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Edited by Novikova V.I., Lysenko I.M.

LABORATORY INDICES IN AGE ASPECT IN PEDIATRICS (IN TABLES)

A HANDBOOK

for IV-VI- year students of medical universities, doctors - probationers, pediatricians

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The handbook «Laboratory indices in age aspect in pediatrics (in tables)» is intended for 4-6- year students of medical universities doctors - trainees, pediatricians. In the edition it is possible to find answers to all the questions of interest for the doctor, normative age parameters of functioning of various organs and systems.

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INTRODUCTION

The group of authors started writing the manual with the purpose of collecting all normative indices of various organs and systems functioning in age aspect to simplify educational process on pediatrics and provide help for beginning doctors in their work.

The knowledge of normative laboratory indices will allow students, doctors - trainees, pediatricians to correctly estimate seriousness of the patient's state, to fix in time the beginning of disease, correctly to estimate quality of treatment, efficiency of those or other remedies applied.

Timely beginning of therapy and adequate treatment will result in reduction of treatment duration and stay of patients in hospital. It will also reduce time parameters of parents' temporary disability because of them being on sick-leave to take care of their sick children. This approach will allow to decrease case fatality rate, death rate and the number of children initially qualified as disabled, which will improve the quality of life of small patients.

The group of authors

I. Blood system

Table 1. Peripheral blood

Index	Age				
	1-2 day	3-6 day	12-28 day	infant	early age
Hemoglobin (g/l)	190-210	180-200	160-167	120-125	120-126
Erythrocytes (cell*10^{12}/l)	5,1-5,8	5,0-5,5	4,9-5,0	4,5-4,6	4,5-4,7
Color index	1,2	1,3	1,1	0,8-0,9	0,9-0,95
Leukocytes (cell *10^9/l)	20-28	13,6-18	10-12	10-11	11-12
Thrombocytes (cell*10^9/l)	190-200	230-250	240-250	200-230	250-260
Reticulocytes (‰)	26	10-11	8-8,5	7-7,4	7,3-7,5
ESR(mm/hr)	2,5	2,5	2,7-3,0	6-7	7,5-8
Hematocrit (%)	56	53	40	35	35-37

Index	Age			
	under school age	school age	teenage	adults
Hemoglobin(g/l)	127-130	125-130	130-140 (girls)	120-140 (girls)
			140-145 (boys)	130-160 (boys)
Erythrocytes (cell*10^{12}/l)	4,6-4,7	4,6-4,8	4,7-4,8(girls)	3,9-4,7(girls)
			5,0-5,2(boys)	4-5(boys)
Color index	0,9-0,95	0,95-1,0	0,95-1,0	0,85
Leukocytes(cell*10^9/l)	9-10	8-9	7-8	4,4-9
Thrombocytes (cell*10^9/l)	190-260	180-250	200-300	180-320
Reticulocites (‰)	6,5-7	5-7	6,8-7,0	2-10
ESR (mm/hr.)	8-9	8-10	8-10	2-10
Hematocrit (%)	38-40	38-40	40-42(girls)	36-42(girls)
			43-47(boys)	40-54(boys)

Table 2. Leucocytic formula

Index (%)	Age				
	1-2 day	3-6 day	12-28 day	infant	early
Myelocytes	0,5	0,5	0	0	0
Metamyelocytes	4	2,5-3,0	0,5-1,0	0	0,5
Neutrophils:					
stab	25,5-27	7-9	2.5-3,5	3,5-4	3,5-4
segmented	34,5-36	34-40	22-30	25-28	38-41
Eosinophils	2,0-2,5	3-3,2	2,5-3,0	1,5-2,0	1,5-2,0
Basophils	0,25-0,30	0	0,4-0,5	0,3-0,4	0,3-0,4
Lymphocytes	24-26	30-40	60-68	50-54	40-44
Monocytes	9-10	10-11	9-10	10-11	9-10

Index (%)	Age			
	under school age	school age	teenage	adults
Myelocytes	0	0	0	0
Metamyelocytes	0.25-0,3	0.25-0,3	0	0
Neutrophils:				
stab	3-4	3-4	2,5-4	1-6
segmentated	40-42,5	40-45	48-58	47-72
Eosinophils	1,0-2,0	1,0-2,0	1,0-4,0	0,5-5
Basophils	0,4-0,5	0,4-0,5	0-0,3	0-1
Lymphocytes	40-44	39-42	28-36	19-37
Monocytes	8-9	8-9,5	8-9	3-11

Table 3. Erythrocyte characteristics

Index	Age				
	1-2 day	3-6 day	12-28 day	infant	early age
Osmotic resistance of erythrocytes					
- minimum(%)		0,40-0,42	0,46-0,48	0,48-0,52	0,44-0,48
- maximum(%)		0,32-0,34	0,34-0,38	0,36-0,40	0,36-0,40
Mean diameter of erythrocytes (μm)	7,92-7,98	8,2-8,3	7,8-8,0	7,0-7,35	7,3-7,39

Index	age			
	under school	school	teenage	adults
Osmotic resistance of erythrocytes (%)				
- minimum	0,44-0,48	0,44-0,48	0,46-0,48	0,48-0,46%
- maximum	0,36-0,40	0,36-0,40	0,34-0,32	0,34-0,32%
Mean diameter of erythrocytes (μm)	7,3-7,6	7,34-7,49	7,5-7,7	7,8-7,9

Table 4. Lymphoadenogram

Type of cells (%)	Age								
	1-2 day	3-6 day	12-28 day	ifant	early	under school	school	teenage	adults
Lymphoblasts	0-5	0-5	1-5	1-5	2-4	2-4	2-3	2-3	2
Prolympho-cytes	25-30	20-34	15-22	10-18	10-12	8-10	6-8	4-6	3,4
Lymphocytes	16-20	24-32	20-30	20-30	28-36	40-44	50-62	64-70	91

Table 5. Morphologic characteristics of sternal puncture content

Cell elements (%)	Age				
	1-2 day	3-6 day	12-28 day	infant	early
Nondifferentiated blasts	0,17-0,97	0,17-0,97	0,05-2,1	0-1,72	0,04-1,08
Myeloblasts	0,22-2,0	0,7-2,5	0,6-2,65	1,45-2,65	0,7-3,0
Neutrophils:					
promyelocytes	4,8-6,9	4,8-6,9	4,5-6,5	4,4-6,5	2,8-5,7
metamyelocytese	10,1-14,2	6,5-11,4	6,4-10,8	9,3-14,4	8,4-11,8
segmentated	5,8-9,7	4,9-7,8	4,9-7,8	6,8-10,2	7,1-8,5
	16,3-23	16,4-23,5	13,1-19,0	17,6-20,1	13,4-25,0
	10,7-16,8	9-10,1	9-10,2	8,3-16,2	13,2-22,5
Eosinophilic myelocytes	0,12-1,0	0,08-0,85	0,07-0,64	0,09-0,73	0,09-0,85
Basophils of all generations	0,02-0,27	0-0,22	0-0,28	0-0,09	0-0,13
Monocytes	0	0-0,2	0-0,14	0-1,012	0,012-0,017
Lymphocytes	9,7-16,7	10,0-16,8	10,0-16,4	10,2-16,3	6,6-13,6
Plasmatic cells	0	0	0-0,2	0-0,05	0-0,015
Erythroblasts	1-2,06	1-2,08	1,5-3,0	0,9-2,4	0,75-1,9
Normoblasts (normocytes):					
basophilic	2,5-3,3	2,1-4,5	2,0-4,8	1,7-3,4	1,44-3,4
polychromatophilic	4,8-7,7	8,7-14,2	8,6-15,03	7,6-10,6	7,4-11,2
oxyphilic	5,44-7,26	5,4-7.0	4,9-8,0	5,5-7,2	5,3-7,6
Reticular cells	0,3-1,5	0,14-1,3	0,35-2,2	0,4-2,03	0,05-1,08
Myelokaryocytes (*10^9/l)	120-234	115-238	195-330	245-355	170-285
Megakaryocytes (*10^9/l)	0,0706-0,1074	0,0648-0,1076	0,07-0,16	0,053-0,1138	0,054-0,1211

