
CONTENT

1. PHYSIOLOGY OF BLOOD	7
1.1 Methods of blood taking	7
1.2 Measurement of hematocrit value	9
1.3 The red blood cells count	11
1.4 Hemolysis	14
1.5 Measurement of erythrocyte sedimentation rate	15
1.6 The reticulocytes count	17
1.7 Determination of the hemoglobin concentration in blood	18
1.8 Calculation of mean hemoglobin content in the red cell	19
1.9 Calculation of mean corpuscular hemoglobin concentration	20
1.10 Calculation of mean red cell (corpuscular) volume	21
1.11 White blood cells count	21
1.12 Differential white blood cells count	23
1.13 Automatic evaluation of hematological parameters	25
1.14 Determination of blood groups	27
1.15 Determination of Rh factor	28
1.16 The platelets count	29
1.17 Determination of the bleeding time	31
1.18 Determination of the coagulation time	31
1.19 Measurement of the prothrombin time. Quick's method	32
1.20 Determination of the recalcification time of plasma. Howell's test	33
1.21 Retraction of coagulum	34
2. PHYSIOLOGY OF CARDIOVASCULAR SYSTEM	36
2.1 Physiological properties of the heart. Demonstration on the fish – videofilm	36
2.2 Determination of the heart borderlines by percussion	39
2.3 Auscultation of the heart. Heart sounds	41
2.4 Electrocardiography (ECG). Physiological ECG curve	41
2.5 Vectorcardiography	44
2.6 Modelling of the heart activity. Program SIM HEART	45
2.7 Evaluation of heart and pulse rates	47
2.8 Oculocardiac reflex	48
2.9 Orthostatic and clinostatic reflexes	50
2.10 Effect of an exercise on heart rate in man. Ruffier's test	51
2.11 Ewing's battery of cardiovascular tests	52
2.12 Evaluation of spontaneous heart rate variability	55
2.13 Blood pressure measurement by auscultation method	57
2.14 Blood pressure measurement by oscillometric method	59

- 2.15 Intermittent long-term monitoring of blood pressure – ABPM method 60
- 2.16 Continuous monitoring of finger arterial blood pressure
by Finometer/Portapres device 62
- 2.17 Effect of Valsalva manoeuvre on blood pressure 63
- 2.18 Effect of an exercise on blood pressure 65
- 2.19 Changes of the blood pressure in “cold-stress” test 65
- 2.20 Measurement of blood velocity by ultrasound 66
- 2.21 Evaluation of resistance of skin capillaries. Rumpel-Leed’s test 67
- 2.22 Control of cardiovascular system – program MacMAN 68
- 3. PHYSIOLOGY OF RESPIRATORY SYSTEM 70**
- 3.1 Auscultation of the lungs 70
- 3.2 Auscultation of the lungs – computer program 71
- 3.3 Pulmonary function tests – spirometry 71
- 3.4 Evaluation of forced expiratory spirogram 76
- 3.5 Pneumotachography and measurement
of the spirometric parameters by computer – aided spirometer 78
- 3.6 Determination of flow-volume loop 80
- 3.7 Evaluation of forced expiration by personal spirometer 82
- 3.8 Measurement of airway resistance (R_{aw}) 83
- 3.9 Assessment of the surfactant activity by capillary surfactometer 84
- 3.10 Measurement of oxygen consumption, determination
of ventilation equivalent, and oxygen utilisation coefficient 86
- 3.11 Gas analysis of expiratory air by oxymeter and capnograph 87
- 3.12 Determination of PO_2 , PCO_2 and acid-base balance parameters
in the capillary blood. Astrup’s method 88
- 3.13 Measurement of oxygen saturation of hemoglobin by pulse oxymetry 90
- 3.14 Chemical control of breathing 91
- 3.15 Control of breathing – program MacPUF 92
- 3.16 Measurement of nasopharyngeal mucociliary transport in man 94
- 4. PHYSIOLOGY OF GASTROINTESTINAL SYSTEM 96**
- 4.1 Demonstration of ptyalin effects in saliva 96
- 4.2 Measurement of swallowing time 97
- 4.3 Examination of composition of gastric juice – free and total acidity 98
- 4.4 Determination of glycemia by glucometer 99
- 5. METABOLISM 101**
- 5.1 Measurement of basal metabolic rate 101
- 5.2 Measurement of metabolic rate during physical work 106
- 5.3 Basic anthropometric measurement 107
- 5.4 Estimation of daily requirements for energy and nutrients 110
- 5.5 Estimation of daily expenditure of energy 113

6. PHYSIOLOGY OF KIDNEYS	118
6.1 Renal function tests	118
6.2 Investigation of urine by diagnostic test strips	122
6.3 Microscopic investigation of urinary sediment	123
6.4 Control of urine excretion – computer program MacPEE	124
7. PHYSIOLOGY OF SKELETAL MUSCLES	126
7.1 Modelling of the muscle activity – program SIM MUSCLE	126
7.2 Measurement of skeletal muscles strength in humans	129
8. SENSORY PHYSIOLOGY	131
8.1 Ophthalmoscopy	131
8.2 Pupillary light and accommodation reflex	132
8.3 Photostress test	133
8.4 Examination of the field of vision	134
8.5 Examination of astigmatism	136
8.6 Evidence of blind spot	137
8.7 Colour mixing	137
8.8 Contrasts in the colour vision	138
8.9 Otoscopy	139
8.10 Rinne's, Weber's, Schwabach's tests	140
8.11 Anterior rhinoscopy	141
8.12 Evaluation of smell perception. Olfactometry	142
8.13 Evaluation of taste perception	143
8.14 Investigation of skin sensitivity	144
8.15 Space perception by tactile sense and stereognosis	146
9. PHYSIOLOGY OF CENTRAL NERVOUS SYSTEM	148
9.1 Examination of some somatic reflexes in humans	148
9.2 Examination of cerebellar functions	150
9.3 Laterality of brain hemispheres	151
9.4 Modelling of the nerve activity – program SIM NERVE	152
9.5 Measurements of the reaction time	154
9.6 Short-term memory test	155
9.7 Testing of learning abilities	157
9.8 Testing of psychomotor rate	158
10. REFERENCES	160