

Contents

1. Physiology	1
<i>Solomon Sathish Kumar</i>	
• Pancreas	1
• Diabetes Mellitus	11
2. Introduction and Overview of Glycemic Disorders	16
<i>Nihal Thomas, Senthil Vasanth K</i>	
Part A: Epidemiology and Pathogenesis	
• Epidemiology and Evolution	16
• Pathogenesis	19
Part B: Classification and Approach	
• Classification	26
• History Taking in Diabetes	26
• Diagnosis of Diabetes Mellitus	29
• Concept of Prediabetes	29
• Concept of “The Metabolic Syndrome”	30
• Screening for Diabetes	34
• Summary of Recommendations for Adults with Diabetes Mellitus	34
• Glycosylated Hemoglobin	35
3. Practical Medical Nutritional Therapy	39
<i>Mini Joseph, Leepica Kapoor, G Sai Mala</i>	
• Goals of Nutrition Therapy	39
• Maintenance of Body Weight	39
• Macronutrients	40
• Carbohydrates	41
• Protein	43
• Fat	44
• Micronutrients	47
• Nonnutritive Sweeteners	47
• Alcohol and Diabetes	47
• Fenugreek	48
• Food Exchanges	48
• Meal Planning	48
• Carbohydrate Counting	56
• Insight from the Nutritional Studies in Vellore	59
4. Exercise	63
<i>Jubbin Jagan Jacob, Samuel Vinod Kumar</i>	
• Physiological Changes Occurring during Exercise	63
• Clinical Implications of the Effects of Exercise in Diabetes	64

• Benefits of Exercise in Patients with Diabetes	64	
• Potential Adverse Effect of Exercise in Patients with Diabetes	65	
• Exercise Prescription	66	
• Types of Physical Activity	72	
• Practical Considerations	76	
5. Counseling		80
<i>Ruchita Mehra Srivastava</i>		
• Steps in Counseling	80	
• Case Studies	91	
6. Oral Antidiabetic Agents		98
<i>Nitin Kapoor, Senthil Vasan K, Nihal Thomas</i>		
• Role of Oral Antidiabetic Agent Therapy in Type 2 Diabetes Mellitus	98	
• Biguanides	98	
• Sulfonylureas	101	
• Meglitinide	104	
• α -Glucosidase Inhibitors	105	
• Thiazolidinediones	106	
• Incretin Effect	108	
• Hydroxychloroquine in Diabetes	112	
• Sodium-Glucose Cotransporter 2 Inhibitors	112	
• Bromocriptine	114	
• Guidelines for Initiating Oral Antidiabetic Agents	115	
7. Parenteral Therapeutic Agents		124
<i>Sahana Shetty, Senthil Vasan K, Nitin Kapoor, Nihal Thomas</i>		
• Insulin Therapy	124	
• History	125	
• Classification of Insulin	125	
• Glucagon-like Peptide 1 Analogs	136	
• Amylin Analog	140	
• Case Studies	141	
8. Insulin Therapy—Practical Aspects		146
<i>Ruth Ruby Murray, Vijayalakshmi A</i>		
• Insulin Syringes	147	
• Factors that Affect Rate of Absorption of Insulin	152	
• Complications of Insulin Therapy	153	
• Barriers to Insulin Therapy	157	
• Sick-day Management	158	
• Alternative Methods of Insulin Delivery	159	
• Determining Effectiveness of Self-injection	161	
• Dose Adjustment for Normal Eating	168	
• Insulin Port (I-Port)	169	
• Flash Glucose Monitoring System	169	

