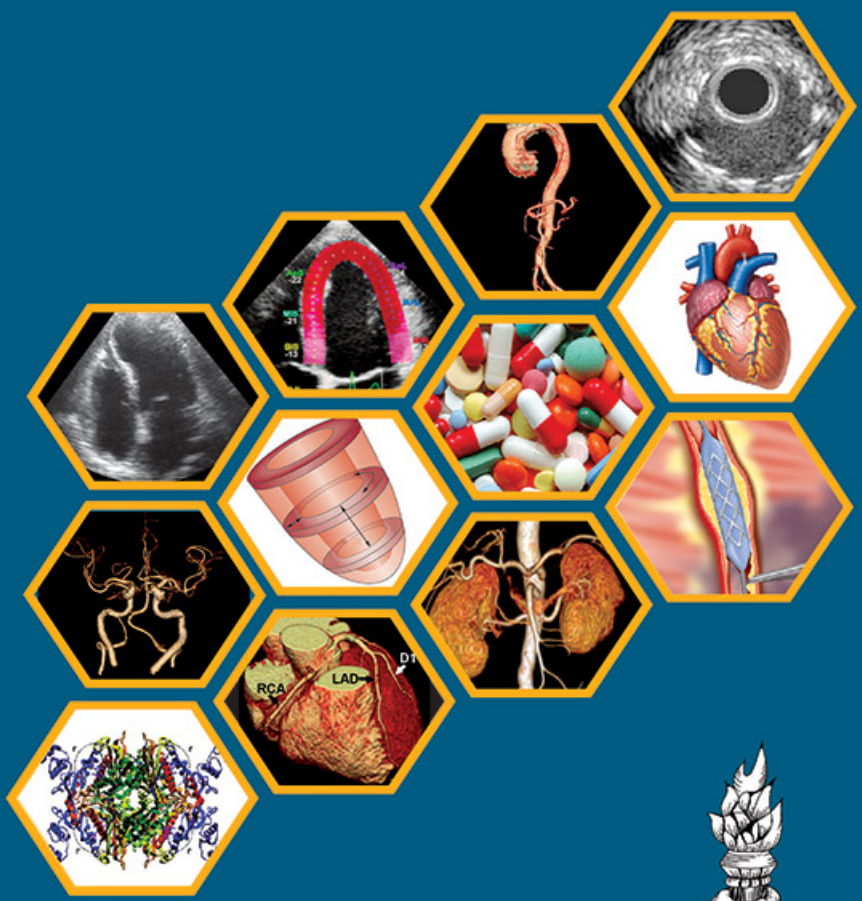
w.ejaypee.com, for detailed information on cardiology books, visit our website www.ejaypee.com, for detailed information on cardiology books, visit our website www.ejaypee.com

Advances in Statin Therapy & Beyond in CVD (ASTC)

A Textbook of Cardiology

Editors-in-Chief

HK Chopra (India)
Navin C Nanda (USA)
Jagat Narula (USA)
GS Wander
CN Manjunath
Praveen Chandra (India)
Viveka Kumar
CK Ponde
AK Pancholia (India)



JAYPEE

Contents

SECTION 1: CLINICAL

1. **ACC/AHA Cholesterol Guidelines: How to Handle the High-risk Patients?** 3
   Bhavuk Jaiswal, GS Wander
2. **Consensus of ESC Lipid Guidelines: What is Applicable for Indians?** 9
   Saumitra Ray
3. **Familial Hypercholesterolemia** 14
   JPS Sawhney, Ayush Kumar, Kushal Madan
4. **Understanding and Applying Latest Lipid Guidelines in Clinical Practice** 18
   Manotosh Panja, Madhumanti Panja
5. **What are Top 6 Cardiovascular Prevention Trials on Lipid Lowering?** 25
   Archit Dahiya, Rajeev Sharma, Tushar Wadhawan, Rajeev Agarwal
6. **Targets in Lipid-lowering Therapy Today** 30
   Ram Manohar Talupula, S Ramakrishnan
7. **Update on Lipid Management for ASCVD Prevention: What is New in the Cholesterol Guidelines?** 35
   Vaibhav Bandil, Suman Bhandari
8. **The Nuances of Statin Therapy for ASCVD in Clinical Practice** 44
   PC Manoria, Pankaj Manoria, Piyush Manoria
9. **Controversies to Consensus in Classification of Hyperlipidemias and Importance of Statins** 50
   Rajeev Gupta
10. **How to Enhance Practice and Implementations of Lipid-lowering Guidelines and Adherence?** 61
    K Venugopal
11. **Comparison of Cholesterol Guidelines in Secondary Prevention and CVD Outcome: What is the Consensus Today?** 65
    Geevar Zachariah, Deepak Nandan
12. **Current Status, Efficacy, Safety, and Outcome Data of Statin: Atorvastatin versus Rosuvastatin in CVD Outcome** 72
    Saumitra Ray, Biswarup Sarkar
13. **Current Place of Rosuvastatin/Ezetimibe Combination in Management of Hypercholesterolemia** 76
    HK Chopra, Ravi R Kasliwal, JPS Sawhney, Manish Bansal, Himani Malhotra
14. **Risk Factors of Dyslipidemia** 81
    Harsh Wardhan, Archit Dahiya
15. **Pathophysiology of Dyslipidemia** 85
    Hanumanth K Reddy, Ravi Komatireddy, Prachi Pophali, Abhishek Bhandiwad, Muhammad Shabbir Ijaz
16. **Pleiotropic Effects of Statins and CVD Outcomes** 91
    Ajay Kr Sinha, Vikas Singh, Sanjeev Kumar, Pramod Kumar
17. **Dyslipidemia in Diabetes: Management Strategies** 96
    Vidyut Jain, Avani Jain
18. **High-dose versus Low-dose Statins in Cardiovascular Diseases** 102
    Praveen Jain, Tanul Jain, Mohammad Jibran
19. **Statin for Primary Prevention of Cardiovascular Disease** 108
    Satyanarayan Routray, DR Das
20. **Statin for Tertiary Prevention of Cardiovascular Disease** 114
    Jabir Abdullakutty, Musna PJ, Vijin Joseph VF, Jimmy George

21. **Dyslipidemia and Statin: An Overview** 122
Vishal Batra, Girish MP, Mohit D Gupta, Shweta Goswami, Rajni Saijpaul

22. **Efficacy, Safety, and Promising of Atorvastatin versus Rosuvastatin in LDL Cholesterol Reduction Potential and CVD Protection** 126
Viveka Kumar, Virbhan Balai

23. **Statins and Angiogenesis** 132
Geetha Subramanian, J Cecily Mary Majella

24. **Statin in Stress-induced Dyslipidemia** 135
Satish Kr Gupta, Rahul Gupta

25. **Statin in Polyvascular Disease** 143
Somasundaram M, Sharada Sivaram K, Jacob Abraham Ruram

26. **Statin and Sexual Dysfunction** 146
Deepak Jumani

27. **Statin and Erectile Dysfunction** 152
AK Pancholia

28. **Statin and Nonalcoholic Steatohepatitis** 156
Amrish Sahney, Manav Wadhawan, Ajay Kumar

29. **Statins and Hyperthyroidism** 162
Hemraj B Chandalia

30. **Lipid Lowering in Nonalcoholic Fatty Liver Disease** 164
AK Pancholia, Dipesh Kothari

31. **Statins in Cushing's Syndrome** 169
Vinod Mittal

32. **Statin and Gallstones Disorder** 172
Sachin Ambekar, Aayushi Gupta

33. **Dyslipidemia in Pregnancy** 174
JPS Sawhney, Vyom Mori, Saurabh Bagga, Kushal Madan

