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Department	Biochemistry
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Version Number	Change Details	Date
1	New document created	14/02/2025
2	Added front page, updated hospitals and testosterone, alphabetised.	15/04/2025
3	Corrected: testosterone, ALT, AST, amikacin, ammonia, glucose, bicarbonate, albumin, C3. Formatted.	18/06/2025

Assay	Units	Age	Reference Interval	
			Males	Females
ACE	U/L	All	20 - 70	
Acute kidney injury (AKI) warning stage		All	None	
AFP	klU/L	All	< 7	
AFP, Body Fluid	kU/L	All	None	
Albumin	g/L	0 - 14 days	28 - 41	
		15 days up to 1 year	25 - 46	
		1 - 7 years	35 - 45	
		8 - 14 years	37 - 47	
		15 - 18 years	38 - 50	35 - 49
		≥ 19	31 - 45	
Albumin, 24h Urine	mg/24h	All	< 30	
Albumin, Body Fluid	g/L	All	None	
Albumin, Random Urine	mg/L	All	None	
Albumin:creatinine ratio, Urine	mg/mmol	All	<3	
Alkaline Phosphatase (ALP)	U/L	< 28 days	70 - 380	
		28 days - 15 years	60 - 425	
		≥ 16 years	30 - 130	
Alpha-1-antitrypsin	g/L	All	0.9 - 2.0	
ALT	U/L	<1 year	5 - 51	
		1-12 years	11 - 30	
		13-18 years	10 - 33	8 - 24
		≥ 19 years	< 45	< 34
Amikacin	mg/L	All	<5	
Ammonia (DH, PRUH)	umol/L	< 4 weeks	<100	
		≥ 4 weeks	<40	
Ammonia (GSTT)	umol/L	< 4 weeks	<100	
		≥ 4 weeks	<50	
Amylase, Body Fluid	U/L	All	None	
Amylase, Total	U/L	0 - 14 days	3 - 10	
		14 days - 12 weeks	2 - 22	
		13 weeks up to 1 year	3 - 50	
		1 - 17 years	25 -101	
		≥ 18 years	23 - 96	
Amylase, Pancreatic	U/L	All	8 - 51	
Amylase, Random Urine	U/L	All	16 - 491	21 - 447
Amylase Excretion, 24h Urine	U/24h	All	170 - 2000	
Anion gap	mmol/L	All	8 - 17	

Assay	Units	Age	Reference Interval	
			Males	Females
Anti-mullerian hormone (AMH)	pmol/L	< 3 months	570 - 1468	4.2 - 23.2
		3 - 12 months	301 - 1062	3.1 - 15.2
		12 months - 15 years	301 - 1015	2.3 - 44.2
		16 -19 years	5.5 - 103	
		20 -24 years		8.7 - 83.6
		25 - 29 years		6.4 - 70.3
		30 - 34 years		4.1 - 58.0
		35 - 39 years		1.1 - 53.5
		40 - 44 years		0.2 - 39.1
		45 - 49 years		0.1 - 19.3
		≥ 50 years		None
Apolipoprotein A1	g/L	<2 years	0.61 - 1.64	0.59 - 1.69
		2 - 12 years	0.93 - 1.72	0.86 - 1.79
		13 - 59 years	0.95 - 1.86	1.01 - 2.23
		≥ 60 years	0.73 - 1.86	0.91 - 2.24
Apolipoprotein B	g/L	<2 years	0.16 - 1.24	0.17 - 1.20
		2 - 12 years	0.48 - 1.25	0.51 - 1.26
		13 - 59 years	0.49 - 1.73	0.53 - 1.82
		≥ 60 years	0.54 - 1.63	0.64 - 1.82
AST	U/L	≤ 14 days	23 - 186	
		15 days - 1 year	23 - 83	
		1 - 6 years	26 - 55	
		7 - 11 years	22 - 41	
		12 - 18 years	18 - 40	17 - 33
		≥ 19 years	5 - 34	5 - 31
AST:ALT ratio		All	≤ 1.0	
AST:platelet ratio index (APRI)		All	None	
Beta-hydroxybutyrate	mmol/L	All	None	
Bicarbonate	mmol/L	0 - 15 years	19 - 28	
		≥ 16 years	22 - 29	
Bile Acids, Total	μmol/L	All	1.0 - 6.1 (fasting)	
Bilirubin, Body Fluid	umol/L	All	None	
Bilirubin, Conjugated (Hub, DH, PRUH)	μmol/L	All	0 - 7	
Bilirubin, Conjugated (GSTT)	μmol/L	All	0 - 9	
Bilirubin, Total	μmol/L	All	<21	
CA 125	kiU/L	All	N/A	< 35
CA 153	kiU/L	All	< 31	
CA 19-9	kiU/L	All	< 37	
CA 19-9, Body Fluid	kU/L	All	None	
Caeruloplasmin	g/L	All	0.2 - 0.6	
Calcium	mmol/L	All	None	