Cell elements	Age			
	underschool	school	teenage	adults
Undifferentiated blasts	0,01-0,6	0,01-0,6	0,02-0,9	0,1-1,1%
Myeloblasts	0,7-6,0	0,4-2,0	0,2-2,4	0,2-1,7%
Nuetrophilic:				
promyelocytes	0,5-4,0	0,5-4,0	1-4,2	1,0-4,1%
myelocytes	4,0-13,2	4,5-14,4	7,5-13,6	7,0-12,2%
metamyelocytes	8-14	8,5-16,2	8-19,1	8,0-15,0%
stab	13,1-16,8	8,5-17,1	10-19,5	12,8-23,7%
segmentated	10-20,2	10-20,2	12-23,5	13,1-24,1%
Eosinophilic myelocytes	0-3,5	0-3,3	0-3,6	0,5-4,2%
Basophils of all generations	0-0,5	0-0,6	0-0,6	0-0,5%
Monocytes	0-0,25	0-0,3	0-0,3	0-0,7%
Lymphocytes	2,0-8,0	2,0-8,5	2,0-8,0	4,3-13,7%
Plasmatic cells	0-0,25	0-0,28	0-0,3	0,1-1,8%
Erythroblasts	0,5-1,5	0,55-1,6	0,55-1,5	0,2-1,1%
Normoblasts (normocytes):				
basophilic	1,4-3,0	1,65-3,44	1,6-3,1	1,4-4,6%
polychromatophilic	8,0-12,3	10,2-18,1	11-20	8,9-16,9%
oxyphilic	4,8-6,7	3,1-6,2	0,9-7,9	0,8-5,6%
Reticular cells	0,34-2,1	0,1-1,7	0,1-1,5	0,1-1,6%
Myelokaryocytes	120-244,4	90,0-410,2	65,0-305-2	41,6-195*10^9/l
Megakaryocytes	0,018-0,260	0,018-0,270	0,06-0,16	0,05-0,15*10^9/l
Leukoerythroblast ratio				2,1-4,5%

Table 6. Splenogram (counted in one 1000 cells)

Type of cells (%)	Age		
	school	teenage	adults
Lymphoblasts	0,2-0,8	0,2-0,8	0-0,2
Prolymphocytes	0,85-6,2	0,9-7,0	1-10,5
Lymphocytes	56-82	58-85	57-84,5
Reticular cells	0,5-2,0	0,5-2,0	0,5-1,8
Plasmacytes	0,24-0,31	0,2-0,3	0-0,3
Erythrokaryocytes	0,9-1,4	0-0,15	0-0,2
Muelocytes	0,2-0,4	0,2-0,4	0-0,4
Metamyelocytes	0-0,1	0,1	0-0,1
Neutrophilic granulocytes	0,85-5,9	0,9-6,5	1,0-7,0
Eosinophilic granulocytes	0,1-1,32	0,1-1,3	0,2-1,5
Basophilic granulosytes	0,1-0,75	0,1-0,9	0,1-1,0

Table 7. System of blood coagulation and fibrinolysis

Index	Age				
	1-2 day	3-6 day	12-28 day	infant	early age
Suharev'sblood coagulation time test:					
venous (min.)	4-12	4-12	4-12	4-12	4-11
capillary (according to Suharev) (min.)	Start- 1 End- 4	Start- 1 End 4	Start-1 End- 5	Start- 1 End- 5	Start- 1 End- 5
Duke's test for Bleeding time(accord. to Duke) (min.)	2-4	2-4	2-4	2-4	2-4
RT (recalcification time) (sec.)	60-120	60-120	60-120	60-120	60-80
APTT (activated partial thromboplastin time) (sec.)	42,9-54,0	40,6-52,0	40,4-53,0	35,5-49,0	30,0-50,0
PTI (prothrombin index) (%)	80-95	80-95	80-95	80-95	85-100
ISR (international standardized ratio)	0,8±0,1	0,85±0,2	0,9±0,15	0,8-1,1	0,8-1,1
Fibrinogen (g/l)	1,67-3,99	1,62-4,62	1,62-3,78	1,5-3,79	1,9-3,8
Fibrinolysis (euglobulin clot lysis time) (hr.)	>2,5	>2,5	>3	>3	>3
TT (thrombin time) (sec.)	19-28,3	18-29,2	19,4-29,2	19,8-31,2	20-30
TT with protamine sulphate (PTT)	10,1-15,9	10,0-15,3	10,0-14,3	10,7-13,9	12-14
RT	15±2,3	14±3,6	18±3,2	19±3,0	18±1,2
AT-III (antithrombin III) (reference unit)	39-60	40-80	40-70	60-80	60-80
Factor XIII (fibrin-stabilizing factor) (IU/ml)	0,27-1,31	0,44-1,44	0,39-1,47	0,46-1,62	0,47-1,59
Reaction of plasma clot (μg/ml)	<15	<15	<10	<10	<10
FDP (fibrinogen degradation p.'s)	89±11	101±26	132±26	156±32	157±34
FDP (D-dimer) (mg/ml)	<0,35	<0,4	<0,4	<0,4	<0,4
Aggregation of thrombocytes when stimulated with ADP: (in 1 μl)	1,2±0,9	0	0	0	0
with Collagen	30,6±5,3	25,5±2,1	28,7±1,3	28,7±1,3	28,7±1,3
with Ristomycinum					
Activity of factor II (of prothrombin) (%)	67,0±4,0	71,2±2,8	86,8±1,7	90,2±5,4	90,2±5,4
V (of proaccelerin) (%)	92,9±3,4	86,8±1,0	80,6±0,9	92,9±3,4	92,9±3,4
VIII (%)	101,8±4,1	84,7±1,8	81,0±1,1	101,8±4,1	101,8±4,1
X (%)	61,9±1,5	63,5±2,3	60,3±2,2	61,9±1,5	61,9±1,5
VII (%)	71,9±1,2	75,6±2,8	67,6±1,3	71,9±1,2	71,9±1,2

Index	Age			
	under school	school	teen age	adults
Blood coagulation time:				
venous(min.)	4-11	5-10	5-10	5-10 min
capillary(according to Suharev) (min.)	Start- 2 End- 5	Start - 2 End- 5	Start- 2 End– 5	start– 30sec.- 2min, end-3-5 min
Bleeding time (accord. to Duke) (min.)	2-4	2-4	2-4	2-3 min
RT(recalcification time) (sec.)	50-70	50-70	50-70	50-70 sec.
APTT (activated partial thromboplastin time) (sec.)	36-50	36-50	36-50	32-49 sec.
PTI (prothrombin index) (%)	85-100	85-100	85-100	85-110%
ISR (international standardized ratio)	0,8-1,1	0,8-1,1	0,8-1,1	0,86-1,18
Fibrinogen (g/l)	2,0-4,0	2,0-4,0	2,0-4,0	2,0-4,0 g/l
Fibrinolysis(euglobulin clot lysis time) (hr)	>3	>3	>3	>3 hr.
TT (thrombin time) (sec.)	12±3,4	13±2,1	19±1,2	28-22 sec.
TT with protamine sulphate (PTT)	14±2,3	16±3,2	17±4,2	18-22
RT	80-120	80-120	80-120	80-120%
AT-III (antithrombin III) (reference unit)	40-50	40-50	40-50	40-50 reference units.
Factor XIII (fibrin-stabilizing factor)	III-IV	III-IV	III-IV	III-IV ст.
Reaction of plasma clot (μg/ml)	<10	<10	<10	Less than10 μg/ml
FDP(fibrinogen degradation p.'s) (ng/ml)	100±2.1	121±2.6	152±3.4	<250 ng/ml
FDP(D-dimer) (mg/ml)	<0,4	<0,4	<0,5	<0,5
Agregation of thrombocytes when stimulated with ADP: (in 1 μl)	80-86	80-86	80-98	80-100%
with Collagen	80-100	80-100	80-100	80-100%
with Ristomycinum				
Activity of factor II (of prothrombin) (%)	90,2±5,4	90,2±5,4	90,2±5,4	85-110%
V(of proaccelerin) %	92,9±3,4	92,9±3,4	92,9±3,4	85-110%
VIII (%)	101,8±4,1	101,8±4,1	101,8±4,1	80-100%
X (%)	61,9±1,5	61,9±1,5	61,9±1,5	60-130%
VII (%)	71,9±1,2	71,9±1,2	71,9±1,2	65-135%

Table 8. Testing of blood group in ABO system with standard serums and standard erythrocytes

Tested blood belongs to group	Result of reaction with standard serums				Result of reaction with standard erythrocytes		
	0αβ (I)	Aβ (II)	Bα (III)	AB (IV)	0αβ (I)	Aβ (II)	Bα (III)
0 (I)	-	-	-	-	-	+	+
A (II)	+	-	+	-	-	-	+
B (III)	+	+	-	-	-	+	-
AB (IV)	+	+	+	-	-	-	-

II. Uroscopy

Table 9. Physical characteristics of urine

Index	Age				
	1-2 day	3-6 day	12-28 day	infant	early
Amount of urine in 24 hours (ml/kg/hr.)	0,5	0,5-1,5	2-2,5	3,5-2,5	2-2,5
Relative density in a morning portion	1010-1012	1010-1012	1002-1004	1014-1018	1014-1020
Color	Straw-coloured	Straw-coloured	Straw-coloured	Straw-coloured	Straw-coloured
Transparency	Transparent	Transparent	Transparent	Transparent	Transparent

