Tissue Synchronization Imaging and Computer Tomography with an Application to Pacing and Cardiac Resynchronization Therapy		13
	G Saracino, R Curtin, J Hsing, N Greenberg, B Wilkoff, JD Thomas, RA Grimm		
2-1:	Heart Rate Variability	Chairs	C Swenne JP Martinez P Laguna
<hr/>			
	Variations of HRV Analysis in Different Approaches		17
	FC Chang, CK Chang, CC Chiu, SF Hsu, YD Lin		
	Long-Range Dependence in Heart Rate Variability Data: ARFIMA Modelling vs Detrended Fluctuation Analysis		21
	A Leite, AP Rocha, ME Silva, S Gouveia, J Carvalho, O Costa		
	Analysis of Physiological Meaning of Detrended Fluctuation Analysis in Heart Rate Variability Using a Lumped Parameter Model		25
	JL Rojo-Álvarez, A Sanchez-Sanchez, O Barquero-Perez, R Goya-Esteban, E Everss, I Mora-Jimenez, A García-Alberola		
	Modeling and Estimation of Time-Varying Heart Rate Variability during Stress Test by Parametric and Non Parametric Analysis		29
	M Orini, R Bailón, P Laguna, LT Mainardi		

Cyclic Variation in Heart Rate during Sleep in Four Recordings of up to 13 Years in Elderly Adults 33
 PK Stein, RJ Cohen, NM Devlin, EM Lundequam, PP Domitrovich, JS Gottdiener, SR Redline

2-2: Whole Heart Models of the Normal and Abnormal ECG Chairs A van Oosterom
 BM Horáček
 J Leon
 J Xue
 S Panfilov

The Mean Firing Rate of Atrial Fibrillation as Estimated from the ECG Evaluation Using a Biophysical Model 37
 M Lemay, V Jacquemet, F Jousset, JM Vesin, A van Oosterom

Analysing Effects of Implant Dimensions on Electrocardiograph: A Modeling Approach 41
 J Väisänen, J Requena-Carrión, F Alonso-Atienza, JL Rojo-Álvarez, J Hyttinen

A 3D Model of Magnetohydrodynamic Voltages: Comparison with Voltages Observed on the Surface ECG during Cardiac MRI 45
 GM Nijm, S Swiryn, AC Larson, AV Sahakian

Modeling of Heterogeneous Electrophysiology in the Human Heart with Respect to ECG Genesis 49
 DL Weiss, G Seemann, DUJ Keller, D Farina, FB Sachse, O Dössel

2-3: Clinical Decision Support Chairs R Arzbaecher
 J Rogers
 B Muhlestein
 J Destro-Filho

Determining Risk Factors for Survival after LMCA Stenosis with Intelligent Data Analysis 53
 P Povalej, V Kanic, P Kokol

Decision Support System for the Practical Implementation of the Chronic Heart Failure Guidelines: The MyHeart Approach 57
 C Bescos, M Harris, R Bover, R Schmidt, J Perez-Villacastin

Comparison of Teaching Basic Electrocardiographic Concepts with and without ECGSIM 61
 TP Patuwo, GS Wagner, OA Ajjola

Virtual Heart: Simulation-Based Cardiac Physiology for Education 65
V Hurmusiadis

Use of Body-Surface Potential Mapping and Computer Model Simulations for Optimal Programming of Cardiac Resynchronization Therapy Devices 69
R Mohindra, JL Sapp, JC Clements, BM Horáček

2-4: Systolic and Diastolic Function Chairs L Simonetti
B Warner
W Rehwald

Assessment of Factors Affecting Accuracy and Repeatability in Semi-Automated Echocardiographic Measurement of Chamber Volume Using a Physical Phantom 73
J Wild, AJ Sims, J Pemberton, A Kenny, A Murray

Prognostic Significance of Electrocardiogram and Cine Magnetic Resonance Imaging Parameters in Patients with Idiopathic Dilated Cardiomyopathy 77
HA Kestler, J Kraus, M Höher, V Hombach, J Wöhrle

Cardiac Motion Analysis from Magnetic Resonance Imaging: CINE Magnetic Resonance versus tagged Magnetic Resonance 81
A Bajo, MJ Ledesma-Carbayo, C Santa Marta, E Pérez David, MA García-Fernández, M Desco, A Santos

Assessment of Left Atrial Function Using Multi-Slice CT Images 85
WC Hu, MH Wu, HM Tsao, CC Lin, LY Shyu, JJ Wang

Comparison of Three Methods to Estimate Regional Wall Motion on the Evalechocard Database of Echocardiographic Image Sequences 89
N Kachenoura, F Frouin, L Sarry, C Tilmant, T Corpetti, H Guillemet, O Nardi, A Delouche, B Diebold

3-1: Time Frequency and Time Scale Analysis Chairs JP Martínez
P Laguna
L Sörnmo
M Stridh

Denoising Cyclostationary Framework for Enhanced Electrocardiogram Analysis 93
CN Gupta, R Palaniappan

Wavefront Detection from Intra-Atrial Recordings 97
U Richter, M Stridh, D Husser, DS Cannom, AK Bhandari, A Bollmann, L Sörnmo

Statistical Analysis in Complex-Valued Wavelet Analysis of Voltage-Sensitive Dye Mapping 101