Assay	Units	Age	Reference Interval	
			Males	Females
Calcium, Adjusted	mmol/L	< 4 weeks	2.0 - 2.7	
		4 weeks - 15 years	2.2 - 2.7	
		≥ 16 years	2.2 - 2.6	
Calcium, Random Urine	mmol/L	All	None	
Calcium Excretion, 24hr Urine	mmol/24h	All	2.5 - 7.5	
Calcium:Creatinine ratio, random urine	mmol/mmol	<1 year	0.05-1.50	
		1 year	0.05-1.25	
		2 - 4 years	0.05-1.00	
		5 - 9 years	0.05-0.70	
		10 - 17 years	0.05-0.60	
		≥ 18 years	0.20-0.60	
Carbamazepine	mg/L	All	4 - 12 (Trough)	
CEA	µg/L	All	<5	
CEA, Body Fluid	ug/L	All	None	
Chloride	mmol/L	All	95 - 108	
Chloride excretion, 24hr urine	mmol/24h	< 15 years	110-250	
		15 - 60 years	110-250	
		≥ 61 years	110-250	
Chloride, Random random	mmol/L	All	None	
Cholesterol, Body Fluid	mmol/L	All	None	
Cholesterol, HDL	mmol/L	All	0.9 - 1.7	0.9 - 2.0
Cholesterol, LDL, Calculated	mmol/L	All	None	
Cholesterol, LDL, Direct	mmol/L	All	None	
Cholesterol, Non-HDL	mmol/L	All	None	
Cholesterol, Total	mmol/L	All	None	
Complement C3	g/L	All	<5	
		< 1 year	None	
		1 - 13 years	0.80 - 1.70	0.82 - 1.73
		14 - 79 years	0.82 - 1.85	0.83 - 1.93
Complement C4	g/L	≥ 80 years	None	
		< 1 year	None	
		1 - 13 years	0.14 - 0.44	0.13 - 0.46
		14 - 80 years	0.15 - 0.53	0.15 - 0.57
		> 80 years	None	
Cortisol	nmol/L	All	102 - 535 (Before 10 am)	
			80 - 477 (After 5 pm)	
C-Peptide	pmol/L	All	258 - 1718 (Fasting)	
Creatine Kinase	U/L	All	40 - 320	25 - 200