9. Gadgets and Glucose Monitoring	177
<i>Felix Jebasingh K, Ruth Ruby Murray</i>	
• Self-monitoring of Blood Glucose	177
• Continuous Glucose Monitoring System	183
• Flash Glucose Monitoring System	184
• Other Gadgets Used in Diabetes	188
• Newer Upcoming Products for Diabetes-related Problems	189
10. Peripheral Neuropathy	192
<i>Mahesh DM, Thomas V Paul, Nihal Thomas</i>	
• Risk Factors	193
• Classification	193
• Pathogenesis	194
• Clinical Presentation	195
• Management	203
11. Feet, Foot Care, and Neuroarthropathy	213
<i>Riddhi Dasgupta, Bharathi S, Sunitha R, Edwin Stephen, Jubbin Jagan Jacob, Nihal Thomas, Hari Krishna Nair</i>	
Part A: Foot Care and Neuroarthropathy	
<i>Riddhi Dasgupta, Bharathi S, Sunitha R, Edwin Stephen, Jubbin Jagan Jacob, Nihal Thomas</i>	
• Ulceration	213
• Neuroarthropathy	223
• Peripheral Artery Occlusive Disease	231
Part B: Wound Care in Patients with Diabetes	
<i>Hari Krishna Nair</i>	
• Wound Assessment	238
• Wound Cleansing	239
• Debridement	239
12. Therapeutic Footwear	245
<i>Riddhi Dasgupta, Felix Jebasingh K, Judy Ann John, Bobeena Rachel Chandy, Rajan P, Premkumar R</i>	
• Foot Injury Mechanism due to Sensory Neuropathy	245
• Foot Injury Mechanism due to Motor and Sensory Neuropathy	246
• Foot Examination for Selecting Appropriate Foot Orthotics	247
• Selection of Footwear	250
13. Hypertension	269
<i>Sudeep K, Jubbin Jagan Jacob</i>	
• Obesity	271
• Renovascular Hypertension	271
• Primary Hyperaldosteronism	272
• Screening and Initial Evaluation	274
• Target Blood Pressure	274
• JNC 8 Report	275
• Nonpharmacologic Therapy of Hypertension	275
• Pharmacotherapy of Hypertension	276
• Resistant Hypertension	282

14. Nephropathy

286

Santosh Varghese, Suceena Alexander

- Risk Factors 287
- Classification 287
- Survival in Patients with Diabetic Nephropathy 289
- Pathogenesis of Nephropathy 289
- Pathology 290
- Differentiating from Other Causes of Kidney Diseases 291
- Management 292
- Renin-Angiotensin-Aldosterone System Blockade 293
- What should be Done When the GFR has Begun to Decline? 295
- Avoidance of Further Injury 297
- Supportive Treatment for the Chronic Kidney Disease Patient 298
- Investigations 300
- Renal Replacement Therapy 300
- Normoalbuminuric Chronic Kidney Disease in Diabetes 301
- Newer/Experimental Therapy for Diabetic 302

15. Macrovascular Complications in Diabetes

305

Shubhrangshu Dey, Viji Samuel, Sanjith Aaron

Part A: Cardiovascular Complications and Dyslipidemia

Subhrangshu Dey, Viji Samuel

- Epidemiology 305
- Diabetes Mellitus and Cardiovascular Disease 305
- Diabetic Dyslipidemia 311

Part B: Stroke and Diabetes

Sanjith Aaron

- Risk for Stroke in a Patient with Diabetes 317
- Primary and Secondary Stroke Prevention Strategies in Diabetics 317
- Diabetes in the Setting of Acute Ischemic Stroke 318
- Other Special Considerations in a Diabetic Patient with a Stroke 319

16. Ocular Disease and Retinopathy

321

Smitha Jasper, Saban Horo, Padma Paul

- Vision and Refraction Changes in Diabetes 321
- Diabetes and Changes in the Orbit and Extraocular Muscles 321
- Ocular Surface Changes in Diabetes 322
- Diabetes and the Lens 323
- Diabetes and Glaucoma 323
- Diabetes and the Pupil 324
- Diabetes and the Optic Nerve 324
- Acute and Chronic Causes of Vision Loss in Diabetes 325
- Diabetic Retinopathy 325

