REFERENCE INTERVALS - CLINICAL CHEMISTRY

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RENAL FUNCTION

Test Group – Renal Function	Detail		Interval	Units	Source
Sodium	0-1 m		134 - 148	mmol/L	
	>1 m		135 - 145	mmol/L	
Potassium	0-1 m		4.5 – 6.0	mmol/L	
	>1 m		3.5 – 5.2	mmol/L	
Chloride	Adult		95 – 110	mmol/L	
Urea	<1m		1 - 4	mmol/L	
	1m – 1yr		1.4 – 5.4	mmol/L	
	1 yr – 4yr		1.8 – 5.4	mmol/L	
	Adult		3.2 – 7.7	mmol/L	
Creatinine	0 – 1wk		<95	umol/L	NZ Chem Path Quality Assurance Group (NZCPQAG)
	1wk – 4wk		<50	umol/L	
	4wk – 2yrs		<40	umol/L	
	2yrs – 6yrs		<50	umol/L	
	6 – 12yrs		<65	umol/L	
	12yrs – 15yrs		<80	umol/L	
	Female 15yrs – 19yrs		<90	umol/L	
	Male 15yrs – 19yrs		<105	umol/L	
	Adult female		45 - 90	umol/L	
	Adult male		60 – 105	umol/L	
Uric Acid	0-1 yrs		0.08-0.37	mmol/L	
	>1y-5 yrs		0.10-0.30	mmol/L	
	Female	>5yrs-13yrs	0.13-0.33	mmol/L	
		>13 yrs	0.16-0.42	mmol/L	
	Male	>5Y-10 yrs	0.13-0.33	mmol/L	
		>10 yrs	0.23-0.42	mmol/L	
eGFR			> 90	mL/min/1.73m2	
Bicarbonate	<2yrs		17 – 27	mmol/L	
	≥2yrs		22 – 31	mmol/L	
Creatinine Clearance	Female	<40yrs	88 – 182	mL/min	
		40 - 49yrs	80 – 174	mL/min	
		50 - 59yrs	72 – 160	mL/min	
		60 - 69yrs	64 – 158	mL/min	
		>70yrs	56 - 150	mL/min	
	Male	<40yrs	97 - 186	mL/min	
		40-49yrs	91 - 180	mL/min	
		50-59yrs	85 - 175	mL/min	
		60-69yrs	66 - 164	mL/min	
		>70yrs	60 - 156	mL/min	

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DIABETIC

Test Group – Diabetic	Detail	Interval	Units
Glucose	Fasting	3.5 – 5.4	mmol/L
	Non-Fasting	3.5 – 7.7	mmol/L
Glucose Challenge		< 7.8	mmol/L
Glucose Tolerance	Non-Pregnant Fasting	3.5 – 5.4	mmol/L
	Non-Pregnant 2 hour	< 7.8	mmol/L
	Pregnant Fasting	3.5 – 5.4	mmol/L
	Pregnant 2 hour	< 9.0	mmol/L
HbA1c		<41	mmol/mol

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LIVER FUNCTION

Test Group – Liver Function	Detail		Interval	Units	Source
Total Bilirubin	Up to 24 hours		<150	µmol/L	
	24 to 48 hours		<200	µmol/L	
	48 to 72 hours		<250	µmol/L	
	3 to 7 days		<300	µmol/L	
	7 days to 3 wks		<100	µmol/L	
	3 to 4 wks		<50	µmol/L	
	4 wks to Adult		<25	µmol/L	
Direct Bilirubin	<1m		<20	µmol/L	
	Adult		< 5	µmol/L	
ALP	0 to <6 m		80 - 600	U/L	
	6 m to <10yrs		80 - 450	U/L	
	Female	10 to <13yrs	45 - 460	U/L	
		13 to <15yrs	45 - 300	U/L	
		15 to <22yrs	45 - 150	U/L	
		22 to <50yrs	40 - 110	U/L	
		50 to <60yrs	40 - 120	U/L	
		>60yrs	40 - 130	U/L	
	Male	10 to <15yrs	45 - 500	U/L	
		15 to <17yrs	45 - 380	U/L	
		17 to <19yrs	45 – 220	U/L	
		19 to <22yrs	45 - 150	U/L	
		22 to <50yrs	40 - 110	U/L	
		50 to <60yrs	40 -120	U/L	
		>60yrs	40 - 130	U/L	
GGT	0 - 6m		<150	IU/L	
	Female	>6m	<50	IU/L	
	Male	>6m	<60	IU/L	
ALT	ALL		< 45	U/L	
AST	0-2yrs		<80	U/L	
	>2 – 10yrs		<60	U/L	
	>10yrs		<45	U/L	
Total Protein	0-1m		45 - 75	g/L	LPL
	>1m – 2m		46 - 65	g/L	
	>2m – 6m		50 - 75	g/L	
	>6m – 1yr		55 - 80	g/L	
	>1yr – 70yrs		66 - 84	g/L	
	>70yrs		64 - 82	g/L	
Albumin	0 – 3m		25 - 40	g/L	
	3 – 1yr		32 - 45	g/L	
	>1yr		32 - 48	g/L	
	Pregnancy				
	Gestation	2-14w	32-45	g/L	LPL
		14-28w	27-37	g/L	
		28-42w	25-35	g/L	
Globulin	0 – 90 days		> 16	g/L	Laboratory data
	90 – 365 days		> 18	g/L	
	1 – 4 yrs		22 - 35	g/L	
	>4 yrs		25 - 41	g/L	
Lipase	Serum		10 – 60	IU/L	