J Bardonová, I Provazník, M Nováková, J Sekora, M Svrcek

An ECG Classification Model based on Multilead Wavelet Transform Features 105

M Llamedo Soria, JP Martínez

A Cardiac Electro-physiological Model Based Approach for Filtering High Frequency ECG Noise 109

MA Mneimneh, GF Corliss, RJ Povinelli

3-2: Cell Coupling and Impulse Propagation Chairs R MacLeod
G Yan
C Henriquez

An Efficient Technique for Determining the Steady-State Membrane Potential Profile in Tissues with Multiple Cell Types 113

V Jacquemet, CS Henriquez

Spatial Properties and Effects of Ajmaline for Epicardial Propagation on Isolated Rabbit Hearts: Measurements and a Computer Study 117

I Romero Legarreta, S Bauer, R Weber dos Santos, H Koch, M Bär

Reconstruction of Transmembrane Currents Using Support Vector Machines and Its Application to Endocardial Mapping: A Model Study 121

F Alonso-Atienza, JL Rojo-Álvarez, D Álvarez, M Moscoso, A García-Alberola

Multisite Field Potential Recordings and Analysis of the Impulse Propagation Pattern in Cardiac Cells Culture 125

S Jacquir, S Binczak, M Rossé, D Vandroux, G Laurent, P Athias, JM Bilbault

A Model for Estimating the Anisotropy of the Conduction Velocity in Cardiac Tissue Based on the Tissue Morphology 129

JG Stinstra, S Poelzing, RS MacLeod, CS Henriquez

3-3: Telemedicine and Community Health Chairs P Clemmensen
D Hampton
J Fayn
A Barbagelata
B Drew

ZigBee-Based Wireless ECG Monitor 133

V Auteri, L Roffia, C Lamberti, T Salmon Cinotti

The MyHeart Project: A Framework for Personal Health Care Applications 137
M Harris, J Habetha

Mind the Gap 141
GA L'Abbate

3-4: Multi-modal Signal Processing Chairs S Luo
O Meste
G Carrault
L Mainardi

Hyperbox Classifiers for ECG beat analysis 145
G Bortolan, II Christov, W Pedrycz

Premature Ventricular Beat Detection by Using Spectral Clustering Methods 149
BR Ribeiro, AM Marques, JH Henriques, MA Antunes

Analysis of Surface Atrial Signals Using Spectral Methods for Time Series with Missing Data 153
R Sassi, VDA Corino, LT Mainardi

Adaptive Threshold QRS Detector with Best Channel Selection Based on a Noise Rating System 157
F Chiarugi, V Sakkalis, D Emmanoulidou, T Krontiris, M Varanini, I Tollis

Recognition of Cardiac Arrhythmias by Means of Beat Clustering on ECG-Holter Records 161
E Delgado, JL Rodríguez, F Jiménez, D Cuesta, G Castellanos

3-5: Acute Infarction, Reperfusion, Remodeling Chairs R Kim
B Bekkers
H Arheden
H Engblom

Automated Calculation of Infarct Transmurality 165
E Heiberg, H Engblom, M Ugander, H Arheden

Estimation of Area at Risk in Myocardial Infarction 169
J Carnicky, JFA Ubachs, A Mateasik, H Engblom, H Arheden, E Hedström, GS Wagner,
L Bacharova

4-1: Computers in Cardiology/Physionet Challenge	Chairs	G Moody RH Selvester A van Oosterom BM Horáček R MacLeod
---	--------	--

Model-Based Approach to the Localization of Infarction		173
D Farina, O Dössel		
Using Inverse Electrocardiography to Image Myocardial Infarction		177
FD Dawoud		
Body Surface Potential Mapping for Detection of Myocardial Infarct Sites		181
P Zarychta, FE Smith, ST King, AJ Haigh, A Klinge, D Zheng, S Stevens, J Allen, A Okelarin, P Langley, A Murray		
RPS/GMM Approach toward the Localization of Myocardial Infarction		185
MA Mneimneh, RJ Povinelli		

4-2: New Concepts in Pacing and Computer Analysis of Paced Rhythms	Chairs	S Swiryn K Haisty T Simmons
---	--------	-----------------------------------

Atrial and Ventricular anti-Tachycardia Pacing as a Method of Rhythm Discrimination		189
ML Brown, R Yee, S Saba, A Abeyratne, J Christensen, G Klein		
Computer Analysis of Implanted Cardiac Pacemaker Rhythm		193
JAA Fairweather, P Johnston, S Luo, PW Macfarlane		
High Resolution Electrocardiography Optimised for Recording Pulses from Electronic Pacemakers: Evaluation of a New Pacemaker Sensing System		197
S Petrutiu, AV Sahakian, A Ricke, B Young, S Swiryn		
A Wireless Multi Bundle Concentric Coil for Charging the Battery of a Total Artificial Heart or a Pacemaker		201
HM Amasha, ZK Ghazzawi, JI Al-Nabulsi		