34. **Statins and Inflammatory Markers** 178
Srikant Sharma, Pratik Katyayan, HK Chopra, Soumit Sharma, Akash Kashyap

35. **Grow younger and Live Longer with Statin: Effect on Vascular Age** 183
Srikant Sharma, Aayushi Gupta, HK Chopra, Ankush Bansal

36. **Oxidative Stress and Statin Therapy** 190
Jostol Pinto, A George Koshy

37. **Impact of Statins on Endothelium and Vascular Biology** 194
Shishu Shankar Mishra, Biswaranjan Mishra, Satyavir Yadav, Satyanarayan Routray

38. **Exercise, Dyslipidemia, and Statin Therapy** 200
Chetan Shah, Charan Reddy KV

39. **Role of Statin Drugs for Polycystic Ovary Syndrome** 204
Vidya Pancholia, AK Pancholia

40. **Statin in Dyslipidemia and Hearing Loss** 208
Chanchal Pal

41. **Statins Intolerance: Is it Really a Problem?** 212
AK Pancholia, Mugdha Lakhotia, Rajesh Meena

42. **New Insights into Managing Symptoms during Statin Therapy** 218
A Muruganathan

43. **Nutrition versus Statins: Where do we Stand?** 224
SC Manchanda, Kushal Madan

44. **Cholesterol Confusion and Statin Controversy** 227
Vitull K Gupta, Meghna Gupta, Varun Gupta

45. Statin Therapy in the Perioperative Period 232
Ajmer Singh, Gagandeep S Wander, Yatin Mehta

46. Statin Therapy in Cardiac Intensive Care 235
Poonam Malhotra Kapoor

47. Pharmacogenomics of Statin Response 242
Prerna Kapoor, Anindya Ghosh, Aditya Kapoor

48. Advances in Statin Therapy and Beyond in Dyslipidemia-inflicted CAD Mortality Reduction 247
Anindya Ghosh, Aditya Kapoor

49. The Controversy of a Wider Statin Utilization 257
BP Singh, Rahul M Gutte, Chandrashekhar Pandey, Neeraj Kumar

50. Gender Disparity in Statin Therapy 261
VV Muthusamy, S Sathish Kumar, LN Meena

51. How Much Statin Intervention is Enough? 266
Vijay Bang, Charan Reddy KV

52. Balancing Primary Prevention and Statin-induced Diabetes Prevention 271
SB Gupta

53. Statin Effect on Atherosclerotic Plaque 275
VK Katyal, Nidhi Yadav, Sandeep Goyal, Deepinder Singh

54. All for "Statins" and Statins for All: An "Update" 279
Rakesh Varma, Anwar H Ansari, Gaurav Arora

55. Triglycerides Reduction Strategies to Prevent CV Events 289
Jamshed J Dalal, Tabassum Khan

56. Statin above the Age of 75 Years: Is it Relevant? 296
Rajan Joseph Manjuran

57. Do Lp(a) Levels Contribute to CVD Risk? What are the Effects of Statin, PCSK9i, LDL Apheresis, and ASOs Therapy? 299
Jayagopal PB, SKM Sarjun Basha

58. Morbidity and Mortality Benefits of Statin Therapy in CVD 303
Jayagopal PB, SKM Sarjun Basha

59. Novel and Emerging Nonstatin Lipid-lowering Drugs 307
Peeyush Jain, Abdul Allam Khan

60. Diagnostic and Prognostic Markers of Dyslipidemia in CVD 311
Satya Nand Pathak

SECTION 2: STATINS AND CORONARY ARTERY DISEASE

61. ACS and Statins: Role of Statins in Acute Coronary Syndrome 317
Pawan K Sharma, HK Chopra

62. Advances in Statin Therapy in Acute Coronary Syndrome with Comorbidities 320
Viveka Kumar, Pradipta K Nayak, Sangeeta Dhir, Vidhya Natrajan

63. Advances in Statin Therapy in NSTEMI with Familial Dyslipidemia 328
Balakumaran Jeyakumaran, Lijo Varghese, Thomas Alexander

64. Role of Statins in Chronic Coronary Syndrome 332
Rohit Tandon, Jasvinder Singh

65. Familial Dyslipidemia with Triple Vessel Disease Management Strategies 337
Satyendra Tewari, Harshit Khare

66. Statin for Plaque Passivation in NSTEMI 342
Arup Dasbiswas, Debasri Dasbiswas, Harshveer Singh Malhi

67. Statin after PCI in STEMI with Dyslipidemia 347
Brian Pinto, Yogesh Kolamkar

68. **Advances in Statin Therapy and Beyond in Dyslipidemia with MVD** 351
Rony Mathew Kadavil, Jimmy George

69. **Statin Intolerance Management Strategy** 355
D Prabhakar

70. **Statin with PCSK9 or Inclisiran in TVD, Diabetes, and Dyslipidemia** 361
Justin Paul Gnanaraj, Anne Princy S, Karthikaa Saminathan, Sabarish Sankaran

71. **Advances in Statin and Beyond in Polyvascular Intervention with Familial Dyslipidemia** 367
Subhasish Dey, Debabrata Roy

72. **Statin Effect on Coronary Calcium Score** 371
Manish Shaw, Aprateem Mukherjee, Priya Jagia

73. **Advances in Statin Therapy for CABG** 374
Nikhil Pachpande, OP Yadava

74. **Statin Therapy in Takotsubo Syndrome with Dyslipidemia** 378
Amit O Singh, Rajesh A Matta, Prafulla G Kerkar

SECTION 3: STATINS AND HYPERTENSION

75. **Advances in Statin Therapy in Young with Hypertension** 385
Mohan Bhargava, Mohit M Bhagwati, Neha Israni Bhargava

76. **Advances in Statins Therapy in Elderly with Hypertension** 390
Amrish Agrawal, Vishal Agrawal, Afzalhussein Yusufali, Abdulla Shehab

77. **Statins in Hypertension** 397
CK Ponde, Rohan Sonawane

78. **Promise of Statins in Early Onset and Late Onset of Hypertension with Comorbidities** 402
HK Chopra, Anil Pareek, Anu Grover, AK Pancholia, Shiv Chopra

SECTION 4: STATINS IN HEART FAILURE

79. **Statins with HFpEF** 415
Sandeep Bansal, Anunay Gupta, Gaurav Kumar Divani

80. **Statins in Heart Failure with Comorbidities** 418
Sanjay Mittal, Roopam Singh

SECTION 5: STATIN IN ARRHYTHMIA

81. **Advances in Statin Therapy in Atrial Fibrillation** 429
Rabin Chakraborty, Arindam Pande

82. **Advances in Statin Therapy in Ventricular Tachycardia Storm in Coronary Artery Disease with Familial Dyslipidemia** 433
Pawan Suri, Vanita Arora

83. **Advances in Statin Therapy in Coronary Artery Disease and Post Pacemaker Implantation Patient with Familial Dyslipidemia** 436
Surendra Chutani, Arun Chutani, Aarti Shah, Bharat Kantharia

84. **Advances in Statin after Device Therapy in Heart Failure** 441
Surendra Chutani, Arun Chutani, Arti Shah, Bharat Kantharia

SECTION 6: STATIN IN AORTIC DISEASE

85. **Unmet Needs of Statin Therapy in Aortic Atherosclerosis** 447
Anil Dhall, Kunal Mahajan

86. **Advances in Statin Therapy in Aortic Diseases** 456
Swarnika Srivastava, Anil Bhan

SECTION 7: STATIN AND STROKE

87. **Advances in Statin Therapy in Multiple Lacunar Infarcts** 465
Neeraj Tyagi

88. **Advances in Statin Therapy in Thrombotic Stroke** 468
Vinit Suri, Kunal Suri, Kanika Suri