• Ophthalmoscopy	331	
• Recording of Fundus Findings	335	
17. Diabetes and Nonalcoholic Fatty Liver Disease		338
<i>Nitin Kapoor, Nihal Thomas</i>		
• Problem Statement	338	
• Natural History of the Disease and Pathophysiology	338	
• Evaluation of Nonalcoholic Fatty Liver Disease	339	
• Management of Nonalcoholic Fatty Liver Disease and Diabetes	341	
18. Autonomic Neuropathy		347
<i>Kanakamani Jeyaraman</i>		
• Epidemiology of Diabetic Autonomic Neuropathy	347	
• Pathogenesis	348	
• Clinical Manifestations of Diabetic Autonomic Neuropathy	349	
• Current Guidelines for the Diagnosis of Diabetic Autonomic Neuropathy	364	
• Management Implications of Diabetic Autonomic Neuropathy	365	
19. Infections in Diabetes		368
<i>George M Varghese, Ravikar Ralph, Abraham OC</i>		
• Specific Infections	370	
20. Cutaneous Manifestations of Diabetes Mellitus		387
<i>Anju George, Renu George</i>		
• Microangiopathies	387	
• Neurovasculopathies	391	
• Obesity- and Hyperlipidemia-related Skin Disorders	392	
• Infections	393	
• Sclerodermatous Changes	399	
• Associations with Diabetes Mellitus	401	
• Cutaneous Complications of Insulin and Oral Antidiabetic Agents	406	
21. Hyperglycemic Emergencies		409
<i>Jubbin Jagan Jacob</i>		
• Precipitating Factors	410	
• Pathophysiology of Diabetic Ketoacidosis and Hyperosmolar Hyperglycemic State	410	
• Clinical Recognition, Establishing a Diagnosis, and Assessment of Comorbidities	412	
• Diagnostic Evaluation and Laboratory Studies	413	
• Clinical Management of Diabetic Ketoacidosis and Recognition of Complications	414	
• Complications	420	
• Special Situations	421	
• Use of Inpatient Standard Management Protocols in Diabetic Ketoacidosis	423	

- Clinical Management of Hyperosmolar Hyperglycemic State 423
- Prognosis 424
- 22. Hypoglycemia 427**
Nitin Kapoor, Nihal Thomas, Jubbin Jagan Jacob
 - Clinical Classification of Hypoglycemia 427
 - Pathophysiology of Counterregulation 428
 - Causes 428
 - Clinical Recognition of Hypoglycemia 429
 - Clinical Management of Hypoglycemia 431
 - Long-term Management 433
 - Hypoglycemia-associated Autonomic Failure 433
 - Recurrent Hypoglycemia 433
 - Consequences 433
- 23. Pregnancy and Diabetes 438**
Mahesh DM, Philip Finny, Kanakamani Jeyaraman
 - Terminology 439
 - Gestational Diabetes Mellitus 441
 - Pregestational Diabetes 448
 - Management 449
 - Future Risks in Mother 454
- 24. Diabetes in Childhood and Adolescence 458**
Asha HS, Riddhi Dasgupta, Aaron Chapla, Veena V Nair
 - Epidemiology 458
 - Diagnosis 458
 - Classification 459
 - Clinical Features 462
 - Approach to Diagnosis 464
 - Management 465
 - Chronic Complications 471
 - Acute Complications 473
 - Sick-day Management 474
 - Type 2 Diabetes in Children 476
- 25. Diabetes in the Elderly 480**
Rahul Baxi, Nihal Thomas
 - Diabetes in the Older Adult: How is it Different? 480
 - Management of Diabetes in the Elderly 481
- 26. Secondary Diabetes and Other Specific Types 488**
Dukhabandhu Naik, Nitin Kapoor, Nihal Thomas
 - Classification of Secondary Diabetes 488
 - Chronic Complications in Secondary Diabetes 499
 - Other Specific Types of Diabetes 501