Index	Age			
	under school	school	teen age	adults
Amount of urine in 24 hours	2-1,7	1,4	1,4	800-2000 ml
Relative density in a morning portion	1018-1021	1020-1024	1022-1024	1020-1026
Color	Straw-coloured	Straw-coloured	Straw-coloured	Straw-coloured
Transparency	Transparent	Transparent	Transparent	Transparent

Table 10. Chemical composition of urine

Index	Age				
	1-2 day	3-6 day	12-28 day	infant	early
Reaction	Subacid	Subacid	Subacid - neutral	Neutral - alkalescent	Neutral - alkalescent
Protein	traces	traces	absent	absent	absent
Glucose	absent	absent	absent	absent	absent
Acetone	absent	absent	absent	absent	absent
Ketone bodies	absent	absent	absent	absent	absent
Urobilin bodies	absent	absent	absent	absent	absent
Bilirubin	absent	absent	absent	absent	absent
Uric acid	absent	absent	absent	sporadic appearance of salts	sporadic appearance of salts
Purine bases (mg/24hr.):					
Hypoxanthine	3-3,4	2,4-3,1	2,8-3,2	4,4-4,7	4,4-6,0
Xanthin	2,6-2,8	2,7-3,0	3,1-3,4	3,1-3,9	2,9-4,3
Urea (mmol/l)	280-330	290-350	340-380	340-380	350-430
Creatinine (mmol/24hr.)	5,2-12,1	5,6-11,8	6,2-12,4	6,2-12,4	6,4-13,8
α- amylase (g/(hr * l))	0,012-0,018	0,018-0,024	0,024-0,030	Up to 0,032	Up to 0,032
Uropepsin (mg/24hr)	24-65	26-68	32-72	34-76	34-76
Potassium (mmol/24hr)	62-78	64-80	66-80	64-80	68-88
Sodium (mmol/24hr)	40-62	50-82	50-88	56-90	68-100
Chlorine (mmol/l)	60-110	70-110	80-150	80-150	100-170
Inorganic phosphorum (mmol/24hr)	0,016-0,020	0,016-0,022	0,016-0,024	0,016-0,026	0,016-0,028

Index	Age			
	under school	school	teen age	adults
Reaction	Neutral-subacid	Neutral - subacid	Neutral - subacid	Neutral or subacid
Protein	0,002-0,006	0,002-0,006	0,002-0,006	Up to 0,017-0,03
Glucose	absent	No more than 0,15 g/l	No more than 0,15 g/l	No more than 0,15 g/l
Acetone	absent	absent	absent	absent
Ketone bodies	absent	absent	absent	absent
Urobilin bodies	absent	absent	absent	absent
Bilirubin	absent	absent	absent	absent
Uric acid	sporadic appearance of salts	sporadic appearance of salts	1,05-2,8 mmol/24hr.	1,62-3,6 mmol/24hr.
Purine bases (mg/24hr.):				
Hypoxanthine	6,5-7	6,5-7,5	8,5-9,5	9,7 mg/24hr.
Xanthin	2,7-4,2	3,8-4,7	4,9-5,4	6,1 mg/24hr.
Urea (mmol/l)	280-360	350-580	350-580	333,0-582,8 mmol/24hr.
Creatinine (mmol/24hr.)	6,8-15,9	6,8-15,9	7,1-17,7	4,4-17,7 mmol/24hr.
α- amylase (g/(hr. *l))	Up to 0,038	Up to 0,041	Up to 0,044	Up to 0,044 g/(hr.*l)
Uropepsin (mg/24hr.)	30-72	36-78	36-78	38-96 mg/24hr.
Potassium (mmol/24hr.)	74-96	76-98	80-100	38,4-76,7 mmol/24hr.
Sodium (mmol/24hr.)	70-100	70-100	80-120	130,5-261,0 mmol/24hr.
Chlorine (mmol/l)	120-180	120-220	120-220	150-250 mmol/l

Table 11. Urinary sediment

Index	Age				
	1-2 day	3-6 day	12-28 day	infant	early
Epithelial cells (squamous or transitional epithelium)	0-1	0-3	0-3	1-3	1-4
Leucocytes	0-1	0-1	1-2	1-2	1-2
Erythrocytes	absent	absent	absent	absent	absent
Cylinders	absent	absent	absent	absent	absent
Mucus	absent	absent	absent	absent	absent
Bacteria	absent	absent	absent	absent	absent

Index	Age			
	under school	school	teen age	adults
Epithelial cells (flat or transient epithelium)	1-4	1-4	0-4	0-3 in sight
Leucocytes:				
- boys	Sporadic	1-2	1-2	0-2 in sight
- girls	Sporadic	2-3	2-3	1-2 in sight
Erythrocytes	Sporadic	Sporadic	Sporadic	Sporadic
Cylinders	absent	absent	No or sporadic hyaline casts	No or sporadic hyaline casts
Mucus	absent	absent	absent	absent
Bacteria	absent	No more than 1200 in1 ml	No more than 1800 in1 ml	No more than 2000 in1 ml

Table 12. Kakovsky-Addis's method

In 24-hour amount of urine there are:	Age				
	early	under school	school	teen age	adults
Leucocytes	Up to $2*10^6$/day	Up to $2*10^6$/day	Up to $2*10^6$/day	Up to $2*10^6$/day	Up to $2*10^6$/day
Erythrocytes	Up to $1*10^6$/day	Up to $1*10^6$/day	Up to $1*10^6$/day	Up to $1*10^6$/day	Up to $1*10^6$/day
Cylinders	Up to $2*10^4$/day	Up to $2*10^4$/day	Up to $2*10^4$/day	Up to $2*10^4$/day	Up to $2*10^4$/day

Table 13. Nechiporenko's method

In 1 ml of urine there are:	Age				
	1-2 day	3-6 day	12-28 day	infant	early
Leucocytes	Up to 1500	Up to 1500	Up to 1500	Up to 2000	Up to 2000
Erythrocytes	Up to 1200	Up to 1200	Up to 1200	Up to 1000	Up to 1000
Cylinders	Up to 16-18	Up to 16-18	Up to 16-18	Up to 16-18	Up to 16-18

In 1 ml of urine there are:	Age			
	under school	school	teen age	adults
Leucocytes	Up to 1800	Up to 1800	Up to 2000	Up to 2000
Erythrocytes	Up to 800	Up to 1000	Up to 1000	Up to 1 000
Cylinders	Up to 20	Up to 20	Up to 20	Up to 20

Table 14. Functional examination of kidneys

Name of test	Age			
	under school	school	teen age	adults
Folgard's test for dilution	More than 50% of the liquid consumed is emitted in 2 hr., the rest – in 3-4 hr. Relative density decreases to 1001-1003, amount of urine in portions 50-500ml	More than 50% of the liquid consumed is emitted in 2 hr., the rest – in 3-4 hr. Relative density decreases to 1001-1003, amount of urine in portions 50-500ml	More than 50% of the liquid consumed is emitted in 2 hr., the rest – in 3-4 hr. Relative density decreases to 1001-1003, amount of urine in portions 50-500ml	More than 50% of the liquid consumed is emitted in 2 hr., the rest – in 3-4 hr. Relative density decreases to 1001-1003, amount of urine in portions 50-500ml
Folgard's test for concentration	Amount of urine in portions of 50-60 ml, relative density in 4-8 hr. reaches 1020-1024	Amount of urine in portions of 50-60 ml, relative density in 4-8 hr. reaches 1028-1035	Amount of urine in portions of 50-60 ml, relative density in 4-8 hr. reaches 1028-1035	Amount of urine in portions of 50-60 ml, relative density in 4-8 hr. reaches 1028-1035
Zimnitskii's test	Twenty four hours' amount of urine is 65-75% of the liquid consumed. Daily diuresis is ⅔-¾ of a 24-hour amount. Relative density 1004-1018	Twenty four hours' amount of urine is 65-75% of the liquid consumed. Daily diuresis is ⅔-¾ of a 24-hour amount. Relative density 1004-1024	Twenty four hours' amount of urine is 65-75% of the liquid consumed. Daily diuresis is ⅔-¾ of a 24-hour amount. Relative density 1004-1024	Twenty four hours' amount of urine is 65-75% of the liquid consumed. Daily diuresis is ⅔-¾ of a 24-hour amount. Relative density 1004-1024
Peberg's test	Glomerular filtration 75-125 mg/min Reabsorption 98,2-98,8%	Glomerular filtration 75-125 mg/min Reabsorption 98,2-98,8%	Glomerular filtration 75-125 mg/min Reabsorption 98,2-98,8%	Glomerular filtration 75-125 mg/min Reabsorption 98,2-98,8%
Indigo carmine test	Emission of colored urine in 5-10 min.	Emission of colored urine in 5-10 min.	Emission of colored urine in 5-10 min.	Emission of colored urine in 5-10 min.