89. **Advances in Statin Therapy in Stroke with Diabetes** 473
Joy Dev Mukherji, Mukesh Kumar

SECTION 8: STATIN AND CAROTID ARTERY DISEASE

90. **Advances in Statin Therapy in Patients with Increased IMT of Carotid Artery Disease** 481
Naveen Garg, KK Kapur

91. **Advances in Statin Therapy in Carotid Artery Stenosis** 486
Narendra Nath Khanna, Suparna Rao

SECTION 9: PERIPHERAL VASCULAR DISEASE

92. **Advances in Statin Therapy and Beyond: In Peripheral Vascular Disease and after Peripheral Vascular Intervention with Dyslipidemia** 493
Narendra Nath Khanna, Suparna Rao

SECTION 10: STATIN IN RENOVASCULAR DISEASE

93. **Statin after Renovascular Intervention** 505
Nagendra S Chauhan, Praveen Chandra

SECTION 11: STATIN IN DIABETES

94. **Statins in Young Diabetics** 509
Vinod Mittal

95. **Advances in Statins in Elderly Diabetics** 515
Subhash Kumar Wangnoo, Varsha Kachroo, Khwaja Mohammad Usman, Mohammad Asim Siddiqui

96. **Statin-induced Diabetes: Evidence, Mechanisms, and Implications** 520
Anil Pareek, Peeyush Jain, Ravi Tejraj Mehta

97. **Advances in Statin Therapy in Diabetes with and without Comorbidities** 527
Supriya Datta, Viswanathan Mohan

98. **Statin in Diabetes with CVD: Outcome Data** 533
Om J Lakhani, Surender Kumar

99. **Statins for Diabetes: A Polyvascular Disease** 537
Yash Pal Munjal, Vijesh Vijayan, Ghan Shyam Pangtey

100. **Advances in Statin Therapy in Diabetes with Obesity** 542
Anuj Maheshwari, Anubha Srivastava, Dinesh Lalwani, Dinesh Kumar

101. **Advances in Statin Therapy in Diabetic Women: Is the Outcome Different?** 547
Sarita Bajaj

SECTION 12: STATIN AND OBESITY

102. **Role of Statins in Obesity** 553
J Cecily Mary Majella, Surenderan GD, Geetha Subramanian

SECTION 13: STATIN AND KIDNEY

103. **Statins in Nephrotic Syndrome** 561
Arunkumar S, Dipankar Bhowmik

104. **Statins after Renal Transplant** 565
Himanshu Verma, Uttayan Chakrabarti, Rashi Verma

105. **Role of Statin in CKD** 569
Ramesh Hotchandani, Abhimanyu Bhatia

106. **Statin in Diabetic Nephropathy** 573
Vidyarani Mohankumar, Vijay Viswanathan

SECTION 14: ECHOCARDIOGRAPHIC EVALUATION OF STATIN EFFECT AND OUTCOME

107. **Echocardiographic Evaluation of Carotid Intima-media Thickness Regression with Statin Therapy** 581
Mansi Kaushik, Manish Bansal, Ravi R Kasliwal, HK Chopra

108. **Statin-induced Regression of Atherosclerosis: Validation by Ultrasound Modalities** 588
Aakash Hans, Navin C Nanda, Harvinder Dod, HK Chopra

109. **Echocardiographic Vascular Stiffness Evaluation after Statins** 594
Kamal Sharma, Prashant Vazirani, Jignesh Patel

110. **Echocardiographic Evaluation of Carotid Plaque Passivation after Statin Therapy** 597
Rahul Mehrotra, Raj Kumar, Mohit M Bhagwati

111. **Echocardiography in Evaluation of Left Ventricular and Left Atrial Remodeling on Statin Therapy** 601
Shahzad Ahmad, John Davis, Masood Ahmad

112. **Echocardiographic Assessment of Aortic Valve Calcification and Role of Statin Therapy** 606
Hardeep Kaur Grewal, Manish Bansal, Ravi R Kasliwal, HK Chopra

113. **The Plaque Paradox** 610
S Shanmugasundaram, U Ilayaraja, S Saravanakumar, V Malathi

114. **Statins and Pleiotropic Actions** 617
G Vijayaraghavan

115. **Echocardiographic Assessment of Mitral Annular Calcification and Role of Statin Therapy** 622
Ravi R Kasliwal, Manish Bansal, HK Chopra

116. **Echocardiographic Evaluation of LV Dysfunction after Statin Therapy** 626
Aniruddha De

117. **Statins in Heart Failure** 635
CK Ponde, Sahil Sareen

118. **Evaluation of Statin Effect on Left Ventricular Hypertrophy and Left Ventricular Mass** 638
Srikanth KV, Satish C Govind

119. **3D Echo Evaluation of Statin Effect on LA and LV Strain** 642
V Amuthan, RVA Ananth

120. **Echocardiographic Evaluation of Statin Effect on Left Ventricle and Left Atrium Strain in Heart Failure with Coronary Artery Disease** 654
Tahmid Rahman, On Chen, Smadar Kort

121. **Echocardiographic Evaluation of Statin Therapy on Carotid Plaque** 657
Rekha Mishra, Manisha Sharma, Geetika Agarwal

SECTION 15: AORTIC ATHEROSCLEROTIC STATIN EFFECT EVALUATION

122. **CTA Evaluation of Statin Effect on Aortic Atherosclerosis** 667
Manish Shaw, Aprateem Mukherjee, Priya Jagia

123. **MRA Evaluation of Statin Effect on Aortic Atherosclerosis** 670
Mona Bhatia, Parveen Kumar

SECTION 16: STATIN EFFECT EVALUATION IN RENOVASCULAR DISEASE

124. **Role of Echo in Evaluation of Renovascular Disease after Statin Therapy** 679
Naveen Garg, KK Kapur

125. **Color Doppler Evaluation of Erectile Dysfunction after Statin Therapy** 683
Naveen Garg, KK Kapur

SECTION 17: NUCLEAR IMAGING IN VASCULAR ATHEROSCLEROSIS

126. **Nuclear Imaging Evaluation of Statin Effect on Vascular Atherosclerosis** 691
GN Mahapatra

127. **Nuclear Imaging in Evaluation of Statin Effects on Vascular Atherosclerosis with Dyslipidemia** 699
Prabhu Ethiraj, Sai Supriya Prabhu, G Manohar, MS Senthilkumar

SECTION 18: NUTRITION AND DYSLIPIDEMIA

128. Omega-3 Fatty Acids in the Treatment of High Triglycerides 707
Pawan K Sharma, HK Chopra

129. Coenzyme Q_{10} and Statins: Role of CoQ_{10} in Congestive Heart Failure 711
Pawan K Sharma, HK Chopra

130. Role of Red Yeast Rice and Phytosterols in Dyslipidemia 715
Pawan K Sharma, Paul N Hopkins, HK Chopra

131. New Ways for Healthy Edible Oils: Blends 722
Sudhakar Mhaskar, Shashank Joshi

SECTION 19: STATIN AND PEDIATRIC

132. Evidence-based Approach to the Use of Lipid-modifying Drugs 733
Ahmed Adel Elamragy, Mostafa Mahmoud Abdrabou, Sonia Ali El-Saiedi

133. Therapeutic Management of Pediatric Dyslipidemia 747
Antoine F Abdelmassih, Rabiba-Allah Ismail, Sonia Ali El-Saiedi

