

NEW RCPCH REFERENCE RANGES- 2016

Ranges vary between populations and age groups and it is important to always check the reference ranges. If there is no age-specific paediatric range, use the adult range.

| | Adult (use if no paediatric age-specific range) | Range | Paediatric (age if applicable) | Range |
|---|---|---------------------------------|---|----------------------------------|
| Haematology: | | | | |
| Haemoglobin | Male | 130 – 175 g/l | 0 – 6 days | 145 - 220 g/l |
| | Female | 115 – 165 g/l | 7 days | 140 - 186 g/l |
| | | | 8 days – 3 months | 95 - 125 g/l |
| | | | 3 months – 4 years | 110 - 140 g/l |
| | | | 5 – 12 years | 115 - 140 g/l |
| White cell count | | 3.0 – 10.0 x 10 ⁹ /l | 0 – 6 days | 10.0 - 26.0 x 10 ⁹ /l |
| | | | 7 days | 5.0 – 21.0 x 10 ⁹ /l |
| | | | 8 days – 6 months | 6.0 – 15.0 x 10 ⁹ /l |
| | | | 7 months – 12 years | 5.0 – 12.0 x 10 ⁹ /l |
| Platelets | | 150 – 400 x 10 ⁹ /l | | 150-450 x 10 ⁹ /l |
| Mean cell haemoglobin (MCH) | | 27 – 33 pg | 0 – 3 months | 31 – 37 pg |
| | | | 3 – 4 months | 27 – 33 pg |
| | | | 4 months – 12 years | 23 – 31 pg |
| Mean cell haemoglobin concentration (MCHC) | | 32 – 35 g/dl | | 32 – 35 g/dl |
| Mean cell volume (MCV) | | 80 – 96 fl | 0 – 3 months | 100 – 130 fl |
| | | | 3 – 4 months | 85 – 100 fl |
| | | | 4 months – 4 years | 70 – 86 fl |
| | | | 4 – 12 years | 77 – 91 fl |
| Neutrophils | | 2.0 – 7.5 x 10 ⁹ /l | 0 – 3 days | 5.0 – 13.0 x 10 ⁹ /l |
| | | | 4 days | 1.5 – 10.0 x 10 ⁹ /l |
| | | | 5 days – 6 years | 1.5 – 8.0 x 10 ⁹ /l |
| | | | 7 – 11 years | 2.0 – 6.0 x 10 ⁹ /l |
| Lymphocytes | | 1.5 – 4.0 x 10 ⁹ /l | 0 – 2 days | 2.0 – 4.5 x 10 ⁹ /l |
| | | | 3 days | 3.0 – 9.0 x 10 ⁹ /l |
| | | | 4 days – 12 months | 4.0 – 10.0 x 10 ⁹ /l |
| | | | 1 – 6 years | 1.5 – 9.5 x 10 ⁹ /l |
| | | | 7 – 10 years | 1.5 – 7.0 x 10 ⁹ /l |
| Monocytes | | 0.2 - 1.0 x 10 ⁹ /l | 0 – 3 days | 0.5 – 1.5 x 10 ⁹ /l |
| | | | 4 days – 6 years | 0.3 – 1.1 x 10 ⁹ /l |
| | | | 7 – 10 years | 0.2 – 1.2 x 10 ⁹ /l |
| Eosinophils | | 0 – 0.4 x 10 ⁹ /l | 0 – 3 days | 0.1 – 2.0 x 10 ⁹ /l |
| | | | 4 days – 6 years | 0.1 – 1.0 x 10 ⁹ /l |
| | | | 7 – 10 years | 0.1 – 0.8 x 10 ⁹ /l |
| Basophils | | 0 - 0.1 x 10 ⁹ /l | | 0 – 0.1 x 10 ⁹ /l |
| Reticulocytes | | 25 - 100 x 10 ⁹ /l | 0 – 1 day | 1.8 – 4.6 x 10 ⁹ /l |
| Packed cell volume (PCV) | | 0.35 – 0.48 | 0 – 2 months | 0.44 – 0.64 |
| | | | 2 – 3 months | 0.32 – 0.44 |
| | | | 4 months – 3 years | 0.36 – 0.44 |
| Erythrocyte sedimentation rate | | < 20 mm/hr | | < 20 mm/hr |
| D dimers | | <0.5mg/l | | <0.5 mg/l |
| Coagulation screen | | | | |
| International normalised ratio (INR) | | 1.0 | | 1.0 |
| Activated partial thromboplastin time (APTT) | | 22 – 41 seconds | Term babies | |
| | | | 0 – 3 months | 28.0 – 55.0 seconds |
| | | | Preterm babies (30-36 weeks gestation) | |
| | | | 0 – 21 days | 27– 75 seconds |
| | | | 22 days – 3 months | 26.9 – 62.5 seconds |
| | | | Term and preterm | |