Assay	Units	Age	Reference Interval	
			Males	Females
Creatinine	μmol/L	< 15 days	29 - 82	
		15 days - 1 year	9 - 32	
		2 - 4 years	18 - 38	
		5 - 11 years	27 - 54	
		12 - 14 years	40 - 72	
		15 - 18 years	55 - 96	43 - 74
		≥ 19 years	64 - 104	49 - 90
Creatinine, Body Fluid	umol/L	All	None	
Creatinine, PD Fluid	umol/L	All	None	
Creatinine, Random Urine	mmol/L	All (GP source)	None	
		All (non-GP source)	5.1 - 14.2	3.9 - 9.4
Creatinine Excretion, 24hr Urine	mmol/24h	All (GP source)	None	
		All (non-GP source)	7.7 - 21.3	5.9 - 14.1
CRP	mg/L	All	<5	
CTX	ug/L	30-50	0.05 - 0.60	0.05 - 0.45
Digoxin	ug/L	All	0.5 - 2.0	
eGFR by CKD-EPI	mL/min/1.73m ²	All	None	
Ethanol	mg/L	All	None	
Ferritin	μg/L	< 6 years	12-200	12 - 150
		≥ 6 years	15-200	15 - 150
Folate	ug/L	All	3.1 - 20.5	
Follicle stimulating hormone (FSH)	IU/L	All	1.0 - 12.0	
		Follicular Phase		3.0 - 8.1
		Mid-Cycle Phase		2.6 - 16.7
		Luteal Phase		1.4 - 5.5
		Postmenopausal		26.7 - 133.4
Free Androgen Index		<1 year	0.0 - 32.7	0.0 - 1.3
		1-9 years	0.0 - 0.6	0.0 - 1.3
		9-14 years	0.2 - 34.7	0.1 - 2.6
		14-19 years	3.6 - 83.3	0.6 - 6.5
	%	19 - 49 years	24.5 - 113.3	0.7 - 8.7
		≥ 50 years	19.3 - 118.4	0.5 - 4.7
Fructosamine	μmol/L	< 16 years	None	
		≥ 16 years	205 - 285	
Gentamicin (DH, PRUH)	mg/L	< 4 weeks	< 2.0	
		≥ 4 weeks	< 1.0	
Gentamicin (GSTT)	mg/L	All	None	
GGT	U/L	All	<55	<38
Globulins	g/L	All	22 - 38	

Assay	Units	Age	Reference Interval	
			Males	Females
Glucose	mmol/L	All	4.0 - 6.0 (fasting - normal)	
			6.1 - 6.9 (fasting - impaired)	
			> 6.9 (fasting - diabetes mellitus)	
			> 11.0 (random - diabetes mellitus)	
			> 6.7 (random - if pregnant consider glucose tolerance test)	
Glucose, Body Fluid	mmol/L	All	None	
Glucose, CSF	mmol/L	All	None	
Haptoglobin	g/L	< 2 year	0.00 - 3.00	0.00 - 2.35
		2 - 12 years	0.03 - 2.70	0.00 - 2.20
		13 - 59 years	0.14 - 2.58	0.35 - 2.50
		≥ 60 years	0.40 - 2.68	0.63 - 2.73
HbA1c	mmol/mol	All	20 - 41	
hCG (Abbott)	IU/L	All (non-pregnant)	None	< 5
		All (pregnant)	None	None
hCG (Roche)	IU/L	0 - 49 years	0 - 2	≤ 1
		≥ 50 years	0 - 2	≤ 7
hCG, Body Fluid (Roche)	IU/L	All	None	
Immunoglobulin A	g/L	<3 months	0.01 - 0.34	
		3 - 11 months	0.08 - 0.91	
		1 - 11 years	0.21 - 2.91	0.21 - 2.82
		12 - 59 years	0.63 - 4.84	0.65 - 4.21
		≥ 60 years	1.01 - 6.45	0.69 - 5.17
Immunoglobulin G	g/L	< 1 month	3.97 - 17.65	3.91 - 17.37
		1 - 11 months	2.05 - 9.48	2.03 - 9.34
		1 year	4.75 - 12.10	4.83 - 12.26
		2 - 79 years	5.40 - 18.22	5.52 - 16.31
		≥ 80 years	5.40 - 18.22	5.52 - 16.31
Immunoglobulin M	g/L	< 3 months	0.06 - 0.21	
		3 - 11 months	0.17 - 1.43	0.17 - 1.50
		1 - 11 years	0.41 - 1.83	0.47 - 2.40
		≥ 12 years	0.22 - 2.40	0.33 - 2.93
Insulin	pmol/L	All	None	
Iron	μmol/L	All	11.6-31.6	9.0-30.4
Lactate	mmol/L	All	0.50 - 2.20	
Lactate, CSF	mmol/L	All	1.0 - 2.20	
Lactate Dehydrogenase	U/L	All	125 - 220	