134. Children with Dyslipidemia: Preventive Strategies 752
Hosam Rashwan, Hala El Marsafawy

135. Statins in the Management of Familial Hypercholesterolemia 757
IB Vijayalakshmi

SECTION 20: STATIN AND EYES

136. Role of Statins in Glaucoma 765
Preetinder Kaur

137. Statin and Cornea 767
Monika Nadar

138. Statins in Vitreoretinal Disorders 770
Krishna Vaitheeswaran

139. Statin in Uveitis and Inflammatory Eye Disease 774
Shalini Garg

SECTION 21: STATIN AND SKIN

140. Cutaneous Manifestations of Disorders of Lipid Metabolism 779
Hilary Modir, Mary Thomas, Payal Gupta

SECTION 22: STATIN AND PULMONARY DISORDERS

141. Statins and Pulmonary Disorders 785
Bhagwan Mantri, Pawan Kumar Mangla, Aayushi Gupta

SECTION 23: ATORVASTATIN AND CVD PREVENTION

142. Atorvastatin and CVD: Indications, Contraindications, and Outcome Consensus 793
Ranjit Kumar Nath, Rajeev Bharadwaj

SECTION 24: ROSUVASTATIN AND CARDIOVASCULAR DISEASE PREVENTION

143. Rosuvastatin in Coronary Artery Disease: Indications, Contraindications, and Outcome Consensus 801
Neeraj Pandit, Puneet Aggarwal, Kaushal Choudhari, Vatsal Kayal

SECTION 25: SYSTEMIC INFLAMMATORY RESPONSE SYNDROME

144. Statin in Sepsis 809
Surabhi Awasthi, Ashish Arora

145. Role of Statins in Coronavirus Disease Crisis 815
Sanghamitra Sinha, Aakashneel Bhattachrya, Ashish Arora, Surabhi Awasthi

146. Statins in Critical Care: Cautious Optimism 820
Ashish Arora, Surabhi Awasthi, Aakashneel Bhattachrya, Sanghamitra Sinha

SECTION 26: DYSLIPIDEMIA, YOGA AND STATIN THERAPY

147. Dyslipidemia, Yoga and Statin Therapy 827
SC Manchanda, Kushal Madan

SECTION 27: STATIN IN CARDIO-ONCOLOGY

148. Promise of Statin Therapy in Dyslipidemia Inflicted Stroke in Head and Neck Cancer 833
Kanika Sood Sharma, Aditi Tanwar, VVS Shobana

SECTION 28: BEYOND STATIN

149. PCSK9 Inhibitors: New Lipid Lowering Agents 839
Pawan K Sharma, HK Chopra

150. PCSK9 Inhibitors in Diabetes Mellitus 842
Sudeep Kumar, Smarak Ranjan Rout, Aditya Kapoor

151. New Therapies of Dyslipidemia and their Benefits: Inclisiran and Bempedoic Acid 848
Pawan K Sharma, HK Chopra

SECTION 29: FUTURE DIRECTIONS

152. Review of Recent Trials on Statin and Vascular Protection 855
V Pavan Teja, YK Subhash Singh, Nitish Naik

153. Past, Present, and Future of Familial Dyslipidemia Management in CAD Management 859
Bhushan Shah, Purneshwar Pandey, Mohit D Gupta, Girish MP

154. PCSK9 Inhibitors Therapy in Dyslipidemia CVD Protection Potentials: Where are We Today? 866
Aseem Basha, Neil Bardoloi

155. PCSK9 Inhibitors Therapy in Dyslipidemia: Present Status and Future Directions 871
Dayasagar Rao V, Rajesh Natuva

156. When to use Statin Therapy, Bempedoic Acid, and Inclisiran, and How Effective is Icosapent Ethyl? 878
Kirandeep Kaur, Sandeep Kaushal, GS Wander

157. PCSK9 Inhibitors in Dyslipidemia with Coronary Artery Disease 882
Viveka Kumar, Mitendra Singh Yadav

158. Advances in Bempedoic Acid and Inclisiran Therapy in Dyslipidemia 891
Vinod Sharma, Ruchi Sharma

159. Recent Trials of Inclisiran in Dyslipidemia 900
I Sathyamurthy, KN Srinivasan

160. Inclisiran in Dyslipidemia for Indians 905
SS Iyengar, V Subash Chandra

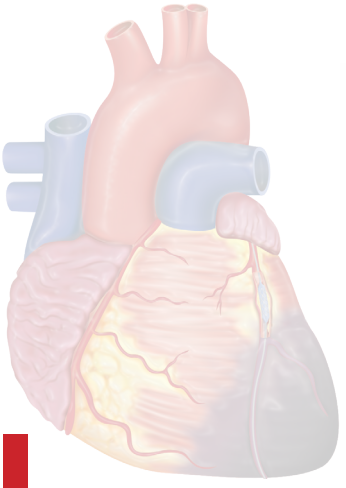
161. New Drugs for Dyslipidemia in the Future 909
Surendra Kumar Naik, S Ramakrishnan

162. Advances in Lipid Therapy Beyond Statin: How far PCSK9 Inhibitors Trials Impacted the Clinical Practice? 914
J Sharma, MK Das, Moitry Das

163. Role of Bariatric Surgery in Dyslipidemia with CVD 918
Pradeep Chowbey

Index *923*

CHAPTER 2



Consensus of ESC Lipid Guidelines: What is Applicable for Indians?

Saumitra Ray

INTRODUCTION

Dyslipidemia has been established as the most important modifiable risk factor for atherosclerotic cardiovascular disease (ASCVD) by genetic, epidemiological, and clinical studies. It is generally accepted that hypercholesterolemia, especially, high low-density lipoprotein cholesterol (LDL-C) level, is the main causal entity. High triglyceride (TG) level, low high-density lipoprotein cholesterol (HDL-C) level and high non-HDL cholesterol level comprising intermediate-density lipoprotein (IDL) and very low-density lipoprotein (VLDL), also have been implicated in the process of atherogenesis with variable evidences and named as atherogenic dyslipidemia. This is especially relevant in India. Thus, it is evident that guidelines are required for such a complex and rapidly changing field of clinical medicine. The European Society of Cardiology (ESC) comes out with guidelines periodically and the latest one has been published in the year of 2019, in collaboration with the European Atherosclerosis Society (EAS) under the heading of "Guidelines for the management of dyslipidemias: Lipid modification to reduce cardiovascular risk."[1] Interestingly, this guideline has divided Europe into high-risk regions and low-risk regions and gave separate recommendations to assess risk as per a new algorithm called "SCORE". Thus, it is evident that even within Europe, the risk stratification and the subsequent management varies from one country to another, and thus it is obvious that these recommendations are not meant for any other region of the world. Every country should develop its own guidelines based on the studies on its own population. Unfortunately, most countries, including India, lack that wide database on which a tailor-made guideline can be made. So, it is pragmatic to base the recommendations on a standard guideline where the concerned population includes a substantial proportion of Asians/Indians, and to modify it as per the special Indian situations. The following document is an attempt to make the ESC lipid guidelines as relevant to India as possible.

CRITICAL ANALYSIS OF ESC/EAS GUIDELINE IN PERSPECTIVE OF INDIAN SCENARIO

Risk Assessment

The ASCVD risk assessment tool developed according to ESC Guidelines is called "SCORE Cardiovascular Risk Chart." The assessment is for the 10-year risk of fatal CVD. The risk has been categorized in four segments: <3%, 3–4%, 5–9%, and ≥10%. The parameters utilized are regions of Europe (high-risk or low-risk), gender, age (40–70 years), smoking status, systolic blood pressure (120–180 mm Hg) and total cholesterol level (4–7 mmol/L). In India, the central obesity as reflected in waist–hip ratio (WHR), diabetes mellitus (DM), atherogenic dyslipidemia (high TG, low HDL-C, high VLDL and high small dense LDL with relatively normal LDL-C) play an important role in ASCVD risk of a person. None of these has been reflected in the SCORE system. At the same time, there is no risk tool developed in India to incorporate these factors. So, it may be recommended to use these factors as risk enhancers. In India, QRISK 2 score may be more useful as it incorporates the important parameters of ethnicity, family history of premature coronary artery disease (CAD), social deprivation, diabetes, and body mass index (BMI).[2]

An Indian study looked into the risk categorization done by four different tools after a first myocardial infarction (MI), and found a wide variation among the different methods of assessment. Even, it was earlier suggested that the Framingham risk score should be multiplied by 1.4 for men of South Asian origin.[3]

JAYPEE BROTHERS

Evaluation of Lipid Parameters

Whom to screen?