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| | | | 3 months - 12 years | 28.0 – 45.0 seconds |
| Prothrombin time (PT) | | 10 – 12 seconds | Term babies | |
| | | | 0 – 3 months | 8.5 – 14.1 seconds |
| | | | Preterm babies (born at 30-36 weeks) | |
| | | | 0 – 3 months | 8.5 – 17.0 seconds |
| Thrombin time (TT) | | 9 – 15 seconds | | 9 – 15 seconds |
| Fibrinogen | | 1.5 - 4.0 g/dl | | 1.5 – 4.0 g/dl |
| Fibrinogen degradation products | | < 8 mg/ ml | | |
| Arterial blood gas: | | | | |
| pH | | 7.35 – 7.45 | | 7.35 – 7.45 |
| PaO₂ | | 11 - 15 kPa | | 11 - 15 kPa |
| | | | Preterm neonatal target | 8 – 12 kPa |
| PaCO₂ | | 4.6 – 6.4 kPa | | 4.6 – 6.4 kPa |
| Bicarbonate (HCO₃) | | 22 – 30 mmol/l | | 19 – 28 mmol/l |
| | | | Neonate | 14 – 28 mmol/l |
| Base excess | | -2 to +2 mmol/l | | -2 to +2 mmol/l |
| Clinical chemistry | | | | |
| Electrolytes: | | | | |
| Sodium | | 135 – 146 mmol/l | | 133 – 146 mmol/l |
| Potassium | | 3.5 – 5.3 mmol/l | | 3.5 – 5.5 mmol/l |
| Chloride | | 95 – 106 mmol/l | | 95 – 106 mmol/l |
| Bicarbonate | | 22 - 29 mmol/l | | 19 – 28 mmol/l |
| Urea | | 2.5 – 7.8 mmol/l | 0-12 months | 0.8 – 5.5 mmol/l |
| | | | 1 – 16 years | 2.5 – 6.5 mmol/l |
| Creatinine | | 60 – 120 µmol/l | Neonate | 21– 75 µmol/l |
| | | | 1 month to 4 years | 13 – 39 µmol/l |
| | | | 5-11 years | 29 – 53 µmol/l |
| | | | 12 years+ | 40 – 90 µmol/l |
| | | | | |
| Calcium | | 2.2 – 2.6 mmol/l | <4 weeks | 2.0 – 2.7 mmol/l |
| | | | 4 weeks – 16 years | 2.2 – 2.7 mmol/l |
| Magnesium | | 0.7 – 1.0 mmol/l | | 0.6 – 1.0 mmol/l |
| Phosphate | | 0.8 – 1.5 mmol/l | <1 year | 1.3 – 2.6 mmol/l |
| | | | 1 – 16 years | 0.9 – 1.8 mmol/l |
| Metabolic tests: | | | | |
| Fasting glucose | | 3.0 – 6.0 mmol/l | Neonate | 2.5 – 5.5 mmol/l |
| | | | Child | 3.0 – 6.0 mmol/l |
| Glycated haemoglobin (HbA_{1c}) | | 20 - 42 mmol/mol (4-6%) | | 20 – 42 mmol/mol (4-6%) |
| | | | | |
| Total cholesterol (TC) | | < 5.0 mmol/l | Infant | 1.2 – 4.7 mmol/l |
| | | | Child | 2.8 – 6.0 mmol/l |
| LDL cholesterol (fasting) | | < 3.0 mmol/l | | < 3.0 mmol/l |
| HDL cholesterol | | > 1.2 mmol/l | | < 1.2 mmol/l |
| Ratio of TC/HDL | | < 4.5 | | < 4.5 |
| Triglycerides (fasting) | | < 2.3 mmol/l | Neonate | <1.8 mmol/l |
| | | | Infant | 0.3 – 1.7 mmol/l |
| | | | Child | 0.4- 2.1 mmol/l |
| Plasma osmolality | | 275 – 295 mOsmol/kg | | 275 – 295 mOsmol/kg |