4-3:	Medical Informatics for Clinical Trials and Outcomes Research	Chairs	D Mark S Prucka B Judd J Tcheng
<hr/>			
	EPOCH® and ePRISM® : A Web-Based Translational Framework for Bridging Outcomes Research and Clinical Practice		205
	GE Soto, JA Spertus		
	AALIM: Multimodal Mining for Cardiac Decision Support		209
	T Syeda-Mahmood, F Wang, D Beymer, A Amir, M Richmond, SN Hashmi		
	A Decision Support System for Ischemic Event Detection		213
	FO Favretto, CRG Farias, LO Murta Jr		
	A Knowledge-Extraction Experience in Anticoagulation for Early Postoperative Cardiac Valvular Surgery		217
	MA Simonet, A Boignard, V Bach, S Tramaille, M Simonet, D Blin		
	Implementation and Use of a Patient Data Management System in the Intensive Care Unit: A Two-Year Experience		221
	SP Nelwan, TB van Dam, SH Meij, NHJJ van der Putten		
4-4:	Atrial and Ventricular Fibrillation and Defibrillation	Chairs	L Gettes R Ideker W Smith E Aramendi
<hr/>			
	A New Method to Assess Sinus Rhythm Maintenance Likelihood Before Electrical Cardioversion of Persistent Atrial Fibrillation		225
	R Alcaraz, JJ Rieta		
	Sequential VT/VF Discrimination Algorithm Based on Wave Mode Sample Entropy for Adult and Pediatric Patients		229
	U Irusta, J Ruiz, S Ruiz de Gauna, E Aramendi		
	Comparison of the Scope of True and Integrated Bipolar Leads in Implantable Cardioverter Defibrillators		233
	J Requena-Carrión, J Väisänen, F Alonso-Atienza, JL Rojo-Álvarez, J Hyttinen, A García-Alberola		
	Vulnerability to Atrial Fibrillation under Stretch Can Be Explained by Stretch-Activated Channels		237
	NHL Kuijpers, RJ Rijken, HMM ten Eikelder, PAJ Hilbers		

4-5: Genetic Basis of Electrophysiologic Abnormalities	Chairs	J Couderc M Höher H Zhang C Perzanowski
---	--------	--

Modelling Conduction through the Purkinje Ventricular Junction and the Short-QT Syndrome Associated with HERG Mutation in the Rabbit Ventricles		241
OV Aslanidi, RN Sleiman, H Williamson, MR Boyett, H Zhang		
Mechanistic Insights to Pro-Arrhythmogenesis of Short-QT Syndrome Associated with KCNQ1 Gene Mutation		245
H Zhang, S Kharche, P Stewart, JC Hancox		
Modelling Effects of Sotalol on T-wave Morphology		249
TP Brennan, M Fink, D Stokeley, B Rodriguez, L Tarassenko		

5-1: Electronic Health Record	Chairs	D Pryor BJ Lawson R Mark M Höher
--------------------------------------	--------	---

Two-Way Converter between the HL7 aECG and SCP-ECG Data Formats Using BioSig		253
A Schloegl, F Chiarugi, E Cervesato, E Apostolopoulos, CE Chronaki		
Feature Weighting and Selection Using a Hybrid Approach Based on Rademacher Complexity Model Selection		257
LF Giraldo, E Delgado, CG Castellanos		
Finding Disease Similarity by Combining ECG with Heart Auscultation Sound		261
F Wang, T Syeda-Mahmood, D Beymer		
Finding Relevant Cases in Large Databases of Signals Time Series, and Clinical Data		265
MC Villarroel, A Saeed, GD Clifford, GB Moody, RG Mark		

5-2: Principal and Independent Component Analysis	Chairs	P Laguna P Gomis P Langley J Roig M Stridh
--	--------	--

ECG-Based Waveform Characterization of Atrial Fibrillation		269
M Stridh, A Bollmann, D Husser, L Sörnmo		

Spatial Characteristics of Atrial Fibrillation Using the Surface ECG			273
U Richter, M Stridh, A Bollmann, D Husser, L Sörnmo			
Non-Invasive Assessment of Direction of Right Atrial Activation During Atrial Fibrillation Using Correlation Function Analysis			277
J Carlson, F Holmqvist, SB Olsson, PG Platonov			
Separating the Atrial and Ventricular Components in Atrial Fibrillation. Are 64 Leads Better than 12?			281
AJ Haigh, A Murray, P Langley			
Stability of Scroll Excitation Waves in Human Atria during Fibrillation: A Computational Study			285
S Kharche, CJ Garratt, AV Holden, H Zhang			
5-3: High Resolution/High Frequency ECG for Clinical Diagnosis	Chairs	E Berbari T Schlegel S Abboud	
<hr/>			
Evaluation of Auto-Regressive Modeling Procedures for the Detection of Abnormal Intra-QRS Potentials Using a Boundary Element Electrocardiogram Model			289
MC Svendsen, TF Oostendorp, EJ Berbari			
5-4: Computer Algorithms for Ischemia/Infarction	Chairs	P Macfarlane S Zhou J Wang P Kligfield A Gorgels	
<hr/>			
Evaluation of Age and Sex Dependent Criteria for ST Elevation Myocardial Infarction			293
PW Macfarlane, DR Hampton, E Clark, B Devine, CP Jayne			
Study of the Dynamic Relationship between T Wave Morphology and Heart Rate during Ischemia			297
F Simón			
Detection of Acute Myocardial Ischemia by Vessel-Specific Leads Derived from the 12-Lead Electrocardiogram			301
JY Wang, M Mirmoghisi, JW Warren, GS Wagner, BM Horáček			
Classifying Ischemic Events Using a Bayesian Inference Multilayer Perceptron and Input Variable Evaluation Using Automatic Relevance Determination			305
MG Smyrnakis, DJ Evans			

A Fully Automatic Algorithm for the Analysis of Heart Rate Changes and Cardiac Recovery during Exercise 309