Assay	Units	Age	Reference Interval	
			Males	Females
Lactate Dehydrogenase (LDH), Body Fluid	U/L	All	None	
Lipase	U/L	All	≤ 60	
Lithium	mmol/L	All	0.4 - 1.0	
Lp(a)	nmol/L	All	None	
Lutenising Hormone (LH)	IU/L	All	0.6 - 12.1	1.8 - 11.8 (Follicular Phase)
				7.6 - 89.1 (Mid-Cycle Phase)
				0.6 - 14.0 (Luteal Phase)
				5.2 - 62.0 (Postmenopausal)
Macroprolactin recovery	%	All	≥ 60	
Magnesium	mmol/L	< 4 weeks	0.60 - 1.00	
		4 weeks - 15 years	0.70 - 1.00	
		≥ 16 years	0.70 - 1.00	
Magnesium, Random Urine	mmol/L	All	None	
Magnesium Excretion, 24hr Urine	mmol/24h	All	2.4 - 6.5	
Methotrexate	umol/L	All	None	
Neuron-specific enolase (NSE)	ug/L	All	< 11.1	
Non-esterified fatty acids (NEFA)	mmol/L	All	None	
NT-proBNP	ug/L	All	< 400 (Heart Failure)	
		Outpatients	400 - 2000 (Echo within 6	
		Outpatients	> 2000 Echo within 2 weeks	
		Inpatients	400 - 2000 (Outpatient	
		Inpatients	> 2000 (Inpatient Echo)	
Oestradiol	pmol/L	All	40 - 162	77 - 923 (Follicular Phase)
				140 - 2383 (Mid-Cycle Phase)

Assay	Units	Age	Reference Interval	
			Males	Females
				77 - 1145 (Luteal Phase)
				< 103 (Postmenopausal)
Osmolality	mOsm/kg	All	285 - 295	
Osmolality, Urine	mOsm/kg	All	None	
Paracetamol	mg/L	All	None	
Parathyroid Hormone (PTH)	ng/L	All	15 - 68	
Phenobarbitone	mg/L	All	10 - 40	
Phenytoin	mg/L	All	5 - 20	
Phosphate	mmol/L	< 4 weeks	1.3 - 2.6	
		4 weeks up to 1 year	1.3 - 2.4	
		1 - 15 years	0.9 - 1.8	
		≥ 16 years	0.8 - 1.5	
Phosphate, Random Urine	mmol/L	All	13 - 44	
Phosphate Excretion, 24hr Urine	mmol/24h	All	15 - 60	
Potassium	mmol/L	< 4 weeks	3.4 - 6.0	
		4 weeks up to 1 year	3.5 - 5.7	
		1 - 15 years	3.5 - 5.0	
		≥ 16 years	3.5 - 5.3	
Potassium, Body Fluid	mmol/L	All	None	
Potassium, Random Urine	mmol/L	All	None	
Potassium Excretion, 24hr Urine	mmol/24h	< 15 years	25 - 125	
		≥ 15 years	25 - 125	
Procalcitonin	ug/L	All	0.0 - 0.08	0.0 - 0.05
Procollagen 1 N-Terminal Propeptide (P1NP)	ug/L	All	28 - 80	15-59
Progesterone	nmol/L	All	<1.6	0.3 - 1.6 (Follicular Phase)
				3.8 - 50.6 (Luteal Phase)
				0.3 - 1.6 (Postmenopausal)

