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# DEPARTMENTAL INFORMATION

The Department of Clinical Biochemistry at the Bristol Royal Infirmary comprises of three sections:

* Automated Biochemistry
* Immunochemistry
* Metabolic, Neuroendocrine and Nutrition Lab

### How to contact the department

During core hours (Mon-Fri 9-5):

* Please contact the Helpdesk for general enquiries: 0117 342 3080 (x23080 from within the Trust).
* Clinical advice can be obtained from the Duty Biochemist: 0117 342 7834 (x27834) or for non-urgent advice email biochemadvice@uhbw.nhs.uk
* There is a Paediatric / Metabolic Biochemist available x21299

Out of hours:

* The laboratory is staffed 24/7 and can be contacted on bleep 2331
* For urgent clinical advice there is an on-call Clinical Biochemist who can be contacted via switchboard

For full staff list and more detailed information please refer to the [Intranet](http://connect/Divisions/DiagnosticAndTherapy/LaboratoryMedicine/clinicalbiochemistry/Pages/default.aspx) page.

# SPECIMEN CONTAINERS

For blood samples, there are several different bottles available, and different tests may stipulate different bottles. The majority of biochemistry analytes are measured on either a serum sample (SST, yellow or brick red top) or a lithium heparin plasma sample (PST, light green top).

**SERUM (SST) LITHIUM HEPARIN (PST) EDTA FLUORIDE OXALATE SERUM (NO GEL) LITHIUM HEPARIN (NO GEL)**

     

Below is an equivalence table that can be used when collecting blood samples from a paediatric patient.

|  |  |
| --- | --- |
| Adult Tube | Paediatric Equivalent |
| 1 x 3mL Lithium heparin  | 2 x lithium heparin micro-collect |
| 1 x 3.5 mL Gold SST | 3 x SST micro-collect |
| 1 x2 mL FlOx  | 2 x FlOx micro-collect |
| 1 x 4 mL EDTA | 2 x Paediatric EDTA |
| 8 x EDTA micro-collects (0.5 mL) |

### CONSENT

Informed consent will be inferred by the patient willingly submitting to the sample collection procedure.

# TEST DIRECTORY FOR ON SITE TESTING

* Sample volume for routine biochemistry tests marked with an asterix: \*Usually up to 20 routine biochemistry tests can be analysed on the same tube.
* For further information about individual laboratory tests please contact the department as above.
* In addition the following online resources are useful:

<https://labtestsonline.org.uk/>

[Assays – Supra-Regional Assay Service (sas-centre.org)](https://www.sas-centre.org/assays)

<http://www.toxbase.org/>

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| **Test Name** | **Sample type** | **Container** | **Volume** | **Test information** | **TAT** | **Reference range / Results interpretation** |
| **Adrenocorticotropic hormone (ACTH)** | Blood | EDTA tube | Min vol 1 mL | Poor *in vitro* stability - sample must be sent on ice to lab immediately.  | 24 hours(Mon-Fri) | 5-50 ng/L |
| **Alanine transaminase (ALT)** | Blood | Serum (SST) or LiHep (PST) | One tube\* | Part of Liver Function TestALT is primarily a marker of hepatocellular damage, although it can be raised due to release from other tissues such as in rhabdomyolysis. | 6 hours | <1 year: 13 – 45 U/L Female 1+ years: 10 – 40 U/LMale 1+ years: 10 – 60 U/L |
| **Albumin** | Blood | Serum (SST) or LiHep (PST) | One tube\* | Albumin is produced by the liver, and is important in maintaining vascular fluid balance. | 6 hours | Age <1 year 30 – 45 g/LAge 1 year+ 35 – 50 g/L |
| Fluid | Universal pot  | Min vol 1 mL | Not validated in this sample type | 6 hours |  |
| Urine | Universal pot | Min vol 1 mL | Albumin : creatinine ratio (ACR) is calculated. Also known as ‘microalbumin’ or ‘microalbuminuria’ | 6 hours | Confirmed ACR 3 mg/mmol or more is clinically important. ACR 3-70 mg/mmol should be confirmed on early morning urine. If haematuria present and ACR 30 mg/mmol or more, specialist referral is indicated. |
| **Alkaline phosphatase (ALP)** | Blood | Serum (SST) or LiHep (PST) | One tube\* | Part of Liver Function TestALP can be elevated due to bone pathology and hepatobiliary disease. ALP is also produced by the placenta and results will be higher in pregnancy. | 6 hours |

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| Sex | Age |  | LRL | URL |  |
| B | 0 | 13 days | 90 | 273 | U/L |
| B | 14 days | 11 months | 134 | 518 | U/L |
| B | 1 year | 9 years | 156 | 369 | U/L |
| B | 10 years | 12 years | 141 | 460 | U/L |
| F | 13 years | 14 years | 62 | 280 | U/L |
| M | 13 years | 14 years | 127 | 517 | U/L |
| F | 15 years | 16 years | 54 | 130 | U/L |
| M | 15 years | 16 years | 89 | 365 | U/L |
| F | 17 years | 18 years | 54 | 130 | U/L |
| M | 17 years | 18 years | 59 | 164 | U/L |
| B | 19 years +  |  | 30 | 130 | U/L |

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| **Alkaline phosphatase isoenzymes** | Blood | Serum (SST) or LiHep (PST) | One tube \* | Only indicated if total ALP activity is elevated. Can confirm the diagnosis of benign transient hyperphosphatasaemia (BTH). | 2 weeks | Qualitative report of major ALP isoform(s) present: Liver, Bone, Intestinal, Placental and BTH |
| **Alpha-1-Antitrypsin (A1AT)** | Blood | Serum (SST) or LiHep (PST) | One tube \* | A1AT phenotype is automatically added if:Age <16 years, *or*Total A1AT <1.0 g/L | 24 hours |

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| --- | --- | --- | --- | --- | --- |
| Sex | Age |  | LRL | URL |  |
| B | 0 | 25 weeks | 0.8 | 1.8 | g/L |
| B | 26 weeks | 51 weeks | 1.1 | 2 | g/L |
| B | 1 year | 4 years | 1.1 | 2.2 | g/L |
| B | 5 years | 9 years | 1.4 | 2.3 | g/L |
| B | 10 years | 14 years | 1.2 | 2 | g/L |
| B | 15 years +  |  | 0.9 | 2 | g/L |