M Vaglio, A Porta, P Pizzinelli, S Di Marco, D Lucini, F Badilini, M Pagani

5-5: Electrophysiology of Ischemia Chairs J Xue
C Ferrero
J Rodriguez
B Olson

Dispersion of Refractoriness in a Simulated Ischemic 2D Tissue and Implications in Vulnerability to Reentry 313

B Trénor, L Romero, JM Ferrero (Jr), J Sáiz, G Moltó, V Hernández

The Safety Factor Approach in the Analysis of Reentrant Patterns of Activation in the Ischemic Virtual Heart 317

L Romero, B Trénor, JM Ferrero (Jr), J Sáiz, G Moltó, JM Alonso

Vulnerability to Reentry in a 3D Regionally Ischemic Ventricular Slab Preparation. a Simulation Study 321

E Heidenreich, L Romero, JF Rodríguez, B Trénor, JM Ferrero (Jr), J Sáiz, M Doblaré

Simulating ECG Changes during Acute Myocardial Ischemia 325

PM van Dam, TF Oostendorp, A van Oosterom

Using a Cell-to-ECG Model to Evaluate Ischemia Detection from Different Lead Sets 329

WH Gao, Y Chen, XD Han, P Zhu, JQ Xue

A Model for Simulating Bundle Branch and Fascicular Block 333

CW Olson, GS Wagner, RHS Selvester, DM Lange, JK Chan, KE Olson, GD Bass

6-1: Novel Repolarization Assessment for Cardiac Surgery Chairs A Murray
M Malik
D Goodman

Investigating the Role of Ventricular Repolarization Morphology in Surface ECGs for Identifying Patients with a History of Drug-Induced Arrhythmias 337

JP Couderc, S Kaab, M Hinterseer, S McNitt, X Xia, A Fossa, B Beckmann, S Polonsky, W Zareba

A Robust Method for Quantification of IKr-Related T-Wave Morphology Abnormalities 341

MP Andersen, JQ Xue, C Graff, TB Hardahl, E Toft, JK Kanters, M Christiansen, HK Jensen, JJ Struijk

QT Interval Prolongation during Rapid Fall in Blood Glucose in Type I Diabetes 345
TF Christensen, I Lewinsky, LE Kristensen, J Randløv, JU Poulsen, E Eldrup, C Pater,
OK Hejlesen, JJ Struijk

6-2: Electrophysiology at the Cellular Level Chairs D Chorvat
G Yan
C Henriquez
E Berbart

Probing of Cardiomyocyte Metabolism by Spectrally Resolved Lifetime Detection of NAD(P)H Fluorescence 349

S Aneba, Y Cheng, A Mateasik, B Comte, D Chorvat Jr, A Chorvatova

Assessment of Low-Intensity Fluorescence Signals in Living Cardiac Cells Using Time-Resolved Laser Spectroscopy 353

D Chorvat Jr, F Elzwiei, V Bassien-Capsa, A Mateasik, A Chorvatova

Optical Recording of Single Cardiomyocyte Transmembrane Potential in Langendorff-Perfused Mouse Hearts 357

G Bu, EJ Berbari, M Rubart

Relationship between the Potassium Currents Block and the Occurrence of Early after Depolarizations in the Setting of Sodium Current Blockade 361

T Moukabary, DE Haines

A Novel Mathematical Model of the Electrical Action Potential in a Canine Purkinje Fiber Cell 363

P Stewart, OV Aslanidi, H Zhang

Dependence of Action Potential Duration on Extracellular Calcium Concentration in a Model of Human Ventricular Myocyte 367

C Pes, E Grandi, P Avanzini, S Severi

6-3: 3D Plus Time Cardiac Imaging Chairs J Kisslo
C Lamberti
N Greenberg

Performance Evaluation of 4D Reconstruction Methods for Gated Cardiac Single Photon Emission Computed Tomography in Obese Patients 371

S Sayeram, DS Lalush

Dynamic 4D Blood Flow Representation in the Aorta and Analysis from Cine-MRI in Patients 375
M Xavier, A Lalande, PM Walker, C Boichot, A Cochet, O Bouchot, E Steinmetz, L Legrand, F Brunotte

6-4: Simulation Based Methods for the Vascular System Chairs J Lawson
B Steele
J Taekman

Model-Based Estimation of Cardiac Output and Total Peripheral Resistance 379
TA Parlikar, T Heldt, GV Ranade, GC Verghese

A Model-Based Study of the Influence of Vaso-Active Drugs on Pulse Delays Measured from the Electrocardiogram 383
XL Aubert, J Muehlsteff

Arteries Become Stiffer with Increasing Blood Pressure: Agreement Between Computer Simulation and Clinical Measurement 387
D Zheng, A Murray

Using One-Dimensional Finite Element Analysis to Estimate Differential Pressure of Renal Artery Stenoses 391
BN Steele

6-5: Adaptive and Non-Linear Filtering and Dynamic Analysis Chairs E Pueyo
A Casaleggio
M Costa

Non-Invasive, High-Density Mapping of Human Atrial Fibrillation - Introduction and Illustration of a Novel Diagnostic Tool 395
MS Guillem, AM Climent, D Husser, J Millet, A Bollmann

Denoising of Heart Rate Variability Signals During Tilt Test Using Independent Component Analysis and Multidimensional Recordings 399
FJ Gimeno-Blanes, JL Rojo-Álvarez, J Requena-Carrión, E Everss, J Hernández-Ortega, F Alonso-Atienza, A García-Alberola

