

10/10/10

Table of Contents

| | |
|---|----|
| 1. ANATOMY OF THE KIDNEY | 11 |
| Gross Morphology of the Kidney | 11 |
| Gross Vascular Supply of the Kidney | 13 |
| Microscopic Structure and Vascular Supply of the Nephron | 14 |
| Summary | 18 |
| 2. VOLUME AND COMPOSITION OF THE BODY FLUIDS | 20 |
| Body Water | 20 |
| Body Fluid Compartments | 20 |
| Body Fat | 25 |
| Ionic Composition of the Body Fluids | 25 |
| Summary | 39 |
| 3. ELEMENTS OF RENAL FUNCTION | 42 |
| Historical Development of Concepts | 42 |
| Proof of Glomerular Ultrafiltration | 45 |
| Proof of Tubular Reabsorption | 47 |
| Proof of Tubular Secretion | 49 |
| Summary | 50 |
| 4. THE NATURE OF GLOMERULAR FILTRATION | 52 |
| Functional Description of Glomerular Capillaries | 52 |
| Electron Microscope Description of Glomerular Capillaries | 56 |
| Summary | 59 |
| 5. CLEARANCE AND RATE OF GLOMERULAR FILTRATION | 61 |
| Clearance | 61 |
| Measurement of Glomerular Filtration Rate | 62 |
| Summary | 67 |

| | |
|---|-----|
| 6. TUBULAR REABSORPTION | 69 |
| Types of Reabsorptive Mechanism | 70 |
| Characteristics of T _m -Limited Reabsorptive Mechanisms | 71 |
| Characteristics of Passive Reabsorptive Mechanisms | 86 |
| Summary | 88 |
| 7. MECHANISMS OF REABSORPTION AND EXCRETION OF IONS AND WATER | 91 |
| Evolution of Renal Functions | 91 |
| Magnitude of Problem of Salt and Water Reabsorption | 93 |
| Reabsorption of Ions and Water in Proximal Tubule | 93 |
| Ion and Water Reabsorption in Distal Nephron | 102 |
| Summary | 113 |
| 8. TUBULAR SECRETION | 116 |
| Active Secretion by T _m -Limited Mechanisms | 116 |
| Active Secretion by Gradient-Time-Limited Mechanisms | 124 |
| Passive Tubular Secretion | 126 |
| Summary | 129 |
| 9. RENAL CIRCULATION | 131 |
| Measurement of Renal Blood Flow | 131 |
| Control of Renal Circulation | 134 |
| Renal Hormonal Factors in Blood Pressure Regulation | 140 |
| Summary | 144 |
| 10. BUFFER MECHANISMS OF TISSUES AND BODY FLUIDS | 146 |
| The Nature of Buffer Action | 147 |
| Chemical Buffering of Strong Acids and Bases in the Body | 154 |
| Chemical Buffering of Weak Acids in Vivo | 158 |
| Summary | 161 |
| 11. RENAL REGULATION OF ACID-BASE BALANCE | 163 |
| Renal Reabsorption and Excretion of Bicarbonate | 163 |
| Summary | 185 |
| 12. REGULATION OF VOLUME AND OSMOLAR CONCENTRATION OF EXTRACELLULAR FLUID | 188 |
| Regulation of Extracellular Volume | 188 |
| Regulation of Osmolar Concentration of Extracellular Fluid | 194 |
| Thirst | 199 |
| Summary | 200 |

TABLE OF CONTENTS

9

| | | |
|-----|--|-----|
| 13. | RENAL FUNCTION IN RENAL DISEASE | 202 |
| | Glomerulonephritis | 202 |
| | Pyelonephritis | 205 |
| | Nephrosis | 206 |
| | Tubular Necrosis | 207 |
| | Nephrosclerosis | 208 |
| | Toxemia of Pregnancy | 209 |
| | Congenital Disorders | 210 |
| | Summary | 213 |
| 14. | UREMIC SYNDROME | 215 |
| | Pathogenesis of Uremic Syndrome | 215 |
| | Renal Control of Erythropoiesis | 217 |
| | Treatment of Uremic Syndrome | 218 |
| | Summary | 224 |
| 15. | FUNCTIONS OF URETERS AND BLADDER | 226 |
| | Ureters | 226 |
| | Urinary Bladder | 226 |
| | Micturition | 228 |
| | Summary | 231 |
| | INDEX | 233 |