Contents

Introduction

1. Platelet Ultrastructure Morphology **1**

2. Platelet Morphology and Function **7**
- Introduction to Platelets *7*
- Electron Microscopy *12*
- Atomic Force Microscopy *12*
- Fluorescent and Confocal Microscopy *13*
- Platelet Aggregometry Studies *14*
- Platelet Biochemistry *18*

3. Platelet Morphology and Dysfunction **22**
- Glanzmann Thrombasthenia *22*
- Common Platelet Disorders, Biochemical and Clinical Findings *24*
- Miscellaneous Dysfunction of Platelet Function *29*

4. Platelet Physiology **36**

5. Platelet Activation Mechanisms **46**
- Signaling Pathways via GTP-Binding Protein–Coupled Receptors *47*
- Phosphoinositide Metabolism and Platelet Activation *49*
- Lipid Phosphate Phosphatases and Platelet Activation *49*
- Protein Phosphorylations and Platelet Activation *50*

6. Role of Calcium in Platelet Activation **55**

7. Eicosanoid Metabolism and Platelet Function **60**

8. Calcium Modulation by Cyclic Nucleotides **70**

9. Pharmacology of Antiplatelet Drugs **77**
- Agents Modulating Platelet Function *79*

10. Antiplatelet Therapies **88**
- Platelet Physiology *89*
- Clinical Conditions Needing Antiplatelet Therapy *90*
- Pharmacological Approaches for Development of Antiplatelet Drugs *90*
- Clinical Complications Needing Antiplatelet Therapies *91*
- Clinical Trials of Antiplatelet Drugs *93*

11. Aspirin Resistance **101**
- Platelet Physiology *102*
- Arachidonic Acid Metabolism *102*
- Clinical use of Aspirin *103*
- Aspirin Resistance *106*
- Prevalence of Aspirin Resistance *108*

12. Platelet Dysfunctions Associated with Diabetes Mellitus **120**
- Platelet Physiology *120*
- Arachidonic Acid Metabolism *121*
- Platelet Hyperfunction *121*
- Oxidative Stress *124*
- Vascular Dysfunction *126*
- Blood Cells and Blood Components *128*
- Role of Platelets in Vascular Pathology *128*
- Management of Hematological Parameters *129*

13. Platelet Hyperfunction as a Risk Promoter for Acute Coronary Events **137**
- Platelet Physiology *138*
- Activation of Circulating Blood Cells and Inflammation *139*
- Vascular Dysfunction *139*
- Hormones, Stress, and Acute Coronary Events *140*
- Therapeutic Implications *142*
- Need for a Point-of-Care Assay for Monitoring Antiplatelet and Antithrombotic Therapies *143*

14. Epinephrine-induced Platelet Membrane Modulation **149**
- Mechanism of Membrane Modulation *149*

15. Platelet-Vessel Wall Interactions **166**
- Blood Vessel Covered by a Monolayer of Endothelial Cells *166*
- Platelet Physiology *167*
- Vascular Dysfunction *168*

16. Blood Biocompatibility Studies **179**
- Blood Biocompatibility Laboratory (BBL), Medical School, University of Minnesota *179*
- Short-term Goals of BBL *179*
- Stroke Research: Platelet and Blood Clot Studies *180*
- National Institute of Health Research Grants *180*

- Assays Available for Studies at BBL *181*
- Role of Platelets in Blood-Biomaterial Interactions *183*
- Validation of Blood-Biomaterial Interactions with Pyrolytic Carbon Bileaflet Heart Valves *185*
- Exposure of Mechanical Pyrolytic Carbon Leaflets to Human Blood Under Flow Conditions *187*
- Exposure of Fully Assembled Heart Valves to Human Blood Under Flow Conditions *188*
- Novel Nanoparticle-based Theranostics: Expectations and Limitations *194*
- Nano- and Microparticles in Cardiovascular Drug Delivery *195*

Index *203*