

### Clinical Chemistry Reference Ranges

Test	Age	Reference Range
<b>Acid base (blood gas)</b>		
Hydrogen (H+) (nmol/L)	Newborn	32-47
	Neonate/Infant	35-48
	Child/Adult	35-45
pH	Newborn	7.33-7.49
	Neonate/Infant	7.32-7.45
	Child/Adult	7.35-7.45
pCO <sub>2</sub> (kPa)	Neonate	3-6-5.4
	Infant	3.5-5.5
	Child	4.4-6.1
pO <sub>2</sub> (Kpa)	Neonate	6.7-12.0
	Child	11.0-13.5
	Adult	10.5-13.5
	Imprecision	1.7
Calculated actual bicarbonate (mmol/L)	Child	17-27
	Adult	24-27
Calculated base excess (mmol/L)	Newborn	-10 to -2
	Infant	-7 to -1
	Child	-4 to +2
	Adult	-2 to +3
<b>Acid Glycoprotein (orosomuroid) (g/L)</b>	Child (>5y)/Adult	0.4-1.0 female 0.6-1.2 male
<b>ACTH, 9am (ng/L)</b>	Child/Adult	<46
<b>Acute phase reactants</b>		
Alpha-1-antitrypsin (g/L)	Neonate	0.9-2.2
	Infant	0.8-2.0
	Child	1.1-2.3
	Adult	1.1-2.1
<b>Alpha-1-antichymotrypsin (g/L)</b>	Adult	0.3-0.6
<b>Alanine aminotransferase (ALT, SGPT) (U/L)</b>	Male	<50 U/L
	Female	<35 U/L
<b>Albumin (g/L)</b>	Neonate	24-40
	Infant	25-49
	Child	35-48
	Adult	35-50
<b>Alkaline Phosphatase (U/L)</b>	Neonate	73-391
	Infant	59-425
	1y-14y	76-308
	14y-16y	49-242
	Adult	30-130
<b>Alpha fetoprotein (kU/L)</b>	Newborn	50,000-150,000
	2 weeks	7,000-20,000
	4 weeks	1,500-2,500
	6 weeks	200-400
	8 weeks	50-100

	10 weeks 3 month - Adult	6-12 3-8
<b>Ammonia</b> (µmol/L)	Neonate Infant/Child/Adult	Up to 100 Up to 50
<b>Amylase</b> Plasma U/L Urine amylase/creatinine ratio u/mmol creatinine	Child/Adult Child/Adult	30-100 <38
<b>Angiotensin Converting Enzyme (ACE)</b> (U/L)	6m-19y	29-112
<b>Androstenedione</b> (nmol/l)	1-7 days 1-4 Weeks 1-12 months 1-10 years 10-17 years Male 17 yrs + Female 17 yrs +  Follicular Luteal Post-menopausal  Synacthen test 0mins 30 mins	≤ 10.8 nmol/L ≤ 9.2 nmol/L ≤ 3.1 nmol/L ≤ 2.3 nmol/L ≤ 6.9 nmol/L ≤ 7.8 nmol/L ≤ 7.8 nmol/L  ≤ 6.0 nmol/L ≤ 10.3 nmol/L ≤ 6.5 nmol/L  ≤ 7.6 nmol/L ≤ 11.7 nmol/L
<b>Aspartate aminotransferase (AST, SGOT)</b> (U/L)	Neonate Infant/Child Adult	18-92 13-61 5-61
<b>Bicarbonate</b> (total carbon dioxide) (mmol/L)	Neonate Infant Child Adult	14-30 16-30 19-28 22-29
<b>Bile Salts Glycodihydroxycholeanoate</b> Plasma (µmol/L) Urine (µmol/mmol creatinine)		0-6 0.02-0.47
<b>Bile Salts Glycodihydroxycholeanoate</b> Plasma (µmol/L) Urine (µmol/mmol creatinine)		0-2 0.04-1.39
<b>Bile Salts Taurodihydroxycholeanoate</b> Plasma (µmol/L) Urine (µmol/mmol creatinine)		0-2 0.01-0.08
<b>Bile Salts Taurodihydroxycholeanoate</b> Plasma (µmol/L) Urine (µmol/mmol creatinine)		0-2 0.01-0.08
<b>Bilirubin, conjugated</b> (µmol/L)	Neonate Child/Adult	Up to 10 Up to 2 (97.5 <sup>th</sup> centile)