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| **Alpha-1-antitrypsin phenotype** | Blood | Serum (SST) or LiHep (PST) | One tube \* | For diagnosis of A1AT deficiency | 2 weeks | The Protease Inhibitor (PI) type is reported:PI M, PI MZ, PI MS, PI Z, PI S, PI SZ |
| **Alpha-fetoprotein (AFP)** | Blood | Serum (SST) or LiHep (PST) | One tube \* | AFP tumour marker ONLY. For antenatal Downs syndrome screening use special paper request form. | 24 hours (Mon-Fri) | <5 weeks: No range5 weeks +: <8 kIU/L |
| CSF | Universal pot  | Min vol 0.1 mL | Not validated in this sample type | 24 hours (Mon-Fri) |  |
| **Ammonia** | Blood | EDTA tube | Min vol 0.5 mL | Ammoniagenesis occurs *in vitro*, leading to falsely high results.Sample must be sent on ice to lab immediately. | 2 hours | Age <1 month <100 µmol/LAge 1 month+ <50 µmol/LDelay in analysis causes artefactual increase |
| **Amphetamines (urine)** | Urine | Universal pot | Min vol 1 mL | Usually remains detectable in urine for 24-72 hours. Care should be taken to avoid tampering with the sample and that the sample is fresh and from the correct individual | 24 hours (Mon-Fri) | Positive / negative Cut-off 1000 ug/L |
| **Amylase** | Blood | Serum (SST) or LiHep (PST) | One tube \* | Please request Lipase as the first line screen for acute pancreatitis | 24 hours | 28 – 100 U/L |
| Fluid | Universal pot  | Min vol 1 mL | Not validated in this sample type | 24 hours |  |
| Urine | Universal pot | Min vol 1 mL | Amylase is a small protein and is predominantly renally cleared.For calculation of amylase:creatinine clearance ratio (ACCR) | 24 hours | Urine amylase <300 U/LACCR <1% is suggestive of macroamylasaemia |
| **Angiotensin Converting Enzyme (ACE)** | Blood | Serum (SST) or LiHep (PST) | One tube \* | Patients on ACE inhibitors will give falsely low results. | 2 days | 13 – 64 IU/L |
| CSF | Universal pot  | Min vol 0.1 mL | Not validated in this sample type | 2 days | <3 U/L |
| **Anion Gap** | Blood | Serum (SST) or LiHep (PST) | One tube \* | Anion gap = Sodium - (Chloride + bicarbonate) | 6 hours | 6 – 14 mmol/L |
| **Aspartate transaminase (AST)** | Blood | Serum (SST) or LiHep (PST) | One tube \* | AST is used as a marker of hepatocellular damage, but due to poor specificity for liver tissue has largely been superseded by the use of ALT. | 24 hours | <2 weeks: <150 U/L2-52 weeks: <60 U/L1-7 years: <40 U/LFemale 8+ years: <35 U/LMale 8+ years: <50 U/L |
| **B12** | Blood | Serum (SST) or LiHep (PST) | One tube \* |  | 24 hours | <145 ng/L: Likely deficiency145 - 180 ng/L: Deficiency not excluded180-914 ng/L: Normal>914 ng/L: Raised serum vitamin B12 |
| **Benzodiazepine (urine)** | Urine | Universal pot | Min vol 1 mL | Request if only benzodiazepines required, otherwise request urine drug screen (Opiates, methadone and benzodiazepines). Care should be taken to avoid tampering with the sample and that the sample is fresh and from the correct individual | 24 hours (Mon-Fri) | Positive / negative Cut-off 200 ug/L |
| **Bicarbonate** | Blood | Serum (SST) or LiHep (PST) | One tube \* | Cannot be added on to an existing request; bicarbonate rapidly equilibrates with CO2 in the atmosphere.  | 6 hours | 22 – 29 mmol/L |
| **Bile Acids** | Blood | Serum (SST) or LiHep (PST) | One tube \* | Bile acids are used as a marker of obstetric cholestasis and are not a routine marker of liver function. | 24 hours | <10 µmol/L (non-fasting)NOTE: UDCA will cause positive interference |
| **Bilirubin (total)** | Blood | Serum (SST) or LiHep (PST) | One tube \* | Bilirubin is the breakdown product of haem, and is cleared by the liver in a two-step process; conjugation followed by excretion. Increased bilirubin can be due to liver damage, cholestasis, or increased haem breakdown e.g. haemolysis. | 6 hours | <1 month: (no range quoted)1 month+ <21 umol/L |
| **Bilirubin (conjugated / direct)** | Blood | Serum (SST) or LiHep (PST) | One tube \* | Increased conjugated fraction is often a sign of cholestasis. Most useful for investigation of ?Gilbert's.  | 24 hours | No range for conjugated bilirubin quoted.In Gilbert's, the hyperbilirubinaemia is predominately unconjugated, % conjugated is usually <20% |
| **Bilirubin (Fluid)** | Fluid | Universal pot  | Min vol 1 mL | Not validated in this sample type | 6 hours |  |
| **CA 125** | Blood | Serum (SST) or LiHep (PST) | One tube \* | Primarily a marker of ovarian cancer. See NICE guideline CG 122 for further information. Use with caution for diagnosis as also increased significantly in many benign conditions. | 24 hours (Mon-Fri) | <35 kIU/L |
| **CA 15-3** | Blood | Serum (SST) or LiHep (PST) | One tube \* | CA15-3 is used to monitor treatment for breast cancer. Not indicated for diagnosis. | 24 hours (Mon-Fri) | <24 kIU/L |
| **CA 19-9** | Blood | Serum (SST) or LiHep (PST) | One tube \* | CA19-9 is frequently raised in pancreatic cancer. However it can also be raised due to other abdominal pathologies, such as cholestasis and jaundice, and consequently is not advised for diagnosis without supporting imaging.  | 24 hours (Mon-Fri) | <35 kIU/L |
| **Calcium** | Blood | Serum (SST) or LiHep (PST) | One tube \* | The albumin adjusted calcium will also be automatically calculated from calcium and albumin. Can be falsely reduced due to contamination from EDTA - observe correct order of draw. | 6 hours | Age <1 month 2.0 – 2.7 mmol/L Age 1 month – 15 years 2.2 – 2.7 mmol/LAge 16 years+ 2.2 – 2.6 mmol/L |
| Urine | Universal pot | Min vol 1 mL | Reported as calcium : creatinine ratio on a spot sample. Random urine samples are acceptable from children, but in adults a 24h collection is preferred. | 6 hours |

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| Age | Range |
| <1 year | <2.2 |
| 1 year | <1.5 |
| 2 years | <1.4 |
| 3-4 years | <1.1 |
| 5-6 years | <0.8 |
| 7-17 years | <0.7 |
| 18 years + | <0.5 |

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| 24h bottle (acid) | n/a |  | 6 hours | 2.5 – 7.5 mmol/day |
| **Carbamazepine** | Blood | Serum (SST) or LiHep (PST) | One tube \* | Pre dose sample. | 24 hours | 5 – 12 mg/L |
| **Carcinoembryonic antigen (CEA)** | Blood | Serum (SST) or LiHep (PST) | One tube \* | Used to monitor treatment and recurrence of colorectal cancer. Not suitable for use in diagnosis as it may not be raised in cancer, and can be raised due to a variety of other pathologies. | 24 hours | <3 µg/L |
| Fluid | Universal pot  | Min vol 1 mL | Not validated in this sample type | 24 hours |  |
| **Chloride** | Blood | Serum (SST) or LiHep (PST) | One tube \* | Not part of routine electrolytes | 6 hours | 95 – 108 mmol/L |
| Urine | Universal pot | Min vol 1 mL | Not part of routine urine electrolytes. | 6 hours |  |
| **Cholesterol** | Blood | Serum (SST) or LiHep (PST) | One tube \* |  | 6 hours |  |
| **Ciclosporin / cyclosporine** | Blood | EDTA tube | Min vol 1 mL | A separate EDTA tube is required, sample should be taken as pre-dose | 24 hours | 70 – 160 µg/LReference range applies only to samples taken 10 hours post dose (trough level) for matched sibling and unrelated BMT. For other indications see local guidelines. |
| **Cocaine (urine)** | Urine | Universal pot | Min vol 1 mL | Usually remains detectable in urine for 24-72 hours. Not part of routine drugs of abuse screen. Care should be taken to avoid tampering with the sample and that the sample is fresh and from the correct individual | 24 hours (Mon-Fri) | Positive / negative Cut-off 300 ug/L |
| **Complement (C3 & C4)** | Blood | Serum (SST) or LiHep (PST) | One tube \* |  | 24 hours | C3: 0.9 – 1.8 g/LC4: 0.1 – 0.4 g/L |
| **Cortisol** | Blood | Serum (SST) or LiHep (PST) | One tube \* | Cortisol shows a strong diurnal rhythm, and a randomly timed cortisol is limited diagnostic utility. Dynamic function tests are the best way to formally exclude or diagnose adrenal disease, although early morning (9am) or midnight cortisol can be useful. Please ring x27834 to discuss investigation. | 6 hours | For investigation of adrenal insufficiency:<150 nmol/L Suggest short Synacthen test to confirm adrenal insufficiency150-350 nmol/L Indeterminate cortisol, repeat at 9am>350 nmol/L Adrenal insufficiency extremely unlikelyInterpret with care if patient taking other steroids, or if hyperestrogenic stateInterpretation of Synacthen stimulated cortisol: ≥450 nmol/L excludes adrenal insufficiency. In pregnant ladies or taking OCP a higher threshold of 600 nmol/L applies. Please see separate communication about cortisol assay for more details. |
| Urine | 24h bottle (plain) | n/a | Also known as urine free cortisol (UFC). Useful in diagnosis of hypercortisolism | 2 weeks | Normal: <120 nmol/24hCushing’s likely: >300 nmol/24h |
| Saliva | Salivette | n/a | Salivettes available from the laboratory. Recommended to send paired early morning and late evening samples. Both cortisol and cortisone are measured. Useful in diagnosis of hypercortisolism. | 4 weeks | Early morning cortisol 3 – 22 nmol/LEarly morning cortisone 12 – 45 nmol/LLate evening cortisol <2 nmol/LLate evening cortisone 2 – 12 nmol/L |
| **C-Peptide** | Blood | EDTA tube | Min vol 0.5 mL | Serum (SST) or lithium heparin (PST) also acceptable, but have reduced *in vitro* stability | 24 hours (Mon-Fri) | During hypoglycaemia:<50 pmol/L Adequate suppression50-149 pmol/L Borderline150+ pmol/L Inappropriately highRef range in fasted state: 240 – 1500 pmol/LFor investigation of established diabetes, random/post-prandial state:<100 pmol/L Severe insulin deficiency 100-300 pmol/L Borderline>300 pmol/L Substantial insulin production |
| Urine | Boric acid pot | Min vol 2 mL | Universal pot also acceptable, but reduced *in vitro* stability | 24 hours (Mon-Fri) | For investigation of patients with established DM (>3 years):>0.6 nmol/mmol: Substantial insulin secretion. Associated with type 2 DM & MODY and absence of absolute insulin requirement.0.2-0.6 nmol/mmol: Intermediate insulin secretion.<0.2 nmol/mmol: Severe insulin deficiency. Manage as type 1 DM. |
| **C-reactive protein (CRP)** | Blood | Serum (SST) or LiHep (PST) | One tube \* | Used as a non-specific marker of inflammation.  | 6 hours | <5 mg/LValues above 200 mg/L frequently indicate septicaemia |
| **Creatine kinase (CK)** | Blood | Serum (SST) or LiHep (PST) | One tube \* | Creatine kinase is released in large amounts from muscle when tissue damage occurs, although a raised CK can be a sign of tissue damage anywhere in the body.  | 6 hours | Male: 40 – 320 U/LFemale: 25 – 200 U/LValues >10x ULN may indicate rhabdomyolysis |
| **Creatinine** | Blood | Serum (SST) or LiHep (PST) | One tube \* | Creatinine is produced at a relatively constant rate by the body, and cleared by the kidneys. It is therefore a useful marker for glomerular filtration rate, and used to calculate eGFR. At the BRI, an enzymatic assay is used to give greater accuracy of creatinine results. | 6 hours |

