Department of Physiology

Synopsis for the Final Exam in Physiology for Medical Students
Academic year 2013/2014

1. Homeostasis and homeostatic regulation. Control systems, negative feedback, and levels of physiological regulation.
3. Active transport across the cellular membrane. Transport of macromolecules and particles.
5. Physiology of excitable tissues. Transmembrane potential and resting membrane potential.
8. Physiology of synapse. Types of synapses. Neurotransmitter release by the presynaptic terminal.
12. Types of muscle contraction. Length-tension and force-velocity relationship in the skeletal muscle.
16. White blood cells: types and general characteristics. Functions of the different types of leukocytes.
18. Fibrinolytic system and physiological inhibitors of blood coagulation.
20. Lymphatic system. Formation and composition of the lymph. Functions of the spleen.
26. Regulation of cardiac function. Intracardial autoregulation. Cardiac function curves.
31. Regulation of blood flow. Local and systemic control of blood flow.
32. Regulation of arterial pressure: short-term and long-term control.
36. Pulmonary ventilation. Pulmonary volumes and capacities. Minute ventilation and alveolar ventilation.
41. Transport of carbon dioxide in the blood. Dissociation curve of carbamino-hemoglobin.
42. Regulation of respiration. Medullary respiratory centre. Chemical control of respiration: central and peripheral chemoreceptors. Reflex (non-chemical) control of respiration.
43. General overview of the gastrointestinal system. Motor function of the gastrointestinal system: segmenting and peristaltic movements, migrating myoelectric complex.
44. Chewing and swallowing. Gastric motor activity.
47. Composition and functions of the saliva and gastric juice. Regulation of saliva and gastric juice secretion.
48. Composition and functions of the pancreatic juice, bile and intestinal secretions. Regulation.
49. Digestion in the gastrointestinal system: general characteristics. Digestion of carbohydrates, proteins, nucleic acids and lipids.
50. Absorption in the gastrointestinal system: general characteristics. Absorption of the carbohydrates, proteins and lipids.
50. Absorption of electrolytes, water, vitamins and bile acids in the gastrointestinal tract.
51. Functions of the liver.
52. Metabolism: general characteristics. Carbohydrate metabolism. Regulation of blood glucose level.
53. Protein and lipid metabolism. Regulation.
55. General principles of nutrition. Essential nutrients.
56. Vitamins and minerals.
58. Thermoregulation in warm and cold environment and during acclimatization. Fever.
60. Tubular transport mechanisms. Transport in the various elements of the tubular system of the nephron. Renal clearance.
63. Physiology of the skin.
64. Volume and composition of body fluids. Water and electrolyte balance in the body.
65. Body fluid volume and osmolality dynamics. Regulation of fluid and electrolyte balance.
68. Hypothalamo-hypophyseal system. Hormones of the posterior pituitary.
69. Adenohypophyseal hormones: physiological effects and control of their secretion.
70. Thyroid hormones: mechanism of action, physiological effects and control of their secretion.
71. Adrenal cortex: hormones, physiological effects and control of their secretion.
72. Adrenal medulla: hormones, physiological effects and control of their secretion.
73. Hormones of the endocrine pancreas: physiological effects and control of their secretion.
74. Control of calcium-phosphate balance: parathyroid hormone, calcitonin and vitamin D$_3$.
75. Male reproductive system. Endocrine function of the testes and its control. Spermatogenesis.
76. Female reproductive system. Endocrine and reproductive functions of the ovaries. Regulation of the ovarian and uterine cycle.
77. Female reproductive system. Pregnancy and childbirth. Lactation.
82. Somatosensory system: afferent pathways and central processing of information.
84. Auditory system. Functional morphology of the ear. Sound transmission in the middle and inner ear. Organ of Corti.
89. Color vision. Eye movements and binocular vision.
90. Olfactory sensory system.
91. Gustatory sensory system.
93. Vestibular apparatus.
95. Motor functions of the cerebral cortex, basal ganglia, and cerebellum.
97. Physiology of sleep. Control of the sleep-wake cycle. Biological rhythms.
100. Integration of the autonomic functions. Hypothalamus. Limbic system. Physiological bases of emotions and motivation.
102. Neurophysiological basis of learning and memory.
104. Respiratory adaptation to exercise. Neuroendocrine and thermoregulatory response to exercise.
105. Effects of hypobaric and hyperbaric conditions, acceleration and weightlessness on the body.

Signed by the Head of the Department of Physiology,
Prof. R. Girchev, MD, PhD, DSc