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| Liver function: | | | | |
| Albumin | | 35 – 50 g/l | <4 weeks | 25 – 45 g/l |
| | | | 4 weeks – 1 year | 30 – 45 g/l |
| | | | 1 – 16 years | 35 – 50 g/l |
| Alanine aminotransferase (ALT) | | 10 – 50 IU/l | 0 – 12 months | 0 – 41 IU/l |
| | | | 1 – 2 years | 0 – 28 IU/l |
| | | | 3 – 6 years | 0 – 29 IU/l |
| | | | 7 – 12 years | 0 – 36 IU/l |
| | | | 13 – 17 years | 0 – 37 IU/l |
| Aspartate aminotransferase (AST) | | 10 – 40 IU/l | Neonate | 18 – 92 IU/l |
| | | | Child | 8-60 IU/l |
| Alkaline phosphatase (ALP) | | 25 – 115 IU/l | Neonate | 73- 391 IU/l |
| | | | Infant | 59 – 425 IU/l |
| | | | 1- 14 y | 76 – 308 IU/l |
| | | | 14-16 | 49 – 242 IU/l |
| Bilirubin | | < 17 µmol/l | 14 days – 16 years | <21 µmol/l (conjugated <2µmol/l) |
| Gamma glutamyl transferase (γGT) | | 9 - 40 IU/l | | 9 – 40 IU/l |
| Cardiac enzymes: | | | | |
| Creatine kinase | Male | 25 – 200 U/l | | 25 – 300 U/l |
| Troponin T | | < 0.01 µg/l | | < 0.01 µg/l |
| Haematinics: | | | | |
| Serum vitamin B12 | | 160 – 925 ng/l | | 160 – 925 ng/l |
| Serum folate | | 3 – 15 µg/l | | 3 – 15 µg/l |
| Ferritin | | 12 – 200 µg/l | | 12 – 200 µg/l |
| Iron | | 14 – 31 µmol/l | Male | 14 – 31 µmol/l |
| Total iron binding capacity | | 54 – 75 µmol/l | | 54 – 75 µmol/l |
| Thyroid stimulating hormone (TSH) | | 0.3 – 4.2 mU/l | 0 – 3 days | 5.2 – 14.6 mU/l |
| | | | 4 days – 12 months | 0.6 – 8.1 mU/l |
| | | | Child | 0.5 – 4.5 mU/l |
| Free T4 | | 9 - 25 pmol/l | 0 – 6 days | 11 – 32 pmol/l |
| | | | 7 days – 3 months | 12 – 18 pmol/l |
| | | | Over 3 months | 12 - 24 pmol/l |
| Free T3 | | 4.0 – 7.2 pmol/l | | 3.0 – 9.0 pmol/l |
| Cortisol (9am) | | 200 – 700 nmol/l | | 200 – 700 nmol/l |
| Cortisol (midnight) | | < 140 nmol/l | | < 140 nmol/l |
| Parathyroid hormone | | 15.2 – 81 ng/l (1.6 – 8.5 pmol/l) | | 11-35 ng/l (1.2-3.7 pmol/l) |
| Prolactin | | 90 - 320 U/l | Male | 90 – 320 U/l |
| | | 100 - 500 U/l | Female | 100 – 500 U/l |
| Renin (erect/recumbent) | | 1.2 - 4.5/1.1-2.7 pmol/ml/hr | 0 – 3 months | 4.0 – 12.0 pmol/ml/hr |
| | | | 3 months – 5 years | 2.0 – 6.0 pmol/ml/hr |
| | | | 6 – 9 years | 1.0 – 4.0 pmol/ml/hr |
| | | | 10 – 16 years | 0.6 – 2.2 pmol/ml/hr |
| Aldosterone (erect/recumbent) | | 600 - 1200/100-500 pmol/l | 0 – 3 months | 1000 – 3500 pmol/l |