<b>Bilirubin</b> , total paediatric (µmol/L)	Neonate	Variable dependent on child. Action limits for phototherapy/exchange transfusion vary from days of birth and are lower for premature babies – See nomogram in trust guidance (Ref 1790v1)
	Child/Adult	Up to 21
<b>Biotinidase</b> (U/L)	Child/Adult	2.5-10.5
<b>C-peptide</b> (fasting adults, pmol/L)	Adult	298-2350
<b>Caffeine</b> (mg/ml)		10-35mg/L
<b>Calcium ionised</b> (mmol/L)	Child/Adult	1.13 – 1.32 (adjusted to pH 7.4)
<b>Calcium Total</b> Plasma (mmol/L)	Neonate	2.14-2.74
	Infant	2.13-2.72
	Child	2.10-2.56
	Adult	2.14-2.51
	Adult	2.5-7.5
Urine (mmol/24h)	Adult	2.5-7.5
<b>Carbamazepine</b> (Tegretol) (mg/L)	Child/Adult	4-12
<b>Carnitine</b> (µmol/L)		
	Total	23-60
Free		15-53
<b>Chloride</b> (mmol/L)	Neonate	97-114
	Infant	98-113
	Child	98-111
	Adult	95-108
<b>Cholestanol</b> (µmol/L)	All	3-16
<b>Cholesterol</b> (mmol/L)	Neonate	1.5-4.0
	Infant	1.2-4.7
	Child	2.8-6.0
	16y-19y	2.8-5.7
	Adult (desirable)	<5.2
<b>Cholinesterase</b> (IU/L)		>5300
<b>Complement Profile</b> (g/L)		
	C3	0.75-1.65
C4		0.14 -0.54
<b>Complement Components</b> (g/L)		
	C1 esterase inhibitor	0.15-0.35
C3 nephritic factor		Negative
<b>Copper</b> (µmol/L)	0-6 months	5.9-16.3
	6 months to 1y	3.8-23.8
	Female 1y-13y	11.0-27.0
	Female 13y-49y	11.0-38.9
	Adult (male)	11.0-27.2
	Adult (female)	14.2-35
	Child/Adult	<0.9
Urine µmol/24h		

<b>Cortisol</b> (nmol/L)		<p>Early morning cortisol &lt; 160 nmol/L suggests possible adrenal insufficiency and requires urgent discussion with the endocrine team and follow-up with a short synacthen test.</p> <p>Early morning cortisol &gt; 340 nmol/L makes adrenal insufficiency highly unlikely.</p> <p>Early morning between 160-340 nmol/L, a short synacthen test may be required to exclude adrenal insufficiency. Suggest discuss with the endocrine team.</p>
<b>***Please note the Synacthen test is only valid if the samples are taken promptly at 30 &amp; 60 mins***</b>		
<b>Creatinine kinase</b> (creatine phosphokinase (CK, CPK) (U/L)	0-90d 90d-1y 1y-10y 11y-14y 15y-18y Adult	28-470 24-240 24-175 30-170 27-145 30-170
<b>Creatinine</b> (µmol/L)	Newborn Neonate Infant 1y-2y 2y-4y 5y-11y 12y-14y 15y+ Male 15y+ Female Urine Creatinine mmol/kg body weight/24h Creatinine clearance (ml/min/1.73 sq.m)	31-107 24-76 13-34 13-34 21-39 29-53 40-69 54-90 43-71 0.045-0.34 40-65 95-150 Over 100ml/min
<b>Cyclosporine</b> (Ciclosporin) (µg/L)	Child/Adult	100-400 (trough levels)
<b>7-Dehydrocholesterol</b> (µmol/L) For the diagnosis of Smith Lemli Opitz Syndrome		>5
Normal (µmol/L)		<2
<b>8-Dehydrocholesterol</b> (µmol/L)		<3
<b>DHEAS</b> (µmol/L)	Male 1-7 days Male 8-15 days Male 1-6 months Male 6-12 months Male 1-4 y Male 4-7 y Male 7-11 y Male 11 y Male 12-15 y	2.5-10.2 1.0-6.1 <2.0 <0.7 <0.8 <0.5 <2.6 <4.1 <9.3