The ESC/EAS guidelines recommend that lipid screening for risk assessment is not needed in people with established ASCVD, type I or II DM, very high levels of individual risk factors or chronic kidney disease (CKD). However, they require lipid assessment to monitor the treatment effect and target attainment. Screening for lipid parameters to assess risk is important in men above 40 years and women above 50 years, people with family history of premature CVD, or with hypertension, central obesity, autoimmune chronic inflammatory conditions, antiretroviral therapies, or with signs of genetic dyslipidemia. Though this appears quite comprehensive, but as Indians have premature atherosclerosis and have high prevalence of metabolic syndrome (MS), it is wise to screen all adult population irrespective of age or comorbid conditions, if feasible.

What to screen?

The ESC/EAS recommends screening at the baseline for total cholesterol (TC), TG, LDL-C, and HDL-C and some of the derivatives from these values. However, they also recommend ApoB or ApoB/ApoA1 ratio as an alternative to assess ASCVD risk. All ApoB-containing lipoproteins, i.e., VLDL, IDL, and LDL, can be estimated by ApoB measurement and thus the total atherogenic particles in plasma can be captured by one value. However, in India, the Apo B estimation is not widely available and not interpretable by most clinicians. Thus, there is no reason to abandon the traditional parameters at this point. Rather, assessment of lipoprotein a [Lp(a)] is recommended at least once in all dyslipidemic patients, and it may be wise to do it at the baseline rather than in any arbitrary phase of life. Assessment of non-HDL-C may be a more acceptable alternative to ApoB in Indian set up, and also endorsed by the ESC/EAS guidelines.

When to screen?

The ESC/EAS recognizes the fact that prandial state is only relevant for the assessment of TG. In a vast country such as India with an enormous variation of socioeconomic and infrastructural standards, it may not be feasible to get people for screening in fasting state. So, a random sample is often sufficient, and direct method of LDL-C measurement should be adopted. If the random TG is high, then a proper fasting sample is needed as LDL-C measurement by Friedewald formula may be affected by high TG.

Treatment Targets

Low-density lipoprotein cholesterol is the primary target of treatment. Five categories of patients have been defined with different LDL-C targets. The targets for those with very high risk for ASCVD are below 55 mg/dL and >50% reduction from baseline. For those having a second vascular event within 2 years of the first, a target is set below 40 mg/dL. The targets for high-, moderate- and low-risk patients are 70 mg/dL, 100 mg/dL and 116 mg/dL, respectively. This aggressive approach is very suitable for Indian patients as well.

For very high, high, and moderate CV risk people, the respective targets for non-HDL-C are 85, 100, and 130 mg/dL; and for ApoB are 65, 80, and 100 mg/dL. In view of recently published trials such as REDUCE-IT, PREDIMED, and analysis of BARI-2D, a TG value above 135 mg/dL, may be considered as a target for treatment in patients with MS or high CV risk.

Treatment Strategies

Lifestyle Management

Lifestyle management (LSM) has been duly emphasized in the ESC guidelines, though the controversial role of any particular type of diet has also been highlighted. LSM implementation is even more important in India for the following reasons:

- Poor baseline lifestyle of most Indians, including an inertia for physical exercise, carbohydrate-rich diet, inappropriate and excessive use of cooking oil, high prevalence of tobacco use, high social and occupational stress
- Genetic predisposition to MS and early ASCVD
- Limited access to health care and poor affordability to medicines.

Public education for healthy living by all available means is the need of the hour.

Pharmacotherapy

Statins remain the mainstay of therapy for dyslipidemia, primarily reducing LDL-C, but also reducing TG, variably increasing HDL-C, but without any relevant effects on Lp(a). Statins are classified as mild-, moderate-, and high-intensity depending on the reduction of baseline LDL-C by <30%, 30–49%, or >50%, respectively. This depends on the molecule and its dose. This is very relevant to Indian scenario as well. As in India, atherogenic dyslipidemia (AD, otherwise called diabetic dyslipidemia), as mentioned earlier, is prevalent, while selecting statin, those with greater effects on the parameters of AD may be considered. While atorvastatin and rosuvastatin reduce TG meaningfully, pitavastatin may increase HDL-C significantly and new-onset diabetes is lowest with pitavastatin. However, even with the highest dose, pitavastatin can reduce LDL-C only moderately. Cholesterol absorption inhibitor, ezetimibe, is recommended by the ESC/EAS as an add-on to statin when with the highest tolerated dose, the LDL-C level does not attain the target. This is especially relevant to India as it is cheap, readily available, effective, and with minimal side effects and may avert the use of proprotein convertase subtilisin/kexin type 9 inhibitors (PCSK9I) by attaining the LDL-C goal in a good proportion of patients. PCSK9I, alirocumab and evolocumab, are very potent molecules to reduce LDL-C. They are more effective in presence of statins. They are positioned as the third-line treatment to attain LDL-C goal after full dose of statin and ezetimibe. They are very relevant in Indian context as a large number of patients do not achieve the LDL-C goal with statin ezetimibe combination, highest doses of statins are sometimes not tolerated due to side effects, there is a good number of patients with heterozygous familial hypercholesterolemia (HeFH) and many patients fulfill the criteria for an LDL-C

JAYPEE BROTHERS

goal of below 40 mg/dL, which is difficult to achieve. However, they are very expensive and a lifelong therapy is not feasible for most Indian patients, particularly when most patients still pay out of their pockets for treatment and even when insured, home treatment is mostly not covered. Fibrates effectively lower fasting and postprandial TG levels and TG-rich lipoprotein (TRL) remnant particles. Major randomized control trials and meta-analyses produced conflicting data on CV outcome with fibrates. As in India atherogenic dyslipidemia is so prevalent, there is urgent need to define the role of fibrates. It is generally agreed that in high risk individuals, whose serum TG is above 150 mg/dL with highest tolerated dose of statins, and especially where serum HDL-C is low, fibrates should be considered. In CKD, lower dose of fenofibrate (75 mg) is recommended along with close supervision of renal function. Saroglitazar is a molecule of Indian origin, and not available in Europe, which showed good efficacy in reduction of TG and blood sugar as well. It has minimal side effects and is compatible with statin use. But, till now, it has no CV outcome data. The n-3 (or omega-3) fatty acid, eicosapentaenoic acid (EPA) showed CV benefit along with reduction of serum TG, but a combination of EPA and docosahexaenoic acid (DHA) failed to do so. Their efficacy has also been questioned in fish-eating community. They may also promote weight gain and new-onset atrial fibrillation. They are expensive as well. Thus overall, their relevance in Indian scenario is somewhat low.

