

CWPS Biochemistry and Immunology Reference Range Changes

Assays highlighted in grey have revised reference ranges

Biochemistry and Immunology Assay List	New Reference Interval	Previous Reference Interval
ALBUMIN	>16 years 35-50 g/L Neonate and infant 30-45 g/L 1-16 years 30-50 g/L	>16 years 35-50 g/L Neonate and infant 30-45 g/L 1-16 years 30-50 g/L
ALKALINE PHOSPHATASE (ALP)	Adult 30-130 U/L Neonate 70-380 U/L Infant -16y 60-425 U/L	M 40-130; F 35-105 U/L 1 day <250 2-5 days <231 6 days-6 months <449 7 months-1 year <462 1-3 years <281 4-6 years <269 7-12 years <300 13-17 years (M) <390 13-17 years (F) <187
ALPHA 1 ANTITRYPSIN	1.1-2.1 g/L	1.1-2.1 g/L
ALPHAFETOPROTEIN (AFP)	<7 kU/L	<9 kU/L
ALT	10-49 U/L	M 10-50 F 5-38 IU/L
AMMONIA	Sick/premature <150 umol/L Neonate <100 umol/L Infant-16 years <50 umol/L Adult 11-32 umol/L	Sick or premature <150 umol/L Neonate <100 umol/L, Infant-16 years <50 umol/L
AMYLASE	30-118 U/L	<100 IU/L
ANGIOTENSIN CONVERTING ENZYME (ACE)	Adult 20-70 U/L	20-95 U/L
AST	< 34 U/L	M 8-40 F 6-34 IU/L
VITAMIN B12	211-911 ng/L	191-663 ng/L
BETA 2 MICROGLOBULIN (B2M)	1.00-2.40 mg/L	<4 mg/L
BICARBONATE	22-29 mmol/L	22-29 mmol/L
BILE ACIDS	<14 umol/L	<14 umol/L
NT-Pro BNP	None reported	M 19-49y <10; M49-64y <27 F 19-49y <18; 49-64y <39 pmol/L
CA 125	≤35 kU/L	<35 kU/L
CA 15-3	≤33 kU/L	<28 kU/L
CA 19-9	≤37 kU/L	<33 kU/L
CAERULOPLASMIN	0.2 - 0.6 g/L	0.2-0.6 g/L
CALCIUM	> 16 yrs = 2.2-2.6 mmol/L Adjusted Neonate = 2.0-2.7 mmol/L (total) Infant-16y = 2.2-2.7 mmol/L (total)	>16y 2.1-2.58 mmol/L Adjusted Neonate 2.0-2.7 (total) Infant-16y 2.2-2.7 (total)

CARBAMAZEPINE*#	4-12 mg/L	4-10 mg/L
CARCINOEMBRYONIC AG (CEA)	Non-smokers: < 2.6 ug/L	<5 ug/L
CHOLESTEROL	None applied	Ideally <5.0 mmol/L
CHLORIDE	95 - 108 mmol/L	95-108 mmol/L
COMPLEMENT C3C	Newborns 0.60–1.10 g/L 3 months 0.70–1.20 g/L 6 months 0.70–1.40 g/L 9 months 0.80–1.40 g/L 12 months 0.80–1.50 g/L 2–10 years 0.80–1.50 g/L 12–18 years 0.90–1.60 g/L 20 years 0.80–1.60 g/L 30 years 0.80–1.60 g/L 40–70 years 0.90–1.70 g/L	0.75-1.75 g/L
COMPLEMENT C4	0.12–0.36 g/L	0.14-0.54 g/L
CONJUGATED BILIRUBIN	None reported	None reported
CORTISOL	7–9 am 145 – 619 nmol/L	9am 133-537 nmol/L
C-REACTIVE PROTEIN (CRP)	<10 mg/L	<10 mg/L
CREATINE KINASE (CK)	M 46–171 U/L F 34–145 U/L	M 30-175 U/L F 25-125 U/L
CREATININE	0 - <14days M 27 - 81 F 27 - 81 14d - <1yr M 14 - 34 F 14 - 34 1 - <3yr M 15 - 31 F 15 - 31 3 - <5yr M 23 - 37 F 23 - 37 5 - <7yr M 25 - 42 F 25 - 42 7 - <9yr M 30 - 48 F 30 - 48 9 - <11yr M 28 - 57 F 28 - 57 11yr M 36 - 64 F 36 - 64 12yr M 36 - 67 F 36 - 67 13yr M 38 - 76 F 38 - 74 14yr M 40 - 83 F 43 - 75 15yr M 47 - 98 F 44 - 79 16yr M 54 - 99 F 48 - 81 Adult Males - 53-97 umol/L Adult Female 44-71 umol/L	M 65-105; F 50-90 umol/L Neonate (prem) 29-87 Neonate (term) 27-77 2-12 months 14-34 1-2 years 15-31 3-4 years 23-37 5-6 years 25-42 7-8 years 30-47 9-10 years 29-56 11-12 years 39-60 13-14 years 40-68 Adult M 65-105 umol/L Adult F 25-125 umol/L
CSF GLUCOSE	None reported	None reported
CSF LACTATE	0.6-2.2 mmol/L	1.1-2.4 mmol/L
CSF PROTEIN	0.15 - 0.45 g/L	0.15-0.45 g/L
CYCLOSPORIN	None reported	2 hour post: 400-700 ug/L 12 hour post: 75-125 ug/L

