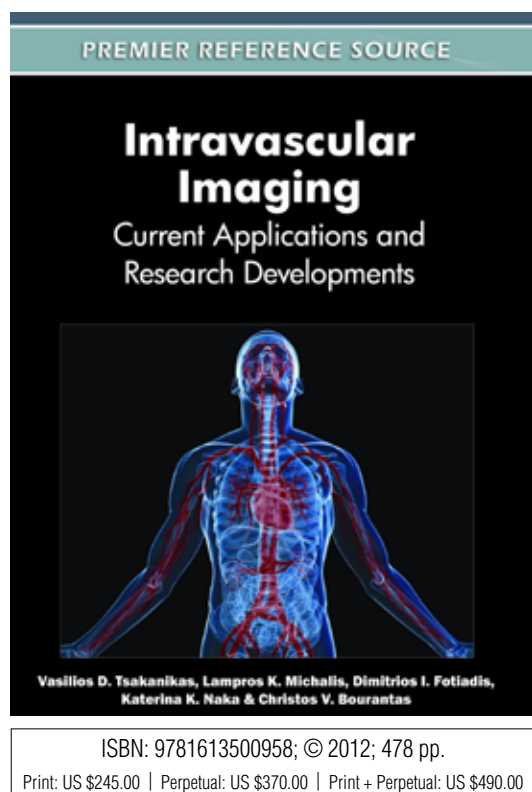


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## Intravascular Imaging: Current Applications and Research Developments



Vasilios D. Tsakanikas (University of Ioannina, Greece), Lampros K. Michalis (University of Ioannina, Greece), Dimitrios I. Fotiadis (University of Ioannina, Greece), Katerina K. Naka (University of Ioannina, Greece and Michaelideion Cardiology Center, Greece) and Christos V. Bourantas (University of Ioannina, Greece)

Limitations of angiography, the traditional invasive method for assessing vascular pathology, have led to an interest in alternative invasive techniques that visualize the arterial wall and allow characterization of plaque type. These alternative techniques, which include intravascular ultrasound, angioscopy, thermography, optical coherence tomography, near infrared spectroscopy, and intravascular magnetic resonance imaging are able to provide valuable information regarding plaque vulnerability, the composition of plaque, and luminal morphology.

**Intravascular Imaging: Current Applications and Research Developments** presents all available intravascular imaging techniques and analyzes their impact in clinical practice and research. This publication aims to inform medical specialists, biomedical engineers, bioinformaticians, and researchers of current developments and future trends in intravascular imaging techniques, promoting continued evolution of this discipline.

### Topics Covered:

- Angioscopy
- Fusion Methodologies and Intravascular Imaging
- Future Trends in Intravascular Imaging
- Implications of Intravascular Imaging
- Intravascular Magnetic Resonance Imaging
- Intravascular Ultrasound (IVUS)
- Near Infrared Spectroscopy
- Optical Coherence Tomography (OCT)
- Role of Rheology in the Atherosclerotic Process
- Thermography

**Market:** This premier publication is essential for all academic and research library reference collections. It is a crucial tool for academicians, researchers, and practitioners and is ideal for classroom use.

**Vasilios D. Tsakanikas** was born on 1st of January of 1983 in Agrinio, Greece. He graduated from the 1st High School of Agrinio in 2000. He received the Diploma Degree in Electrical and Computer Engineering in 2005 from the National Technical University of Athens, Greece. In his thesis, he performed an analysis of the established link between terminal mobile communication devices and users' heads, utilizing the F.D.T.D. (Finite Difference Time Domain) numerical method. He received a M.Sc. in Computer Science from the Athens University of Economics and Business, Department of Informatics, Greece in 2007. Today, he is working as Software Engineer on several biomedical projects.