III. Intestinal contents

Table 15. Physical properties

Index	Age				
	1-2 day	3-6 day	12-28 day	infant	early
Amount of urine in 24 hours	3-5 times 40-50g each time	3-4 times 40-50g each time	3-4 times 50-60g each time	2-3 times 70-80g each time	200-250
Consistence	homogenous	inhomogeneous	homogenous	homogenous	homogenous
Form	fluid pulp	fluid pulp	pulplike	pulplike	pulplike - shaped
Colour	dark green	transitional	peach	yellow	yellow-brown
Reaction	acid	Acid or alkalescent at feeding with cow milk			neutral or alkaline
Mucilage	found	found	found	absent	absent
Blood	absent	absent	absent	absent	absent

Index	Age			
	under school	school	teen age	adults
Amount of urine in 24 hours	250-280	250-300	300-400	250-400 g
Consistence	homogenous	homogenous	homogenous	homogenous
Form	cylindric	cylindric	cylindric	cylindric
Colour	brown	brown	brown	brown
Reaction	neutral or alka-lescent	neutral or alka-lescent	neutral or alka-lescent	neutral or alka-lescent
Mucilage	absent	absent	absent	absent
Blood	absent	absent	absent	absent

Table 16. Microscopy of fecal matter

Index	Age				
	1-2 day	3-6 day	12-28 day	infant	early
Muscle fibers	Are not found	Are not found	Are not found	Are not found	Digested
Connective tissue	Absent	Absent	Absent	Absent	Absent
Neutral fat	Absent	Absent	Absent	Absent	In a small amount
Fatty acids and soaps	Absent	Absent	Absent	In a small amount	In a small amount
Vegetable cellulose:					
digestible	Absent	Absent	Absent	sporadic cells	sporadic cells
indigestible			Are found in different quantities depending on the character of feeding		
Starch	Absent	Absent	Absent	Small amount	Small amount
Detritus				Depends on the character of feeding	
Mucus, epithelium	Small amount	Small amount	Small amount	Absent	Absent
Leucocytes	10-15	10-15	8-10	6-10	6-10

Index	Age			
	under school	school	teen age	adults
Muscle fibers	Digested	Digested	Digested	Absent or digested, without cross striation
Connective tissue	Sporadic fibres	Sporadic fibres	Sporadic fibres	Absent or sporadic fibres
Neutral fat	In a small amount	In a small amount	In a small amount	Absent or in a small amount
Fatty acids and soaps	In a small amount	In a small amount	In a small amount	In a small amount
Vegetable cellulose:				
digestible	Sporadic cells or cell groups	Sporadic cells or cell groups	Sporadic cells or cell groups	Sporadic cells or cell groups
indigestible	In different amounts	In different amounts	In different amounts	In different amounts
Starch	Absent	Absent	Absent	Absent
Detritus	Is in various amounts depending on the character of feeding			
Mucus, epithelium	Absent	Absent	Absent	Absent
Leucocytes	6-10	6-8	Sporadic	Sporadic

IV. Saliva

Table 17. Physical properties

Index	Age				
	1-2 day	3-6 day	12-28 day	infant	early
Amount	Small	Small	Small	150-200	150-250
Relative density	1000-1002	1000-1002	1000-1002	1002-1004	1002-1004
pH	Neutral	Neutral	Neutral	Neutral	Neutral or subacid

Index	Age			
	under school	school	teen age	adults
Amount	150-250	250-450	800-1000	1000-1500ml/24hr.
Relative density	1004-1006	1004-1006	1004-1008	1002-1008
pH	Alkalescent-subacid	Alkalescent-subacid	Alkalescent-subacid	6,0-7,9

Table 18. Chemical composition

Index	Age				
	1-2 day	3-6 day	12-28 day	infant	early
Nitrogen (non- protein) (mmol/l)	0,9-1,1	0,9-1,1	0,9-1,2	1,2-2,4	1,5-2,9
Ammonia (μmol/l)	0,9-1,5	1,0-1,5	1,0-2,5	1,0-3,1	1,0-3,2
Protein (g/l)	0,08-0,12	0,08-0,12	0,12-0,16	0,16-0,20	0,18-0,26
Calcium (total) (mmol/l)	0,2-0,4	0,4-0,6	0,6-0,7	0,6-0,8	0,8-1,0
Carbonates (ml /100 ml)	4-6	6-8	12-14	14-16	16-18
Urinary acid (mmol/l)	0,030-0,040	0,030-0,040	0,040-0,048	0,040-0,050	0,040-0,060
Urea (mmol/l)	1,2-1,6	1,2-1,6	1,2-1,6	1,4-1,8	1,4-1,8
Potassium (mmol/l)	10-18	11-18	12-17	13-18	14-19
Sodium (mmol/l)	1,2-8,0	1,4-9,0	1,8-13,6	1,8-14,0	2,0-14,0
Phosphorus of lipids (mmol/l)	-	-	0,0011-0,0015	0,0011-0,043	0,0011-0,044
Phosphorus inorganic (mmol/l)	-	-	2,1-3,2	2,4-5,9	2,9-6,5
Chlorides (mmol/l)	-	-	4,3-4,9	4,6-5,7	4,7-6,8
Cholesterol (mmol/l)	traces	traces	0,06-0,1	0,06-0,12	0,08-0,21

Index	Age			
	under school	school	teen age	adults
Nitrogen (non- protein) (mmol/l)	3,2-4,1	3,5-5,9	5,1-9,2	9,28
Ammonia (μmol/l)	1,0-3,9	1,1-4,6	1,2-5,5	1,2-6
Protein (g/l)	0,2-0,32	0,2-0,4	0,2-0,4	0,2-0,4
Calcium (total) (mmol/l)	0,8-1,0	1-2	1-2	1-2
Carbonates (ml /100 ml)	16-18	18-32	20-48	20-45
Urinary acid (mmol/l)	0,060-0,080	0,060-0,080	0,080-0,088	0,088
Urea (mmol/l)	1,4-1,6	1,4-1,6	1,6-1,8	1,83
Potassium (mmol/l)	16-20	18-22	19-22	19-23
Sodium (mmol/l)	4,0-16,5	4,0-18,5	5,0-20,5	5,2-24,4
Phosphorus of lipids (mmol/l)	0,0014-0,051	0,0014-0,051	0,0016-0,059	0,0016-0,064
Phosphorus inorganic (mmol/l)	3,1-7,45	3,1-7,6	3,1-7,8	3,2-8,08
Chlorides (mmol/l)	7,5-13,9	7,8-14,2	8-15,7	8,46-16,9
Cholesterol (mmol/l)	0,06-0,21	0,07-0,25	0,07-0,25	0,065-0,233

V. Gastric juice

Table 19. Physical properties

Index	Age				
	1-2 day	3-6 day	12-28 day	infant	early
Amount (ml on an empty stomach)	0-3	0-5	0 - a small amount	0 - a small amount	0 - a small amount

Index	Age			
	under school	school	teen age	adults
Amount	0-20 (on an empty stomach)	0-30 (on an empty stomach)	1500-1800 ml/24hr.	2000-3000 ml/24hr.
Relative density				1005
pH	1,9-2,1	1,9-2,2	2,1-2,9	1,6-2,9

Table 20. Chemical composition

Index	Age		
	12-28 day	infant	early
Nitrogen: non-protein (mmol/l)	10,4-10,9	10,4-10,9	10,9-11,0
Urea and ammonia (mmol/l)	2,5-2,9	2,6-3,1	2,9-3,1
Amino acids (mmol/l)	1,0-3,4	1,0-3,8	1,1-4,6
Chlorides (mmol/l)	70-89	80-94	90-110
Free hydrochloric acid (mmol/l)	10,2-11,7	10,5-12,8	12,8-13,2
Urinary acid (μmol/l)	30-34	34-37	36-39
Potassium (mmol/l)	2,8-3,1	3,5-3,9	3,7-4,2
Sodium (mmol/l)	18-20,7	20-78,8	24-80,5

Index	Age			
	under school	school	teen age	adults
Nitrogen: non-protein (mmol/l)	11,8-13,5	12,6-14,0	14,0-29,9	14,3-34,4
Urea and ammonia (mmol/l)	3,1-4,2	3,8-4,4	4,5-8,7	4,99-9,99
Amino acids (mmol/l)	1,1-4,9	1,2-5,2	1,2-5,4	1,43-5,7
Chlorides (mmol/l)	110-120	110-129,5	130-148	155,1
Free hydrochloric acid (mmol/l)	13,5-16,9	14-18,1	18-21,5	20
Urinary acid (μmol/l)	38-44	38-44	45-110	47,6-118,9
Potassium (mmol/l)	3,8-4,4	4,5-5,1	5,1-60,1	5,6-65,5
Sodium (mmol/l)	28-115,6	29-120,5	28-135,6	31,3-189,3