Lipid Management in Special Subgroups

Familial Hypercholesterolemia

The ESC/EAS 2019 guidelines have given clear recommendations on diagnosis and management of familial hypercholesterolemia (FH), both heterozygous (HeFH) and homozygous (HoFH). By available data from India, the prevalence of both HeFH and HoFH appear to be the same as in other countries.[2] But the awareness and diagnostic facilities are grossly inadequate. The Dutch Lipid Clinic Network diagnostic criteria have been recommended by the ESC/EAS and are equally applicable in Indian setting. Family history, clinical history, physical examination, LDL-C level, and DNA analysis form the basis of diagnosis. In the family history section, premature CAD was defined as below age of 55 years for male and 60 years for female. However, in India, as CAD occurs a decade earlier than the western world, this age criteria become weak for diagnosis of FH. Detection of tendon xanthomata and arcus cornealis is very important. As many patients when first suspected are already on some statin, it is important to apply appropriate algorithm to assess the pretreatment LDL-C level depending on the nature and dose of the statin. And lastly, DNA analysis is not widely available in India.

Once a case of FH is diagnosed, family cascade screening is important. The goal is to reduce LDL-C by >50% and to below 55 mg/dL, more so in cases with known ASCVD or in presence of any other major risk factor. For children in suspected families, screening should be done by age of 5 years, and treatment should be started by age 8–10 years, with a goal LDL-C below 135 mg/dL. Usual algorithm of statin, ezetimibe, and PCSK9I is followed for treatment. The same is true for Indian setup as well. Statins are contraindicated in women planning pregnancy, during pregnancy, and during breastfeeding. Nonabsorbable bile acid sequestrants and LDL apheresis are suitable here.

Metabolic Syndrome and Type 2 Diabetes Mellitus

The ESC/EAS 2019 Guidelines have discussed in details the issue of dyslipidemia in presence of MS and type 2 diabetes mellitus (T2DM). They recognized the special type of dyslipidemia here characterized by elevation of both fasting and postprandial TG, ApoB, and small dense LDL, and low levels of HDL-C and ApoA1. However, the postprandial TG levels are not yet standardized. Statins remain the mainstay of treatment and the absolute CV event reduction is more than in nondiabetic people with lower number needed to treat. Ezetimibe also showed greater absolute benefit in diabetic subgroup. PCSK9I have the added advantage of reducing Lp(a). Role of fibrates and saroglitazar has already been discussed. Overall, the ESC/EAS guideline recommendations are nicely applicable for Indians.

Acute Coronary Syndrome

The ESC/EAS has recognized that though acute coronary syndrome (ACS) patients posed the highest risk of adverse outcome, the lipid management remained suboptimal. This truth is amplified in India. There is strong evidence-based recommendation to use high-intensity statins (which include only atorvastatin 40–80 mg daily and rosuvastatin 20–40 mg daily) for rapid and sustained clinical benefit. It is also recommended to take the blood sample immediately after admission, as prandial status is irrelevant for LDL-C and after ACS, LDL-C tends to decrease for a few days. It is advisable to start high-dose statin as soon as possible, and preloading is helpful, especially for stent implantation, and even more for primary angioplasty in ST elevation MI. This may also reduce contrast-induced acute kidney injury. After 4–6 weeks, if LDL-C is above target, then stepwise addition of ezetimibe and PCSK9I is recommended. PCSK9I may be initiated during the acute phase if the patient is already on highest tolerated dose of statin and ezetimibe, but LDL-C above the target.

All treatment should continue indefinitely with periodic assessment of efficacy and safety.

All these recommendations are suitable for India. But as PCSK9I may not be affordable by majority of Indian patients, the highest dose of statin, e.g., atorvastatin 80 mg rather than 40 mg, and rosuvastatin 40 mg rather than 20 mg, should be tried, ensuring the tolerability, before embarking on PCSK9I.

Monitoring of Safety during Treatment

Recommendations for safety came from consensus opinion, rather than any evidence.

Baseline alanine aminotransferase (ALT) should be tested and then checked only if there is symptoms or suggestions of

JAYPEE BROTHERS

TABLE 1: New recommendations in 2019 ESC/EAS lipid guidelines.

Recommendations	*Class of recommendation*	*Relevance in India*
Ultrasonography assessment of carotid/femoral arterial plaque burden as a risk modifier in low-/moderate-risk people	IIa	Should be encouraged in India as cheap, easily available and with a high yield
Coronary artery calcium score by CT in asymptomatic low/ moderate risk people	IIa	Very relevant as huge number of subclinical cases, but limited utility due to availability issue
One off measurement of Lp(a) to identify an inherited risk factor	IIa	As relevant as in Europe
In high or very high risk people with TG value 135–499 mg/dL despite statin therapy, n-PUFA treatment is indicated	IIa	Though high TG is more prevalent in India, and PUFA may improve glycemic status, but its widespread use is restricted by availability, cost and fish associated stigma LSM remains the key of tackling high TG
HeFH patients in very high risk and in primary prevention setup, LDL-C reduction to below 55 mg/dL and >50% from baseline is indicated	IIa	As relevant as in Europe
Statin indicated in old people <75 years as primary prevention, as per risk assessment	I	As relevant as in Europe
Above 75 years, statins given for primary prevention only in high-risk people	IIb	As relevant as in Europe
In people with T2DM and very high risk, LDL-C reduction to below 55 mg/dL and >50% from baseline is indicated whereas in people with T2DM and high risk, LDL-C reduction to below 70 mg/dL and >50% from baseline is indicated	I	As T2DM is so prevalent in India, proper risk assessment and targeted therapy for LDL-C are of paramount importance
To achieve LDL-C target, intensification of statin therapy takes priority over combining statin with ezetimibe +/- PCSK91	IIa	Extremely important in India due to socioeconomic reasons and to ensure compliance. Highest dose of statin should be aimed at rather than the lower dose option in the same-intensity category
Diabetic premenopausal women who are planning pregnancy or not using adequate contraception, must avoid statins	III	Education must spread and alternatives should be made more readily available
Patients on maximally tolerated dose of statin and ezetimibe if presents with ACS, prompt introduction of PCSK91 is indicated	IIa	More relevant in India as CAD is usually premature and more extensive and uptake is better during hospital stay for higher motivation and insurance coverage

(ACS: acute coronary syndrome; CAD: coronary artery disease; CT: computed tomography; Lp(a): lipoprotein(a); ESC/EAS: European Society of Cardiology/European Atherosclerosis Society; HeHF: heterozygous familial hypercholesterolemia; LDL-C: low-density lipoprotein cholesterol; LSM: lifestyle modification; PCSK9I: proprotein convertase subtilisin/kexin type 9 inhibitor; PUFA: polyunsaturated fatty acids; TG: triglyceride; T2DM: type 2 diabetes mellitus)

liver injury, and if the patient is on fibrates. A rise of more than 3 times the upper limit of normal (ULN) requires stopping statin/fibrate. Creatine kinase (CK) indicating muscle injury should only be checked if patient develops muscle pain/weakness and especially in frail people with liver or kidney injury, taking high dose statin, and taking interacting drugs. A rise above 10 times, the ULN requires stoppage of statin. Regular monitoring of HbA1C is advocated in elderly or obese people or in people with MS, which is very relevant in India.

The ESC/EAS lipid guidelines have introduced several new recommendations in 2019 and modified some recommendations from the 2016 guidelines. These are summarized in tabular forms **(Tables 1 and 2)** along with a comment on each issue as to their relevance in Indian perspective.

CONCLUSION

The lipid guideline by the ESC/EAS published in 2019 is a very comprehensive document. However, as recognized in the guideline itself, it is fraught with some uncertainties, gaps in the evidence and also in need of modification for different regions within Europe itself. Naturally, it cannot be transposed as such to India, a country itself featuring more variations within itself than in the continent of Europe. Not only the clinical substrates and effects of various modes of therapy vary, but also the infrastructure and socioeconomic substrates are widely different. An attempt is made here to make the ESC/EAS guideline more readily acceptable and applicable in Indian scenario. But, ideally India should have her own guidelines, and there are good attempts toward that end recently.[4]

JAYPEE BROTHERS

TABLE 2: Changes in recommendations in ESC/EAS lipid guidelines from 2016 to 2019.

