Contents

SECTION 1: FLUID, ELECTROLYTES, ACID-BASE DISORDERS AND CALCIUM-PHOSPHORUS METABOLISMS

1. Evaluation of Patients with Kidney Disease **3**

Anil K Agarwal, Uday Nori

Assessment of GFR 4; Assessment of Tubular Function 5; Renal Biopsy 13

2. Physiology of Urinary Concentration and Dilution and Diabetes Insipidus **15**

Karen S Servilla, Antonios H Tzamaloukas

Physiology of Urinary Dilution and Concentration 15; Vasopressin Release and its Mode of Action 18; Abnormalities of Urinary Concentration 20

3. Hyponatremia: Etiology, Pathophysiology, and Management **26**

Anil K Mandal

Definition 26; Associated Conditions 26; Symptoms and Signs of Hyponatremia 28; Summary of Diagnosis of Hyponatremia 32; Key Points 36

4. Hypernatremia: Pathophysiology, Diagnosis, and Management **37**

Anil K Mandal

Etiology 37; Pathophysiology 38; Management of Hypernatremia 42; Key Points 45

5. Hypokalemia: Prevention and Treatment **46**

Anil K Mandal

Pathophysiology 46; Causes of Hypokalemia 47; Clinical Manifestations of Hypokalemia 50; Diagnosis of the Etiology of Hypokalemia 53; Treatment of Hypokalemia 54; Hypokalemia in Patients with CHF 57; Key Points 61

6. Hyperkalemia: Pathophysiology, Diagnosis, Treatment, and Prevention **62**

Anil K Mandal

Decrease in K^+ Excretion 62; Increase in Potassium Load (Includes Intake) 63; Redistribution of Potassium 64; Other Causes of Hyperkalemia 64; Diagnosis of Hyperkalemia 65; Management of Hyperkalemia 66; Key Points 68

7. Metabolic Acidosis and Metabolic Alkalosis **70**

Nabil J Haddad, Anil K Agarwal

Production of Metabolic Acidosis 70; Metabolic Alkalosis 78

8. Metabolic Alkalosis: Pathophysiology and Management **81**

Anil K Mandal

Development of Metabolic Alkalosis 81; Diagnosis 83; Management 83; Dosage Regimen and Side Effects 84; Treatment of Choice 85; Key Points 85

9. Polyuria and Diabetes Insipidus **86**
Anil K Mandal
Polyuria 86; Diabetes Insipidus 87; Polyuria of Hypercalcemia 89;
Treatment 91; Referral 92; Key Points 92

10. Calcium and Phosphorus Metabolism Associated with Clinical Disorders in Pediatric and Adult Population **94**
Rajendra Bhimma, Anil K Mandal
Calcium 94; Phosphate 105; Key Points 109

11. Generalized Edema (Anasarca): A Systematic Approach to Diagnosis and Management **112**
Anil K Mandal
Anatomy and Physiology of Edema 112; Etiologies of Edema 113;
Idiopathic Edema 114; Signs, Symptoms, and Laboratory Testing 114;
Assessment of Edema 116; Therapeutic Options 116; Key Points 123

SECTION 2: DIABETES

12. Diabetes: Logical Approach to Management of Diabetes with a Goal to Prevention of Complications **127**
Anil K Mandal
Hindrance to Control of Hyperglycemia 127; Therapy for Diabetes 131;
Hypoglycemia 139; Key Points 143

13. Diabetes and Sexual Dysfunction: Etiology, Pathology, and Treatment **145**
Anil K Mandal
Erectile Dysfunction in Men 145; Sexual Life in Diabetic Women 149; Key Points 151

14. Diabetes: What does High Glucose do to Body Function? **152**
Anil K Mandal

15. Nondiabetic Renal Disease in Patients with Type 2 Diabetes Mellitus **158**
Jai Prakash
Prevalence of NDRD in Type 2 DM 158; Clinical Features of NDRD in Type 2 DM 159;
Histological Lesions of NDRD in Type 2 Diabetic Patients 160;
Renal-Retinal Relationship in Proteinuric Type 2 Diabetes 161;
Management of NDRD in Type 2 Diabetic Patients 162; Key points 164

SECTION 3: RENAL FAILURE

16. Pathophysiology, Prevention and Treatment of Progressive Renal Failure Associated with Severe Congestive Heart Failure **169**
Anil K Mandal
Pathophysiology of Renal Failure, Fluid Overload, and Electrolyte Imbalance in Severe CHF 169;
Prevention and Treatment 171; Patients' Presentation 173