Parameter Tuning Associated with Nonlinear Dynamics Techniques for the Detection of Cardiac Murmurs by Using Genetic Algorithms 403
E Delgado, J Jaramillo, AF Quiceno, G Castellanos

Comparison of Signal Peak Detection Algorithms for Self-Gated Cardiac Cine MRI 407
GM Nijm, AV Sahakian, S Swiryn, AC Larson

7-1: Electrophysiology

- Effects of Anaesthesia on Atrial Fibrillation Organization during Catheter Ablation Procedures** 411
R Cervigón, J Moreno, C Heneghan, J Mateo, C Sánchez
- Circadian Variation in the Occurrences of Ventricular Tachyarrhythmias: Differences between Coronary Artery Disease and Dilated Cardiomyopathy** 415
A Casaleggio, P Rossi, V Malavasi, G Musso, L Oltrona
- Comparative Analysis of the Parameters Affecting AED Rhythm Analysis Algorithm Applied to Pediatric and Adult Ventricular Tachycardia** 419
E Aramendi, U Irusta, S Ruiz de Gauna, J Ruiz
- New Feature Selection Methods for Qualification of the Patients for Cardiac Pacemaker Implantation** 423
G Ilczuk, R Mlynarski, W Kargul, A Wakulicz-Deja
- Comparison of Two Automated Methods for QT Interval Measurement** 427
RE Gregg, S Babaeizadeh, DQ Feild, ED Helfenbein, JM Lindauer, SH Zhou
- Evaluation of QT Interval Correction Methods in Normal Pediatric Resting ECGs** 431
H Qiu, GL Bird, L Qu, VL Vetter, PS White

7-2: Computerized ECG

- Comparison of Different Methods for the Derivation of the Vectorcardiogram from the ECG and Morphology Descriptors** 435
JA Belloch, MS Guillem, A Climent, J Millet, D Husser, A Bollmann
- Relation between Depolarization and Repolarization Phases in Body Surface QRST Integral Map** 439
M Ferencic, M Kania, G Stix, T Mroczka, R Maniewski
- Non-Contact Measurement of Cardiac Electromagnetic Field in Mice by Use of a Microfabricated Atomic Magnetometer** 443
B Lindseth, P Schwindt, J Kitching, D Fischer, V Shusterman
- Measurements Standards and Test Signals in QRS Boundary Determination** 447
S Hargittai
- Post-Extrasystolic Changes of the Vectorcardiographic T Loop in Healthy Subjects** 451
VN Batchvarov, II Christov, G Bortolan, II Simova, AJ Camm

7-3: Heart Rate Variability

Distant Prediction of Paroxysmal Atrial Fibrillation Using HRV Data Analysis	455
YV Chesnokov, AV Holden, H Zhang	
Screening Patients with Paroxysmal Atrial Fibrillation (PAF) from Non-PAF Heart Rhythm Using HRV Data Analysis	459
YV Chesnokov, AV Holden, H Zhang	
Generalized Distribution and Q Statistics Evidences in Heart Rate Variability	463
LO Murta Jr, KC Nakzato, L Gallo Jr	
Analysis of the Heart Rate Variability and Stratification of the Risk of Cardiac Patients with Chagas' Disease	465
M Vizcardo, J Jiménez, F Moleiro, A Marcano, A Octavio, A Rodríguez	
A Graphical User Interface for the Study of Heart Rate Variability	469
PP Domitrovich	
A Novel Heart Rate Variability Index for Evaluation of Left Ventricular Function Using Five-Minute Electrocardiogram	473
S Babaeizadeh, SH Zhou, X Liu, WY Hu, DQ Feild, ED Helfenbein, RE Gregg, JM Lindauer	

7-4: Cardiovascular Regulation

ECG Signal Quantization Effects in the Analysis of Atrial Fibrillation	477
C Vayá, JJ Rieta	
An Investigation on Autonomic Effects by Using PR Intervals	481
TW Shen, YT Tsao	
Screening Obstructive Sleep Apnoea Syndrome from Electrocardiogram Recordings Using Support Vector Machines	485
AH Khandoker, CK Karmakar, M Palaniswami	
Disorder Classification in the Regulatory Mechanism of the Cardiovascular System	489
A Jalali, A Ghaffari, M Ghasemi, H SadAbadi, P Ghorbanian, H Golbayani	
Dynamic Analysis of Multi Lead ECG Recordings for Detection and Categorization of Respiratory Events during Sleep	493
C Maier, V Rödler, P Laguna, H Dickhaus	

7-5: PCA/ICA

Organization Deterioration Assessment from the Surface ECG in the Onset and Termination of Paroxysmal Atrial Fibrillation	497
R Alcaraz, JJ Rieta	
Common Spatial Pattern: An Improved Method for Atrial Fibrillation Wave Extraction	501
I Romero Legarreta, G Wübbeler, C Elster	
Analysis of Atrial Fibrillation Laplacian Potential Maps Using Spatial Independent Component Analysis	505
LY Shyu, YR Lin, SH Jo, CT Tai, WC Hu	
Analysis of Spectrogram Parameter Organization Applied to the Characterization of Atrial Fibrillation	509
C Vayá, JJ Rieta	
Adaptive Singular Value QRST Cancellation for the Analysis of Short Single Lead Atrial Fibrillation Electrocardiograms	513
R Alcaraz, JJ Rieta	
Analysis of Inter-Atrium Differences in Paroxysmal and Persistent Atrial Fibrillation Using Principal Component Analysis	517
R Cervigón, J Moreno, F Castells, C Heneghan, J Millet	
Evaluation of Multi-Component Electrocardiogram Beat Detection Algorithms: Implications of Three Different Noise Artifacts	521
T Last, CD Nugent, FJ Owens, DD Finlay	
Application of Numerical Noise Titration during Autonomic Blockade	525
S Vandeput, F Beckers, B Verheyden, AE Aubert, S Van Huffel	