## Section 1: Intravascular Ultrasound

### Chapter 1

#### *Basic Principles of Image Acquisition*

Katsarou Ourania (National and Kapodistrian University of Athens Medical School, Greece)  
Vavuranakis Manolis (National and Kapodistrian University of Athens Medical School, Greece)

### Chapter 2

#### *Intravascular Image Interpretation*

Naka Katerina K. (University of Ioannina, Greece)  
Papamichael Nikolaos D. (University of Ioannina, Greece)

### Chapter 3

#### *IVUS Image Processing Methodologies*

Sakellarios Antonis A. (University of Ioannina, Greece)  
Bourantas Christos V. (Castle Hill Hospital, UK)  
Athanasίου Lambros S. (University of Ioannina, Greece)  
Fotiadis Dimitrios I. (University of Ioannina, Greece)  
Michalis Lampros K. (University of Ioannina, Greece)

### Chapter 4

#### *Analysis of Radiofrequency Ultrasound Signals:*

Thury Attila (Erasmus MC, The Netherlands & University of Szeged, Hungary)  
Garcia-Garcia Héctor M. (Erasmus MC, The Netherlands)  
Regar Evelyn (Erasmus MC, The Netherlands)

### Chapter 5

#### *Implications of Intracoronary Ultrasound Imaging for Clinical Practice*

Bourantas Christos V. (Castle Hill Hospital, UK)  
Naka Katerina K. (University of Ioannina, Greece)  
Garg Scot (Castle Hill Hospital, UK)  
Alamgir Farqad M. (Castle Hill Hospital, UK)  
Hoye Angela (Castle Hill Hospital, UK)  
Michalis Lampros K. (University of Ioannina, Greece)

### Chapter 6

#### *Research Utility of Intravascular Ultrasound*

Garcia-Garcia Hector M. (Erasmus MC, The Netherlands)  
Garg Scot (Royal Blackburn Hospital, UK)  
Brugaletta Salvatore (Erasmus MC, The Netherlands)  
Diletti Roberto (Erasmus MC, The Netherlands)  
Shin Eun-Seok (Erasmus MC, The Netherlands & University of Ulsan, Korea)  
Serruys Patrick W. (Erasmus MC, The Netherlands)

## Section 2: Imaging by Angioscopy

### Chapter 7

#### *Imaging by Angioscopy*

Rees Michael (Bangor University, UK)

## Section 3: Thermography

### Chapter 8

#### *Thermography:*

Toutouzas Konstantinos (Athens Medical School, Greece)  
Drakopoulou Maria (Athens Medical School, Greece)  
Stefanadis Christodoulos (Athens Medical School, Greece)

### Chapter 9

#### *Research and Clinical Utility of Thermography*

Toutouzas Konstantinos (Athens Medical School, Greece)  
Tsiamis Eleftherios (Athens Medical School, Greece)  
Drakopoulou Maria (Athens Medical School, Greece)  
Stefanadis Christodoulos (Athens Medical School, Greece)

## Section 4: Optical Coherence Tomography

### Chapter 10

#### *Optical Coherence Tomography:*

Athanasίου Lambros S. (University of Ioannina, Greece)  
Bruining Nico (Erasmus MC, The Netherlands)  
Prati Francesco (San Giovanni Hospital, Italy)  
Koutsouris Dimitris (National Technical University of Athens, Greece)

### Chapter 11

#### *Optical Coherence Tomography Image Interpretation and Image Processing Methodologies*

Thackray Simon D. (Castle Hill Hospital, UK)  
Bourantas Christos V. (Castle Hill Hospital, UK)  
Loh Poay H. (Castle Hill Hospital, UK)  
Tsakanikas Vasilios D. (University of Ioannina, Greece)  
Fotiadis Dimitrios I. (University of Ioannina, Greece)

### Chapter 12

#### *OCT in the Clinical Practice and Data from Clinical Studies*

Prati Francesco (San Giovanni Hospital, Italy & CLJ Foundation, Italy)  
Di Giorgio Alessandro (Ferrarotto Hospital, Italy, & ETNA Foundation, Italy)  
Ramazzotti Vito (San Giovanni Hospital, Italy)  
Mallus Maria Teresa (San Giovanni Hospital, Italy)