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| Sex | Age | LRL | URL |  |
| B | 0 – 13 days | 27 | 77 | µmol/L |
| B | 2 – 51 weeks | 14 | 34 | µmol/L |
| B | 1 – 2 years | 15 | 31 | µmol/L |
| B | 3 – 4 years | 23 | 37 | µmol/L |
| B | 5 – 6 years | 25 | 42 | µmol/L |
| B | 7 – 8 years | 30 | 47 | µmol/L |
| B | 9 – 10 years | 29 | 56 | µmol/L |
| B | 11 years | 36 | 64 | µmol/L |
| B | 12 years | 36 | 67 | µmol/L |
| M | 13 years | 38 | 76 | µmol/L |
| F | 13 years | 38 | 74 | µmol/L |
| M | 14 years | 40 | 83 | µmol/L |
| F | 14 years | 43 | 75 | µmol/L |
| M | 15 years | 47 | 98 | µmol/L |
| F | 15 years | 44 | 79 | µmol/L |
| M | 16 years | 54 | 99 | µmol/L |
| F | 16 years | 48 | 81 | µmol/L |
| M | 17 years + | 59 | 104 | µmol/L |
| F | 17 years + | 45 | 84 | µmol/L |

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| **eGFR** | Blood | Serum (SST) or LiHep (PST) | One tube \* | Calculated according to the CKD-EPI 4 variable equation | 6 hours | >90 mL/min/1.73m2 |
| **Digoxin** | Blood | Serum (SST) or LiHep (PST) | One tube \* | Samples should be taken 6-8 hours post dose | 24 hours | 0.8 – 2.0 µg/L |
| **Estradiol (E2)** | Blood | Serum (SST) or LiHep (PST) | One tube \* | Some, but not all, exogenous oestrogens can cross react in the assay. Results may be unreliable if patient is on HRT or an oral contraceptive, depending on the formulation. | 6 hours |

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| Sex | Age | E2 |
| F | <1 y | <200 pmol/L |
| F | 1-11 y | <80 pmol/L |
| F | 12 y+ | Follicular phase: 80-420 pMMid-cycle: 120 – 1900 pMLuteal phase: 130 – 900 pMMenopausal: <110 pmol/L |
| M | <1 y | <200 pmol/L |
| M | 1-12 y | <80 pmol/L |
| M | 13 y+ | <120 pmol/L |

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| **Faecal Calprotectin** | Faeces | Stool pot or Calex tube |  | Patients are able to self-extract using Calex tube  | 2 weeks | <100 µg/g IBD unlikely100 – 250 µg/g Indeterminate. Repeat & consider referral >250 µg/g Organic pathology likely, suggest urgent referral |
| **Ferritin** | Blood | Serum (SST) or LiHep (PST) | One tube \* |  | 24 hours | <5 years: 12 – 56 ug/L5-15 years: 15 – 56 ug/LAdults (16+):<15 ug/L: Absolute iron deficiency 15-30 ug/L: Low body iron stores30-100 ug/L: Indeterminate ferritin 100-340(M)/310(F) ug/L: Normal ferritin>340(M) / >310(F) ug/L: Elevated ferritin |
| **FIB-4** | Blood | Serum (SST) and EDTA | BOTH serum and EDTA | Calculated score generated from age, AST, ALT and platelet count.  | 24 hours | Please refer to abnormal liver blood test algorithm: <https://remedy.bnssgccg.nhs.uk/adults/hepatology/liver-disease/> |
| **Folate** | Blood | Serum (SST) or LiHep (PST) | One tube \* |  | 24 hours | 3 – 20 ug/L |
| **Follicle stimulating hormone (FSH)** | Blood | Serum (SST) or LiHep (PST) | One tube \* |  | 24 hours |

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| Sex | Age | FSH |
| F | <1 y | <16 IU/L |
| F | 1-8 y | 0.6 – 6.4 IU/L |
| F | 9-11 y | 0.9 – 7.8 IU/L |
| F | 12 y+ | Follicular phase: 3.9–8.8 IU/LMid-cycle: 4.5 – 22.5 IU/LLuteal phase: 1.8 – 5.1 IU/LMenopausal: >16 IU/L |
| M | <1 y | <4 IU/L |
| M | 1-8 y | 0.2 – 2.3 IU/L |
| M | 9-12 y | 0.6 – 5.0 IU/L |
| M | 13-17  | 1.3 – 7.4 IU/L |
| M | 18 y+ | 1.3 – 19.3 IU/L |

