

Contents

SECTION 1: Cardiac Imaging

NONINVASIVE

1. Echocardiographic Evaluation of Infective Endocarditis: The Current Status	3
<i>IB Vijayalakshmi</i>	
• Evaluation of Infective Endocarditis	3
2. The Intricacies in Echocardiographic Evaluation of Aortic Stenosis	17
<i>Sameer Shrivastava, Neel Bhatia</i>	
• Main Echocardiographic Indices Used to Assess AS Severity	17
• Dimensionless Velocity Index	19
• Assessing Left Ventricle Contractile and/or Flow Reserve	20
• Distinguishing between True Severe and Pseudosevere Aortic Stenosis	21
3. Echocardiography of Heart Failure: How to Use It in Routine Clinical Practice?	24
<i>Satoshi Nakatani</i>	
• How to Assess Systolic Function of the Heart?	24
• How to Assess Diastolic Function of the Heart?	25
• Left Ventricular Geometry and Abnormal Echoes	28
• Right Ventricular Function	28
• Intracardiac Pressure Estimation	29
4. Speckle Tracking Echocardiography: Basics and Clinical Applications	31
<i>Navin C Nanda</i>	
• Cardiac Muscle Structure	31
• Methods of Speckle Tracking Echocardiography and Parameters Measured	32
5. A Gold Standard for Evaluation of Cardiomyopathies	43
<i>Johann Christopher</i>	
• Idiopathic Dilated Cardiomyopathy	43
• Hypertrophic Cardiomyopathy	44
• Restrictive Cardiomyopathy	45
• Cardiac Amyloidosis	45
• Arrhythmogenic Right Ventricular Cardiomyopathy	46
• Left Ventricular Noncompaction	46
• Myocardial Sarcoidosis	46
• Iron Overload Cardiomyopathy	46
6. Real World Indications for Cardiac Magnetic Resonance Imaging: When is It Invaluable in Clinical Practice?	51
<i>Tommaso D'Angelo, Eike Nagel</i>	
• Myocarditis	52
• Nonischemic Dilated Cardiomyopathies	53
• Hypertrophic Cardiomyopathy	53
• Coronary Artery Disease	54
• Viability/Hibernation	55
• Other Indications	55
• Contraindications and Limitations	55
7. Cardiac MRI and Cardiac CT: Indispensable Tools for the Diagnosis of Coronary Artery Disease	57
<i>Parang Sanghavi, Aamish Kazi, Bhavin Jankharia</i>	
• Cardiac Computed Tomography	57
• Cardiac Magnetic Resonance Imaging	59

8. Cardiac Imaging: Current Scenario and Future Directions	61
<i>Om Tavri, Priya Chudgar</i>	
• Computed Tomography Coronary Angiography 61 • Perfusion Imaging 62	
• Virtual Computed Tomography—Fractional Flow Reserve 63 • Spectral Computed Tomography 63 • Plaque Characterization 63 • Hybrid Imaging 64	
• Cardiac Magnetic Resonance Imaging 64 • T1 and T2 Mapping 65	
9. Clinical Decision-making with Myocardial Perfusion Imaging in Patients with Known or Suspected Coronary Artery Disease	67
<i>Mythri Shankar</i>	
• Diabetes Mellitus 68 • Women and Elderly 68 • Chronic Kidney Disease 69	
10. Current Status of Rubidium-82 PET-CT Myocardial Perfusion Imaging	70
<i>Prasanta Kumar Pradhan, Gowri Sankar</i>	
• Historical Perspective 70 • Characteristics of Sr-82/Rb-82 Generator and Physiology of Rb-82 70 • Comparison with SPECT Agents 70 • Comparison between Rb-82 and N-13 Ammonia 71 • Dosimetry 71	
11. Innovation of New Tracers in the Era of Multimodality Cardiac Imaging	74
<i>Padmakar V Kulkarni</i>	
• Myocardial Function 75 • Myocardial Perfusion 75 • Fluorine-18-labeled Agents for Myocardial Perfusion Studies 75 • Energy Metabolism 76	
• Imaging Atherosclerotic Plaques 76	
12. Myocardial Imaging Products' Evolution: Change for the Better	80
<i>N Ramamoorthy, Meera Venkatesh</i>	
• Thallium-201 as Myocardial Perfusion Marker 80 • Technetium-99m Compounds as Myocardial Perfusion Markers 81 • Labeled Fatty Acid as Marker for Metabolism: Iodine-123 Products 81 • PET Tracers as Myocardial Perfusion Markers 81	
• PET Tracers as Marker of Myocardial Viability 82	
13. Efficacy of Combining FDG-PET Metabolic and Tc-99m-MIBI Myocardial Perfusion Study in Assessment of Myocardial Viability	85
<i>BK Das, Sudatta Ray, Oma Shankar</i>	
• What is Myocardial Viability? 85 • Methods of Assessment of Viability 85	
• Combination of MPS with MIBI and FDG-PET 86	
14. Myocardial Viability Assessment: Is it Alive?	88
<i>Shrikant Solav</i>	
15. Hybrid Myocardial Imaging Techniques: Role in Functionally Relevant Coronary Disease	90
<i>Sanjay Gambhir, Mudalsha Ravina, Gawri Sankar, Nitin Yadav</i>	
• Morphology Versus Anatomy 90 • Technical Developments 90	
• Calcium Scoring and Myocardial Perfusion Imaging 91 • Hybrid PET-MR 96	
16. Role of Coronary Flow Reserve in Coronary Artery Disease	100
<i>Ashwani Sood, Abhiram GA, BR Mittal</i>	
• Diagnosis of Coronary Artery Disease 100	

