Electrocardiograms are one of the most widely used methods for evaluating the structure-function relationships of the heart in health and disease. This book is the first of two volumes which reviews recent advancements in electrocardiography. This volume lays the groundwork for understanding the technical aspects of these advancements. The five sections of this volume, Cardiac Anatomy, ECG Technique, ECG Features, Heart Rate Variability and ECG Data Management, provide comprehensive reviews of advancements in the technical and analytical methods for interpreting and evaluating electrocardiograms. This volume is complemented with anatomical diagrams, electrocardiogram recordings, flow diagrams and algorithms which demonstrate the most modern principles of electrocardiography. The chapters which form this volume describe how the technical impediments inherent to instrument-patient interfacing, recording and interpreting variations in electrocardiogram time intervals and morphologies, as well as electrocardiogram data sharing have been effectively overcome. The advent of novel detection, filtering and testing devices are described. Foremost, among these devices are innovative algorithms for automating the evaluation of electrocardiograms.

Open access book [www.intechopen.com](http://www.intechopen.com)
Chapter 5 Automated Selection of Optimal ECG Lead Using Heart Instantaneous Frequency During Sleep
Yeon-Sik Noh, Ja-Woong Yoon and Hyung-Ro Yoon .................................................................107

Part 3 ECG Feature Analysis

Chapter 6 A Novel Technique for ECG Morphology Interpretation and Arrhythmia Detection Based on Time Series Signal Extracted from Scanned ECG Record
Srinivasan Jayaraman, Prashanth Swamy, Vani Damodaran and N. Venkatesh ................................127

Chapter 7 QT Interval and QT Variability
Bojan Vrtovec and Gregor Pograjcn...............................................................141

Chapter 8 The Electrocardiogram – Waves and Intervals
James E. Skinner, Daniel N. Weiss and Edward F. Lundy .........................................................149

Chapter 9 Quantification of Ventricular Repolarization Dispersion Using Digital Processing of the Surface ECG
Ana Cecilia Vinzio Maggio, Maria Paula Bonomini, Eric Laciar Leber and Pedro David Arini ......181

Chapter 10 Medicines and QT Prolongation
Ryuji Kato, Yoshio Ijiri and Kazuhiko Tanaka .........................................................................207

Chapter 11 Concealed Conduction
Hasan Ari and Kübra Doğanay .................................................................................................217

Chapter 12 Recognition of Cardiac Arrhythmia by Means of Beat Clustering
on ECG-Holter Recordings
J.L. Rodríguez-Sotelo, G. Castellanos-Domínguez and C.D. Acosta-Medina .........................225

Part 4 Heart Rate Variability

Chapter 13 Electrocardiographic Analysis of Heart Rate Variability in Aging Heart
Elpidio Santillo, Monica Migale, Luca Fallavollita, Luciano Marini and Fabrizio Balestrini ........253

Chapter 14 Changes of Sympathovagal Balance Measured by Heart Rate Variability
in Gastroparetic Patients Treated with Gastric Electrical Stimulation
Zhiyue Lin and Richard W. McCallum ..................................................................................271

Chapter 15 Associations of Metabolic Variables with Electrocardiographic Measures
of Sympathovagal Balance in Healthy Young Adults
Richard M. Millis, Mark D. Hatcher, Rachel E. Austin, Vernon Bond, Kim L. Goring .................283

Part 5 ECG Signal Processing

Chapter 16 An Analogue Front-End System with a Low-Power On-Chip Filter
and ADC for Portable ECG Detection Devices
Shuenn-Yuh Lee, Jia-Hua Hong, Jin-Ching Lee and Qiang Fang ...............................................297

Chapter 17 Electrocardiogram in an MRI Environment: Clinical Needs, Practical
Considerations, Safety Implications, Technical Solutions and Future Directions
Thoralf Niendorf, Lukas Winter and Tobias Frauenrath ...........................................................309

Chapter 18 Customized Heart Check System by Using Integrated Information
of Electrocardiogram and Plethysmogram Outside the Driver’s Awareness
from an Automobile Steering Wheel
Motohisa Osaka .......................................................................................................................325

Chapter 19 Independent Component Analysis in ECG Signal Processing
Jarno M.A. Tanskanen and Jari J. Viik .....................................................................................349

Part 6 ECG Data Management

Chapter 20 Broadening the Exchange of Electrocardiogram Data from Intra-Hospital
to Inter-Hospital
Shizhong Yuan, Daming Wei and Weimin Xu ..............................................................................375