		<p><1 week 2.9-16.5 umol/L 1-4 weeks 0.9-11.7 1-12 months 0.1-3.4 1-4 years 0-0.5 5-9 years 0.1-2.3 M10-14y 0.7-6.7 F10-14y 0.9-7.6 M15-19y 1.9-13.4 F15-19Y 1.8-10 M20-24y 5.7-13.4 F20-24y 4.0-11.0 M25-34y 4.3-12.2 F25-34y 2.7-9.2 M35-44y 2.4-11.6 F35-44y 1.7-9.2 M45-54y 1.2-9.0 F45-54y 1.0-7.0 M55-64y 1.4-8.0 F55-64y 0.5-5.6 M65-74y 0.9-6.8 F65-74y 0.9-6.8 F65-74y 0.3-6.7 M >75y 0.4-3.3 F >75y 0.3-4.2</p>
DHA SULPHATE	<p>M 2-3 years <0.08-0.6 F 2-3 years <0.08-0.6 M 4-9 years <0.08-2.4 F 4-9 years <0.08-2.9 M 10-14 years 1.0-7.3 F 10-14 years 0.9-6.7 M 15-21 y 2.8-14.2 F 16-21 year 2.7-11.2 Females 0.70 – 12.49 µmol/L Males 0.94 – 15.44 µmol/L</p>	
DIGOXIN	0.8 - 2.0 ug/L	0.8-2.0 ug/L
ETHANOL	None reported	None reported
FERRITIN	<p>M 22 - 322 ug/L F 10 - 291 ug/L</p>	<p>M & PostMeno F 15-350 ug/L Pre-Menopausal F 10-150</p>
FOLATE	> 5.38 ug/L	3.9-26.8 ug/L
FREE T3	<p>Adult 3.5 - 6.5 pmol/L Infants (1 -23 Months) 5.1 - 8.0 pmol/L Children (2 -12 years) 5.1 - 7.4 pmol/L Adolescents (13-20yr) 4.7-7.2 pmol/L</p>	2.8-7.1 pmol/L
FREE T4	<p>Adult 11.5 - 22.7 pmol/L 1-23 months 12.1-18.6 2-12 years 11.1 - 18.1 13-20 years 10.7 - 18.4</p>	9-26 pmol/L