Amylase	Serum	25 – 135	U/L	

BONE

Test Group – Bone	Detail	Interval	Units	Source
Calcium	1 – 3days	1.80 – 2.80	mmol/L	
	4days – 1yr	2.10 – 2.80	mmol/L	
	>1yrs	2.10 – 2.55	mmol/L	
Adjusted Calcium	1 - 3days	1.80 – 2.80	mmol/L	
	4days – 1yr	2.10 – 2.80	mmol/L	
	>1yrs	2.10 – 2.55	mmol/L	
Phosphate	<1yr	1.40 – 2.50	mmol/L	NZ Chem Path Quality Assurance Group (NZCPQAG)
	1 – <4yrs	1.10 – 2.20	mmol/L	
	4 – <15yrs	0.90 – 2.00	mmol/L	
	15 – <18yrs	0.80 – 1.85	mmol/L	
	>18yrs	0.75 – 1.50	mmol/L	
Magnesium		0.70 – 1.0	mmol/L	

IRON METABOLISM

Test Group – Iron Metabolism	Detail		Interval	Units
Iron	0 - 2 m		10 – 31	µmol/L
	2 m - 1year		4.0 – 27	µmol/L
	1 - 3 years		5.0 – 23	µmol/L
	3 - 10 years		6.0 – 25	µmol/L
	10 - 18 years		8.0 – 32	µmol/L
	Adult		10 - 30	µmol/L
Transferrin			1.7 – 3.4	g/L
Transferrin Saturation	0 – 2m		0.35 – 0.94	
	2m – 1yr		0.1 – 0.46	
	1 – 3yrs		0.1 – 0.42	
	3 – 10yrs		0.14 – 0.45	
	10 – 18yrs		0.15 – 0.50	
	>18yrs		0.15 – 0.50	
Ferritin	Female	0 - 5 m	15 - 400	ug/L
		5 - 11 m	15 - 80	ug/L
		1 - 14 yrs	15 - 150	ug/L
		15 - 19 yrs	15 - 170	ug/L
		20 - 29 yrs	20 - 170	ug/L
		30 - 40 yrs	20 - 190	ug/L
		>40 yrs	20 - 380	ug/L
	Male	0 - 5m	15 - 400	ug/L
		5 - 11 m	15 - 80	ug/L
		1 - 14 yrs	15 - 150	ug/L
		15 - 19 yrs	15 - 170	ug/L
		20 - 29 yrs	20 - 320	ug/L
		30 - 40 yrs	20 - 400	ug/L
		>40 yrs	20 - 450	ug/L

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ENZYMES

Test Group – Enzymes	Detail	Interval	Units	Source
LDH	0 – 14 days	<1200	U/L	NZ Chem Path Quality Assurance Group (NZCPQAG)
	15 days to <1 yr	<450		
	1 yr to <10yrs	<320		
	>10yrs	120 - 250		
CK	Female	30 – 180	U/L	
	Male	60 - 220	U/L	
Troponin T		<15	ng/L	

B12 / FOLATE

Test Group – B12 / Folate	Detail	Interval	Units
Vitamin B12	Normal	170 - 800	pmol/L
Serum Folate	Normal	5 – 45	nmol/L

