School of Medicine

DEPARTMENT OF PHYSIOLOGY
INTEGRATED PROGRAM OF MEDICINE – COURSE: MEDICAL PHYSIOLOGY

March, 2020.

1. Transport of the substance through the cell membrane, osmosis, active and passive transport
2. Potassium, physiological effects, transport through the membrane, regulation of concentration
3. Sodium, physiological effects, transport through the membrane, regulation of concentration
4. Calcium, physiological effects, transport through the membrane, regulation of concentration
5. Membrane potential
6. Action potential
7. The molecular mechanism of skeletal muscle contraction
8. The energy of muscle contraction
9. Control of the skeletal muscle contraction (motor unit, summation, stairwell effect, tetany, stiffness, denervation)
10. Neuromuscular transmission
11. Coupling of stimulation and contraction
12. Smooth muscle contraction
13. Differences between smooth and skeletal muscle, fast and slow muscle fibers
14. Nervous and hormonal control of smooth muscle contraction
15. Heart muscle physiology, action potential of the heart
16. Cardiac muscle contraction
17. Cardiac cycle
18. Regulation of cardiac output
19. Rhythmic excitation and conduction system of heart
20. Origin and control of the heart impulses
21. Normal electrocardiogram
22. Physical properties of circulation
23. Arterial pressure
24. Veins and their functions, functions of the spleen
25. Microcirculation, Straling equilibrium
26. Lymphatic system
27. Blood flow control mechanisms, humoral regulation of circulation
28. Nervous regulation of circulation and rapid control of the blood pressure
29. The role of the kidney in the regulation of pressure, the renin-angiotensin-aldosterone system
30. Hypertension
31. Regulation of cardiac minute volume and venous return
32. Measurement of cardiac minute volume
33. Blood flow through muscles and its regulation
34. Coronary blood flow
35. Heart valves and heart tones
36. Circulatory shock and physiological principles of its treatment
37. Body fluids, fluid compartments, composition, measurement
38. Intercellular fluid and edema

39. Physiological structure of the kidney, glomerular filtration
40. Renal blood flow and control
41. Juxtaglomerular apparatus and macula densa
42. Formation of urine, structure and nerve connections of the bladder
43. Reabsorption in the proximal tubule
44. Reabsorption in the distal tubule
45. Late distal tubule and cortical collecting tubule
46. Control of reabsorption in the tubules
47. Measurement of renal function using clearance
48. Control of osmolarity and sodium concentration
49. Countercurrent mechanism, osmoreceptors, ADH
50. Kidney regulation of potassium
51. Renal regulation of calcium, phosphate and magnesium
52. Integrated response to changes in sodium intake
53. Effect of hormones on kidneys (ADH, PTH, AT II, aldosterone, adrenaline, noradrenaline, endothelin, NO)
54. Composition of normal urine
55. Acidobase equilibrium, buffers
56. Acidosis (respiratory and metabolic)
57. Alkalosis (respiratory and metabolic)
58. Renal correction of acidosis and alkalosis
59. Erythrocytes and hemoglobin
60. Metabolism of iron
61. Leukocytes (granulocytes, monocyte-macrophage system and lymphocytes)
62. Innate immunity
63. Acquired immunity
64. Blood groups, transfusion, hemolytic disease of the newborn
65. Hemostasis and blood clotting
66. Prevention of blood clotting
67. Proteins in the blood
68. Pulmonary ventilation mechanics, pulmonary volumes, and capacities
69. Oxygen
70. Carbon dioxide
71. Pulmonary circulation, pulmonary capillary dynamics, pulmonary edema
72. Diffusion of oxygen and carbon dioxide through the respiratory membrane
73. Ventilation-prefusion ratio, effect on gas concentration in alveoli
74. Oxygen transport by blood
75. Role of hemoglobin in oxygen transfer
76. Carbon dioxide transport by blood
77. Regulation of respiration
78. Physiology of diving and high-altitude physiology
79. Autonomic nervous system - sympathetic nervous system
80. Autonomic nervous system - parasympathetic nervous system
81. Adrenaline and noradrenaline (chemical composition, formation, action)
82. Acetylcholine (chemical composition, formation, action)
83. Mobility, nervous control and types of functional movements of the digestive system
84. Splanchnic blood circulation, nerve flow control, blood flow in the microvilli
85. Movement and mixing of food in the digestive system
86. Salivary secretion, secretion in the stomach and pancreas
87. Excretion of bile from the liver, functions of the biliary tree

88. Composition and role of bile in digestion
89. Excretion in the small and large intestine
90. Digestion of carbohydrates
91. Fat digestion
92. Digestion of proteins
93. Absorption in the small and large intestine
94. Carbohydrate metabolism
95. Lipid metabolism
96. Protein metabolism
97. Metabolic functions of the liver
98. Physiology of bilirubin
99. Regulation of food intake
100. Obesity, malnutrition, anorexia, cachexia
101. Water soluble vitamins
102. Fat soluble vitamins
103. Metabolic energy, ATP, phosphocreatine, aerobic and anaerobic energy, oxygen debt
104. Intensity of metabolism, basal metabolism, hormonal control
105. Regulation of body temperature
106. Types of hormones and mechanism of hormone action
107. Hormones of the hypothalamus
108. Hormones of the adenohypophysis
109. Growth hormone
110. Hormones of the neurohypophysis (oxytocin and ADH)
111. Thyroid hormones
112. Synthesis and secretion of adrenal hormones
113. Functions of mineralocorticoids - aldosterone
114. Functions of glucocorticoids, adrenal androgens
115. ACTH, MSH, lipotropin, and endorphin
116. Insulin and its metabolic effects
117. Glucagon and its functions
118. Blood glucose regulation, diabetes
119. Parathyroid hormone and calcitonin
120. Regulation of calcium and phosphate metabolism; the role of vitamin D
121. Bone physiology
122. Functional structure of male sexual organs, spermatogenesis
123. Testosterone and its effects
124. Control of male sexual functions from hypothalamus and pituitary gland
125. Functional structure of female sexual organs, oogenesis
126. Menstrual cycle
127. Ovarian hormone physiology - estrogen and progesterone
128. Pregnancy, function of the placenta
129. Hormonal factors and maternal response in pregnancy
130. Lactation