



REFERENCE RANGE

HAEMATOLOGY

Name of the test	Method	Reference range
Hemoglobin	Cian-methaemoglobin method	male 130-180 g/l female 115-160 g/l
RBC	Conductometric method	male 4.2-6.2 T/l female 3.7-5.4 T/l
WBC	Conductometric method	3.5-10.5 G/l
MCV	Conductometric method	82-98 fl
MCH	Calculated	26.5-32.0 pg
MCHC	Calculated	295-360 g/L
HCT	Indirect conductometric determination	male 0.37-0.55 L/L female 0.35-0.44 L/L
RDW	Calculated	11.5-14.5
PLT	Conductometric after flotation	130-440 G/L
MPV	Conductometric after flotation	7.1 – 11.5 fL
PCT	Calculated	0.002-0.450 L/L
PDW	Conductometric after flotation	15.5-30.5
ERS	Westergreen	< 25 mm/h
Differential count- automatic		
Name	method	
Neu%	MAPSS	44-76%
Eo%	MAPSS	0.00-6.00%
Mo%	MAPSS	3.00-13.00%
Ba%	MAPSS	0.00-2.00%
Ly%	MAPSS	20-40 %
Neu-count	MAPSS	2.0-7.8 G/l
Eo-count	MAPSS	0.00-0.700 G/l
Mo-count	MAPSS	0,20-1,50 G/l
Ba-count	MAPSS	0,00-0,20G/l
Ly-count	MAPSS	0.6-4.1 G/l
Differential count – manual		
Name	Method	Normal
St	visual-optical	< 0.06

Sg	visual-optical	0,44- 0.76
Eo	visual-optical	< 0.04
Mo	visual-optical	< 0.10
Ba	visual-optical	< 0.01
Ly	visual-optical	0.20-0.40
Reticulocytes	visual-optical	25 – 85 G/l

COAGULATION

Test	Method	Reference range
Prothrombin time INR	Chronometric method	70-120% 0.8-1.2
aPTT	Chronometric method	25.0-38.0 sec.
TT	Chronometric method	8-14 sec.
Fibrinogen	Chronometric method	2.0-4.5 g/L
Bleeding time	Chronometric method	120-300s.
Clothing time	Chronometric method	300-600s.
D dimmer	MEIA	< 600 ng/ml

CLINICAL CHEMISTRY

Test	Method	Reference range
Glucose	GOD/PAP; Hexokinase/G-6-PDH	3.3-6.0 mmol/l
Total protein	Biuret	63.0-84.0 g/l
Albumin	Bromcresol green	35.0- 55.0 g/l
Creatinine	Jaffe mod.	50.0-133.0 µmol/l Children (<14years): 30.93 – 69.99 µmol/l
Urea	Enzymatic Urease/GLDH	1.7-8.3 mmol/l
Uric acid	Enzymatic color. Uricase-PAP	male 200.0-420.0µmol/l female 140.0-320.0µmol/l
Cholesterol	Enzymatic color.CHOD-PAP	≤ 6.5 mmol/l
HDL-direct cholesterol	Direct method	1.04-1.56 mmol/l
LDL-cholesterol	Direct method	≤ 3.6 mmol/l
VLDL-cholesterol	Calculated	≤ 0.90 mmol/l
Triglycerides	Enzymatic colorymetric-GPO-PAP	≤ 2.2 mmol/l
Microalbumin	Immunoturbidimetry	Fresh urine <20 mg/l 24-h urine < 30 mg/24h
Glicated hemoglobine	MEIA/Jonexchange chromatography/	4.0 - 6.0 %