FSH	<p>Female Normally menstruating Follicular Phase 3–10 IU/L Midcycle Peak 3–33 IU/L Luteal Phase 2–9 IU/L Postmenopausal 23–116 IU/L</p> <p>Males 13–70 years 1–18 IU/L Paediatric Male 2–3 y < 1 4–9 y < 2.0 IU/L 10–11 y < 5 IU/L 12–21 y 1–8 IU/L</p> <p>Female 2–3 y 1–5.0 IU/L 4–9 y < 5.0 IU/L 10–11 y 1–9 IU/L 12–21 y 2–10 IU/L</p>	<p>Male Adult 2-12 IU/L</p> <p>Female Adult Follicular 3-12 IU/L Ovulatory 5-21 IU/L Luteal 2-8 IU/L Post-menopausal 26-135 IU/L</p>
GAMMA GT	<p>M < 73 U/L F < 38 U/L</p>	<p>M 10-70 IU/L F 5-50 IU/L</p>
GLUCOSE	3.0-5.6 mmol/L	3.0-5.6 mmol/L
GROWTH HORMONE	<p>Males: ≤ 9 mIU/L Females: ≤ 24 mIU/L</p>	Fasting <5.5 mIU/L
HAPTOGLOBIN	0.4–2.8 g/L	0.3-2.0 g/L
HCG	< 2 IU/L	<2 IU/L
HDL CHOLESTEROL	<p>M >1.0 mmol/L F >1.2 mmol/L</p>	<p>M >1.0 mmol/L F >1.2 mmol/L</p>
HOMOCYSTEINE	4 to 14 µmol/L	<p>M<14 µmol/L F<13 µmol/L</p>
IGF-1	<p>1-14 days = <3.3 nmol/L 1 year = 7.2-42.5 2 yr = 6.6-39.4 3yr = 6.4-37.6 4yr = 6.4-36.8 5yr = 6.5-37.2 6yr = 6.8-38.6 7yr = 7.4-41.1 8yr = 8.3-44.9 9yr = 9.6-50.4 10yr = 11.4-58.8 11yr = 14.4-71.6 12yr = 18.6-90.1 13yr = 23.8-110.5 14yr = 28.6-126.4 15yr = 30.8-129.5 16yr = 29.4-117.4 17yr = 25.1-95.0 18yr = 21.2-75.9 19yr = 18.3-62.8 20yr = 16.5-55.1 21-25 = 15.1-46.5 26-30 = 15.2-42.8 31-35 = 15.0-39.9 36-40 = 14.2-36.9</p>	<p>2m-5y (M) 3.6-14.8 (F) 4.4-22.3 nmol/L 6-8y (M)7.1-26.8 (F)10.4-31.7 9-11y (M)11.1-32.3 (F) 11.4-51.9 12-15y (M) 15-64.8 (F) 24.5-66.3 16-20Y (M) 32.1-62.6 (F) 34.8-61.2 21-24Y(M) 24.4-52 (F) 19.3-43.2 25-39Y (M)12.5-29.6 (F) 14.0-32.1 40-54y (M) 11.5-27.3 (F)12.1-31.8 >55y (M) 7.1-24.1 (F) 7.0-26.6 nmol/L</p>

	<p>41-45 = 13.1-34.7 46-50= 12.2-32.8 51-55 = 11.3-30.9</p> <p>56-60 = 10.5-29.3 61-65 = 9.8-27.6 66-70 = 9.0-26 71-75 = 8.3-24.4 76-80 = 7.7-23.0 81-85 = 7.2-21.6</p>	
IMMUNOGLOBULINS IgA	<p>0-2 weeks <0.15 - 0.08 g/L 2-6 weeks 0.02 - 0.15 6-12 weeks <0.15 - 0.4 3-6 months <0.15 - 0.5 6-9 months 0.15 - 0.7 9-12 months 0.2 - 0.7 1-2 years 0.3 - 1.2 2-3 years 0.3 - 1.3 3-6 years 0.4 - 2.0 6-9 years 0.5 - 2.4 9-12 years 0.7 - 2.5 12-15 years 0.8 - 2.8 15-45 years 0.8 - 2.8 over 45 years 0.8 - 4.0</p>	0.8-4.0 g/L and paediatric ranges
IMMUNOGLOBULINS IgG	<p>0-2 weeks 5.0 - 17.0 g/L 2-6 weeks 3.9 - 13.0 6-12 weeks 2.1 - 7.7 3-6 months 2.4 - 8.8 6-9 months 3.0 - 9.0 9-12 months 3.0 - 10.9 1-2 years 3.1 - 13.8 2-3 years 3.7 - 15.8 3-6 years 4.9 - 16.1 6-9 years 5.4 - 16.1 9-12 years 5.4 - 16.1 12-15 years 5.4 - 16.1 15-45 years 6.0 - 16.0 over 45 years 6.0 - 16.0</p>	5.3-16.5g/L and paediatric ranges
IMMUNOGLOBULINS IgM	<p>0-2 weeks <0.08 - 0.2 g/L 2-6 weeks 0.08 - 0.4 6-12 weeks 0.15 - 0.7 3-6 months 0.2 - 1.0 6-9 months 0.4 - 1.6 9-12 months 0.6 - 2.1 1-2 years 0.5 - 2.2 2-3 years 0.5 - 2.2 3-6 years 0.5 - 2.0 6-9 years 0.5 - 1.8 9-12 years 0.5 - 1.8 12-15 years 0.5 - 1.9 15-45 years 0.5 - 1.9 over 45 years 0.5 - 2.0</p>	0.5-2.0 g/L and paediatric ranges