17. Nuclear Medicine in Assessment of Cardiac Dyssynchrony	106
<i>Anirban Mukherjee, Chetan D Patel</i>	
• Introduction to Cardiac Dyssynchrony 106	• Nuclear Medicine Techniques
• in Assessment of Cardiac Dyssynchrony 106	• Clinical Utility of Assessment
• of Cardiac Mechanical Dyssynchrony 108	

INVASIVE

18. Is Optical Coherence Tomography Ready to Replace Intravascular Ultrasound in Percutaneous Coronary Intervention?	112
<i>Debabrata Dash</i>	
• Role of Optical Coherence Tomography before Percutaneous Coronary Intervention 112	
• Optical Coherence Tomography in Assessment of Stenting 114	• Postintervention Assessment 114
• Artifacts 115	• Will Optical Coherence Tomography Replace Intravascular Ultrasound 115

19. Association of Coronary Stenosis and Plaque Morphology with Fractional Flow Reserve and Outcomes	117
<i>Jagat Narula</i>	
• Severity of Luminal Stenosis and Fractional Flow Reserve 117	• Plaque Morphology and Fractional Flow Reserve 118
• Fractional Flow Reserve and Subsequent Clinical Events 119	
• Plaque Morphology: A Link between Fractional Flow Reserve and Clinical Outcomes 119	
• Article Information 122	

SECTION 2: Clinical Cardiology

EMERGING THERAPIES

20. PCSK9 Inhibitors: Will they be the Next Wonder Drug after Statins?	127
<i>PC Manoria, Pankaj Manoria, Piyush Manoria, SK Parashar</i>	
• Residual Atherogenic Risk Poststatin Therapy 127	• High Triglycerides as a Determinant of Residual Atherogenic Risk 128
• PCSK9 128	• Clinical Approval in Europe and USA 130

21. Fighting the Devil of Stroke in Atrial Fibrillation: The New Weapons in the Armory	134
<i>PC Manoria, Pankaj Manoria, Piyush Manoria, SK Parashar</i>	
• When to Use New Oral Anticoagulants? 135	• Limitations of New Oral Anticoagulants 136
• Comparison of TSOACs 140	

CORONARY ARTERY DISEASE

22. Management of Prehospital Phase of Acute Myocardial Infarction	142
<i>AK Pancholia</i>	
• Pathophysiology and Impact of Time 142	• Delays in Providing Treatment for Cardiac Emergencies 143
• Prehospital ECGs in Patients with STEMI: What are the Benefits? 143	• Current Guidelines for Prehospital ECGs among Patients with ST-segment Elevation Myocardial Infarction 144
• Treatment of Acute Coronary Syndromes in the Prehospital Phase 145	• Reperfusion Therapy: Prehospital Thrombolysis 146
• Prerequisites for Prehospital Thrombolysis 146	
• Choice of Thrombolytic Agents for Prehospital Thrombolysis 146	• Prehospital versus In-hospital Thrombolysis 147
• Comparison of Thrombolysis with Percutaneous Coronary Intervention in Randomized Controlled Trials 147	