DRUGS

Test Group – Drugs	Detail	Interval	Units
Lithium	Trough (12 hrs post dose)	0.5 – 1.0	mmol/L
Carbamazepine	Therapeutic range	17 – 40	µmol/L
Digoxin	Therapeutic range	0.60 – 2.00	nmol/L
Phenytoin	Therapeutic range	40 – 80	µmol/L
Valproic Acid	Therapeutic range	350 – 700	µmol/L

LIPIDS

Test Group – Lipids	Detail	Target Range	Units
Status			
Cholesterol	0 - 14 days	1.2 – 3.2	mmol/L
	15 days – 1 yr	1.6 – 6.2	mmol/L
	1 – 19 yrs	2.9 – 5.4	mmol/L
	>19 yrs	<5.0	mmol/L
Triglycerides	0 - 14 days	0.9 – 3.0	mmol/L
	15 days – 1 yr	0.6 – 3.0	mmol/L
	1 – 19 yrs	0.5 – 2.3	mmol/L
	>19 yrs	<2.0	mmol/L
HDL Cholesterol	0 -14 days	0.40 – 1.10	mmol/L
	15 days – 1 yr	0.30 – 1.90	mmol/L
	1 - 19 yrs	0.80 – 1.90	mmol/L
	>19 yrs	>1.00	mmol/L
LDL Cholesterol		<3.4	mmol/L
Chol/HDL ratio		<4.5	mmol/L

THYROID FUNCTION

Test Group Thyroid Function	Detail	Interval	Units	Source
Free T4	≥4 days - 1 m	10 - 40	pmol/L	
	>1 m - 1 yr	10 - 30	pmol/L	
	>1 yr - 12 yrs	11 - 22	pmol/L	Laboratory data
	>12 yrs	12 - 22		
TSH	4 days - 1 m	0.4 - 16.0	mIU/L	
	1 m - 1 yr	0.6 - 8.0	mIU/L	
	>1 yr - 18 yrs	0.5 - 4.5	mIU/L	
	>18 yrs	0.27 - 4.2	mIU/L	
Free T3	≥4 days - 7 yrs	3 - 10	pmol/L	
	>7 yrs - 19 yrs	3.5 - 8.0	pmol/L	
	>19 yrs	3.9 - 6.8	pmol/L	

Test Group Thyroid Function	Detail: Gestational age	Interval	Units	Source
Free T4	<7 wks	12-22	pmol/L	
	7 - <14 wks	12-21	pmol/L	
	14 - <28 wks	10-18	pmol/L	
	28 – 40 wks	9-16	pmol/L	
TSH	<7 wks	0.3-4.2	mIU/L	
	7 - <14 wks	0.1-3.5	mIU/L	
	14 - <28 wks	0.2-3.8	mIU/L	
	28 – 40 wks	0.3-3.8	mIU/L	

REPRODUCTIVE HORMONES

Test Group – Reproductive Hormones	Detail		Interval		Units	Source
FSH	Male	0 – 1 yrs	<3.4		IU/L	NZ Chem Path Quality Assurance Group (NZCPQAG)
		1 – 9 yrs	<2.2		IU/L	
		9 – 12 yrs	0.4 – 4.2		IU/L	
		12 – 16 yrs	0.9 – 7.0		IU/L	
		>16 yrs	2 - 12		IU/L	
	Female	0 – 1 yr	1.6 – 19		IU/L	
		1 – 9 yrs	0.7 – 5.8		IU/L	
		9 – 12 yrs	0.5 – 7.6		IU/L	
		12 – 16 yrs	0.9 – 9.1		IU/L	
		>16 yrs	Follicular	3 – 10	IU/L	
			Mid cycle	4 – 25	IU/L	
			Luteal	2 – 8	IU/L	
			Post- menopausal	>20	IU/L	
			Pregnant	<1	IU/L	
LH	Male	0 – 1 yr				NZ Chem Path Quality Assurance Group (NZCPQAG)
		1 – 16 yrs				
		>16 yrs	2 – 9		IU/L	
	Female	0 – 1 yr				
		1 – 16 yrs				
		>16 yrs	Follicular	2 – 8	IU/L	
			Mid cycle	10 – 75	IU/L	
			Luteal	2 – 8	IU/L	
			Post menopausal	>15	IU/L	
			Pregnant	<1	IU/L	