IRON	M 11.6-31.3 µmol/L F 9.0-30.4 µmol/L	M 11-28 umol/L F 7-26 umol/L
LACTATE	0.5-2.2 mmol/L	0.5-2.2 mmol/L
LACTATE DEHYDROGENASE (LDH)	120-246 U/L	2-15 yr = 120-300 IU/L 15+ yr = 0-250 IU/L
LITHIUM	0.4 - 1.0 mmol/L	0.5-0.8 mmol/L
LUTENISING HORMONE	<p>Adult Females Normally menstruating Follicular phase 2–13 IU/L Midcycle peak 9–76 IU/L Luteal phase 0.5–7 IU/L Postmenopausal 8–54 IU/L</p> <p>Males 20–70 years 2–9 IU/L > 70 years 3–35 IU/L</p> <p>Paed Ranges Male 2–3 y < 1.0 IU/L 4–9 y < 1.0 IU/L 10–12 y < 3.0 IU/L 13–21 y 1.0–7 IU/L</p> <p>Female 2–3 y < 1.0 IU/L 4–9 y < 1.0 IU/L 10–12 y < 12 IU/L 13–21 y 1.0–52 IU/L</p>	M 2-9; F Follicular 2-13 IU/L Ovulatory 14-96 IU/L Luteal 1-11 IU/L Post-meno 8-58 IU/L
MAGNESIUM	Adult 0.7-1.0 mmol/L Neonate 0.6-1.0 mmol/L Infant-16y 0.7-1.0 mmol/L	0.7-1.0 mmol/L
OESTRADIOL	<p>Males ND - 146.1 pmol/L</p> <p>Menstruating females (by day in cycle relative to LH peak) Follicular phase (-12 to -4 days) 71.6 - 529.2 pmol/L Midcycle (-3 to +2 days) 234.5 - 1309.1 pmol/L Luteal Phase (+4 to +12 days) 204.8 - 786.1 pmol/L Postmenopausal female (untreated) ND - 118.2 pmol/L</p>	M 94.8-223 pmol/L Follicular 45.4-854 Ovulatory 151-1461 Luteal 81.9-1251 Post-Meno <18.4-505
PARACETAMOL	None reported	None reported
PARATHYROID HORMONE	2.0 - 8.5 pmol/L	1.6-6.9 pmol/L
PHENOBARBITONE*#	Therapeutic range 5 - 20 mg/L	10-40 mg/L
PHENYTOIN	Therapeutic range =5.0 - 20.0 mg/L	10-20 mg/L