Assay	Units	Age	Reference Interval	
			Males	Females
Prolactin	mIU/L	All	73 - 407	109 - 557
Prolactin, Monomeric	mIU/L	All	32 - 309	39 - 422
Prostate Specific Antigen (PSA), Free	ug/L	All	None	0 - 0.5
Prostate Specific Antigen (PSA), Total	µg/L	<40 years	None	None
		40 - 49 years	< 2.49	None
		50 - 59 years	< 3.49	None
		60 - 69 years	< 4.49	None
		70 - 79 years	< 6.49	None
		≥ 79 years	None	None
Protein, Body Fluid	g/L	All	None	
Protein, Total	g/L	< 7 months	None	
		7 - 11 months	51 - 73	
		1 - 2 year	56 - 75	
		3 - 15 years	60 - 80	
		≥ 16 years	60 - 80	
Protein, PD Fluid	g/L	All	None	
Protein, Random Urine	g/L	All	None	
Protein Excretion, 24hr Urine	g/24h	All	< 150	
Protein:Creatinine Ratio, Urine	mg/mmol	All	< 15	
Protein, Total, CSF	g/L	All	0.15 - 0.40	
Rheumatoid Factor	IU/mL	All	< 30	
Salicylate	mg/L	All	None	
Sex Hormone Binding Globulin (SHBG)	nmol/L	< 50 years	17.1 - 77.6	34.3 - 147.7
		> 50 years		26.4 - 118.0
Sodium	mmol/L	All	133 - 146	
Sodium, Body Fluid	mmol/L	All	None	
Sodium, Random Urine	mmol/L	All	None	
Sodium Excretion, 24hr Urine	mmol/24h	< 15 years	40 - 220	27 - 287
		≥ 15 years	40 - 220	27 - 287
T3, Free (fT3)	pmol/L	All	2.4-6.0	
T4, Free (fT4)	pmol/L	All	9.0 - 19.1	
Testosterone (Hub)	nmol/L	< 50 years	8.3 - 30.2	0.5 - 1.9
		≥ 50 years	7.7 - 24.8	0.4 - 1.2
Testosterone (STH, GH)	nmol/L	< 1 year	0.4 - 15.1	0.5 - 1.9
		1 - 5 years	0.3 - 1.5	
		6 - 10 years	0.5 - 2.0	

Assay	Units	Age	Reference Interval	
			Males	Females
		11 - 14 years	0.7 - 19.3	
		15 - 19 years	4.7 - 41.7	
		20 - 49 years	8.3 - 30.2	0.5 - 1.9
		≥ 50 years	7.7 - 24.8	0.4 - 1.2
Theophylline	mg/L	All	10 - 20	
Thyroid Peroxidase Antibodies (TPO)	klU/L	All	≤ 5.61	
Thyroid Receptor Antibody (TRAb)	IU/L	All	Negative < 3.10	
		All	Positive ≥ 3.10	
Thyroid Stimulating Hormone (TSH)	mIU/L	All	0.35 - 4.94	
Transferrin	g/L	<1 year	None	
		1 - 13 years	1.86 - 3.88	1.80 - 3.91
		14 - 59 years	1.74 - 3.64	1.80 - 3.82
		60 - 79 years	1.63 - 3.44	1.73 - 3.60
		≥ 80 years	None	
Transferrin Saturation	%	All	20 - 45	
Troponin I	ng/L	< 6 months	≤ 56	
		6 months - 18 years	≤ 6	
		≥ 19 years	< 35	< 16
Triglycerides	mmol/L	All	None	
Triglycerides, Body Fluid	mmol/L	All	None	
Urate / Uric acid	μmol/L	All	200 - 430	140 - 360
Uric Acid, Random Urine	mmol/L	All	None	
Uric Acid Excretion, 24hr Urine	mmol/24h	All	1.5 - 4.5	
Urea	mmol/L	< 4 weeks	0.8 - 5.5	
		4 weeks up to 1 year	1.0 - 5.5	
		1 - 15 years	2.5 - 6.5	
		≥ 16 years	2.5 - 7.8	
Urea, Body Fluid	mmol/L	All	None	
Urea, PD Fluid	mmol/L	All	None	
Urea, Random Urine	mmol/L	All	None	
Urea Excretion, 24hr Urine	mmol/24h	All	428 - 714	
Valproate	mg/L	All	50 - 100 (Therapeutic)	
Vancomycin (DH, PRUH)	mg/L	All	10 - 20	
Vancomycin (GSTT)	mg/L	All	None	
Vitamin B12	ng/L	<2 years	215 - 1,389	
		2 - 5 years	374 - 1,494	
		6 - 9 years	332 - 1,081	
		10 - 14 years	253 - 871	

Assay	Units	Age	Reference Interval	
			Males	Females
		≥ 15 years	182 - 692	
Vitamin D	nmol/L	All	>50	