Test Group – Reproductive Hormones	Detail	Interval	Units
Progesterone	Ovulation unlikely	<6	nmol/L
	Ovulation possible	6 - 25	nmol/L
	Ovulation confirmed	>25	nmol/L
	Post menopausal	<3	nmol/L
Oestradiol	Follicular	50 - 850	pmol/L
	Mid-cycle	150 - 1450	pmol/L
	Luteal	85 - 1250	pmol/L
	Post Menopausal	< 180	pmol/L
	Male	<200	pmol/L
Prolactin	Female <= 50 years	<630	mIU/L
	Female >50 years	<500	mIU/L
	Male	<400	mIU/L
Monomeric prolactin	Female	< 400	mIU/L
	Male	<280	mIU/L
HCG		< 5	IU/L

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MISCELLANEOUS

Test Group – Miscellaneous	Detail		Interval	Units	Reference range origin
NT Pro BNP			<35	pmol/L	
CRP	0-3m		<10	mg/L	
	3m-15yrs		<8	mg/L	
	>15yrs		<5	mg/L	
CCP antibodies			<5	U/mL	
Rheumatoid Factor			<16	IU/mL	
IgG	Newborn - <2 wks		3.0 – 13.7	g/L	CALIPER – 3 platforms
	≥2 - <6 wks		1.2 – 6.0	g/L	Composite CALIPER and NZCPQAG
	≥6 wks - <6 mths		1.2 – 7.0	g/L	
	≥6 - <12 mths		3.0 – 10.5	g/L	NZCPQAG
	>1 - <4 yrs		3.0 – 11.2	g/L	CALIPER – 3 platforms
	≥4 - <10 yrs		5.0 – 13.3	g/L	
	≥10 - <19 yrs		6.0 – 15.0	g/L	NZCPQAG
	Adult (≥19 - <70 yrs)		7.0 – 16.0	g/L	
	Adult ≥70 yrs		6.0 – 15.0	g/L	
IgA	Newborn to <1 yr		<0.4	g/L	CALIPER – 3 platforms
	≥1 - <3 yrs		<1.1	g/L	
	≥3 - <6 yrs		<1.7	g/L	Composite CALIPER and NZCPQAG
	≥6 - <14 yrs		0.3 – 2.4	g/L	CALIPER – 3 platforms
	≥14 - <19 yrs		0.4 – 3.1	g/L	
	Adult (≥19 - <70 yrs)		0.8 – 4.0	g/L	NZCPQAG
	≥70 yrs		0.8 – 4.0	g/L	
IgM	Newborn < 2 wks		<0.5	g/L	CALIPER – 3 platforms
	≥2 - <13 wks		0.1 – 0.7	g/L	
	≥13 wks - <1 yr		0.1 – 0.9	g/L	
	≥1 – <19 yrs		0.4 – 1.8	g/L	
	Adult (≥19 - <70 yrs)		0.4 – 2.5	g/L	NZCPQAG
	≥70 yrs		0.4 – 2.4	g/L	
IgE			<100	kIU/L	
PTH			1.7 - 7.3	pmol/L	
Serum Cortisol	morning peak		170 - 500	nmol/L	
Testosterone	Female	<10yrs	<0.6	nmol/L	
		10 – 15yrs	<1.5	nmol/L	
		>15yrs	<1.9	nmol/L	
	Male	10 – 14yrs	0 - 28	nmol/L	
		15 – 19yrs	7.6 - 28	nmol/L	
		20 -50yrs	8.7 - 29	nmol/L	
		>50yrs	6.7 - 26	nmol/L	
Thyroperoxidase Ab			<60	IU/mL	

TUMOUR MARKERS

Test Group – Tumour Markers	Detail	Interval	Units
AFP	0 days	9,100-190,000	ug/L
	1 day	8,000-166,000	ug/L
	2 days	7,000-145,000	ug/L
	3 days	6,000-126,000	ug/L
	4 days	5,300-110,000	ug/L
	5 days	4,600-96,500	ug/L
	6 days	4,000-84,500	ug/L
	7 days	3,500-73,500	ug/L
	8-14 days	1,500-59,000	ug/L
	15-21 days	575-23,000	ug/L
	22-28 days	300-6,300	ug/L
	29-45 days	30-5,700	ug/L
	46-60 days	16-2,000	ug/L
	61-90 days	6-1,000	ug/L
	91-120 days	3-420	ug/L
	121-150 days	2-220	ug/L
	151-180 days	1-130	ug/L
	181 days to 2 yrs	0-87	ug/L
	2 yrs to adult	< 10	ug/L
CEA	Nonsmokers	< 3.0	ug/L
PSA	<51 yrs	<2.5	ug/L
	51 – 60 yrs	<3.5	ug/L
	61 -70 yrs	<4.0	ug/L
	>70 yrs	<6.5	ug/L