2016 Recommendation	*2019 Recommendation*	*Indian perspective*
ApoB as an alternative risk marker, especially in people with high TG (IIa)	ApoB is recommended in people with high TG, DM, obesity, MS or very low LDL-C. It may replace LDL-C as the primary risk marker and may be better than non-HDL-C (I)	The relevant clinical conditions are more prevalent in India, but availability, awareness and knowledge of target values restrict its use at present. Non-HDL-C may be more appealing in Indian setup
Ezetimibe added to statin if LDL-C goal not reached (IIa)	Ezetimibe added to statin if LDL-C goal not reached (I)	Aggressive treatment is very important as CAD is more extensive with poorer prognosis and ezetimibe is cheap and easily available
In very high-risk people with above target LDL-C on highest dose of statin and ezetimibe or people with statin intolerance, PCSK91 is indicated (Iib)	For secondary prevention or very high-risk FH patients, the same is recommended, but with class I	In India the situation is paradoxical in the sense that scope of PCSK91 is very high, but affordability is very low. It is important to address the issue with all stake-holders
In high-risk patients with high TG, statin should be given (Iib)	In high risk patients with TG >200 mg/dL, statin should be given (I)	All the more relevant in India due to high prevalence of high TG
In HeFH patients LDL-C goal is below 100 mg/dL without CVD, and below 70 mg/dL with CVD and PCSK91 given with statin and ezetimibe to achieve that goal (IIa)	In highest risk category, the LDL-C target is below 55 mg/dL and PCSK91 given with statin and ezetimibe to achieve that goal (I)	Equally applicable to Indian setup
Though the targets of LDL-C are same for older people as for the young, initial statin dose should be low and increase should be done cautiously (IIa)	Recommendation almost same, but with class I	Renal status assessment and drug interaction issues need to be emphasized on the clinicians
If target LDL-C is not reached in ACS patients with highest dose of statin and ezetimibe, PCSK91 is indicated (Iib)	PCSK91 indicated in similar situation after 4–6 weeks of statin + ezetimibe trial (I)	Equally applicable to Indian setup

(ACS: acute coronary syndrome; ApoB: apolipoprotein B; CAD: coronary artery disease; DM: diabetes mellitus; FH: familial hypercholesterolemia; HDL-C: high-density lipoprotein cholesterol; HeHF: heterozygous FH; LDL-C: low-density lipoprotein cholesterol; LSM: lifestyle modification; MS: metabolic syndrome; PCSK9I: proprotein convertase subtilisin/kexin type 9 inhibitor; PUFA: polyunsaturated fatty acids; TG: triglyceride;)

DECLARATION

No financial, secretarial, or intellectual help was taken while preparing this article. The tables are created by the author himself.

REFERENCES

1. Mach F, Baigent C, Catapano AL, et al. 2019 ESC/EAS Guidelines for the management of dyslipidaemias: Lipid modification to reduce cardiovascular risk. Eur Heart J. 2020;41(1):111-88.
2. Ray S, Sawhney JPS, Das MK, et al. Adaptation of 2016 European Society of Cardiology/ European Atherosclerosis Society guideline for lipid management to Indian patients: A consensus document. Indian Heart J. 2018;70(5):736-44..
3. Cooper A, O'Flynn N; Guideline Development Group. Risk assessment and lipid modification for primary and secondary prevention of cardiovascular disease: summary of NICE guidance. BMJ. 2008; 336(7655):1246-8.
4. Puri R, Mehta V, Iyengar SS, et al. Lipid Association of India Expert Consensus Statement on Management of Dyslipidemia in Indians 2020: Part III. J Assoc Physicians India. 2020;68(11[Special]):8-9.

JAYPEE BROTHERS

or detailed information on cardiology books, visit our website www.ejaypee.com, for detailed information on cardiology books, visit our website www.ejaypee.com, for detailed info

Advances in Statin Therapy & Beyond in CVD (ASTC)

A Textbook of Cardiology

It is the first publication of its kind in the form of a textbook of cardiology from India to the world. Over 324 contributors from India and abroad have contributed their prestigious chapters in this book, focuses on every aspect of statin therapy and beyond in dyslipidemia with cardiovascular disease (CVD) enhancing knowledge and has tremendous innovative and research potential of understanding advances and innovations in dyslipidemia for the undergraduates, postgraduates, practicing cardiologists, endocrinologists, nephrologists, neurologists, ophthalmologists, critical care pulmonologists, pediatricians, pediatric surgeons, physicians, cardiovascular surgeons, imaging experts, and nutritionists, etc. The book including 29 sections.



HK Chopra is the Senior Consultant Cardiologist, working in Moolchand Medcity, New Delhi, India, for the last 41 years, now at Medanta Moolchand Heart Institute and is the Chairman of CME, Moolchand Medcity and is working in Clinical, Preventive Cardiology and Echocardiography. He is the Chairman, World Wellness Foundation, and was the President of the Cardiological Society of India, 2015 and Indian Academy of Echocardiography, 2017. He has pioneering contribution in thrombolysis in ST-elevation myocardial infarction (STEMI) since 1983 in India and at Cedars-Sinai Hospital, University of California, Los Angeles, USA, with Dr William Ganz (1985–86) and University of Alabama, USA, with Dr Navin C Nanda (1986–87). He has organized more than 25 World Congresses in Cardiology and is the Country Head, American Heart Association (AHA). He is the Editor-in-Chief of *Hypertension: New Frontiers, Advances and Innovation in Heart Failure, Advances in Clinical Cardiovascular Imaging, Echocardiography & Interventions Cardiodiabetes Update, Atrial Fibrillation Update, STEMI Update, Heart Protection Book, CSI Cardiology Update 2014* by M/s Jaypee Brothers Medical Publishers (P) Ltd, New Delhi, India. He has authored the book *Lifestyle and Health: A Mind Body Capsule*. He is a former Editor-in-Chief of Indian Heart Journal and Journal of Indian Academy of Echocardiography. He is the Chief Advisor of Health Committee of SCOPE. He had contributed more than 739 articles in various national and international journals. His clinical research work is recognized all over the world. He is recipient of various national and international awards. Recently, he was conferred special award "World Icon in Cardiology making India Proud by AACIO" USA for the first time in the world as a Chief Editor of top 10 textbooks of cardiology on 10 topics in 10 years. He was conferred the most prestigious award "Icon of the Century in Clinical and Preventive Cardiology" by Union Health Minister, Government of India and was bestowed upon Icon in Clinical, Preventive Cardiology and Echocardiography by His Excellency Bharat Ratna Dr APJ Abdul Kalam, Former President of India. He authored the first "Heart Wellness Programme" launched by Health Minister, the Government of India. He worked with an eminent cardiologist of India, Dr KL Chopra for 22 years. He organized more than 2150 workshops on public health education and heart checkup camps. He is FRCP, and fellow of ACC, AHA, ESC, ACA, ISCU, ISCVU, CSI, IMSA, ASE, IAE and GSI.