	Male 15-17 y	1.3-9.7
	Male 17 y	2.8-9.3
	Male 18-19 y	2.8-11.9
	Male 20-29 y	7.6-17.3
	Male 30-39 y	3.2-14.0
	Male 40-49 y	2.6-14.0
	Male 50-59 y	1.9-8.4
	Male 60-69 y	1.1-7.8
	Male >70 y	0.8-4.8
	Female 1-7 days	2.0-10
	Female 8-15 days	1.2-6.7
	Female 1-6 months	<2.0
	Female 6-12 months	<0.7
	Female 1-4 y	<2.1
	Female 4-7 y	<1.0
	Female 7-9 y	<1.8
	Female 9-11 y	<4.3
	Female 11 y	<2.7
	Female 12-14 y	0.8-4.8
	Female 14-17 y	0.9-9.6
	Female 17-20 y	2.6-10.9
	Female 20-29 y	1.8-10.3
	Female 30-39 y	1.2-7.3
	Female 40-49 y	0.9-6.5
	Female 50-59 y	0.7-5.4
	Female 60-69 y	0.4-4.0
	Female >70 y	0.4-2.4
<b>Diazepam (with Nordiazepam) (µg/L)</b>	Child/Adult	<2500
<b>Digoxin (µg/L)</b> Ideally 6-8h post dose	Child/Adult	Therapeutic target range 0.5-2.0 µg/L. In patients being treated for heart failure a target range of 0.5-1.0 µg/L is recommended (Hallworth and Watson "Therapeutic Drug Monitoring", ACB Venture Publications 2008 page 98).
<b>Dimethylglycine (µmol/mmol creatinine)</b>		0-16
<b>Dopamine (nmol/mmol creat.)</b>	0-1y	<1950
	1y-3y	<1450
	3y-5y	<950
	5y-8y	<850
	8y-11y	<750
	>12y	<650
<b>Follicle stimulating hormone (FSH) (IU/L)</b>	0-1 Month	<22.0
	Male 1 month -6y	<2.8
	Male 6y-11y	<3.8
	Male 11y-14y	<4.6
	Male 14y +	1.5-12
	Female 1 month – 14y	0-11
	Follicular phase	3.5-13
	Mid cycle	4.7-22

	Luteal phase Female 60y + (post menopausal)	1.7-7.7 26-135
<b>Free T<sub>3</sub></b> (pmol/L)	0 – 1 year 1 – 5 years 6 – 10 years 11 – 14 years 15 – 18 years  6 Days to 3 Months 3 Months to 5 Years 5 Years to 8 Years 8 Years to 19 Years	3.4 – 7.6 4.3 – 7.2 4.4 – 6.8 3.4 – 6.5 2.9 – 6.8  13.9 - 26.5 12.5 - 22.0 11.1 - 22.5 9.6 - 20.4
<b>Galactose-1-Phosphate</b> (µmol/GM-Hb) Galactosaemia on galactose free diet	Child/Adult	Up to 30 >0.6
<b>Gamma-glutamyl transferase</b> (U/L)	Newborn Neonate 1m-3m 4m-6m 7m-12m Child Adult	24-227 11-149 <123 <53 8-20 10-27 9-31
<b>Glucose</b> plasma fasting (mmol/L)  Urine (mmol/L)  CSF (mmol/L) CSF/plasma glucose ratio (mmol/mmol)	Neonate Child Neonate Child Diabetic in control Child	2.5-5.5 3.0-6.5 Up to 1.1 Up to 0.3 Up to 150 mmol/24 h 2.8-4.4 >0.6
<b>Glycated haemoglobin (HbA1c)</b> (mmol/mol Hb)	Child/Adult	20.0-48.0
<b>Glycosaminoglycans</b> (mucopolysaccharides MPS) (Screen) Mg/mmol creatinine	0-1m 1m-3m 3m-6m 6m-12m 1y-2y 2y-3y 3y-5y 5y-7y 7y-9y 9y-11y 11y-13y 13y-15y over 15y	22.1-40.8 9.2-38.8 11.9-34.5 4.2-30.5 6.8-21.7 9.7-19.5 6.2-15.4 6.2-12.1 4.1-10.8 4.5-10.8 2.8-10.4 2.0-7.6 1.7-4.4
<b>Growth hormone</b> (µg/L)	0-7d 5-15d 15d-11y 11y-18y 18y+	1-23 1-15 <4.7 <11 <4.3