7-6: ECG Filtering and Analysis

Evaluation Measures for Adaptive PLI Filters in ECG Signal Processing	529
FC Chang, CK Chang, KY Chi, YD Lin	
A New Adaptive Approach to Remove Baseline Wander from ECG Recordings Using Madeline Structure	533
J Mateo, C Sánchez, C Vayá, R Cervigón, JJ Rieta	
Synthesizing Surface ECGs from Intracardiac Electrograms Using an Adaptive Filter Method	537
J Lian, H Kraetschmer, D Müssig	
Time Series Calculation of Heart Rate Using Multi Rate FIR Filters	541
MR Risk, DF Slezak, P Turjanski, A Panelli, RAM Taborda, G Marshall	

Non-Linear Analysis of the Main Atrial Wave to Estimate Organization in Paroxysmal Atrial Fibrillation	545
R Alcaraz, JJ Rieta	

7-7: Power Line Interference

Detection and Suppression of Power-Line Interference in Electrocardiogram Signals	549
YH Hu, YD Lin	

Improvement of an Extended Kalman Filter Power Line Interference Suppressor for ECG Signals	553
LD Avendano-Valencia, LE Avendano, JM Ferrero (Jr), G Castellanos-Dominguez	

7-8: Time Frequency Analysis

Threshold Sensitivity in Time Domain BRS Estimation: Minimum Beat-to-Beat Changes and Minimum Correlation	557
S Gouveia, AP Rocha, P Laguna, P Lago	

7-9: Multi-Modal Signal Processing

Atrio-Ventricular Junction Behaviour During Atrial Fibrillation	561
P Bonizzi, V Zarzoso, O Meste	

Analysis of the T Wave Alternans Phenomenon with ECG Amplitude Modulation and Baseline Wander	565
O Meste, D Janusek, R Maniewski	

Poincare Plots of Time-Frequency Parameters Applied to the Prediction of Atrial Fibrillation Termination	569
C Vayá, JJ Rieta, J Mateo, C Sánchez	

Detection of Ventricular Fibrillation by Sequential Hypothesis Testing of Binary Sequences	573
J Pardey	

Robust Prediction of Atrial Fibrillation Termination Using Wavelet Bidomain Entropy Analysis	577
R Alcaraz, JJ Rieta	

An Improved Method for Unsupervised Analysis of ECG Beats Based on WT Features and J-Means Clustering	581
JL Rodríguez-Sotelo	

7-10: Autonomic and Vascular Physiology

- Poincaré Surface Profile. Novel Non-Invasive Method to Detect Preferential Ventricular Response during Atrial Fibrillation** 585
AM Climent, MS Guillem, D Husser, FJ Castells, J Millet, A Bollmann
- Multiscale Information Analysis of the Autonomous Nervous System during Myocardial Ischemia** 589
JF Valencia, M Vallverdú, P Gomis, GS Wagner, P Caminal
- Computer Model for Determination of the Physiologic Correlates of the Impedance Cardiovasculogram Associated with Acute Heart Failure** 593
RL Summers
- An Artificial Neural Network Model as a Tool to Identify the Anaerobic Threshold during Dynamic Physical Exercise** 597
AC Silva Filho, RM Souza, L Gallo Jr, LO Murta Jr

7-11: Medical Informatics for Clinical Trials

- Development and Evaluation of a Web-Based Training Technique for Preparation of Participants in an Outcomes Research Practicum** 601
M Yavari, GS Wagner, L Bacharova
- Sharing Acute Myocardial Infarction Databases through the Internet with MySQL and PHP: A Web-Accessible Database for Clinical Research Networks** 605
S Carrasco, R Sanz, D Moratal, V Bodí, JJ Rieta

7-12: Electrophysiologic Modeling and Simulation

- Effect of Ectopic Focus Frequency on Fibrillatory Conduction in Atrial Remodelling Tissue. A Simulation Study** 609
C Tobón, J Sáiz, JM Ferrero (Jr), G Moltó, JM Alonso
- The pH Dependence on the Electrophysiological Effect of Lidocaine in Ventricular Myocardium. A Computer Modelling Study** 613
K Cardona, J Sáiz, M Martínez, G Moltó, V Hernández
- Influence of 1B Ischemic Ventricular Tissue on the Automaticity of Purkinje Fibers: A Simulation Study** 617
E Ramírez., J Sáiz, B Trénor, JM Ferrero (Jr), G Moltó, V Hernández
- Electrocardiogram Synthesis Using a Gaussian Combination Model (GCM)** 621
S Parvaneh, M Pashna

Electrocardiographic Imaging of Myocardial Infarction Using Heart Vector Analysis	625
M Ghasemi, A Jalali, H SadAbadi, M Atarod, H Golbayani, P Ghorbanian, A Ghaffari	
Variation of ECG Features on Torso Plane: An Innovative Approach to Myocardial Infarction Detection	629
H SadAbadi, A Jalali, M Ghasemi, P Ghorbanian, M Atarod, H Golbayani, A Ghaffari	