27. Perioperative Care	507
<i>Georgene Singh</i>	
• Metabolism at Rest	507
• Metabolic Challenge of Surgery	508
• Preoperative Management of Diabetic Patients	508
• Level of Glycemic Control	508
• Classification of the Type of Surgery	513
• Management of Diabetes	513
• Choice of Anesthesia	514
• Premedication	515
• Intraoperative Anesthetic Management of Diabetic Patients	515
• Point-of-Care Glucose Measurements	517
• Major Surgery Regimen	517
• Management of Diabetic Patients under Different Modes of Anesthesia	518
• Problems to be Anticipated in a Diabetic Patient under Anesthesia	519
• Emergency Surgery in the Diabetic Patient	521
• Special Clinical Scenarios	521
• Postoperative Management of Diabetic Patients	521
28. Obesity with Diabetes	525
<i>Nitin Kapoor, Inian Samarasam, Nihal Thomas</i>	
• Definition of Obesity	525
• Epidemiology of Obesity and its Impact on Diabetes	525
• Etiopathogenesis of Obesity	526
• Evaluation of Obesity	527
• Management	530
29. Laboratory and Analytical Methods	540
<i>Geethanjali Arulappan, Charles Stephen</i>	
• Laboratory Errors	540
• Preanalytical, Analytical, and Postanalytical Errors	541
• Role of Laboratory in Diabetes Management	544
• Available Assays	545
• Other Tests of Relevance	550
30. Recent Advances	555
<i>Sahana Shetty, Nihal Thomas</i>	
• Newer Drugs for the Management of Diabetes Mellitus	555
• Newer Incretin-based Therapies	557
• Once-weekly Dipeptidyl Peptidase-4 Inhibitors	557
• Newer Insulin Secretagogues	558
• Insulin Receptor Activators	560
• New Hepatic Targets for Glycemic Control in Diabetes	561
• Novel Insulin Formulations	563

- Bionic Pancreas 564
- Immunotherapy for Type 1 Diabetes 565
- Pancreatic Transplant and Pancreatic Islet Cell Transplantation 566
- Stem Cell Therapy 567
- Gene Therapy 569

31. In-hospital Management of Diabetes 573

Rahul Baxi, Nihal Thomas

- Effects of Hyperglycemia in Hospitalized Patients and Benefits of Glycemic Control 573
- Which Patient should We Admit? 573
- Aims and Targets 575
- Diabetes Inpatient Team 575
- Paradox: Barriers to Glycemic Control in Hospital 576
- Common Errors in Management 576
- Glucose Control 578
- Diabetes Management in the Critically Ill Patients 581

32. Integrating Systems 585

Flory Christina, Nihal Thomas, Abraham Joseph, Senthil Vasan K, Vinod Shah, Hasna Rajesh

Part A: Team Approach to the Management of Diabetes

Flory Christina, Nihal Thomas, Abraham Joseph, Senthil Vasan K

- Disease Prevention 585
- Prevention and its Importance 586
- Integrated Diabetes Clinics 587
- Functionaries of an Integrated Diabetes Clinic and their Role 588
- Improving Foot Care for People with Diabetes Mellitus: An Integrated Care Approach 592
- Diabetes Support Groups 593

Part B: Telehealth—Bridging Distances in Diabetes

Vinod Shah, Hasna Rajesh, Nihal Thomas

- Telehealth Classroom Setup 598
- Desktop Conference: Web-based Learning Method 600
- Requirements for Quality Transmission 601
- Administrative Challenges and Issues 602

Answers to All MCQs 605

Appendices 609

1. Dietary Recommendations 611
2. A Quick Guide for Choosing Footwear, MCR Add-ons and Braces 617
3. Evidence in Medicine 618
4. Diabetes Case Record 619
5. Patient Handouts and Educational Material 623

Final Assessment 629

Index 671