<b>Haematinics</b> B12 (ng/L)	0-11m	184 - 1000
	11m-11y	324 - 1000
	11y-18y	237 - 912
Folate (µg/l)	Normal	3.1 - 20.5
Ferritin (µg/l)	Female	
	0 to <2 Weeks	69-527
Ferritin (µg/l)	2 Weeks to <13 Years	10-76
	13 to <19 Years	8-70
	Male	
	0 to <2 Weeks	69-527
	2 Weeks to <13 Years	10-76
	13 to <19 Years	13-114
<b>Hexanoylglycine</b> (µmol/mmol creatinine)	Normal	0.1-1.1
<b>High Density Lipoprotein (HDL) – Cholesterol</b> (mmol/L)	Child	0.8-2.1
	Adult	1.0-1.7
<b>Homocysteine Total</b> (µmol/l)	Adult male	0-18
	Adult female	0-16
<b>Homovanillic acid (HVA)</b> (µmol/mmol creatinine)	Infant	4-25
	1y-5y	2-15
	>5	2-13
<b>Human chorionic gonadotrophin (hCG)</b> (IU/L)	Males, Non-pregnant women	<2
<b>17-alpha-Hydroxyprogesterone</b> (nmol/L)  Range may be higher in ill and premature neonates	1-14d	≤ 9.2 nmol/L
	2-13w	≤ 8.7 nmol/L
	3m-1y	≤ 5.7 nmol/L
	1y-3y	≤ 2.9 nmol/L
	3y-11y	≤ 2.9 nmol/L
	11y-15y	≤ 4.5 nmol/L
	>15 years male	≤ 6.0 nmol/L
	Female	
	Follicular	≤ 4.4 nmol/L
	Luteal	≤ 14.3 nmol/L
	Post-menopausal	≤ 2.9 nmol/L
	Synacthen test	
	0 mins	≤ 6.2 nmol/L
	30mins	≤ 12.6 nmol/L
<b>IGF-1</b> (µg/L)	0-2y	28-156
	2-4y	40-189
	4-6y	50-223
	6-7y	62-248
	7-8y	78-281
	Female 8-9y	99-376
	Female 9-10y	114-369
	Female 10-11y	134-426
	Female 11-12y	160-581

	Female 12-13y	201-707
	Female 13-14y	256-716
	Female 14-15y	284-713
	Female 15-16y	279-700
	Female 16-17y	270-660
	Female 17-18y	246-533
	Female 18-19y	233-499
	Male 8-9y	90-284
	Male 9-10y	102-304
	Male 10-11y	117-305
	Male 11-12y	129-339
	Male 12-13y	141-419
	Male 13-14y	179-540
	Male 14-15y	229-691
	Male 15-16y	269-697
	Male 16-17y	267-673
	Male 17-18y	243-527
	Male 18-19y	235-512
	19-20y	220-471
	20-30y	115-340
	30-40y	109-324
	40-50y	103-310
	50-60y	97-292
	60-70y	91-282
	70-80y	47-207
	>80y	40-184
<b>Immunoglobulins</b>		
IgG (g/L)	Neonate	3.9-17.0
	Infant	2.1-10.9
	Child	3.1-16.1
	Adult	6.0-16.0
IgA (g/L)	Neonate	0.01-0.15
	Infant	0.05-0.7
	Child	0.3-2.8
	Adult	0.8-4.0
IgM (g/L)	Neonate	0.05-0.4
	Infant	0.15-2.1
	Child	0.5-2.2
	Adult	0.5-2.0
IgE (kU/L)	Neonate	Up to 5
	Infant	Up to 11
	Child	Up to 63
	Adult	Up to 120
<b>Insulin (from 24/1/11) (pmol/L)</b>	Fasting adult	17.8-173
<b>Iron (µmol/L)</b>	0-2y	3.6-25.0µmol/L
	>2y	3.6-26.0µmol/L
<b>Lactate fasting (mmol/L)</b>	Neonate	Up to 3.0
	Child	0.9-1.8
	Adult	0.6-2.4
<b>Lactate dehydrogenase (LDH) (U/L)</b>	Neonate	Up to 1300