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|---|---|---------------------|--|--|--|
| | | | 3 months – 2 years | 400 - 1500 pmol/l | |
| | | | 2 – 5 years | 300 - 1000 pmol/l | |
| | | | 6 – 9 years | 400 - 800 pmol/l | |
| | | | 10 – 16 years | 150 - 450 pmol/l | |
| Testosterone | Male | 9.9 - 27.8 nmol/l | <i>Tanner Stage of Puberty (male):</i> | | |
| | Female | 0.2 - 2.9 nmol/l | Stage 1 | 0.07 – 0.8 nmol/l | |
| | | | Stage 2 | 0.17 – 2.43 nmol/l | |
| | | | Stage 3 | 0.52 – 9.72 nmol/l | |
| | | | Stage 4 | 3.64 – 18.91 nmol/l | |
| | | | Stage 5 | 9.19 – 27.76 nmol/l | |
| | | | | <i>Tanner Stage of Puberty (female):</i> | |
| | | | Stage 1 | 0.1 – 0.3 nmol/l | |
| | | | Stage 2 | 0.2 – 1.0 nmol/l | |
| | | | Stage 3 | 0.3 – 1.0 nmol/l | |
| | | Stage 4 | 0.5 – 1.4 nmol/l | | |
| | | Stage 5 | 0.3 – 1.4 nmol/l | | |
| Luteinising hormone (LH) | Pre-menopausal female | 1 - 11 U/l (luteal) | Female | 1 – 11 U/l (luteal) | |
| Follicle stimulating hormone (FSH) | Female | 2 – 8 U/l (luteal) | Female | 2 – 8 U/L (luteal) | |
| Tumour markers: | | | | | |
| Lactate dehydrogenase (LDH) | | 70 – 250 IU/l | Neonate | <1300 IU/l | |
| | | | Child | 400 – 900 IU/l | |
| Alpha-fetoprotein | | < 10 U/ml | | < 10 U/ml | |
| Miscellaneous: | | | | | |
| 25-OH Vitamin D | | | Replete | 50 – 250 nmol/l | |
| | | | Insufficiency | 25 – 50 nmol/l | |
| | | | Severe deficiency | <25 nmol/l | |
| alpha-1-antitrypsin | | | | 1.8-4.0g/l | |
| Ammonia | | | Neonate | <100 µmol/l | |
| | | | Child | 30-60 µmol/l | |
| Amylase | | < 220 U/l | | < 220 U/L | |
| Amylase: creatinine ratio | | | | <38 U/mmol creatinine | |
| ASOT | | | | <200 U/l | |
| C reactive protein (CRP) | | < 5 mg/l | | < 5 mg/l | |
| Carboxyhaemoglobin | | < 1.5 % | | < 1.5% | |
| CD4 count | | 430 – 1690/µl | 0 – 7 days | 400 – 3500/ µl | |
| | | | 8 days – 2 months | 1700 – 5300/ µl | |
| | | | 3 – 5 months | 1500 - 5000/ µl | |
| | | | 6 – 9 months | 1400 - 5100/ µl | |
| | | | 10 – 15 months | 1000 - 4600/ µl | |
| | | | 16 months – 2 years | 900 - 5000/ µl | |
| | | | 3 – 5 years | 500 - 2400/ µl | |
| | | | 6 – 10 years | 300 - 2000/ µl | |
| | 11 – 16 years | 400 - 2100/ µl | | | |
| Copper | | | | 12 – 29 µmol/l | |
| Erythropoietin | | 4 - 24 mIU/ml | | 4 – 24 mIU/ml | |
| Urate | Male | 0.2-0.42 mmol/l | Male | 0.14 – 0.42 mmol/l | |

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| Total protein | | 60-80g/l | 0 – 1 day | 34 – 50 g/l |
| | | | 2 days – 12 months | 46 – 76 g/l |
| | | | 1 – 18 years | 60 – 80 g/l |
| IgG | | 5.5-16.5g/l | Neonate | 3.9 – 17 g/l |
| | | | Infant | 2.1 – 10.9 g/l |
| | | | Child | 3.1 – 16.1g/l |
| IgA | | 0.8-4g/l | Neonate | 0.01-0.15 g/l |
| | | | Infant | 0.05-0.7 g/l |
| | | | Child | 0.3-2.8 g/l |
| IgM | | 0.5-3g/l | Neonate | 0.05-0.4 g/l |
| | | | Infant | 0.15-2.1 g/l |
| | | | Child | 0.5-2.2 g/l |
| IgE | | <81kU/l | Neonate | <5kU/L |
| | | | Infant | <11kU/l |
| | | | Child | <63 kU/l |
| IgA anti-tissue transglutaminase antibodies | | | | negative/positive |
| Lactate | | 1-2 mmol/l | Neonate | 1 – 3 mmol/L |
| zinc | | | | 11-24 µmol/l |
| | | | Child | 1-2 mmol/l |
| Cerebrospinal fluid: | | | | |
| Opening pressure | | 50 - 180 mmH ₂ O | | Up to 250 mmH ₂ O |
| Total protein | | 0.15 - 0.45 g/l | 0 – 4 months | 0.15 – 1.2 g/l |
| | | | Child | 0.15-0.45 g/l |
| Glucose | | 2.2 - 4.4 mmol/l | | 2.2 – 4.4 mmol/l |
| Cell count | | < 5 /µl | 0 – 30 days | <20 /µl |
| | | | Child | <5 / µL |
| Lymphocyte count | | 60 - 70 % | | 60 – 70% |
| Lactate | | | | <1.9 mmol/l |
| Sweat: | | | | |
| Chloride | | | less than 6 months | <30 mmol/l normal 30-60 borderline >60 abnormal |
| | | | over 6 months | <40 mmol/l normal 40-60 borderline >60 abnormal |
| Sodium | | | | <50 mmol/l |

Based largely on MSCAA ranges with some specific paediatric summary ranges from the Sheffield Children's Hospital NHSFT Laboratory Handbook 2015