SEROLOGY ANTIBODIES

Test Group – Serology Antibodies	Detail	Interval	Units
Hepatitis A Total Ab	Considered protective	≥20	mIU/mL
Hepatitis B surface Ab	Considered protective	≥10	IU/L
Rubella IgG	Non-Immune	<10	IU/mL
	Considered protective	>10	IU/mL

URINE

Test Group – Urine	Detail	Interval	Units
24-hour Urine Creatinine	Female	4 – 17	mmol/collection
	Male	7 – 24	mmol/collection
Urine Potassium		35 – 90	mmol/collection
Urine Sodium		100 - 250	mmol/collection
Urine Chloride		110 - 250	mmol/collection
Protein Creatinine Ratio		<23	mg/mmol
24-hour Urine Protein		<0.25	g/collection
Urine calcium/creatinine ratio	6m – 1yr	< 2.2	mmol/mmol
	1-2 yrs	< 1.5	mmol/mmol
	2- 3yrs	< 1.4	mmol/mmol
	3-5 yrs	< 1.1	mmol/mmol
	5-7 yrs	< 0.7	mmol/mmol
	7-17 yrs	< 0.7	mmol/mmol
	Adult	< 0.6	mole ratio
Albumin/Creatinine Ratio (Microalbumin ratio)	Female	<3.5	mg/mmoL
	Male	<2.5	mg/mmoL

NON-FUNDED

Test Group – Non-Funded	Detail	Interval		Units
Vitamin D	Moderate to severe deficiency	<25		nmol/L
	Mild deficiency	25 – 50		nmol/L
	Optimal target range for bone health	50-150		nmol/L
	Vitamin D intoxication has been reported at this level, but is rare at levels <500nmol/L	>250		nmol/L
Insulin		5 – 13		mU/L
Homocysteine		5 – 15		umol/L
DHEAS	<7 days	2.7 - 20.4		umol/L
	7 to <28d	0.80 - 13.6		umol/L
	28d to <1y	0.0 - 6.7		umol/L
	1y to <5y	0.0 - 0.70		umol/L
	Female	5 to <10y	0 - 2.6	umol/L
		10 to <15Y	0.7 -8.8	umol/L
		15 to <20y	1.4 - 11.5	umol/L
		20 to <25y	3.9 - 11.6	umol/L
		25 to <35y	1.9 - 11.0	umol/L
		35 to <45y	1.5 - 10.9	umol/L
		45 to <55y	0.8 - 8.7	umol/L
		55 to <65y	0.5 - 8.0	umol/L
		65 to <75y	0.2 - 7.5	umol/L
		≥75y	0.2 - 4.5	umol/L
	Male	10 to <15Y	0.4 - 7.6	umol/L
		15 to <20y	1.4 - 14.3	umol/L
		20 to <25y	5.1 - 13.6	umol/L
		25 to <35y	4.0 - 13.9	umol/L
		35 to <45y	1.8 - 12.6	umol/L
		45 to <55y	1.0 - 10.0	umol/L
		55 to <65y	1.0 - 8.6	umol/L
		65 to <75y	0.9 - 7.0	umol/L
		≥75y	0.4 - 5.7	umol/L
SHBG	Female	1yr to <11yrs	19 - 137	nmol/L
		11yrs to <20yrs	Pre-pubertal 19 - 137	nmol/L
			Post-pubertal 23 - 120	nmol/L
		20yrs - 49yrs	23 - 120	nmol/L
		50yrs +	19 - 121	nmol/L
	Male	1yr to <11yrs	18 - 153	nmol/L
		11yrs to <20yrs	Pre-pubertal 18 - 153	nmol/L
			Post-pubertal 13 - 49	nmol/L
		20yrs - 49yrs	13 - 49	nmol/L
		50yrs +	15 - 71	nmol/L

Free testosterone	Female	20yrs – 50yrs	0 - 37	pmol/L
		> 50yrs	0 - 24	pmol/L
	Male	20yrs – 50yrs	218 - 681	pmol/L
		> 50yrs	179 - 520	pmol/L
AMH	Female	26yrs	18-45	pmol/L
		36yrs	8-30	pmol/L
		41yrs	5-25	pmol/L
		60yrs	1-8	pmol/L
	Male	Adult Male	5-115	pmol/L