	Immunoturbidimetry	
Total bilirubin	Jendrassik-Grof with sulfanilic acid	≤ 21.0 μmol/l
Direct bilirubin	Jendrassik-Grof with sulfanilic acid	≤ 8.0 μmol/l
Indirect bilirubin	Jendrassik-Grof with sulfanilic acid	≤ 13.0 μmol/l
ASAT(GOT)	IFCC standardized at 37°C	≤ 44.0 U/l
ALAT(GPT)	IFCC standardized at 37°C	≤ 44.0 U/l
GGT	Szasz/ 37°C	male 5-50.0 U/l female 5-38.0 U/l
ALP	DGKC/ 37°C	30-150 U/l Children: boys (<12 years) <500.0 U/l, boys (<15 years) <750.0 U/l; girls (<12 years) <500.0 U/l
CPK	IFCC/SCE 37°C	male 25.0-195.0 U/l female 25.0-175.0 U/l
CK-MB	Immuno UV H.P.-kinetic MEIA	< 24.0 U/l < 3.8 ng/ml; hospitalised patients without myocardial infarct <9.3 ng/ml
LDH	SFBC	150- 540.0 U/l
Amylase	IFCC Liquid EPS-PNP	<100.0 U/l in serum <460.0 U/l in urine
Potassium	Direct potenciometry ISE	3.5-5.6 mmol/l
Sodium	Direct potenciometry ISE	135.0-152.0 mmol/l
Chloride	Direct potenciometry ISE	98.0-107.0 mmol/l
Calcium	orto-cresolphtalein complexon	2.12-2.62 mmol/l
Ionized calcium	Calculated	1.05-1.32 mmol/l
Inorganic phosphorus	Phosphomolybdate UV	0.96- 1.46 mmol/l
Magnesium	Xylidyl blue	0.65-1.03 mmol/l
Iron	Ferrosine	male 10.0-28.0 μmol/l female 6.0-26.0 μmol/l
TIBC	Determination after saturation of the transferring by an iron solution of excess iron on magnesium hydroxide carbonate	male 44.0-89.0 μmol/l female 47.0- 77.0 μmol/l
TSAT	Calculated after TIBC and iron determination	male 20-40 % female 15-40 %
Lipase	Colorimetric-kinetic	8-78 IU/l

Cholinesterase	Colorimetric-kinetic	Serum 4000-9933 U/l Plasma 2193-5289 U/l
Lp(a)	Immunoturbidimetry	≤ 30 mg/dl
Apo B	Immunoturbidimetry	male ≤ 120 mg/dl female ≤ 90 mg/dl
Apo A1	Immunoturbidimetry	male > 110 mg/dl female > 128 mg/dl
HCO ₃	Enzymatic colorimetric	21- 29 mmol/l

VIRUSOLOGY

Test	Method	Reference range
HBsAg	MEIA	A sample < cut off neg(-) A sample > cut off pos(+)
Anti-HBs	MEIA	< 10mIU/ml neg(-)
anti-HAV-IgM	MEIA	A sample < cut off neg(-) A sample > cut off pos(+)
Anti-HCV	MEIA	A sample < cut off neg(-) A sample > cut off pos(+)
HBc-IgM	MEIA	A sample < cut off neg(-) A sample > cut off pos(+)
HIV 1/2	MEIA	A sample < cut off neg(-) A sample > cut off pos(+)
EBV IgM	ELISA	< 0,8 neg (-); 0,8-1,1 intermediate > 1,1 positive(+)
EBV IgG	ELISA	< 16 neg (-); 16-22 intermediate > 22 positive(+)
Rubeolla IgM	ELISA	< 0,8 neg (-); 0,8-1,1 intermediate > 1,1 positive(+)
Rubeolla IgG	ELISA	< 8 neg (-); 8-11 intermediate > 11 positive(+)
HBeAg	ELISA	< 0.9 (-) negative; 0.9 - 1.1 intermediate; > 1.1 (+) positive
antiHBe	ELISA	< 0.9 (-) negative; 0.9 - 1.1 intermediate; > 1.1 (+) positive
HSV II IgG	ELISA	< 16 neg (-); 16-22 intermediate
HSV I IgG	ELISA	< 16 neg (-); 16-22 intermediate;

		> 22 positive(+)
HSV I Ig M	ELISA	< 0,8 neg (-); 0,8-1,1 intermediate > 1,1 positive(+)
HSV II Ig M	ELISA	< 0,8 neg (-); 0,8-1,1 intermediate > 1,1 positive(+)
Varicella zoster IgG	ELISA	<80 (-)negative; 80-110 intermediate; > 110 (+) positive
Varicella zoster IgM	ELISA	< 0,8 neg (-); 0,8-1,1 intermediate > 1,1 positive(+)
Citomegalovirus IgG	ECLIA	(-)negative
Citomegalovirus IgM	ECLIA	(-)negative

OTHER MARKERS FOR INFECTIOUS DISEASES

Test	Method	Reference range
Lyme disease Borrelia burgdorferi IgM	ELISA	< 0,8 neg (-); 0,8-1,1 intermediate > 1,1 positive(+)
Lyme disease Borrelia burgdorferi IgG	ELISA	< 16 neg (-); 16-22 intermediate > 22 positive(+)
Chlamydia trachomatis IgM	ELISA	< 0,8 neg (-); 0,8-1,1 intermediate > 1,1 positive(+)
Chlamydia trachomatis IgA	ELISA	<1:8 neg(-)
Chlamydia trachomatis IgG	ELISA	<1:16 neg(-)
Helicobacter pylori IgG	ELISA	< 20 U/l neg (-)
Mycoplasma pneumoniae IgG	ELISA	<16(-)negative, 16-22 intermediate, >22 (+)positive
Mycoplasma pneumoniae IgM	ELISA	<0.8(-)negative, 0.8-1.1 intermediate, >1.1 (+)positive