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| **Gamma-glutamyl transferase (GGT)** | Blood | Serum (SST) or LiHep (PST) | One tube \* | Gamma glutamyl transpeptidase is increased in cholestasis. It can also be induced secondary to many medications and ethanol use. | 6 hours | <2 weeks: <160 U/L2-52 weeks: <100 U/LFemale 1+ years: <38 U/LMale 1+ years: <55 U/L |
| **Gentamycin** | Blood | Serum (SST) or LiHep (PST) | One tube \* | Please refer to Trust guidelines on DMS | 6 hours | <1 mg/L |
| **Globulin** | Blood | Serum (SST) or LiHep (PST) | One tube \* | Globulin = Total protein - Albumin. Raised results may indicate monoclonal or polyclonal raised immunoglobulins. Low results may indicate low immunoglobulins. | 6 hours | 22 – 36 g/L |
| **Glucose** | Blood | Fluoride oxalate tube | Min vol 0.5 mL | Serum (SST) or lithium heparin (PST) also acceptable if sample received promptly in the lab. Glucose is rapidly metabolised *in vitro* unless fluoride oxalate tube used | 6 hours | Fasted range: 3.0 – 6.0 mmol/LA result of 7.0 mmol/L if fasted or 11.1 mmol/L if random is consistent with diabetes mellitusA result of 2.6 mmol/L and below is consistent with hypoglycaemia |
| CSF | Fluoride oxalate tube | Min vol 0.5 mL | A plain pot is also acceptable if sample received promptly in the lab. | 6 hours | The ratio of CSF:Plasma glucose is typically in the range 0.5-0.8 |
| **Growth Hormone** | Blood | Serum (SST) or LiHep (PST) | One tube \* | A random GH measurement is of low clinical utility. Best used as part of stimulation or suppression testing. See also IGF1 | 24 hours(Mon-Fri) | The normal response to a glucose tolerance test is suppression of GH to 0.1 µg/L or lower.The normal response to stimulation testing is GH 5 µg/L of higher. |
| **Haptoglobin** | Blood | Serum (SST) or LiHep (PST) | One tube \* |  | 24 hours | Male: 0.5 – 2.0 g/LFemale: 0.4 – 1.6 g/L |
| **HDL Cholesterol** | Blood | Serum (SST) or LiHep (PST) | One tube \* |  | 6 hours |  |
| **Human Chorionic Gonadotrophin (hCG)** | Blood | Serum (SST) or LiHep (PST) | One tube \* | HCG can be used as a tumour marker when germ cell tumours are suspected. HCG is secreted by the placenta in pregnancy, and therefore also provides the basis for urine pregnancy testing. For patients under the care of the Early Pregnancy Unit, HCG can be used to monitor progression of a pregnancy, but blood should not routinely be used for pregnancy testing. | 6 hours | Female pre-menopausal <5 IU/LFemale post-menopausal <12 IU/LMales <2 IU/L |
| CSF | Universal pot  | Min vol 0.5 mL | Not validated in this sample type | 6 hours |  |
| **IgA** | Blood | Serum (SST) or LiHep (PST) | One tube \* |  | 1 week | <1 year <0.3 g/L1-2 years <0.9 g/L3-5 years 0.3 – 1.5 g/L6-13 years 0.5 – 2.3 g/L14-15 years 0.5 – 3.0 g/L16 years + 0.7 – 4.0 g/L |
| **IgG** | Blood | Serum (SST) or LiHep (PST) | One tube \* |  | 1 week | <2 weeks 3.0 – 13 g/L2-52 weeks 1.1 – 6.5 g/L1-3 years 3.0 – 10.7 g/L4-9 years 5.1 – 12.6 g/L10-15 years 6.0 – 14.2 g/L16 years + 6 – 16 g/L |
| **IgM** | Blood | Serum (SST) or LiHep (PST) | One tube \* |  | 1 week | <2 weeks 0.2 – 0.4 g/L2-13 weeks 0.2 – 0.7 g/L3-12 months 0.3 – 0.9 g/L1-15 years 0.4 – 1.7 g/L16 years + 0.4 – 2.3 g/L |
| **IgE** | Blood | Serum (SST) or LiHep (PST) | One tube \* |  | 24 hours (Mon-Fri) | <2 years <20 kIU/L2 – 5 years <60 kIU/L6 – 9 years <90 kIU/L10 – 15 years <200 kIU/L16 years + <100 kIU/L |
| **IGF-1** | Blood | Serum (SST) or LiHep (PST) | One tube \* | This is the screening test for disorders of growth hormone deficiency or excess | 24 hours (Mon-Fri) | Updated multiple age and sex specific ranges provided, contact lab for full details. |
| **Insulin** | Blood | Serum (SST) or LiHep (PST) | One tube \* | For investigation of hypoglycaemia | 24 hours | During hypoglycaemia (glucose <2.7 mmol/L): <7 pmol/L Adequate suppression 7-19 pmol/L Intermediate insulin 20+ pmol/L Inappropriately high In fasted, but not hypoglycaemic, state: 20 – 160 pmol/L Normal range for insulin |
| **Iron** | Blood | Serum (SST) or LiHep (PST) | One tube \* | For investigation of suspected overdose | 24 hours | <14 years: 3 – 25 µmol/L14+ years: 11 – 32 µmol/L |
| **Transferrin Saturation** | Blood | Serum (SST) or LiHep (PST) | One tube \* | This test should generally be requested only for the investigation of iron overload. Request ferritin frontline to investigate iron deficiency | 24 hours (Mon-Fri only) | Transferrin saturation ref range:Female: 16-40%Male: 16-50% |
| **Lactate** | Blood | Fluoride oxalate tube | Min vol 0.5 mL | Lactate is rapidly produced by cells *in vitro*, and samples should always be in a fluoride tube (Adult grey top or paed yellow top) | 24 hours | 0.5 – 2.2 mmol/L |
| CSF | Fluoride oxalate tube | Min vol 0.5 mL |  | 24 hours |

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| --- | --- | --- | --- |
| Age | LRL | URL | units |
| <3 days | 1.1 | 6.7 | mmol/L |
| 3 – 9 days | 1.1 | 4.4 | mmol/L |
| 10 days – 16 years | 1.1 | 2.8 | mmol/L |
| 17 years + | 1.1 | 2.4 | mmol/L |

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| **Lactate Dehydrogenase (LDH)** | Blood | Serum (SST) or LiHep (PST) | One tube \* |  | 24 hours | < 2 weeks <1020 U/L2 weeks – 11 months <380 U/L1 – 9 years <270 U/L10 years + <250 U/L |
| CSF | Universal pot  | Min vol 0.5 mL |  | 24 hours |  |
| **Lipase** | Blood | Serum (SST) or LiHep (PST) | One tube \* | The first line screen for acute pancreatitis | 6 hours | 0 - 9 years: <30 U/L10 - 17 years: <40 U/L18+ years: <67 U/L |
| **Lipoprotein (a)** | Blood | Serum (SST) or LiHep (PST) | One tube \* |  | 1 week | <75 nmol/L |
| **Lipoprotein Electrophoresis** | Blood | Serum (SST) only | One tube \* | Samples should be collected ideally after a 12 hour fast | 2 weeks | Reported as Fredrickson classification:Type 1, 2a, 2b, 3, 4, 5 |
| Pleural fluid | universal pot | Min vol 1 mL | For diagnosis of chylothorax. Triglycerides will be measured first:A value <0.5 mmol/L excludes chylothorax, and a value >1.2 mmol/L confirms chylothorax. | 2 weeks | Reported as either presence or absence of chylomicrons |
| **Lithium** | Blood | Serum (SST) only | One tube \* | Serum sample required. Lithium heparin plasma is NOT suitable. Samples for therapeutic monitoring should be taken 12 hours post dose. | 24 hours | 0.4 – 1.0 mmol/L |
| **Luteinising hormone (LH)** | Blood | Serum (SST) or LiHep (PST) | One tube \* |  | 24 hours (Mon-Fri) |

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| --- | --- | --- |
| Sex | Age | LH |
| F | <1 y | <3.3 IU/L |
| F | 1-8 y | <2 IU/L |
| F | 9-11 y | <8 IU/L |
| F | 12 y+ | Follicular phase: 2.1–10.9IU/LMid-cycle: 19.2 – 103 IU/LLuteal phase: 1.2 – 12.9 IU/L |
| M | <1 y | <6.8 IU/L |
| M | 1-8 y | <2 IU/L |
| M | 9-12 y | <3.3 IU/L |
| M | 13-17  | 0.8 – 8.6 IU/L |
| M | 18 y+ | 1.2 – 8.6 IU/L |