7-13: Electronic Health Record

Innovation and Advantage of the DICOM ECG Standard for Viewing Permanent Archiving of the Diagnostic Electrocardiogram	633
T Hilbel, BD Brown, J de Bie, RL Lux, HA Katus	
A Temporal Search Engine for a Massive Multi-Parameter Clinical Information Database	637
LH Lehman, TH Kyaw, GD Clifford, RG Mark	
An Analysis of the Errors in Recorded Heart Rate and Blood Pressure in the ICU Using a Complex Set of Signal Quality Metrics	641
CW Hug, GD Clifford	

7-14: Telemedicine

Smart Phone-Based Automatic QT Interval Measurement	645
ET Lim, X Chen, CT Ho, ZK Tin, M Sankaranarayanan	
Telemedicine Digital Phonocardiography: Cost-Effective Strategies in Heart Failure Screening and Monitoring	649
S Khor, I Kovacs, K Fugedi, G Horvath, E Domijan, M Domijan	
Cellular Phone Based Online ECG Processing for Ambulatory and Continuous Detection	653
X Chen, CT Ho, ET Lim, TZ Kyaw	

7-15: Systolic and Diastolic Function

Non-Invasive Determination of Electromechanical Time Intervals of Cardiac Cycle Using Abdominal ECG and Doppler Ultrasound Signals from Fetal Hearts	657
AH Khandoker, Y Kimura, T Ito, M Palaniswami	

7-16: Angiography

- Automated and Accurate Measurement of Aortic Pulse Wave Velocity Using Magnetic Resonance Imaging** 661
SS Giri, Y Ding, Y Nishijima, A Pedraza-Toscano, PM Burns, RL Hamlin, OP Simonetti

7-17: Spatial Multi-Modal Imaging

- Tissue Response during Staining and Illumination of Voltage-Sensitive Dye in Rabbit Myocardium** 665
M Nováková, K Nogová, J Bardonová, I Provazník

- 8-1: Electrical and Mechanical Cardiac Modeling** Chairs C Henriquez
R MacLeod
-

- A Tissue-Level Electromechanical Model of the Left Ventricle: Application to the Analysis of Intraventricular Pressure** 669
V Le Rolle, AI Hernández, P-Y Richard, P Pibarot, L-G Durand, G Carrault

- Simulation Analysis of Mechanical Properties of the Canine Heart with Bundle Branch Block Based on a 3-D Electromechanical Model** 673
L Xia, JH Dou, YL Gong, Y Zhang, DD Deng

- 8-2: Cardiovascular Regulation** Chairs P Stein
P Gomis
-

- Changes in RR and QT Intervals after Spontaneous and Respiratory Arousal in Patients with Obstructive Sleep Apnea** 677
M Baumert, J Smith, P Catcheside, DR McEvoy, D Abbott, E Nalivaiko

- Heart Rate Recovery in the Diagnosis of Diabetic Cardiovascular Autonomic Neuropathy** 681
F Ng, S Wong, A La Cruz, MI Hernández, P Gomis, G Passariello

- A Study of Fetal Sympatho-Vagal Balance at Various Gestational Periods Using the Length Transform on Magnetocardiographic Data** 685
D Gutiérrez, H Preissl, H Eswaran, CL Lowery

- Heart Rate Variability Associated with Rapid Eye Movements during Sleep** 689
M Hoshiyama, A Hoshiyama

Time Progression of a Parametric Impulse Response Function Estimate from Intra-Partum Cardiotocography for Normal and Hypoxic Fetuses 693

PA Warrick, RE Kearney, D Precup, EF Hamilton

A Comparison of Holter and Polysomnogram-Based Detection of Bed and Wake Times 697

PK Stein, RJ Cohen, B Mau, PP Domitrovich, JS Gottdiener, SR Redline

8-3: Reduced and Alternative Lead Systems Chairs S Nelwan
O Pahlm
C Nugent
D Finlay
R Abaecherli

Reconstruction of Standard 12-Lead ECGs from 12-Lead ECGs Recorded with the Mason-Likar Electrode Configuration 701

S Man, AC Maan, E Kim, HHM Draisma, MJ Schalij, EE van der Wall, CA Swenne

Evaluation of Limited and Alternative Lead Sets for the Reconstruction of the 12-Lead Electrocardiogram and Body Surface Potential Maps 705

SP Nelwan, DD Finlay, SH Meij, CD Nugent

Adapting ECG Morphology Changes from Reduced-Lead Set by Specifically Trained Algorithms for Acute Ischemia Detection 709

JQ Xue

Performance Evaluation in the Reconstruction of Body Surface Potentials from Reduced Lead Systems. A Comparative Study of Lead Selection Algorithms 713

F Castells, MS Guillem, AM Climent, V Bodí, FJ Chorro, J Millet

The Spatial QRS-T Angle and the Spatial Ventricular Gradient: Normal Limits for Young Adults 717

RWC Scherptong, SC Man, S Le Cessie, HW Vliegen, HHM Draisma, AC Maan, MJ Schalij, CA Swenne

8-4: ECG Dynamics for Exploring Electrophysiologic Signals Chairs P Johanson
V Shusterman
R Childers
A Goldberger
R Lux

Spatial Distribution of T-Wave Alternans 721

D Janusek, M Fereniec, M Kania, R Kepski, R Maniewski

Assessment of Myocardial Damage in Chronic Chagasic Patients using QRS Slopes 725
E Pueyo, E Laciari, E Anzuola, P Laguna, R Jané