### Chapter 13

#### *Research Utility of Optical Coherence Tomography (OCT)*

Toutouzas Konstantinos (Athens Medical School, Greece)  
Karanasos Antonios (Athens Medical School, Greece)  
Stefanadis Christodoulos (Athens Medical School, Greece)

## Section 5: Intracoronary Near-infrared Spectroscopy

### Chapter 14

#### *Intravascular Imaging of Lipid Core Plaque by Near-Infrared Spectroscopy*

Brilakis Emmanouil S. (Dallas VA Medical Center, USA)  
Sum Stephen T. (InfraReDx, Inc., USA)  
Madden Sean P. (InfraReDx, Inc., USA)  
Muller James E. (InfraReDx, Inc., USA)

## Section 6: Intracardiac Echocardiography

### Chapter 15

#### *Intracardiac Echocardiography:*

Nair Rajesh K. (Rigshospitalet, Denmark)  
Loh Poay Huan (Rigshospitalet, Denmark)  
Sondergaard Lars (Rigshospitalet, Denmark)

## Section 7: Fusion Methodologies

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#### *Analysis of the Existing Data Fusion Methodologies for 3D Coronary Imaging*

Siogkas Panagiotis (University of Ioannina, Greece)  
Fotiadis Dimitrios I. (University of Ioannina, Greece)  
Bourantas Christos V. (Castle Hill Hospital, UK)  
Tweddel Ann C. (Castle Hill Hospital, UK)  
Garg Scot (Royal Blackburn Hospital, UK)  
Michalis Lampros K. (University of Ioannina, Greece)  
Koutsouris Dimitris (National Technical University of Athens, Greece)

## Section 8: Current Status of Vascular Imaging

### Chapter 17

#### *Current Status of Intravascular Imaging with IVUS and OCT:*

Hoye Angela (Castle Hill Hospital, UK)

### Chapter 18

#### *Current Clinical Status of Vascular Non-Invasive Imaging Methodologies*

Bragadeesh Thanjavur (University of Hull, UK)  
Tweddel Ann C. (University of Hull, UK)

## Section 9: Intravascular Imaging and Haemodynamics

### Chapter 19

#### *Intravascular Imaging and Haemodynamics:*

Papafakis Michail I. (Harvard Medical School, USA & University of Ioannina, Greece)  
Michalis Lampros K. (University of Ioannina, Greece)

## Section 10: Future Trends in Intravascular Imaging

### Chapter 20

#### *Future Trends in Intravascular Imaging*

Giannoglou George D. (AHEPA University General Hospital, Greece & Aristotle University of Thessaloniki Medical School, Greece)

Chatzizisis Yiannis S. (AHEPA University General Hospital, Greece & Aristotle University of Thessaloniki Medical School, Greece)

### Chapter 21

#### *Future Trends in 3D Intravascular Ultrasound (IVUS) Reconstruction*

Giannoglou George D. (AHEPA University General Hospital, Greece & Aristotle University of Thessaloniki Medical School, Greece)

Antoniadis Antonios P. (AHEPA University General Hospital, Greece & Aristotle University of Thessaloniki Medical School, Greece)

### Chapter 22

#### *Future Trends in Coronary CT Angiography*

Giannoglou George D. (AHEPA University General Hospital, Greece & Aristotle University Medical School, Greece)

Katranas Sotirios A. (AHEPA University General Hospital, Greece & Aristotle University Medical School, Greece)

### Chapter 23

#### *Coronary Plaque Vulnerability:*

Giannoglou George D. (AHEPA University General Hospital, Greece & Aristotle University Medical School, Greece)

Koskinas Konstantinos C. (AHEPA University General Hospital, Greece & Aristotle University Medical School, Greece)

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