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| **Magnesium** | Blood | Serum (SST) or LiHep (PST) | One tube \* | Can be falsely reduced due to even slight contamination from EDTA tubes - observe correct order of draw. | 6 hours | 0.7 – 1.0 mmol/L |
| Urine | Universal pot | Min vol 1 mL |  | 6 hours |  |
| **Methadone metabolite (urine)** | Urine | Universal pot | Min vol 1 mL | Care should be taken to avoid tampering with the sample and that the sample is fresh and from the correct individual | 24 hours (Mon-Fri) | Positive / negative Cut-off 100 ug/L |
| **Methotrexate** | Blood | Serum (SST) or LiHep (PST) | One tube \* | ONLY for monitoring of high dose treatment. Methotrexate levels do not need to be measured routinely in patients on long term therapy. | 24 hours | Follow trust protocol |
| **Neurone Specific Enolase (NSE)** | Blood | Serum (SST) only | One tube \* | A marker of neuronal damage. Also can be raised in non-small cell lung cancer and neuroendocrine tumours. | 24 hours | For neuroprognostication post-OHCA, measure NSE on admission and 48h later and calculate the change ΔNSE48: ≤0 µg/L Low probability of poor neurological outcome.1-10 Moderate probability of poor neurological outcome.>10 Very high probability of poor neurological outcome.A single result >60 µg/L at 48-72 hours post-ROSC indicates high probability of poor neurological outcome.For tumour marker indication: reference range <17 µg/L |
| **NT-proBNP** | Blood | Serum (SST) or LiHep (PST) | One tube \* |  | 24 hours | >2000 ng/L: Refer urgently to heart failure clinic.400 – 2000 ng/L: Refer to heart failure clinic & initiate treatment if high clinical suspicion.<400 ng/L: Heart failure unlikely. Review for alternative causes. If suspicion of heart failure remains discuss with cardiology through advice and guidance. |
| **Opiates (urine)** | Urine | Universal pot | Min vol 1 mL | Care should be taken to avoid tampering with the sample and that the sample is fresh and from the correct individual.Not specific for morphine – codeine will produce a positive result. If confirmation is required please contact the lab. | 24 hours (Mon-Fri) | Positive / negative Cut-off 300 ug/L |
| **Osmolality** | Blood | Serum (SST) or LiHep (PST) | One tube \* |  | 24 hours | 275 – 290 mOsmol/Kg |
| Urine | Universal pot | Min vol 1 mL | Paired serum osmolality required for interpretation. If investigating hyponatraemia, it is recommended to additionally request urine sodium. | 24 hours | A result of 750 mOsmol/kg or above indicates that the kidney is able to concentrate urine adequately. |
| **Paracetamol** | Blood | Serum (SST) or LiHep (PST) | One tube \* |  | 6 hours | Please refer to the treatment nomogram |
| **Parathyroid hormone (PTH)** | Blood | EDTA tube | Min vol 1 mL | A concurrent calcium result is required for interpretation. | 24 hours | 1.3 – 9.3 pmol/L |
| **Phenobarbitone** | Blood | Serum (SST) or LiHep (PST) | One tube \* | Pre dose sample | 24 hours | 10 – 40 mg/L |
| **Phenytoin** | Blood | Serum (SST) or LiHep (PST) | One tube \* | Pre dose sample. Adjusted phenytoin is also calculated according to the Sheiner-Tozer equation - please use this latter parameter in patients with hypoalbuminaemia | 24 hours | 10 – 20 mg/L |
| **Phosphate** | Blood | Serum (SST) or LiHep (PST) | One tube \* |  | 6 hours |

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| Age | LRL | URL | units |
| <1 month | 1.3 | 2.6 | mmol/L |
| 1 – 11 months | 1.3 | 2.4 | mmol/L |
| 1 – 15 years | 0.9 | 1.8 | mmol/L |
| 16 years + | 0.8 | 1.5 | mmol/L |

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| **Potassium** | Blood | Serum (SST) or LiHep (PST) | One tube \* | Potassium leaks from cells over time, and so samples should be received in the laboratory or separated within twelve hours. Cold temperatures accelerates this effect. In vitro haemolysis raises serum potassium, and difficult venesection can cause a high potassium. EDTA contamination will also cause falsely raised results; please observe correct order of draw. | 6 hours | Neonates: 3.4 – 6.0 mmol/LBabies <1y: 3.5 – 5.7 mmol/L1 year + 3.5 – 5.3 mmol/L |
| **Procalcitonin (PCT)** | Blood | Serum (SST) or LiHep (PST) | One tube \* | Please contact microbiology for advice on interpretation | 6 hours | <0.25 µg/L |
| **Progesterone** | Blood | Serum (SST) or LiHep (PST) | One tube \* | For confirmation of ovulation in mid luteal phase (approx. day 21 of a 28 day cycle) | 24 hours (Mon-Fri) | Male <1 year: <20 nmol/LMale 1 year+ <5 nmol/LFemale <1 year: <30 nmol/LFemale 1-11 years: <5 nmol/LFemale 12 years +:Follicular phase: <4 nmol/LLuteal phase: >12 nmol/LWhen measured 7 days before onset of menses, progesterone >30 nmol/L confirms ovulation. A result 12-30 should be repeated with careful timing. Repeat results >12 nmol/L, in the presence of regular cycles, is consistent with normal ovulation. |
| **Prolactin** | Blood | Serum (SST) or LiHep (PST) | One tube \* |  | 24 hours (Mon-Fri) | <700 mIU/LElevated results will be screened for macroprolactin (unless previously shown to be negative) |
| **Prostate-specific antigen (PSA)** | Blood | Serum (SST) or LiHep (PST) | One tube \* |  | 24 hours (Mon-Fri) | Please refer to Remedy for cut-offs:<https://remedy.bnssg.icb.nhs.uk/adults/urology/prostate-including-psa/> |
| **Protein Electrophoresis** | Blood | Serum (SST) only | Min vol 1 mL | Screening for myeloma must include both serum and urine electrophoresis | 1 week | Reported as either the absence of presence of a monoclonal protein. Monoclonal proteins will be isotyped at first presentation only and quantified on every sample. |
| Urine | Universal pot | Min vol 2 mL | Also known as Bence Jones Protein (BJP). Minimum 5 mL early morning urine - no preservative required, boric acid tube unsuitable. See also serum free light chains. | 1 week | Reported as either the absence of presence of a BJP. Monoclonal proteins will be isotyped at first presentation only. Quantitation not available. |
| **Rheumatoid factor (RF)** | Blood | Serum (SST) or LiHep (PST) | One tube \* |  | 24 hours | <20 IU/mL |
| **Salicylate** | Blood | Serum (SST) or LiHep (PST) | One tube \* | For investigation of aspirin overdose | 6 hours |  |
| **Serum Free Light Chains** | Blood | Serum (SST) or LiHep (PST) | One tube \* | For use in the diagnosis and monitoring of plasma cell dyscrasia | 1 week | Interpretation of kappa:lambda ratioNormal renal function: 0.26 – 1.65Confirmed CKD (eGFR<60): 0.37 – 3.10<0.1 or >7.0 is significantly abnormal and urgent referral to haematology is recommended. |
| **Sex Hormone Binding Globulin (SHBG)** | Blood | Serum (SST) or LiHep (PST) | One tube \* |  | 24 hours (Mon-Fri) | Male: 13 – 90 nmol/LFemale: 17 – 136 nmol/L |
| **Sodium** | Blood | Serum (SST) or LiHep (PST) | One tube \* |  | 6 hours | 133 – 146 mmol/L |
| **Sweat Test** | Sweat |  |  | Please email SweatTestBookings@uhbw.nhs.uk with Patient ID (Name, DOB, T number, NHS number), clinical indication for test, requesting Consultant and contact number for patient (Parent/Guardian’s, Carer or Patient’s own). The Duty Paediatric Biochemist will review your request and get back to you to confirm the booking or discuss further.  If your request is urgent please phone x21299 to discuss. | 2 days | Sweat chloride:<40 mmol/L (<30 mmol/L if age <6months): Not elevated40 – 60 mmol/L (30 – 60 mmol/L if age < 6 month): Intermediate >60 mmol/L: Elevated |
| **Tacrolimus** | Blood | EDTA tube | Min vol 1 mL | A separate EDTA tube is required, sample should be taken as pre-dose | 24 hours(Mon-Fri) | Target ranges for tacrolimus blood concentration are indication-specific. Please refer to local guidelines or specialty advice. |
| **Testosterone** | Blood | Serum (SST) or LiHep (PST) | One tube \* | Note that some exogenous steroids such as norethisterone can cause falsely raised results.Significantly elevated results in females can be confirmed using a more specific method if required. | 24 hours (Mon-Fri only) |