Table 21. Stomach contents (on an empty stomach)

Index	Age			
	under school	school	teen age	adults
Amount	0-30	0-50	40-50	40-60 ml
Total acidity	20-40	30-50	40-60	40-60 mmol/l
Free hydrochloric acid	20-40	20-75	40-90	48-120 mmol/l
Pepsin	3,5-4,2	4,5-5,4	5,5-60	5,6-65,5 mmol/l

Table 22. Analysis of secretion

Index	Age		
	school	teen age	adults
Total of the contents collected in 4 portions during 60 min. after withdrawing of the portion " on an empty stomach"	50-70	60-80	50-100 ml
Total acidity	30-50	40-60	40-60 mmol/l
Free hydrochloric acid	20-35	20-40	20-40 mmol/l
Production rate - hour of hydrochloric acid	1,7-3,2	2,0-4,5	1,5-5,5 mmol
Production rate - hour of pepsin	1,2-3,5	1,5-4,0	1-4 milliequivalent

Table 23. Analysis of stimulated stomach secretion

Index	Age					
	school		teen age		adults	
	Stimulant					
	Cabbage juice or decoction	Histamine	Cabbage juice or decoction	Histamine	Cabbage juice or decoction	Histamine
Hour volume of gastric juice (ml)	50-80	Not recommended	60-90	100-150	50-110	100-150
Total acidity (mmol/l)	30-50	Not recommended	40-60	80-110	40-60	80-100
Free hydrochloric acid (mmol/l)	28-34	Not recommended	30-40	60-80	20-40	65-85
Production rate - hour of hydrochloric acid (mmol)	1,5-4,2	Not recommended	2,0-5,5	8-14	1,5-6	8-14
Production rate - hour of free hydrochloric acid (mmol)	1,0-2,6	Not recommended	1,0-3,8	6,5-12	1,0-4,5	6,5-12
Production rate - hour of pepsin (mg)	15-29	Not recommended	18-36	50-80	20-40	50-90

Table 24. Microscopy of stomach contents

Index	Age		
	school	teen age	adults
Starch grains	Are determined	Are determined	Are determined
Muscle fibers	Absent	Absent	Absent
Fat	Absent	Absent	Absent
Plant cells	Absent	Absent	Absent
Epithelium	a little	a little	a little
Erythrocytes	Absent	Absent	Absent
Leucocytes	Small amount	Small amount	Small amount, changed
Candida	Solitary Candida	Solitary Candida	Solitary Candida
Sarcina	Absent	Absent	Absent
Acidophilic microbes	Absent	Absent	Absent

VI. Bile

Table 25. Composition of bile (g/l)

Index	Age					
	school		teen age		adults	
	Hepatic	Vesical	Hepatic	Vesical	Hepatic	Vesical
Diurnal quantity (ml)	260-600		400-800		500-1000 ml	
Nitrogen	0,7-0,8	3,4-4,2	0,7-0,8	4,5-4,9	0,8	4,9
Choline	0,35-0,49	4,8-5,3	0,4-0,7	5,0-5,5	0,4-0,9	5,5
Cholic acids	5-9	90-105	6-12	110-115	7-14	115
Lecithine	0,9-3,7	16-27	1,0-4,5	30-35	1,0-5,8	35
Cholesterin	1,7-2,3	2,8-3,5	2,1-2,6	4,5-6,0	0,8-2,1	4,3-6,0
Protein	1,1-1,9	3,0-3,6	1,4--2,1	4,0-4,5	1,4-2,7	4,5
Bilirubin (mmol/l)	0,16-0,3	0,1-0,16	0,17-0,34	0,12-0,18	0,3-0,6	1,4
α-amylase	3,8-4,0 г amylum / (ml*hr.)	1,4-3,5 mg/ (l*sec.)	4,5-12 г amylum / (ml*hr.)	1,5-3,9 mg/(l*sec.)	6-16 г amylum/ (ml*hr.)	1,67-4,45 mg/ (l*sec.)
Trypsin	25-180 μmol/ (mlxmin)	-	40-420 μmol / (mlxmin)	-	50-500 μmol / (mlxmin)	-

Table 26. Examination of duodenal contents (I portion)

Index	Age		
	school	teen age	adults
Quantity	8-12 ml in 10 min	20-40 (10-12 ml in 10 min)	20-35 (10 ml in 10 min)
Colour	Yellow	Golden- yellow	Golden- yellow
Transparence	Almost full	Transparent	Transparent
Relative density	1004-1012	1005-1014	1007-1015
Reaction	Alkalescent	Alkalescent	Alkalescent

Table 27. Stimulated bile secretion

Index	Age					
	school		teen age		adults	
	Hepatic	Vesical	Hepatic	Vesical	Hepatic	Vesical
Quantity	15-18	20-40	25-30	20-50	30 ml	20-50 ml
Colour	Goldish	Brownish	Goldish	Olive-green	Golden-yellow	Dark-brown (olive-green)
Transparency	Full	Full	Full	Full	Transparent	Transparent
Density ratio	1005-1010	1010-1022	1005-1010	1015-1030	1007-1010	1016-1032
Quantity	Alkalescent	Alkaline	Alkaline	Alkaline	Alkaline	Alkaline
Bilirubin	140-180	180-420	250-280	220-560	307,8 μmol/l	256,5-769,7 μmol/l

Table 28. Microscopic examination of bile portions

Index	Age								
	school			teen age			adults		
	Portion								
	I	II	III	I	II	III	I	II	III
Epithelium	Sporadic cells			Sporadic cells			A little	Sporadic cells	
Leucocytes	2-4	4-8	2-4	2-4	4-8	2-4	2-4	5-10	2-4
Mucilage	a little	absent	absent	a little	absent	absent	is present in various quantities		
Crystals of cholesterin and calcium-bilirubinate	absent	absent	absent	absent	sporadic	absent	absent	sporadic	absent

Table 29. Cerebrospinal fluid

Index	Age				
	1-2 day	3-6 day	12-28 day	infant	early
Quantity	Not determined	Not determined	50-120	70-130	70-140
Relative density	Not determined	Not determined	1004-1006	1004-1006	1004-1007
Pressure	30-60	30-60	40-90	50-100	50-100
Colour	Colorless	Colorless	Colorless	Colorless	Colorless
Cytosis in 1 μl:					
Ventricular fluid	6-10	6-10	4-8	2-4	2-4
Cysternal fluid	8-10	8-10	4-8	2-4	2-4
Lumbar fluid	15-20	15-18	10-16	8-12	6-11
pH	7,6-7,7	7,6-7,7	7,6-7,7	7,6-7,7	7,6-7,7
Protein:					
Lumbar fluid	0,33-0,49	0,33-0,49	0,32-0,40	0,26-0,31	0,22-0,33
Cysternal fluid	Not determined	Not determined	0,16-0,20	0,14-0,21	0,14-0,21
Ventricular fluid	Not determined	Not determined	0,15-0,18	0,14-0,18	0,14-0,19
Glucose	2,22-2,78	2,2-2,8	2,1-2,9	2,4-2,9	2,45-3,2
Chlorine	70-100	90-110	90-110	100-120	100-115

Index	Age			
	under school	school	teen age	adults
Quantity	70-140	80-140	100-150	100-150 мл
Relative density	1004-1006	1004-1007	1006-107	1003-1008
Pressure	50-90	60-100	150-200	150-200 mm of water (lying).
	100-240	120-230	280-400	300-400 mm of water (standing).
Colour	Colourless, occasionally yellowish	Colourless, occasionally yellowish	Colourless, occasionally yellowish	Colourless, occasionally yellowish
Cytosis in 1 μl:				
Ventricular fluid	0-1	0-1	0-1	0-1
Cysternal fluid	0-1	0-1	0-1	01
Lumbar fluid	2-3	2-3	2-3	2-3
pH	7,3-7,7	7,3-7,7	7,3-7,8	7,35-7,80
Protein:				
Lumbar fluid	0,21-0,33	0,21-0,33	0,22-0,33	0,22-0,33g/l
Cysternal fluid	0,10-0,24	0,10-0,24	0,10-0,23	0,10-0,22 g/l
Ventricular fluid	0,12-0,22	0,13-0,21	0,12-0,20	0,12-0,20 g/l
Glucose	2,4-3,56	2,7-3,8	2,7-3,9	2,78-3,89 mmol/l
Chlorine	110-125	110-126	120-130	120-130 mmol/l