Rate-Dependent Flecainide Effects on QRS Duration in Atrial Fibrillation 729
VDA Corino, LT Mainardi, D Husser, A Bollmann

8-5: Bio-Mechanical Applications Chairs J Rogers
L Bacharova
J Rodriguez
F Pagani

Using a Neural Network in a First-Aid Single Point Sensor System to Analyze and Determine Cardiopulmonary Functions of a Casualty in an Emergency 733
M Jaeger, D Wettach, J Motsch, A Bolz

Operator-Independent Force-Frequency Relation Monitoring during Stress with a New Transcutaneous Cardiac Force Sensor 737
V Gemignani, E Bianchini, F Faita, M Giannoni, E Pasanisi, E Picano, T Bombardini

3D Heart Segmentation and Volumetry Using Deformable Shape Models 741
T Schwarz, T Heimann, I Wolf, HP Meinzer

Mitral Valve Reconstruction with Artificial Chordae How to Secure the Desired Length? 745
M Krane, U Braun, H Mayer, A Knoll, R Bauernschmitt, R Lange

9-1: Spatial Multi-Modal Imaging Chairs R White
P Wieringa

In Vitro Demonstration of an SpO2-Camera 749
FP Wieringa, F Mastik, RH Boks, A Visscher, AJJC Bogers, AFW Van der Steen

Computation of Coronary Perfusion Territories from CT Angiography 753
P Beliveau, RM Setser, F Cheriet, RD White, T O'Donnell

9-2: Angiography and Plaque Interrogation Chairs J Miller
C Gallippi
C Lamberti

Detection of Coronary Artery Disease with an Electronic Stethoscope 757
SE Schmidt, C Holst-Hansen, C Graff, E Toft, JJ Struijk

The Assessment of Local Arterial Stiffness from Ultrasound Images 761
E Bianchini, C Giannarelli, F Fata, K Raimo, V Gemignani, L Ghiadoni, M Demi

Dynamic Characterization of Aorta Morphology and Function in Presence of an Aneurysm 765
V Galante, C Corsi, F Veronesi, V Russo, R Fattori, C Lamberti

9-3: Novel Biosignal Methods to Facilitate EP Ablation Chairs J Sapp
BM Horáček
V Chauhan
T Bahnson

Inverse Solution Electrocardiographic Mapping of Epicardial Pacing Correlates with Three-Dimensional Electroanatomic Mapping 769
JL Sapp, F Dawoud, J Clements, MJ Gardner, MN Basta, R Parkash, BM Horáček

Comparison of P Wave Durations as Assessed with the Bipolar and Unipolar Atrial Intracardiac Electrograms: Applicability to QuickOpt™ 773
X Min, P Demers, D Muller, JD Snell, PA Levine, EL Ostrow

Intraprocedural Imaging of Left Atrial and Pulmonary Vein Anatomy for Atrial Fibrillation Ablation 777
R Chan, A Thiagalingam, I Ho, V Reddy, R Manzke

Effect of Ablation on Local Activation Intervals and Dominant Frequencies of Fibrillation 781
SM Abashian, AC Kiser, HD Himel, JH Dumas, SB Knisley

9-4: Automated Algorithms for the Detection of Pro-Arrhythmic Bio-Signals Chairs J Mason
J Couderc
F Badilini
S Idriss

Analysis of the Atrial Repolarisation Phase of the Electrocardiogram in Health and in Atrial Fibrillation 785
P Langley, A Murray

The Electrocardiogram Restitution Portrait Quantifying Dynamical Electrical Instability in Young Myocardium 789
JA Bell, NC Rouze, W Krassowska, SF Idriss

Analysis of Unpredictable Intra-QRS Potentials Based on Multi-Step Linear Prediction Modeling for Evaluating the Risk of Ventricular Arrhythmias 793
CC Lin, WC Hu

Development of a Post-Processing Algorithm to Classify Rhythms Detected as Ventricular Tachyarrhythmias by Implantable Cardioverter Defibrillators 797
BD Gunderson, AS Patel, ML Brown, CD Swerdlow

Three Different Algorithms for Identifying Patients Suffering from Atrial Fibrillation during Atrial Fibrillation Free Phases of the ECG 801
N Kikillus, G Hammer, N Lentz, F Stockwald, A Bolz

9-5: Techniques for Detection and Estimation of Cardiovascular Signal Parameters Chairs L Sörnmo
P Laguna
L Mainardi
W Dassen

Comparison of Atrial Wave Extraction Methods from Invasive Recordings in Atrial Fibrillation 805
JJ Rieta, F Hornero, R Alcaraz, D Moratal

Automatic Detection of Heart Disease from Twelve Channel Electrocardiogram Waveforms 809
TG Zimmerman, T Syeda-Mahmood

Improved Time Domain BRS Assessment with the Use of Baroreflex Events 813
S Gouveia, AP Rocha, P Laguna, P Lago

10: Plenary Session Chairs B Kraus
B Muhlestein

Ultrasound Echocardiographic Assessment of Transmural Inhomogeneity of the Left Ventricular Contraction during the Heart Cycle 817
N Bachner, D Adam, M Leitman, Z Vered

Performance Evaluation of Heart Rate Turbulence Detection Using an Extended IPFM Model 821
K Solem, P Laguna, JP Martínez, L Sörnmo