17. Acute Intrinsic Renal Failure **177**
Jai Prakash
Categories of Acute Renal Failure 177; ARF in Specific Situations 184; Key Points 188

18. A Reversible Syndrome of Acute Renal Failure Associated with Renin-Angiotensin Inhibitor Drugs **190**
Anil K Mandal
Introduction and Case Reports 190; Key Points 197

19. Chronic Renal Failure: Clinical Perspective, Prevention and Nondialysis Treatment **199**

Anil K Mandal

Definition and Introduction 199; Technique 200; Diabetes-Dialysis Business Enterprise 204; Nondialysis Treatment of CRF 207; Key Points 213

20. Effect of Proteinuria on Renal Function in Diabetic and Nondiabetic Renal Disease **215**

Anil K Mandal, Linda M Hiebert, Aswini Patnaik

Overview of Current Status of Treatment of Proteinuria 215;
Case Studies from the Authors' Experience 217;
Overall Comments from the Case Findings 220; Key Points 222

21. Cystic Diseases of the Kidney **225**

Anil K Agarwal, Soni Dhanireddy

Simple Cysts 225; Polycystic Kidney Disease 227; Tuberous Sclerosis 231;
Von Hippel Lindau (VHL) Syndrome 232; Acquired Cystic Kidney Disease (ACKD) 233;
Other Cystic Diseases 234

22. Acute and Chronic Urinary Tract Obstruction in Adults: Pathophysiology, Diagnosis and Management **236**

Anil K Mandal

Anatomy of the Urinary Tract 236; Urinary Tract Obstruction 237; Therapy 239;
Pathophysiology 239; Diagnosis 240; Diuresis Renography (or Diuretic Radionuclide Urography) 241;
Prognosis 243

23. Pathogenesis and Management of Bleeding Disorders in Renal Failure **244**

Anil K Mandal

Types of Bleeding Manifestations 244; Pathophysiology 245;
Relevant Questions that may be Asked in Uremic Bleeding 246; Therapeutic Strategies 247

24. Renal Osteodystrophy **252**

Shalini Sundar, Arnold J Felsenfeld

Prevalence of Different Types of Renal Bone Disease 256; Key Points 269

25. An Overview of Leptospirosis: Renal and Hepatic Syndrome **271**

R Kasi Visweswaran

History 271; Microbiology and Taxonomy 271; Epidemiology 272; Pathology 273;
Pathogenesis 273; Clinical Features 274; Urinalysis 275; Blood Counts 275;
Liver Function Tests 275; Renal Function Tests 275; CSF Studies 276;
Other Investigations 276; Serological Methods 276; Differential Diagnosis 277; Prevention 277;
Management 277; Prognosis 277

26. Drug Dosing in Renal Disease **279**

Shiv K Seth, Megan M Bond

Estimation of Glomerular Filtration Rate 279; Pharmacokinetic Terms 280;
Bioavailability 280; Volume of Distribution 281; Protein Binding 281;
Elimination Coefficient and Half-Life 282; Metabolism 282; Calculation of Loading Dose 284;
Drug Dosage Adjustment in Renal Failure 284; Dialysis 284; Diffusion 284;
Convection and Ultrafiltration 287; Continuous Renal Replacement Therapy 287;
Continuous Ambulatory Peritoneal Dialysis 288; Drug-induced Nephrotoxicity 291;
Aminoglycosides 291; Angiotensin-Converting Enzyme (ACE) Inhibitors 291;
Amphotericin B 291; Nonsteroidal Anti-inflammatory Agents 292; Cisplatin 293;
Cyclosporine 293; Radiographic Contrast Media 293;
Drug-induced Crystal Formation and Nephrolithiasis 293

SECTION 4: HYPERTENSION

27. An Approach to a Patient with Hypertension **297**

Anil K Mandal

Classification of High Blood Pressure 297; Outcome of Undetected and Uncontrolled Hypertension 297; Systematic Approach to a Patient with Hypertension 300; Focus 305; Key Points 312

28. Pregnancy-related Renal Diseases and Hypertension **315**

R Kasi Visweswaran, Jacob George

Hypertensive Diseases in Pregnancy 316; Pathophysiology of Preeclampsia/Eclampsia 317; Acute Renal Failure in Pregnancy 322; Urinary Tract Infections in Pregnancy 323; Pregnancy in Pre-existing Renal Disease 324; Pregnancy and Dialysis 326; Pregnancy following Renal Transplantation 326