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| Sex | Age | Testosterone |
| F | <1 year | <2.2 nmol/L |
| F | 1-8 years | <0.7 nmol/L |
| F | 9-11 years | <1.7 nmol/L |
| F | 12 years + | <2.7 nmol/L |
| M | <1 year | <10 nmol/L |
| M | 1-8 years | <0.7 nmol/L |
| M | 9-12 years | <1.7 nmol/L |
| M | 13-17 years | <20 nmol/L (puberty stage dependent) |
| M | 18 years + | 6 – 27 nmol/L |

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| **Free androgen index** | Blood | Serum (SST) or LiHep (PST) | One tube \* | For investigation of ?hyperandrogenism in adult females | 24 hours (Mon-Fri) | Adult females: 0.8 – 9.0% |
| **Calculated free testosterone** | Blood | Serum (SST) or LiHep (PST) | One tube \* | For investigation of ?hypogonadism in adult males. Vermeulen equation used. | 24 hours (Mon-Fri) | Adult males: 0.17 – 0.66 nmol/L |
| **Theophylline** | Blood | Serum (SST) or LiHep (PST) | One tube \* | Pre dose sample | 24 hours | 5 – 10 mg/L |
| **Thyroglobulin (including thyroglobulin antibodies)** | Blood | Serum (SST) or LiHep (PST) | One tube | For monitoring of thyroid cancer patients after total thyroidectomy and I-131 ablation. | 24 hours | Thyroglobulin post treatment < 0.1 ug/LThyroglobulin antibodies:<0.4 kIU/L: Negative≥0.4 kIU/L: Positive |
| **Thyroid peroxidase antibodies (TPO)** | Blood | Serum (SST) or LiHep (PST) | One tube \* | TPO positivity may indicate a slightly higher likelihood of progression from sub-clinical to overt hypothyroidism. | 24 hours (Mon-Fri) | <10 kIU/L |
| **Thyroid stimulating hormone (TSH)** | Blood | Serum (SST) or LiHep (PST) | One tube \* |  | 6 hours | 0 – 14 days: 0.79 – 5.85 mIU/L15+ days: 0.38 – 5.33 mIU/L |
| **Free T3** | Blood | Serum (SST) or LiHep (PST) | One tube \* | Only requestable by laboratory. Please request TFT and provide full clinical details. Assay will be performed if indicated. | 6 hours | 0 – 14 days: 4.3 – 6.9 pmol/L15 days <3 years: 4.0 – 6.2 pmol/L3+ years: 3.8 – 6.0 pmol/L |
| **Free T4** | Blood | Serum (SST) or LiHep (PST) | One tube \* | Included as part of TFT in children, in known/suspected pituitary disease, and if TSH is abnormal. Please provide clinical details.  | 6 hours | 0 – 14 days: 17 – 57 pmol/L15 days - 2 years: 9.5 – 17.8 pmol/L3+ years: 8.0 – 18.0 pmol/L |
| **Tissue transglutaminase IgA (coeliac screen)** | Blood | Serum (SST) or LiHep (PST) | One tube \* | Anti-tissue transglutaminase (TTG) is the most useful biochemical test for the diagnosis of coeliac. Total IgA will also be measured. In conjunction with European guidelines (NICE/BSG/ESPGHAN) HLA DQ2/DQ8 is available as a separate request in children with strong positive coeliac serology to avoid the need for biopsy. Patients must be a on a normal (gluten-containing) diet for at least one month before testing. | 1 week | Normal <4 IU/mLResults of 4 IU/mL or more will be confirmed with IgA anti-endomysial Abs.If total IgA <0.2 g/L IgG anti-endomysial Abs will be performed (regardless of TTG result) |
| **Tobramycin** | Blood | Serum (SST) or LiHep (PST) | One tube \* |  | 24 hours | <1 mg/L |
| **Total protein** | Blood | Serum (SST) or LiHep (PST) | One tube \* |  | 6 hours | 60 – 80 g/L |
| CSF | Universal pot  | Min vol 0.5 mL |  | 6 hours | < 1 month: 0.15 – 1.30 g/L1 month+ <0.54 g/L |
| Urine | 24h bottle (plain) |  | A plain bottle is required (acid collection is UNSUITABLE) | 6 hours | <0.15 g/24h |
| Urine | Universal pot | Min vol 1 mL | For calculation of protein:creatinine ratio (PCR). Note that ACR is recommended in preference to PCR for proteinuria screening in patients with risk factors for the development of CKD | 6 hours | PCR of 50 mg/mmol or more (30 mg/mmol in pregnancy) is clinically important proteinuria.PCR of 100 mg/mmol or more: Unless previously known and appropriately managed, consider referral for renal opinion. If diabetic, manage according to diabetes pathway.PCR of 300 mg/mmol or more: Nephrotic range proteinuria. Unless previously known and appropriately managed, an urgent renal referral is indicated. |
| **Triglyceride** | Blood | Serum (SST) or LiHep (PST) | One tube \* |  | 6 hours | <2 weeks: 1.0 – 3.1 mmol/L2-52 weeks: 0.6 – 3.1 mmol/L1-13 years: 0.5 – 2.4 mmol/L14 years+ 0.5 – 1.7 mmol/L |
| Fluid | Universal pot  | Min vol 1 mL | Not validated in this sample type | 6 hours | Pleural fluid triglyceride result:<0.5 mmol/L excludes chylothorax>1.2 mmol/L confirms chylothorax0.5 – 1.2 please request fluid lipoprotein electrophoresis |
| **Troponin I** | Blood | Serum (SST) or LiHep (PST) | One tube \* | Please refer to the Trust ACS protocol | 6 hours | New assay: Troponin I – please see new ACS protocol on DMS for decision limits. |
| **Urea** | Blood | Serum (SST) or LiHep (PST) | One tube \* |  | 6 hours |

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| Age | LRL | URL | units |
| <1 month | 0.8 | 5.5 | mmol/L |
| 1 – 11 months | 1 | 5.5 | mmol/L |
| 1 – 15 years | 2.5 | 6.5 | mmol/L |
| 16 years + | 2.5 | 7.8 | mmol/L |

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| **Uric Acid / Urate** | Blood | Serum (SST) or LiHep (PST) | One tube \* |  | 6 hours |

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| Sex | Age | LRL | URL | units |
| B | <8 years | 60 | 240 | µmol/L |
| M | 8 – 10 years | 70 | 350 | µmol/L |
| F | 8 – 10 years | 130 | 370 | µmol/L |
| M | 11 – 15 years | 120 | 460 | µmol/L |
| F | 11 – 15 years | 150 | 390 | µmol/L |
| F | 16 – 49 years | 190 | 360 | µmol/L |
| M | 16 years + | 200 | 430 | µmol/L |
| F | 50 years + | 140 | 360 | µmol/L |

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| Urine | Universal pot  | Min vol 1 mL |  | 6 hours | Urate:creatinine ratio:<2 years 0.30 – 1.52 – 15 years 0.30 – 1.0F 16 years + 0.25 – 0.35M 16 years + 0.30 – 0.45 |
| 24h collection (plain) | n/a |  | 6 hours | 24h urate excretion: 1.5 – 4.5 mmol/24h |
| **Vancomycin** | Blood | Serum (SST) or LiHep (PST) | One tube \* | Please refer to Trust guideline | 24 hours | 10 – 15 mg/L |
| **Vitamin A & E** | Blood | Serum (SST) or lithium heparin (PST) | Min vol 1 mL |  | 2 weeks |