23. STEMI Care in India and the Real World: Pharmacoinvasive Approach	153
<i>HK Chopra</i>	
• Development of Thrombolytic Therapy 153 • Trends in Thrombolysis for STEMI 156 • STEMI Care in India: Problems and Solutions 159	
• Future Directions for STEMI Program in India 160	
24. Bioresorbable Vascular Scaffold	163
<i>MS Hiremath</i>	
• Polymer Based 164 • Metal Based 164 • Cohort A 164 • E-BVS Implantation: Tips and Traps 165 • Role of Intravascular Imaging in BVS Implantation and Follow-up 167	
• E-BVS from Clinical Trials to Clinical Practice 167 • Noninvasive Assessment of BVS 168	
• Restoration of Vasomotion 168	
25. Statin Intolerance	174
<i>Peeyush Jain, Col. Viney Jetley</i>	
• Statin Myopathy 174 • Common Concerns Associated with Long-term Use of Statins 174	
26. Sudden Cardiac Death: How to Predict and Prevent it?	182
<i>Pankaj Manoria, PC Manoria, Piyush Manoria</i>	
• Magnitude of the Problem 182 • Causes of Sudden Cardiac Death 182	
• Mechanism of Sudden Cardiac Death 182 • Risk Factors for Sudden Cardiac Death 183 • Treatment 183	
27. New Gadgets Knocking at the Door: Leadless Pacemakers, Subcutaneous Implantable Cardioverter Defibrillators, Wearable Defibrillators	187
<i>Anitha G, Ulhas M Pandurangi</i>	
• Leadless Pacemaker 187 • Wireless Cardiac Stimulation System 187	
• Subcutaneous Implantable Cardioverter Defibrillator 188	
• Wearable Cardioverter Defibrillator 189	
28. Echocardiographic Evaluation of Left Atrial Clot and Its Utility in Clinical Practice	191
<i>Asha Moorthy, Jain T Kallarakkal</i>	
29. Clinical Applications of Nuclear Cardiology Procedures and Its Future Directions	193
<i>GN Mahapatra</i>	
• Scope of Radionuclide Imaging Procedures 193 • Myocardial Perfusion 194	
• Stress-gated SPECT Tc-99m Myocardial Perfusion Imaging Agents 195	
• Clinical Applications of Myocardial Perfusion Imaging 197 • Pharmacological Stress Perfusion Imaging 199 • Dipyridamole Myocardial Perfusion Imaging 199	
• Mechanism of Action of Dipyridamole 200 • Adenosine Myocardial Perfusion Imaging 200 • Dobutamine Myocardial Perfusion Imaging 200 • Pharmacological Stress Perfusion Imaging with Low Level Treadmill/Bicycle Exercise 202 • New Options in Pharmacological Stress 202 • Regadenoson Myocardial Perfusion Scintigraphy 202	
• Dual Isotope Imaging Using Tl-201 and F-18 FDG Imaging 208 • Fluorodeoxyglucose Positron Emission Tomography versus Fluorodeoxyglucose Single Photon Emission Computed Tomography 210 • Emerging Concepts in Nuclear Cardiology 211	
• Computation of Myocardial Blood Flow with Rubidium-82 and Comparison to N13 Ammonia 212 • Dynamic Single Photon Emission Computed Tomography (SPECT) 215	
• F-18 Flurpiridaz Positron Emission Tomography Myocardial Perfusion Imaging Tracer 217	

- F-18 BMS Myocardial PET Tracer 218 • C-11 Hydroxyephedrine/C-11 Epinephrine/I-123 MIBG and Tc99m tetrofosmin/Sestamibi SPECT MPI 218 • Tracers for Detecting Chronic Inflammatory Disorders such as Cardiac Sarcoidosis/Amyloidosis 218 • Tracers for Detecting Atheromatous Plaque Particularly Vulnerable Plaque Imaging 219 • Tracers for Stem Cells Tracking 219 • Tracers for Patients with Infectious Endocarditis and Aortic Graft Prosthetic Infection 219 • Useful Combined Nuclear Cardiology Techniques 221

30. Cardiac Positron Emission Tomography Perfusion Tracers: Current Status and Future Directions

225

Jamshid Maddahi, René RS Packard

- Current Myocardial Perfusion Positron Emission Tomography Tracers 225
- Future Directions 226 • Funding 228 • Disclosure 228

Index

231