29. Renovascular Disease **329**

Ricardo Paz-Fumagalli

Pathophysiology 329; Epidemiology 331; Diagnostic Testing 331; Management of Renovascular Disease 335; Fibromuscular Dysplasia 340; Key Points 340

SECTION 5: GLOMERULAR DISEASE

30. Poststreptococcal Glomerulonephritis **345**

JP Tiwari, Kedareshwar PS Narvencar

Pathogenesis 345; Pathology 346; Clinical Features 346; Differential Diagnosis 347; Key Points 347

31. Nephrotic Syndrome **349**

JP Tiwari, Kedareshwar PS Narvencar

Pathogenesis 349; Classification 352; Clinical Features 353; Treatment 353; Who Develops Renal Disease? 362

32. Tuberculosis of the Kidney **365**

Jai Prakash, Biplab Ghosh

Etiologic Agent 365; Epidemiology 365; Pathogenesis 366; Pathology 367; Clinical Features 368; Diagnosis 369; Imaging 371; Differential Diagnosis 371; Management 372; Key Points 374

SECTION 6: STONE DISEASE

33. Urinary Stones **379**

Anil K Agarwal, Christopher Valentine

Pathophysiology of Stone Formation 379; Diagnosis 382; Management 384

SECTION 7: DIALYSIS AND TRANSPLANTATION

34. Technique, Practice and Complications of Hemodialysis **393**

Yijuan Sun, Karen S Servilla and Antonios H Tzamaloukas

Principles and Technique of Hemodialysis 393; Hemodialysis Practice 397; Complications of Hemodialysis 398

35. Principles of Peritoneal Dialysis: Management and Complications **406**

Jose A Diaz-Buxo, Rainer Himmele

Physiology of the Peritoneal Membrane 406; Peritoneal Solute and Water Transport 407; Assessment of Peritoneal Membrane Characteristics 407; Peritoneal Dialysis Access 408; Peritoneal Dialysis Solutions 409; Modalities of Peritoneal Dialysis 409; Adequacy and Measurement of Dialysis Dose 411; Dialysis Prescription 412; Complications of Peritoneal Dialysis 413; Clinical Outcome 417

36. Immunologic Concepts of Renal Transplantation **423**

Sanjay K Agarwal

Protein and Related Substances 423; Immunoglobulins 424; The Major Histocompatibility Complex 425; B-Cell Receptor and Antibody 426; T-Cell Receptor (TCR) 426; T-Cell Triggering 427; Specific Immune Responses of T Cells and B Cells 430; The Adhesion Molecules 431; Endothelial Cells 431; IFN-γ Production and Regulation 431; Target Injury; 432; Outcome of Allograft 432; Rejection 432; Graft Adaptation 433; Drug Modification of Immune Response 434; Azathioprine 435; Prodrugs of Mycophenolic Acid (MPA) 435; Leflunomide 435; Key Points 436

37. Diagnosis and Management of Post-transplant Medical and Surgical Complications **438**

Vinay Malhotra, Pankaj Beniwal

Surgical Complications 438; Vascular Complications 438; Urologic Complications 440; Hematuria 441; Gastrointestinal Complications 441; Infectious Complications 441; Common Infections Post-transplant 442; Hypertension 447; Metabolic Complications 447; Hematologic Disorders 448; Bone Metabolism and Disease 449; Malignancies 449; Key Points 450; List of Abbreviations 452

38. Postrenal Transplantation Late Complications Including Rejection **453**

Todd E Pesavento

Immunosuppressive Agents 453; Acute Rejection 457; Chronic Allograft Dysfunction 458; Transplantation of Incompatible Recipients 459; Hypertension 460; Diabetes Mellitus 461; Post-transplant Bone Loss 462; Infectious Complications 463; Polyomavirus 464; Post-transplant Lymphoproliferative Disorders 465; Key Points 466

SECTION 8: PEDIATRIC POPULATION

39. Management of Urinary Tract Infection in Pediatrics **469**

Udai K Kala

Classification of Urinary Tract Infection 469; Pathogenesis 470; Clinical Features of Urinary Tract Infection 471; Management of Urinary Tract Infection; 472; Key Points 475

Index *479*