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| Group | Vit A (umol/L) | Vit E (umol/L) |
| <4 years | 0.5 – 1.6 | 10.2 – 39.0 |
| 4 – 17 years | 0.8 – 2.2 |
| 18+ Male | 1.1 – 3.4 |
| 18+ Female | 0.8 – 3.0 |

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| **Vitamin D (25-OH-vitD)** | Blood | Serum (SST) or LiHep (PST) | One tube \* | <https://remedy.bnssg.icb.nhs.uk/media/rorpnazk/bnssg-vitamin-d-guidelines-2024.pdf> | 24 hours (Mon-Fri) | <25 nmol/L Deficiency25 – 50 nmol/L Insufficiency>50 nmol/L Adequate (but sub-optimal in children)>75 nmol/L Optimal (in children) |
| **Xanthochromia (CSF pigments)** | CSF | Universal pot (forth or last pot collected)  | Min vol 0.5 mL | Samples should be taken >12 hours but <14 days post initial symptoms. Samples should arrive in the lab within an hour of collection and not sent by pneumatic tube system.CSF must be collected according to protocol and protected from light. If sent outside core hours (8am-7pm, 7 days a week), results will routinely be reported the next morning. Please contact the on-call Biochemist if results are required more urgently. Refer to <https://uhbw.mystaffapp.org/document/show_document/11496> for more information. | 24 hours | The presence of bilirubin (with or without oxyhaemoglobin) is suggestive of SAH. |

# REFERRED INVESTIGATIONS

* Samples for these tests are sent to other laboratories for analysis.
* Turnaround time will be much longer than for in house testing. If a result is required more urgently, please contact the lab to discuss this.