VII. Biochemistry of blood

Table 30. Proteins and protein fractions

Index	Age				
	1-2 day	3-6 day	12-28 day	infant	early
Total protein	47-65	44-60	41-55	57-70	57-75
Albumins	49-71	49-69	50-70	50-70	52-70
Globulins:					
α_1	2-5	2-5	3-6	3-6	3-4
α_2	5-11	5-11	6-12	9-15	9-12
β	5-13	5-13	4-14	8-18	8-14
γ	13-25	13-25	10-22	7-13	7-13
Fibrinogen	1,7-2,0	1,7-2,3	1,7-2,8	1,7-2,9	1,7-3,5

Index	Age			
	under school	school	teen age	adults
Crude protein	60-75	60-80	60-82	65-85 g/l
Albumins	30-46	35-45	40-50	40-50 g/l
Globulins:				
α_1	3-4	2,8-3,5	3,5-6	2,7-5,1
α_2	4-8	5-8	5-10	7,4-10,2
β	9-10	10-11	10-12	11,7-15,3
γ	8-12	8-12	8,5-13	15,6-21,4
Fibrinogen	2-3	2,5-3,5	2,5-3,0	2-4

Table 31. Residual nitrogen and its essential ingredients in the serum of blood

Index	Age				
	1-2 day	3-6 day	12-28 day	infant	early
Urea (mmol/l)	2,3-3,3	2,8-3,4	3,3-5,6	3,3-5,6	4,3-5,9
Uric acid (mmol/l)	0,16-0,35	0,16-0,35	0,17-0,38	0,17-0,41	0,17-0,41
Creatinine (mmol/l)	До 0,028	До 0,028	До 0,028	0,028	0,033-0,037

Index	Age			
	under school	school	teen age	adults
Urea (mmol/l)	4,3-6,8	3,9-6,8	2,9-8,3	2,5-8,3
Uric acid: boys (mmol/l) girls (mmol/l)	0,17-0,41	0,17-0,41	0,24-0,49 0,17-0,43	0,24-0,5 0,16-0,4
Creatinine: boys (mmol/l) girls (mmol/l)	Up to 0,028	0,028-0,033	0,044-0,106 0,044-0,097	0,053-0,166 0,044-0,097

Table 32. The basic lipid components of blood plasma

Index	Age								
	1-2 day	3-6 day	12-28 day	infant	early	under school	school	teen age	adults
Total lipids g/l	1,7-4,5	1,7-4,5	2,4-7,0	4,5-7,8	4,5-7,0	4,5-7,0	4,5-7,0	4,5-7,0	4,6-8,0
Total fatty acids g/l	0,7-1,0	0,7-1,0	0,7-1,0	1,5-2,0	2,3-2,5	2,3-2,5	2,3-2,5	2,3-2,5	2,3-2,5
Free (not esterified) fatty acids mmol/l	1,2-2,2	1,2-2,2	0,8-1,0	0,6-0,9	0,3-0,6	0,3-0,6	0,3-0,6	0,3-0,6	0,3-0,6
Total cholesterine mmol/l	1,3-2,6	1,3-2,6	1,5-3,0	1,8-4,9	3,7-5,0	3,7-5,0	3,7-5,0	3,7-5,0	3,7-5,0
g/l	0,50-1,00	0,50-1,00	0,58-1,15	0,69-1,88	1,42-1,90	1,42-1,90	1,42-1,90	1,42-1,90	1,42-1,90
Free (not esterified) cholesterin mmol/l	0,51-1,25	0,51-1,25	0,51-1,25	0,52-1,38	0,88-1,38	0,88-1,38	0,92-1,38	1,24-1,82	1,24-2,33
Ethers of cholesterin mmol/l	0,58-1,07	0,88-1,69	0,88-1,69	1,30-3,56	2,60-4,68	2,70-4,68	2,70-4,68	2,70-4,68	2,70-4,68
Phospholipids g/l	0,39-0,77	0,39-0,77	0,39-0,77	0,93-1,63	1,01-1,70	1,01-1,70	1,08-1,78	1,39-2,55	1,55-3,79
mmol/l	0,5-1,0	0,5-1,0	0,5-1,0	1,2-2,1	1,3-2,2	1,3-2,2	1,4-2,3	1,8-3,3	2,0-4,9
Triglycerides (TG, neutral fats)	0,09-0,78	0,09-0,78	0,09-0,78	0,32-0,85		0,32-1,00	0,32-1,02	0,35-1,42	0,41-1,50
g/l					0,32-0,85				
mmol/l	0,10-0,86	0,10-0,86	0,10-0,86	0,36-0,93	0,36-0,93	0,36-1,11	0,36-1,12	0,39-1,56	0,45-1,70
XC-LPHD, α-lipoproteids g/l	0,05-0,32	0,05-0,32	0,05-0,32	0,13-0,50	0,14-0,55	0,14-0,55	0,14-0,78	0,34-0,93	M0,40-0,93 W0,46-0,93
mmol/l	0,13-1,30	0,13-1,30	0,13-1,30	0,30-1,30	0,34-1,30	0,34-1,30	0,34-1,85	0,78-2,20	M1,00-2,20 W1,20-2,20
XC-LPLD, β-lipoproteids g/l	0,08-0.52	0,08-0,58	0,08-0,75	0,52-1,15	0,60-1,15	0,60-1,15	0,60-1,15	0,60-1,15	0,67-1,15
mmol/l	0,20-1,30	0,20-1,45	0,20-1,85	1,29-3,00	1,50-3,00	1,50-3,00	1.50-3,00	1,50-3,00	1,68-3,00
XC-LPVLD g/l (TG/5)	0,02-0,16	0,02-0,16	0,02-0,16	0,06-0,17		0,06-0,17	0,06-0,20	0,07-0,28	0,08-0,33
mmol/l (TG/2,2)	0,05-0,39	0,05-0,39	0,05-0,39	0,16-0,42	0,06-0,17 0,16-0,42	0,16-0,50	0,16-0,51	0,18-0,71	0,20-0,77
Index of atherogenesis: (XC-LPLD)+(XC-LPVLD) / XC-LPHD	< 1	< 1	< 1	<2,5	<2,5	<2,5	<2,5	<2,5	<3,5

Table 33. Structure and properties of lipoproteids in blood serum

Indices	Lipoproteids					
	Chylomi-crons	LPVLD	LPID	LPLD	LPHG-2 LPHD-3	LPa (norm is less than 0,3 g/l)
Relative density (g / ml)	0,950	0.950-1,006	1,006-1,019	1,019-1,063	1.063-1,125 1.125-1,210	1,050-1,090
Molecular weight	128m	3-128 m	2.5-2,8 m	2,2 m	180 – 380 K	2,2-2,5 m
Diameter (nm)	80-120	30-80	23-35	18-25	5-12	21-26
Electrophoretic mobility	At the be-ginning	preβ-lipopro-teids	Broad β-strip	β- lipopro-teids	α- lipoproteids	preβ- lipopro-teids
Apoproteins	B48, C2, 3. A1, A2, E	B100, C1, C2, C3. E	B100, E	B100	A1, A2, C3, E	apo-a , B100
Structure of lipo-proteids (% of total mass):						
- proteins in total	1-2	5-12	14-18	20-25	45-55	30-35
- lipids in total	98-99	88-95	82-86	75-80	45-55	65-70
- free cholesterine (XC)	1-2	3-7	6-8	8-10	2-3	8-10
- esterified XC	1-5	10-17	18-24	36-37	19-37	36-37
- phospholipids	3-9	13-20	18-24	20-22	24-40	20-22
- triglycerides	80-95	50-70	20-32	10-34	3-5	6-8

Table 34. Components of carbohydrate metabolism of blood

Index	Age				
	1-2 day	3-6 day	12-28 day	infant	early
Glucose of blood: Orthotoluidine methodt: whole blood (mmol/l)	3-3,8	3-3,8	3-4,0	3,2-4,0	3,2-4,2
Fructose (mmol/l)		0,524-1,9	0,54-2,1	0,54-2,1	0,54-1,9
Galactosis of serum(mmol/l)	0,1-0,85	0,1-0,85	0,1-0,85	0,1-0,85	0,1-0,92
Lactic acid (mmol/l)	0,9-1,9	0,9-1,9	0,8-1,6	0,8-1,7	0,8-1,7
Pyruvic acid (μmol/l)	40-75	42-78	45-80	46-83	50-90
β hydroxy-butyric acid (mmol/l)	0,41-1,0	0,41-0,9	0,4-0,96	0,41-0,92	0,42-1,09