PHOSPHATE	Adults 0.8-1.5 mmol/L Neonate 1.3-2.6 mmol/L Infant 1.3-2.4 mmol/L 1-16y 0.9-1.8 mmol/L	Adult 0.8-1.8 mmol/L Neonate 1.3-2.6 mmol/L Infant 1.3-2.4 mmol/L 1-16 years 0.9-1.8 mmol/L
POTASSIUM	Adult 3.5-5.3 mmol/L Neonate 3.4-6.0 mmol/L Infant 3.5-5.7 mmol/L 1-16y 3.5-5.0 mmol/L	Adult 3.5-5.3 mmol/L Neonate 3.4-6.0 Infant 3.5-5.7 1-16y 3.5-5.0
PROGESTERONE	None reported	None reported
PROLACTIN	M 45–375 mIU/L F Non-pregnant 59–619 mIU/L	M <400 F <500 mU/L
PROSTATE SPECIFIC ANTIGEN	NICE: 0-4 normal Age 50-69 PSA ≥ 3.0 then refer via 2 week pathway	<60y <3.0 ug/L <70y <4.0 >70y <5.0
RHEUMATOID FACTOR	< 14 KIU/L	<15 kU/L
SALICYLATE	None reported	None reported
SEX HORMONE BINDING GLOBULIN	Males (<50 years) 11.54 - 54.49 nmol/L Males (>50 years) 17.33 - 71.50 nmol/L Females (≥50 years) 23.65 - 110.61 nmol/L Females (<50) 17.69 - 138.26 nmol/L	M 14-48 nmol/L F 26-110 nmol/L
SODIUM	133 - 146 mmol/L	133-146 mmol/L
TACROLIMUS	None reported	None reported
TESTOSTERONE	Males (<50 years) 6.9 - 23.2 nmol/L Males (≥50 years) 6.5 - 23.7 nmol/L Females (<50) 0.3 - 1.2 nmol/L Females (≥50) <0.2 - 1.3 nmol/L	M 18-49y 8.6-29.0 nmol/L ≥50y 6.7-25.7 F 18-49y <1.8 F≥50y <1.5
THEOPHYLLINE	10-20 mg/L	10-20 mg/L
THYROID PEROXIDASE AB (TPO)	≤60 kU/L	<35 kU/L
TOTAL BILIRUBIN	<21 umol/L	M 4-25 umol/L F 4-20 umol/L <16 yrs <21 umol/L
TOTAL PROTEIN	60-80 g/L	60-80 g/L
TRANSFERRIN	Males 2.2–3.7 g/L Females 2.5–3.8 g/L	2.0-3.6 g/L
TRIGLYCERIDES	< 1.70 mmol/L	0.4-1.9 mmol/L
TROPONIN I	None applied	
TSH	Adult 0.55 - 4.78 mIU/L 1-23 months = 0.87 - 6.15 mIU/L 24 months-12 yr = 0.67 - 4.16 mIU/L 13-20 yrs = 0.48 - 4.17 mIU/L	0.27-4.20 mU/L

Anti Cyclic Citrulinated Peptide (CCP)	<5 kU/L	<10 kU/L
URIC ACID	M 220-547 umol/L F 184-464 umol/L	M 210-420 umol/L <40y F 130-350 umol/L <50y F 130-39 umol/L >50y F 160-420 umol/L
URINE ALBUMIN	<20 mg/L M <2.5 mg/mmol F <3.5 mg/mmol	<20 mg/L M <2.5 mg/mmol F <3.5 mg/mmol
URINE AMYLASE	<650 U/L	<460 IU/L
URINE CALCIUM	2.5-7.5 mmol/24 hour	M 2.5-7.5 mmol/24 hour F 2.5-6.2 mmol/24 hour
URINE CHLORIDE	110-250 mmol/24 hour	Not reported
URINE CREATININE	M 8.4–22.0 mmol/day F 5.3–15.9 mmol/day	M 13.2-17.6 mmol/L24 hour F 7.0-13.2 mmol/24 hour
URINE MAGNESIUM	2.4-6.5 mmol/24 hour	2.4-6.5 mmol/24 hour
URINE TOTAL PROTEIN	<0.2 g/L <0.15 g/24 hours	<0.2 g/L <0.15 g/24 hours
URINE PHOSPHATE	15-50 mmol/24 hour	15-50 mmol/24 hour
URINE URATE	1.5-4.4 mmol/24 hour	2.8-4.4 mmol/24 hour
URINE UREA	430-710 mmol/24 hour	250-580 mmol/24 hour
URINE SODIUM	40-220 mmol/24 hour	40-200 mmol/24 hour
URINE POTASSIUM	25-125 mmol/24 hour	25-100 mmol/24 hour
VALPROATE*#	<100 mg/L	50-100 mg/L
VITAMIN D	>50 nmol/L	>50 nmol/L
UREA	Adult 2.5-7.8 mmol/L Neonate 0.8-5.5 mmol/L Infant 1.0-5.5 mmol/L 1-16y 2.5-6.5 mmol/L	Adult 2.5-7.8 mmol/L Neonate 0.8-5.5 mmol/L Infant 1.0-5.5 mmol/L 1-16y 2.5-6.5 mmol/L

* Assays that are referred to another laboratory outside of the network.

Please contact the Duty Biochemist if the assay is required urgently.