Navin C Nanda is the Distinguished Professor of Medicine and Cardiovascular Disease, University of Alabama at Birmingham, Birmingham, AL, USA and President, International Society of Cardiovascular Ultrasound (ISCU). Editor-in-Chief, Echocardiography, A Journal of Cardiovascular Ultrasound and Allied Techniques. Hon. President, Dr Navin C Nanda Echocardiograph, Emergency Medicine and Paramedics Training Institute (EEPI), Jaipur, Rajasthan, India. Patron, Navin C Nanda Institute of Excellence in Cardiovascular Ultrasound, Nashik, Maharashtra. International President, JROP Institute of Echocardiography, New Delhi. He is a nationally and internationally renowned cardiologist and echocardiographer "whose pioneering work has significantly altered the way cardiology is practiced in the world today". He was awarded the prestigious Ellis Island Medal of Honor (USA) in 2006 and also the 2010 International Service Award from the American College of Cardiology for "significantly enhancing cardiovascular care throughout the world". He was declared the "Echocardiographer of the Millennium" by the Argentinean and Colombian Societies of Cardiology and the "Prince of Echocardiography" by the Italian Society of Echocardiography. He was also named the "Father of Echocardiography" by the Emirates Cardiac Society and the Indian Academy of Echocardiography and "Father of Modern Echocardiography" by the Chinese Medical Association.



Jagat Narula is the Professor of Medicine and holds the Philip J and Harriet L Chair in Cardiovascular Medicine at the Mount Sinai Hospital, New York, USA. He is also the Director of the Cardiovascular Imaging Program at the Zena and Michael A Wiener Cardiovascular Institute, Marie-Josée and Henry R Kravis Center for Cardiovascular Health, as well as Associate Dean for Global Health at the Mount Sinai School of Medicine. He is the Executive Editor of Journal of American College of Cardiology and Editor-in-Chief of the Journal of WHF. After completing his cardiology fellowship training and PhD (Cardiovascular Immunology) from the AIIMS, New Delhi, relocated to Massachusetts General Hospital (MGH) and Harvard Medical School in 1989. At MGH, after cardiology, heart failure and transplantation, and nuclear cardiology fellowships he joined the cardiology faculty. In 1997, he moved to Hahnemann University School of Medicine, Philadelphia, where he was Thomas J Vischer Professor of Medicine, Chief of the Division of Cardiology, Vice-Chairman of the Department of Internal Medicine, and Director of Heart Failure and Transplantation Center. He subsequently joined University of California, Irvine School of Medicine (2003) as Chief of the Division of Cardiology, Associate Dean for Research, and Director of the Cardiovascular Center of the UC Irvine's Douglas Hospital. He was also the Director of Memorial Heart and Vascular Institute, Long Beach Memorial Hospital, and Medical Director of the Edwards Lifesciences Center for Advanced Cardiovascular Technology in UC Irvine's Henry Samueli School of Engineering. He moved to Mount Sinai as the Philip J and Harriet L Goodhart Chair in Cardiology, and the Director of Cardiovascular Imaging Program in the Mount Sinai's Zena and Michael A. Wiener Cardiovascular Institute in 2011. He has more than 1000 original research publications or presentations to his credit and edited more than 35 books or journal supplements, and has been awarded as 'the best young investigator' on several occasions for his research contributions. He was awarded as the Best Educator as also the Innovator in Cardiovascular Medicine by the American College of Cardiology in the year 2012, and was honored as the Master of the American College of Cardiology in 2013. He has received the Distinguished Scientist Award 2015 from the American College of Cardiology.



GS Wander is the Professor and Head, Department of Cardiology, Hero DMC Heart Institute, Dayanand Medical College and Hospital, Ludhiana, Punjab, India and Coordinator of Hero DMC Heart Institute. He has been instrumental in the planning, conception, construction and running of this institute. He was the President of the Association of Physicians of India (2016–17) and Hypertension Society of India (2012–13). He was the Member of Core Committee which has formulated Indian Guidelines for Management of Hypertension in 2001, 2005, and 2013. He has published 170 papers, 45 of them in the Lancet, Nature Genetics, JACC, BHJ, and JHJ. He has organized various conferences like ISH, HSI, IMSACON, CSI, ACADIMA, etc. He delivered lectures in various national and international conferences as a Guest Faculty. He was awarded the Dr BC Roy Award in 2006 from Smt Pratibha Patil, Ex-President of India and Dr K Sharan Cardiology Excellence award by IMA.



CN Manjunath is the Professor and Director, Sri Jayadeva Institute of Cardiovascular Sciences and Research, Bengaluru, Karnataka, India, and practicing the "Treatment First Payment Next Concept". He was the President of the Indian College of Cardiology. He has been awarded for success and achievement in the field of medicine with "Padma Shri" in 2007 by the President of India. Honored Man of the Year by Bangalore Press Club, 2016. Honored "Doctorate of Science" from Rajiv Gandhi University, Bengaluru, 2012. Awarded Millennium Plaque of Honor by Hon'ble Prime Minister of India. He has performed more than 26,000 cardiac interventions including coronary and noncoronary cases. He has done highest number of balloon mitral valvuloplasties with Accura Balloon in India and had done original research on Accura Balloon resulting in balloon valvuloplasty operations. He has more than 250 publications in international and national journals, live workshop conducted for more than 10–15 national and international conferences. He authored chapters in many textbooks, he is the Author and Architect of 'Hrudaya Sanjeevini Scheme for the poor'.



Praveen Chandra is the Chairman of Interventional Cardiology at Medanta—The Medicity Hospital, Gurugram, Haryana, India and Medanta: Moolchand Heart Institute, New Delhi. He is recognized as one of the leaders in angioplasty in the country and is proficient in a lot of new devices and technologies. He has been awarded for success and achievement in the field of medicine with "Padma Shri" in 2016 by the President of India. He served as Director of Cardiac Cath Lab and Acute MI Services at Max Healthcare and Consultant Cardiologist at Escorts Heart Institute and Research Center, New Delhi. He is a Fellow of the Endovascular Intervention Society of India and the Asia-Pacific Society of Interventional Cardiology. He has been a distinguished faculty member in various international meetings. He has published approximately 100 articles, reviews and abstracts in various national and international journals. He has been awarded the prestigious "Recognition Award for Success and Achievement" in the field of angioplasty in India, 1998. First time in India, he did percutaneous aortic valve implantation without surgery. He also did the first ever percutaneous mitral valve repair. Both have important implications in our country with the highest number of valvular cases in the world.



Viveka Kumar is the Principal Director and Chief of Cath Labs, Pan Max Hospitals and Max Heart and Vascular Institute, Saket, New Delhi, India. He has extensive experience in the field of cardiac interventions and electrophysiology. He specializes in complex angioplasties including multivessel, bifurcation and left main angioplasties with rotablation, FFR, IVUS, IABP, IMPELLA devices. He has done more than 7,500 angioplasties and 2,500 balloon valvotomies with good outcome. He is in Editorial Board of Indian Heart Journal. He is principal investigator and subinvestigator of more than 14 international trials. He is recipient of Chikitsa Ratna Award, DMA and Vidya Ratna Award, Kanpur University, Uttar Pradesh. He is Fellow of SCAI, MHRS and ACC.



CK Ponde is Head, Department of Cardiology, PD Hinduja National Hospital, Mumbai, Maharashtra, India. He is National President, IAE-2022 and is recipient of Rashtriya Jan Seva Puraskar 2006. He has up to 150 publications in national and international journals to his credit.



AK Pancholia is Head, Department of Medicine, Clinical and Preventive Cardiology, Arihant Hospital, Indore, Madhya Pradesh, India. He is Convener of CSI-RHD Council, he was the Associate Editor of Indian Heart Journal, and was the Organizing Secretary, 1st National CSI-Heart Failure Conference, Indore, 2015. He is recipient of Award of Excellence in Cardiology by American Association of Cardiologists of Indian Origin (AACIO

Buy from ejaypee

JAYPEE BROTHERS

Shelving Recommendation
CARDIOLOGY

ISBN 978-93-5465-393-3