IMMUNOLOGY

Test	Method	Reference range
IgA	Immunoturbidimetry	0.7-4.0 g/l
IgM	Immunoturbidimetry	male: 0.22-2.40 g/l female: 0.33-2.93 g/l
IgG	Immunoturbidimetry	7.0-16.0 g/l
IgE	ECLIA	0.0-120.0 IU/ml
C3	Immunoturbidimetry	0.75-1.65 g/l
C4	Immunoturbidimetry	0.20-0.65 g/l
CRP	Immunoturbidimetry	< 0,5 mg/dl
US CRP	Immunoturbidimetry	< 5 mg/l
CD 4+ Tcells (%)	flow cytometry	34-58 %
CD 4+ Tcells (count)	flow cytometry	590-1330 / μ l
Waler Rose	Latex agglutination	< 10.0 IU/ml
ASO	Latex agglutination	< 200.0 IU/ml
ANA-detect	ELISA	<1.0 (-) negative; \geq 1.0 (+) positive
ANA-profile – anti ds DNA – anti SS-A (RO) – anti SS-B (LA) – anti Sm protein – anti RNP – anti Scl - 70	ELISA	<20 (-) negative < 15 (-) negative; 15-25 intermediate; >25 (+) positive < 15 (-) negative; 15-25 intermediate; >25 (+) positive < 15 (-) negative; 15-25 intermediate; >25 (+) positive <25 (-) negative; >25 (+) positive < 15 (-) negative; 15-25 intermediate; >25 (+) positive
Anti-mitochondrial antibodies	ELISA	< 10 (-) negative; > 10 (+) positive
Anti-phospholipid antibodies IgG	ELISA	< 10 UI/ml
Anti-phospholipid antibodies IgM	ELISA	< 10 UI/ml

HORMONES

Test	Method	Reference range
TSH	MEIA/ECLIA	0.49 – 4.67 μ IU/ml
ft3	MEIA/ECLIA	2.5 – 4.3 pg/ml
ft4	MEIA/ECLIA	0.71-1.85 ng/dl
TAT	MEIA/ECLIA	< 34 IU/ml
MAT	MEIA/ECLIA	< 12.0 IU/ml
TRAC	ECLIA	<1,5 IU/ml

TG	MEIA/ECLIA	0.83 – 68.0 ng/dl
Prolactine	MEIA/ECLIA	female 3.24 – 29.12 ng/ml; male 3.28 – 19.68 ng/ml
Progesteron	MEIA/ECLIA	female: follicular phase 0.27-2.61 ng/ml luteal phase 3.28-38.63 ng/ml midcycle 5.25-38.63 ng/ml pregnant: first trimester 12.26-81.4 ng/ml second trimester 11.11-81.4 ng/ml thirt trimester 39.3-387.8 ng/ml postmenopausal < 3.37 ng/ml male < 0.82 ng/ml
LH	MEIA/ECLIA	female: follicular phase 1.0- 18.0 mIU/ml midcycle 24 -105 mIU/ml luteal phase 0.4 – 20 mIU/ml postmenopausal 15 - 62 mIU/ml male: 2.0 – 12.0 mIU/ml
FSH	MEIA/ECLIA	female:follicular phase 3.09-7.09 mIU/ml midcycle 2.27-18.51mIU/ml luteal phas 1.38-5.52 mIU/ml postmenopausal 30.57-106.32 mIU/ml male: 1.13-12.51 mIU/ml
Estradiol	MEIA/ECLIA	female: follicular phase 39 – 189 pg/ml midcycle 94 - 508 pg/ml luteal phase 48 - 309 pg/ml postmenopausal < 41 pg/ml male: < 77 pg/ml
Testosterone	MEIA/ECLIA	female 0.05 - 0.73 ng/ml; male 1.95 – 11.38 ng/ml
β –HCG	MEIA/ECLIA	< 5.0 mIU/ml
Cortisol	FPIA/ECLIA	1.7-38.4 μ g/dl
DHEA SO4	MEIA/ECLIA	male 80-560 μ g/ml female 35-430 μ g/ml
Insulin	MEIA/ECLIA	4.1 – 26 uUI/ml
ACTH	MEIA/ECLIA	0.0 – 46.0 ng/ml
17- α - OH-progesterone	ELISA	female: follicular phase.0.2-1.3 μ gr/ml luteal phase 1.0-4.5 μ gr/ml postmenopausal 0.2-0.9 μ gr/ml male 0.2-2.3 μ gr/ml, children 0,2-0,9 μ gr/ml
PTH	MEIA/ECLIA	15-65 pg/ml