Index	Age			
	under school	school	teen age	adults
Glycogen (mg %)	7,5	11-12	11,7	12-21
Glucose of blood: Orthotoluidine method:				
whole blood (mmol/l)	3,3-4,2	3,3-3,4	3,3-4,47	3,33-5,55
plasma (mmol/l)	3,8-5,5	3,33-6,66	3,33-6,66	3,33-6,1
Fructose (mmol/l)	0,54-1,8	0,56-1,8	0,56-1,8	0,56-2,77
Galactose of serum (mmol/l)	0,1-0,92	0,1-0,92	0,11-0,94	0,11-0,94
Lactic acid (mmol/l)	0,8-1,7	0,56-1,67	0,99-1,75	0,99-1,78
Pyruvic acid (μmol/l)	50-90	48-89	45-91	45,6-91,2
β hydroxy-butyric acid (mmol/l)	0,41-1,0	0,41-1,0	0,43-1,0	0,43-1,033

Table 35. Carbohydrate containing proteins and their components in blood

Index	Age				
	1-2 day	3-6 day	12-28 day	infant	early
Glycoproteids (g/l)	1,0-1,2	1,0-1,2	1,0-1,3	1,0-1,3	1,0-1,3
Hexoses of serum, bound with proteins (g/l)	0,9-1,1	0,9-1,1	0,9-1,2	0,9-1,1	1,0-1,15
Seromucoid: according to the content of hexoses (g/l)	0,18-0,20	0,18-0,20	0,18-0,21	0,18-0,24	0,19-0,25
Sialic acids (mmol/l)	1,9-2,1	1,9-2,1	1,9-2,1	2,0-2,2	2,0-2,3

Index	Age			
	under school	school	teen age	adults
Glycoproteins (g/l)	1,1-1,4	1,2-1,6	1,2-1,6	1,2-1,6
Hexoses of serum, bound with proteins (g/l)	1,0-1,1	1,0-1,2	1,05-1,65	1,05-1,15
Seromucoid: according to the content of hexoses (g/l)	0,22-0,27	0,22-0,27	0,22-0,28	0,22-0,28
Sialic acids (mmol/l)	2,0-2,3	2,0-2,3	2,0-2,36	2,0-2,36

Table 36. Content of bilirubin in blood (μmol/l)

Index	Age				
	1-2 day	3-6 day	12-28 day	infant	early
Total	23-25	54-90	4-14	4-14	4-14
Bound	8,5-9,5	8,5-10,0	8,5-10,0	0,85-1,0	0,85-1,0
Free	14,4-19,8	45-82	44-63,3	2,6-10,3	2,5-10,0

Index	Age			
	under school	school	teen age	adults
Total	2,4-10,7	3,4-17,1	4,6-20,5	8,6-20,5
Bound	0,85-2,4	0,85-2,4	0,85-1,5	0,85-1,5
Free	2,5-10,0	2,0-13,4	2,0-13,4	4,0-8,6

Table 37. Indeces of mineral metabolism of blood

Index	Age				
	1-2 day	3-6 day	12-28 day	infant	early
Calcium (mmol/l)	2,25-2,45	2,25-2,45	2,25-2,45	2,35-2,60	2,5-2,87
Magnesium (mmol/l)	0,65-0,95	0,65-0,95	0,65-1,05	0,65-1,0	0,6-1,05
Chlorides (mmol/l)	85-100	85-100	85-100	85-100	90-100
Phosphorus (mmol/l)	1,78	1,78	1,78	1,29-2,26	0,65-1,62
Iron (μmol/l)	17,9-45,0	14,0-19,3	9,8-33,5	7,2-17,9	9,3-33,6
Transferrin (μmol/l)	18-39,5	18-39,5	19-37,5	19-38,5	19-36
Copper (μmol/l)	8-12,5	8-12,5	8-12,5	9-17,5	9-18,5
Ceruloplasmin (g/l)	0,4-0,53	0,4-0,54	0,4-0,58	0,4-0,58	0,4-0,58
Potassium:(mmol/l)					
in plasma	4,66-6,66	4,66-6,66	3,4-5,1	4,15-5,76	4,15-5,76
in erythrocytes	74,5-87,1	74,5-87,1	74,5-87,1	74,5-87,1	77,1-87,1
Natrium: (mmol/l)					
in plasma	135-155	133-142	134-146	133-142	125-143
in erythrocytes	26,5-34,8	26,5-34,8	26,5-34,8	26,5-34,8	15,6-25,6

Index	Age			
	under school	school	teen age	adults
Calcium (mmol/l)	2,5-2,87	2,5-2,87	2,5-2,87	2,3-2,75
Magnesium (mmol/l)	0,65-1,05	0,7-1,2	0,7-1,2	1,2
Chlorides (mmol/l)	90-100	90-100	96-106	97-108
Phosphorus (mmol/l)	0,65-1,62	0,65-1,62	0,87-1,45	1-2
Iron (μmol/l)	9,3-33,6	10-32,5	11-32,5	12-32
Transferrin (μmol/l)	19-36,5	19,2-45,1	19-45,2	19,3-45,4
Copper (μmol/l)	11-22,2	11-22,02	11-22,03	11,02-22,04
Ceruloplasmin (g/l)	0,5-0,8	0,5-0,8	0,5-0.8	0,3-0,58
Potassium:(mmol/l)				
in plasma	3,7-5,12	3,4-5,1	3,69-5,12	3,4-5,3
in erythrocytes	77,1-87,1	77,1-87,1	77,1-87,1	77-96
Natrium: (mmol/l)				
in plasma	137-147	137-147	136-146	130-156
in erythrocytes	15,6-25,6	15,6-25,6	15,6-25,6	13-22

Table 38. Indeces of acid-base state of blood

Index	Age				
	1-2 day	3-6 day	12-28 day	infant	early
pH	7,28-7,30	7,30-7,32	7,39-7,42	7,39-7,42	7,39-7,43
pCO_2 (mm of mercury.)	28-35	30-33	30-31	32-32,4	32-32,6
The buffer bases BB (mequv/l blood)	30-36,2	35-38-3	44-47,9	44-46,8	44-46,8
Excess of bases BE (mequv/l blood)	-14,8- -16,2	-3,2- -3,44	-2,0-+2,2	-1,98-+2,0	-1,98-+2,0
Standard bicarbonate SB (mequv/l plasma)	10-15,2	22-24,3	21-21,8	22-23,2	22-23,2
True bicarbonate the AB (mequv/l plasma)	12,6-13,6	12,6-13,6	19,2-19,9	19,6-20,1	19,9-20,1
Total CO_2 (mequv/l plasma)	13,5-14,2	13,8-14,5	19,0-20,9	20,4-21,1	20,4-21,1

Index	Age			
	under school	school	teen age	adults
pH boys girls	7,39-7,42	7,39-7,42	7,35-7,4 7,38-7,44	7,36-7,42 7,37-7,42
pCO_2 (mm of merc.) boys girls	31,0-32,5	33,0-34,0	35,0-45,0 32,0-39,7	35,8-46,4 32,5-43,7
Buffer bases BB (mequv/l blood)	43,6-46,7	43,5-45,1	43,5-45,9	44,9-51,9
Base excess BE (mequv/l blood) boys girls	-1,8-+2,0	-1,8-+2,0	-2,2-+2,3 -2,3-+2,9	2,4-2,3 3,3-1,2
Standard bicarbonate SB (mequv/l plasma)	23,5-23,7	23,3-23,8	21,3-24,8	18,824,0
True bicarbonate AB (mequv/l plasma)	21,0-21,6	21,2-22,0	19,0-25,0	21,3-24,8
Totall CO_2 (mequv/l plasma)	21,0-23,3	21,9-23,4	21,0-30,0	21-26

Table 39. Immunological parameters of blood

Index	Age				
	1-2 day	3-6 day	12-28 day	infant	early
Lysozyme in serum	6-10 μg /ml	6-10 μg /ml	8-12 μg /ml	8-12 μg /ml	8-12 μg /ml
Properdin in serum	20-30 hemolytic units	20-30 hemolytic units	20-30 hemolytic units	20-40 hemolytic units	20-50 hemolytic units
Complement in serum	50-60 hemolytic units	50-60 hemolytic units	40-60 hemolytic units	40-50 hemolytic units	40-50 hemolytic units
Rheumatoid factor	Not determined	Not determined	Not determined	Availability of agglutination up to titer 1:20	Availability of agglutination up to titer 1:20
α- Fetoprotein	Negative	Negative	Negative	Negative	Negative
C-reactive protein	< 0,5	< 0,5	< 0,5	< 0,5	< 0,5
Lymphocytes (%)	55-78	55-78	55-78	44-72	58-64
CD3	40-50	40-50	40-50	57-70	50-75
CD4	40-50	40-50	36-55	36-60	30-54
CD8	12-25	16-30	16-34	16-40	20-40
CD16	9-12	9-12	9-12	10-16	10-16
B	10-12	10-12	10-12	12-20	12-20
IgG (g/l)	5,7-10	5,7-12	2-4,6	3,2-11,9	4,8-12,5
IgM (g/l)	0,01-0,5	0,01-0,6	0,22-1,0	0,5-1,5	0,5-1,57
IgA (g/l)	-	0,08-0,4	0,08-0,7	0,33-1,51	0,35-2,05
IgE (g/l)	-	-	-	traces	traces