	Child Adult	400-900 340-670
<b>Lipase (U/L)</b>		<60
<b>Lithium (mmol/L)</b>		0.4 – 1.0 (risk of toxicity if >1.5)
<b>Luteinising hormone (LH) (IU/L)</b>	Male 0-1y Male 1y-11y Male 11y-14y Male 14y-17y Male 17y+ Female 0-6y Female 6y-11y Female 11-14y Follicular phase Mid cycle Luteal phase Female 60y + (post menopausal)	<3.2 <1.4 <7.8 1.3-9.8 1.7-8.6 <0.5 <3.1 <11.9 2.4-13 14-96 1.0-11 7.7-59
<b>Magnesium</b> Plasma (mmol/L)  Urine (mmol/kg body weight/24h) (mmol/24h)	Neonate Infant/Child Adult Child Adult	0.6-1.04 0.64-1.09 0.7-1.0 Up to 0.18 2.4-6.5
<b>Manganese (nmol/L)</b>  Risk of toxicity	<1y Child/Adult	120-325 73-210 >364
<b>Methylmalonate (µmol/mmol creatinine)</b>	Child Adult	1.0-8.0 0.2-2.4
<b>Microalbumin (mg/mmol creatinine)</b>		<2
<b>Myoglobin (µg/L)</b> Serum Urine		28-84 <10
<b>Noradrenaline (nmol/24h)</b>	0-1y 1y-3y 3y-5y 5y-8y 8y-11y >11y	<430 <200 <190 <180 <170 <130
<b>17β-Oestradiol (pmol/L)</b>		Dependant on referral laboratory used.
<b>Orotic acid (µmol/mmol creatinine)</b>	Infant/Child/Adult	<3.5
<b>Osmolality</b> Plasma (mmol/kg) Urine (mmol/kg) After water deprivation administration Maximum dilution Maximum concentration	Child/Adult Neonate/Child  Adult Adult	275-295 100-800 over 800 40-100 600-1400
<b>Oxalate (mmol/24h)</b>	Child Adult Female Adult Male	0.14-0.42 0.04-0.34 0.08-0.49
<b>Paracetamol (mg/L)</b>		

Therapeutic range 1-2 h after last dose Overdose; sample taken not less than 4h after overdose: 4 hour levels Refer to Nomogram in BNF	Child/Adult	Up to 30 >100 (treatment indicated – See BNF)
<b>Parathyroid hormone (PTH)</b> (ng/L)	2y 9y 17y 19y	6.4 - 88.6 16.2 - 63.0 21.9 - 87.6 16.0 - 60.4
<b>pH Urine</b>  Within 3 hrs of an ammonium chloride load	Neonate Child	Over 5.0 5.3-7.2 <5.3
<b>Phenobarbitone</b> (Phenobarbital) (mg/L) Trough level after at least 14d of constant therapy	Child/Adult	10-40
<b>Phenylalanine</b> fasting (µmol/L)	Newborn <6m 6m-2y 2y-10y 10y-17y Adult	40-110 32-128 40-140 20-130 30-115 40-100
<b>Phenytoin</b> (mg/L) See Trust guidelines for Therapeutic Drug Monitoring (1523)	Child/Adult	5-20
<b>Phosphate</b> fasting (mmol/L) Plasma  Urine (mmol/kg/body weight/24h) (mmol/24h)	Neonate Infant Child Adult Child Adult	1.0-2.7 1.1-2.4 0.8-1.9 0.8-1.5 0.33-1.28 15-50
<b>Phosphoethanolamine</b> (µmol/mmol Cr) Heterozygote 3-8 x normal Homozygote 10-50 x normal	Child/Adult	<10
<b>Phytanate</b> (µmol/L)	Normal	0.2-19.3
<b>Plasmalogens</b> in red blood cells(ratio) C16 Palmitate C18 Stearate		0.060-0.160 0.150-0.400
<b>Potassium</b> Plasma (mmol/L)  Urine (mmol/kg body weight)	Neonate Infant Child Adult Neonate Child Adult	3.5-6.5 3.5-5.7 3.5-5.4 3.5-5.3 Up to 2.3 Up to 2.0 (25-125 mmol/L) 25-100 mmol/24h
<b>Pristanic acid</b> (µmol/L)	Normal	0-1.88
<b>Progesterone</b> (nmol/L)	Male Female 14-60y	0.7-4.3 No range
<b>Prolactin</b> (mU/L)	0-1y Male 1y + Female 1y +	No range 86-324 102-496