Osteocalcin	MEIA/ECLIA	0.0-21 ng/ml
Calcitonin	MEIA/ECLIA	female: 0-11.5 pg/ml male: 0-18.2 pg/ml
SHBG	MEIA/ECLIA	Female: 13 – 71 nmol/L male: 18 – 114 nmol/L
Growth hormone	MEIA/ECLIA	0.06 – 5.00 ng/ml
4-Androstendion	MEIA/ECLIA	female: 0.3-3.5 ng/ml male: 0.7-3.6 ng/ml
Anti-Muller hormone	ELISA	female <12.6 ng/ml, male 1.3-14.8 ng/ml
Inhibin B	ELISA	10-200 pg/ml

TUMOR MARKERS

Test	Method	Reference range
Total PSA	MEIA/ECLIA	< 4.0 ng/ml
Free PSA	MEIA/ECLIA	<0.9 ng/ml
CEA	MEIA/ECLIA	<5.2 ng/ml
CA 125	MEIA/ECLIA	<35.0 U/ml
CA 15-3	MEIA/ECLIA	<25.0 U/ml
CA 19-9	MEIA/ECLIA	< 27.0U/ml
AFP	MEIA/ECLIA	< 7 ng/ml
SCC	ELISA	<1.5 ng/ml
β2-microglobuline	MEIA/ECLIA	<2164 ng/ml
NSE	MEIA/ECLIA	<16,3 ng/ml
Cyfra 21-1	MEIA/ECLIA	<3,3 ng/ml
CA 72-4	MEIA/ECLIA	< 6.9 U/ml
S-100	MEIA/ECLIA	<0.105 ng/ml
HE 4	MEIA/ECLIA	< 150 pM
Thimidin kinase /TK	MEIA/ECLIA	< 7.0 U/l
CA 50	RIA	< 25 U/ml
M2-PK	ELISA	<15 U/ml

METABOLYTES

Test	Method	Reference range
Folic acid	MEIA/ECLIA	7.2-15.4 ng/ml
Vitamine B12	MEIA/ECLIA	191 – 663 pg/ml
Ferritin	MEIA/ECLIA	female 6,0-159,0 ng/ml; male 28,0-397,0 ng/ml
Homocysteine	FPIA	3.36 – 20.44 μmol/l

BNP	MEIA	< 100 pg/ml
C- peptide	MEIA/ECLIA	0.9 – 7.1 ng/ml
Troponin I	MEIA	0.4 ng/ml (cut off AMI)
25-OH Vitamine D3	ELISA	10-30 ng/ml latent deficiency 30-50 ng/ml optimal level >70 ng/ml overdose
beta-Crosslaps	ECLIA	Female: Premenopausal:0.162- 0.436 ng/ml; Postmenopausal: 0.330- 0.782 ng/ml male: 0.104-0.504 ng/ml

MEDICINES

Carbamazepine	ECLIA	therapeutic range 4-12 µgr/ml
Valproic acid	ECLIA	therapeutic range 50-100 µgr/ml
Phenobarbital	ECLIA	therapeutic range 15-40 µgr/ml toxic range >40 µgr/ml
Digoxine	ECLIA	therapeutic range 0.8 -2.1 toxic range 2.4-8.7

URINE ANALYSE

Test	Method	Reference range
pH		4.5-8.0
Specific gravity		1.000-1.040
Bilirubin	Strip test	(-) neg.
Protein	Strip test	(-) neg.
Glucose	Strip test	(-) neg.
Urobilinogen	Strip test	N
Ketones	Strip test	(-) neg.
Nitrites	Strip test	(-) neg.
Blood	Strip test	(-) neg.
Leucocytes	Strip test	(-) neg.
Sediment	Per field of vision	Er up to 1 Leu up to 4 Epitellia up to 15 Bacteria-neg.
Drugs test – 6 parameters - amphetamine - tetrahydrocannabinol - morphine - amphetamine	Immunochromatography	(-) neg. (-) neg. (-) neg.

- cocaine		(-) neg.	
- barbiturate		(-) neg.	
		(-) neg.	

OTHER TESTS

<i>Carbamazepine</i>	<i>ECLIA</i>	<i>4-12 µgr/ml</i>
<i>Valproic acid</i>	<i>ECLIA</i>	<i>50-100 µgr/ml</i>
<i>Phenobarbital</i>	<i>ECLIA</i>	Optimal therapeutic dose 15-40 µgr/ml toxic levels >40 µgr/ml
<i>Digoxin</i>	<i>ECLIA</i>	<i>therapeutic level 0.8 -2.1</i> <i>toxic level 2.4-8.7</i>

Valid for 2012

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