Index	Age			
	under school	school	teen age	adults
Lysozyme in serum	8-12 μg /ml	8-12 μg /ml	8-12 μg /ml	8-12 μg /ml
Properdin in serum	20-80 hemolytic units	20-80 hemolytic units	20-80 hemolytic units	20-80 hemo-lytic units
Complement in serum	20-40 hemolytic units	20-40 hemolytic units	20-40 hemolytic units	20-40 hemo-lytic units
Rheumatoid factor	Availability of agglutination up to titer 1:20	Availability of agglutination up to titer 1:20	Availability of agglutination up to titer 1:20	Availability of agglutination up to titer 1:20
α-Fetoprotein	Negative	Negative	Negative	Negative
C-reactive protein	< 0,5	Negative	Negative	Negative
Lymphocytes (%)	58-64	30-35	25-30	25-30
CD3	60-80	65-75	60-80	60-80
CD4	35-51	30-40	30-40	30-40
CD8	27-35	27-35	25-38	25-38
CD16	10-16	12-16	12-16	12-16
B	12-20	12-22	12-24	14-24
IgG (g/l)	5,5-14	6,5-14	6,0-14,5	6,0-14,5
IgM (g/l)	0,47-1,85	0,5-1,38	0,6-1,43	0,6-1,6
IgA (g/l)	0,7-2,06	1,06-3,1	1,03-4,6	1,04-4,7
IgE (g/l)	traces	traces	traces	traces

VIII. Indeces of neuroendocrinal regulation system activity

Table 40. The content of hormones of pituitary - adrenal system in blood

Hormones	Age				
	1-2 day	3-6 day	12-28 day	infant	early
Adrenocorticotropic hormones (ACTH) in serum (ng/ml)	10-45	10-45	10-45	10-45	10-45
17- Oxycorticosteroids in urine(μmol/24hr.)	2,0-7,2	2,0-7,2	2,2-7,4	2,2-7,6	2,2-7,8
Cortisol in plasma (nmol/l)	60-104	65-168	70-190	70-190	80-200

Hormones	Age			
	under school	school	teen age	adults
Adrenocorticotropic hormones (ACTH) in serum (ng/ml)	10-50	10-70	10-80	10-80
17- Oxycorticosteroids in urine (μmol/24hr.)	2,4-8,6	4,5-10,5	5,2-13,5	5,2-13,5
Cortisol in plasma (nmol/l)	80-210	100-420	140-600	140-640

Table 41. The content of hormones of pituitary - adrenal system in it is wetted

Hormones	Age				
	early	under school	school	teen age	adults
17- Oxycorticosteroids - girls	3,2±0,2	4,7±0,2	8,0±0,5	10,8±0,3	22,2-62,6 μmol/24hr.
- boys	3,3±0,2	3,9±0,2	8,3±0,2	13,6±0,4	22.9-81,3 μmol/24hr.
Cortisol - girls - boys	0,14±0,015 0,18±0,017	0,15±0,02 0,18±0,015	0,15±0.02 0.23±0.05	0,17±0,02 0.28±0,07	0,26-0,276 nmol/24hr.

Table 42. Pituitary - gonadal system

Hormones	Age								
	teen age				adults				
	boys	girls			men	women			
		Reproductive period				Reproductive period			Pregnancy
		I Phase of a cycle	Ovulation	II Phase of a cycle		I Phase of a cycle	Ovulation	II Phase of a cycle	
In blood plasma (RIA)									
Luteinizing, IU/l	10,2-19,4				0-8,9	1,4-16,4	20,1-73,9	0,1-16,1	
Follicle-stimulating, IU/l	10,6-13,4				2,4-19.9	3,1-19,7	1,7-11,2	10,4-23,1	
Prolactin ng/ml	1,7-16		2,7-19		2-12		2-20		
Testosteron, ng/100ml	26,7-40				300-1200		30-120	30-120	I trimester 9-47
Progesterone, ng/ml	Up to 0,45	0,08-0,1		1,5-18	Up to 0,5	0,1-0,5		2,5-28	II trimester 55-255
Oestrogens, ng/ml		28-95	68-210	91-240	40-115	61-394	122-437	156-350	700-31000
Dehydroepiandrosterone (DHEA), ng/ml	0,9-2,8	1,5	3,1-4,0	5,3-5,8	1,7-4,2	2,0	5,2	7,18	0,5-43
In urine									
Oestrogens, µg//24hr.	<6	4-16	19-62	16-78	<10	5-25	28-100	22-80	Up to 45000
DHEA, mg/24hr.	0-1,5			0-3,1	0-4		0-1,2	0-4,2	

Table 43. Renin - aldosterone system

Index	Age		
	school	teen age	adults
Aldosterone of plasma at taking blood:			
- in the position of the patient lying	0,06-0,18	0,08-0,15	0,08-0,28 nmol/l 0,14-0,83 nmol/l
- In the position of the patient standing	0,012-0,57	0,14-0,7	
Aldosterone of urine(acid- labile conjugate)	0,07-0,28	0,075-0,35	0,083-0,42 nmol/24hr.

Endocrinological status of the able-bodied child

FUNCTION OF THYROID GLAND

Table 44. The content of thyroxine, triiodothyronine and a thyritropic hormone in the blood of children in age aspect

Age	thyroxine		triiodothyronine		thyritropic hormone
	µg/dl	nmol/l	ng/dl	nmol/l	µU/ml
Neonatal	6,6-18,1	85-223	63-256	97-394	11-99
1-5 year	7,3-15,0	94-193	105-269	162-414	8,6-33
5-10 year	6,4-13,3	82-171	94-241	145-371	0,6-6,3
10-15 year	5,6-11,7	72-150	83-213	128-328	20

FUNCTIONAL STATE OF SUPRARENAL GLANDS

Table 45. Standards of urinary excretion of 17-corticosteroids and 17-oxycorticosteroids

Age	Sex	Total 17-CS		Total 17-OCS	
		mg/24hr.	µmol	mg/24hr.	µmol
1-3 year	Girls	1,18±0,09	4,1±0,3	0,93±0,05	3,2±0,2
	Boys	1,01±0,05	3,5±0,2	0,95±0,05	3,3±,02
14-16 year	Girls	7,20±0,11	25,0±0,4	3,10±0,09	10.8±0,3
	Boys	8,70±0,13	30,2±0,5	3,90±0,12	13,6±0,4

Table 46. The content of catecholamins and their metabolites in urine

Age	Adrenalin		Noradrenaline		Vanillylmandelic acid	
	µg/24hr	nmol	µg/24hr.	nmol	µg/24hr.	nmol
Neonatal	0,5-5,0	2,7-27	4-20	20-120	1,2	6
1-5 year	0,5-7,5	2,7-40	4-35	20-200	2,4	12
5-10 year	1-10	5-55	4-70	20-400	4,0	20
10-15 year	1-10	5-55	15-100	80-500	6.0	30

Table 47. The content of adrenocorticotropic hormone in the blood of children and adolescents

Age	Sex	ng/ml	nmol/l
Neonatal	-	120±68	26,4±14,9
7-11 year	Girls	50,2±11,6	11,0±2,6
	Boys	53,0±21,5	11,7±4,7
12-15 year	Girls	43,4±6,9	9,9±1,5
	Boys	47,3±9,8	10,5±2,1
adults		43±17	9,6±3,7

THE FUNCTIONAL CONDITION OF SEX GLANDS

Table 48. The content of Testosteron in the blood of boys

Age, years	Testosteron in serum (on the average), ng/ml
6-7	10-60 (25,6)
8-10	20-100 (46,8)
11	70-400 (247)
12	70-800 (457)
13	800-1000 (630)
14	600-1200 (771)
15	800-1200 (993)

Table 49. The content of estrogens in diurnal urine of girls - adolescents

Age	Phase of a menstrual cycle	General estrogens		Estriol		Estrone		Estradiol	
		µg	nmol	µg	nmol	µg	nmol	µg	nmol
12-14	Proliferative	1-5	3-20	0-3	0-10	0-1	0-4	0-1	0-2
	Secretory	5-50	15-200	1-30	3-100	1-15	4-50	1-10	4-35
>14	Secretory	10-199	35-350	5-65	15-225	5-30	20-100	0-15	0-50

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Пособие
для студентов IV-VI курсов высших медицинских учреждений образования, врачей-стажеров, педиатров

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