<b>Protein total</b> Plasma (g/L)	Neonate Infant Child >17yr	33-72 48-78 60-83 60-80
Urine (mg/24h)	Neonate Child Adult	Up to 10 Up to 50 Up to 100
Urine protein/creatinine ratio (mg/mmol creatinine)		<20
CSF (g/L)	Newborn Neonate 1m-2m 2m-6m >6m	0.3-1.4 0.3-1.2 0.2-0.9 0.1-0.7 0.1-0.4
<b>Salicylate</b> (mg/L)		
Therapeutic range	Child	Therapeutic level <200
Overdose 4h after ingestion		Refer to toxbase for guidelines on toxicity
<b>Selenium</b> (µmol/L)	<2y 2y-4y 4y-16y >16y	0.22-1.22 0.33-1.44 0.52-1.52 0.61-1.24µg-Hb
Glutathione peroxidase (µg-Hb)		
<b>Sex hormone binding globulin</b> (SHBG) (nmol/L)	Child prepubertal Male 17y + Female 17-50y	No range 14.5-48.4 26.1-110
<b>Sodium</b> Plasma mmol/L)	Neonate Infant Child Adult	131-143 133-142 133-144 133-146
Urine (mmol/kg body weight/24h)	Neonate Child Adult	Up to 4.4 Up to 3.7(40-200 mmol/24h) 100-200 mmol/24h
<b>s-Sulphocysteine</b> (µmol/mmol creatinine)		<10
<b>Testosterone</b> (nmol/L)	Male 0-1 month Male 1m-6m Male 6m-6y Male 6-13y Male 13-18y Male 18y + Female 0-1 month Female 1m-10y Female 10-12y Female 12y +	2.6-14 <6.1 <1.12 <2.37 0.98-38.5 8.6-29.0 0.7-2.2 <0.4 <0.9 0.30-1.7
<b>Theophylline</b> (mg/L)	>1 month/Adult	44105 Can be lower in neonates
<b>Thyroid stimulating hormone</b> (TSH, thyrotrophin) (mU/L)	1 Week to <19 Years	0.86 - 5.7
<b>Transferrin</b> (g/L)	Child/Adult	2.0-3.2
<b>Triglyceride</b> fasting (mmol/L)	Neonate Infant	<1.8 0.3-1.7

	Child Adult	0.4-2.1 <2.5
<b>Trimethylamine</b> (and Oxide) ( $\mu\text{mol}/\text{mmol cr.}$ )		Interpretation given on report
<b>Urea</b> ( $\text{mmol}/\text{L}$ )	Neonate Infant Child Adult	0.5-5.7 0.3-4.7 1.6-6.0 2.5-7.8
<b>Uric acid</b> Plasma ( $\mu\text{mol}/\text{L}$ )  Urine ( $\text{mmol}/\text{mmol creatinine}$ )	Neonate Child <10y Child >10y Adult (male) Adult (female) Neonate Infant Child Adult	120-470 160-390 160-500 200-430 140-360 0.3-1.7 0.3-1.3 0.3-0.8 0.3-0.5 (1.5-4.5 $\text{mmol}/24\text{h}$ )
<b>Valproate</b> ( $\text{mg}/\text{L}$ )	Child/Adult	50-100 >150 may be toxic
<b>Very long chain fatty acids</b> (peroxisomal disorders) C22 ( $\mu\text{mol}/\text{L}$ ) C24 ( $\mu\text{mol}/\text{L}$ ) C26 ( $\mu\text{mol}/\text{L}$ ) C24/C22 C26/C22		15-112 14-80 0.33-1.50 0.44-0.97 0.005-0.030
<b>Vitamins</b> A ( $\mu\text{mol}/\text{L}$ )  C (ascorbic acid $\mu\text{mol}/\text{L}$ ) D ( $\text{nmol}/\text{L}$ )  E ( $\mu\text{mol}/\text{L}$ )  Vitamin E/Lipid ratio ( $\mu\text{mol}/\text{L}$ )	Neonate/Infant 1-6y 7y-11y 12y-18y >19y  Neonate Child <16y >16y-adult 1y-6y 7y-12y 13y-19y Adults	0.50-1.50 0.70-1.50 0.91-1.71 0.91-2.51 0.84-3.60 26.1 – 84.6 <25 Vitamin D deficiency. Consider treatment. 25-50 Suboptimal vitamin D status. Advise on dietary and lifestyle change to improve vitamin D status. Consider vitamin D supplementation. Ensure dietary calcium intake is adequate. >50 Vitamin D adequate in context of normal health and adequate dietary calcium intake. 4.6-14.0 9.0-28.0 11.6-35.5 3-5 2-5 2-4 >1.6
<b>Vanillyl mandelic acid</b> (VMA) ( $\mu\text{mol}/\text{mmol creatinine}$ )	Infant 1y-5y >5y	2-12 2-9 1-7
<b>Zinc</b> ( $\mu\text{mol}/\text{L}$ )	Infant/Child/Adult	7.2-20.4