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| **Test Name** | **Sendaway location** | **Sample type** | **Sample container** | **Volume** | **Test information** | **Target TAT** |
| **1,25 Vitamin D** | Norfolk and Norwich University Hospital | Blood | Serum (SST) only | Min vol 1 mL | Must contact the laboratory prior to sending sample, as serum needs to be frozen on day of collection. Lithium heparin NOT suitable. | 4 weeks |
| **11-Deoxycortisol** | King’s Hospital, London | Blood | Serum (SST) or lithium heparin (PST) | Min vol 1 mL | For diagnosis of 11-hydroxylase CAH  | 4 weeks |
| **17-OH Progesterone (17OHP)** | University Hospital of Wales, Cardiff | Blood | Serum (SST) or lithium heparin (PST) | Min vol 0.5 mL | Screening test for Congenital Adrenal Hyperplasia. Please phone lab if urgent. This test is NOT suitable for children under 2 days old. | 1 week |
| **17-OH Progesterone in blood spot** | University Hospital of Wales, Cardiff | Blood spot | Guthrie card (DBS) |  | Monitoring CAH | 2 weeks |
| **17-OH progesterone in saliva** | University Hospital of Wales, Cardiff | Saliva | contact lab for salivette |  | Monitoring CAH | 2 weeks |
| **5-Alpha-Dihydrotestosterone** | St James University Hospital, Leeds | Blood | Serum (SST) or lithium heparin (PST) | Min vol 0.6 mL | For investigation of 5-alpha-reductase deficiency | 4 weeks |
| **5-Hydroxyindoleacetic acid (5HIAA)** | University Hospital of Wales, Cardiff | Urine | 24h bottle (acetic acid only) |  | Avoid bananas, pineapple, walnuts prior to test. If high priority please phone the duty metabolic biochemist on 21299 to discuss | 2 weeks |
| **7-Dehydroxycholesterol (SLOS screen)** | Biochemical Genetics, Southmead | Blood | Lithium heparin tube | Min vol 0.6 mL | Sample should be protected from light | 4 weeks |
| **Acetyl Choline Receptor Antibodies** | Immunology, Southmead | Blood | Serum (SST) or lithium heparin (PST) | Min vol 1 mL | Screening test for Myasthenia Gravis | 2 weeks |
| **Acyl Carnitine (Blood Spot)** | Paediatric Chemistry, Sheffield Children's Hospital | Blood spot | Guthrie card / DBS |  | Urgent samples can be prioritised and turned around more quickly. Please phone the duty metabolic biochemist on 21299 to discuss. | 3 weeks |
| **Acyl Carnitine (Plasma)** | Paediatric Chemistry, Sheffield Children's Hospital | Blood | Lithium heparin tube | Min vol 1 mL | Urgent samples can be prioritised and turned around more quickly. Please phone the duty metabolic biochemist on 21299 to discuss. | 3 weeks  |
| **Adrenal Antibodies**  | Immunology, Southmead | Blood | Serum (SST) only | Min vol 1 mL |  | 2 weeks |
| **Aldosterone and renin (for ARR)** | Kings College Hospital, London | Blood | EDTA tube | Min vol 2 mL | Must be received and processed by the laboratory within 3 hours of sample collection. A number of antihypertensive medications interfere with this test, please contact the laboratory to discuss. | 4 weeks |
| **Allopurinol** | Purine Research Laboratory, St Thomas' Hospital, London | Blood | EDTA tube | 1 tube |  | 4 weeks |
| Urine | 24h bottle (thymol) | n/a |  | 4 weeks |
| **Alpha aminoadipic semi-aldehyde (urine)** | Institute of Child Health, London | Urine | Universal pot | Min vol 2 mL | Send urgently needs to be frozen on receipt | 4-6 weeks |
| **Alpha subunit** | Queen Elizabeth Hospital, Birmingham | Blood | Serum (SST) only | 1 tube | For investigation of TSHoma and thyroid hormone resistance | 4 weeks |
| **Alpha-1-antitrypsin (Faeces)** | St Thomas' Hospital, London | Faeces | Stool pot |  | For investigation of protein losing enteropathy | 2 weeks |
| **Aluminium** | Trace Elements Lab, Guildford | Blood | Trace element tube | 1 tube |  | 4 weeks |
| **Aluminium (urine)** | Trace Elements Lab, Guildford | Urine | Universal pot | Min vol 10 mL | Sample MUST be collected into 20mL white topped sterile pot. Containers with metal lids are unsuitable. | 4 weeks |
| **Amiodarone** | Cardiff Toxicology Laboratories, Llandough | Blood | EDTA tube | Min vol 2 mL | Pre dose sample | 2 weeks |
| **Amitryptyline** | Cardiff Toxicology Laboratories, Llandough | Blood | EDTA tube | Min vol 2 mL |  | 2 weeks |
| **Amphetamine confirmation (urine)** | Cardiff Toxicology Laboratories, Llandough | Urine | Universal pot | Min vol 1 mL |  | 2 weeks |
| **Amyloid A** | National Amyloidosis Centre, London | Blood | SST |  |  | 3 weeks |
| **Anaphylaxis Studies (Mast cell tryptase)** | Immunology, Southmead | Blood | Serum (SST) only | Min vol 2 mL | Ensure samples are taken at the correct time after event | 2 weeks |
| **Androstenedione** | University Hospital of Wales, Cardiff | Blood | Serum (SST) or lithium heparin (PST) | Min vol 1 mL | Androstenedione and DHEAS are analysed and reported together | 2 weeks |
| **Anti-basal ganglia antibodies** | Neuroimmunology and CSF unit, NHNN, UCLH | Blood | Serum (SST) only | 1 tube | Neurology. Sydenham’s chorea, tics, Tourette’s  | 4 weeks |
| **Anti-GAD Abs (for neurology indications)** | Churchill Hospital, Oxford | Blood | Serum (SST) only | Min vol 1 mL | For investigation of Stiff-person syndrome | 4 weeks |
| **Anti-glycine receptor antibodies** | Churchill Hospital, Oxford | Blood | Serum (SST) only | 1 tube |  | 4 weeks |
| CSF | Universal pot |
| **Anti-mullerian hormone (AMH)** | Southmead Hospital | Blood | Serum (SST) or lithium heparin (PST) | Min vol 0.5 mL | Beckman-Coulter AMH. AMH levels vary with age, results should be interpreted in light of clinical context. AMH levels in the range 6.5 - 19.8 pmol/L predict a normal response to controlled ovarian stimulation. | 1 week |
| **Anti-neutrophil antibodies** | NHS blood & transplant, Filton | Blood | Serum (SST) and EDTA | 2 tubes | Sample must arrive in lab in the morning. We require both a serum and an EDTA whole blood tube | 4 weeks |
| **Anti-PLA2R** | Southmead Hospital | Blood | Serum | 2mL |  | 2 weeks |
| **Anti-retinal antibodies** | Neuroimmunology and CSF unit, NHNN, UCLH | Blood | Serum (SST) only | 1 tube |  | 4 weeks |
| **Anti-TNF monoclonal antibody therapy monitoring** | Exeter | Blood | Serum (SST) or lithium heparin (PST) | 1 tube | Please state which drug (or biosimilar) is prescribed. E.g.Infliximab/inflectraAdalimumab/remsima | 2 weeks |
| **AP50** | Immunology, Southmead | Blood | Serum (SST) only | Min vol 1 mL |  | 2 weeks |
| **Apolipoprotein A1** | Royal Victoria Infirmary, Newcastle-Upon-Tyne | Blood | Serum (SST) or lithium heparin (PST) | Min vol 1 mL |  | 2 weeks |
| **Apolipoprotein B** | Royal Victoria Infirmary, Newcastle-Upon-Tyne | Blood | Serum (SST) or lithium heparin (PST) | Min vol 1 mL |  | 2 weeks |
| **Apolipoprotein E genotype** | University Hospital of Wales, Cardiff | Blood | EDTA tube | 1 tube |  | 4 weeks |
| **Aquaporin 4 Antibodies** | Churchill Hospital, Oxford | Blood | Serum (SST) or lithium heparin (PST) | Min vol 1 mL |  | 4 weeks |
| CSF | Universal pot |  |
| **Arsenic** | Trace Elements Lab, Guildford | Blood | Trace element tube | 1 tube | No seafood to be consumed for 72hrs prior. | 4 weeks |
| Urine | Universal pot | Min vol 10 mL | No seafood to be consumed for 72hrs prior. | 4 weeks |
| **Arylsulphatase C (steroid sulphatase screen)** | Willink Laboratory, Manchester | Blood | EDTA tube | Min vol 0.2 mL | Samples should be sent Mon-Thur to reach lab bfore 3 pm. Inform lab in advance. | 4 weeks |
| **Aspartylglucosaminidase** | Willink Laboratory, Manchester | Blood | EDTA tube | 1 tube | Sample must be separated and frozen within 24h | 4 weeks |
| **Aspergillus (IgG)** | Immunology, Southmead | Blood | Serum (SST) or lithium heparin (PST) | Min vol 1 mL |  | 2 weeks |
| **Barbiturate Screen (Urine)** | Birmingham City Hospital | Urine | Universal pot | Min vol 1 mL |  | 2 weeks |
| **Benzodiazepine Confirmation (urine)** | Birmingham City Hospital | Urine | Universal pot | Min vol 1 mL |  | 2 weeks |
| **Beta-2-Microglobulin (Serum)** | Immunology, Southmead | Blood | Serum (SST) only | Min vol 1 mL |  | 2 weeks |
| **Beta-2-Microglobulin (urine)** | Protein Reference Unit, Sheffield | Urine | Universal pot | Min vol 2 mL |  | 2 weeks |
| **Beta-Hydroxybutyrate & free fatty acids (intermediary metabolites)** | Sheffield Children's Hospital | Blood | Fluoride oxalate tube | Min vol 0.2 mL | AKA non-esterified fatty acids | 3 weeks |
| **Bile Acids (urine)** | Paediatric Chemistry, Sheffield Children's Hospital | Urine | Universal pot | Min vol 5 mL | For investigation of peroxisomal disorders and disorders of bile acid synthesis and metabolism. | 4-6 weeks |
| **Bone specific ALP** | Northern General Hospital, Sheffield | Blood | Serum (SST) only | Min vol 2 mL | Monitoring response to therapy in osteoporosis, Paget’s disease, metabolic bone disease | 4 weeks |
| **Bone Turnover Markers** | Royal Liverpool University Hospital | Blood | EDTA tube | 1 tube | This test requires a 9 AM overnight fasted sample | 4 weeks |
| **Bone Turnover Markers (urine)** | Northern General Hospital, Sheffield | Urine | Universal pot | Min vol 5 mL | Second void morning urine | 4 weeks |
| **Bromide** | Birmingham City Hospital | Blood | Serum non-gel | Min vol 2 mL | For patients on bromide therapy only | 4 weeks |
| **Busulfan** | Chemical Pathology, Great Ormond Street | Blood | EDTA tube |  | Please inform the lab in advance. Samples need to come to laboratory urgently | 24 hours (Mon-Fri only) |
| **C-1-Esterase Inhibitor** | Immunology, Southmead | Blood | Serum (SST) only | Min vol 1 mL | Screening test for hereditary angio-oedema. A separate serum sample is required for this test. Will not be processed in the presence of normal C4 concentrations. | 2 weeks |
| **Cadmium** | Trace Elements Lab, Guildford | Blood | EDTA tube | 1 tube | For acute exposure or suspected toxicity. | 4 weeks |
| Urine | Universal pot | Min vol 20 mL | For monitoring of long-term exposure. Should not be requested in acute toxicity, as urine concentrations are often misleadingly low until threshold concentration reached. | 4 weeks |
| **Caeruloplasmin** | Southmead Hospital | Blood | Serum (SST) or lithium heparin (PST) | Min vol 0.5 mL | Request copper and caeruloplasmin if Wilsons disease is suspected. | 2 weeks |
| **Calcitonin** | Kings College Hospital, London | Blood | Serum (SST) only | Min vol 1 mL | Sample MUST be packed in ice for dispatch to the laboratory. | 2 weeks |
| **Calcium Gated Channel Antibodies** | Oxford Immunology | Blood | Serum (SST) only | Min vol 1 mL |  | 4 weeks |
| **Calculi** | Special Chemistry, UCLH | Stone | Universal pot  |  |  | 2 weeks |
| **Cannabinoids (urine)** | Southmead Hospital | Urine | Universal pot | Min vol 1 mL | Normally detectable for up to 2-3 days after acute exposure but up to 2-3 weeks after chronic use. Care should be taken to avoid tampering with the sample and that the sample is fresh and from the correct individual | 1 week |
| **Carbohydrate Deficient Transferrin (for atypical glycoforms)** | Institute of Neurology, London | Blood | Serum (SST) or lithium heparin (PST) | Min vol 0.5 mL | For investigation of congenital disorders of glycosylation | 4 weeks |
| **Carbohydrate Deficient Transferrin (adult)** | King’s College Hospital, London | Blood | Serum (SST) only | Min vol 2 mL | For investigation of alcohol excess.  | 2 weeks |
| **Cardiolipin (Barth syndrome test)** | Neurometabolic Unit, National Hospital, London | Blood | EDTA tube | 1 tube | Samples need to be received in the laboratory Monday-fri, by 3 pm at the latest. Samples can be prioritised: phone 21299 | 4-6 weeks |
| **Carnitine (urine)** | Paediatric Chemistry, Sheffield Children's Hospital | Blood and Urine | Serum (SST) or lithium heparin (PST) and Universal pot | Min vol 5 mL | For the investigation of primary carnitine deficiency (carnitine transporter deficiency). For total/free carnitine request plasma acylcarnitines.A paired urine and blood sample is required to calculate the tubular maximal reabsorption of free carnitine. | 4 weeks |
| **CH50** | Immunology, Southmead | Blood | Serum (SST) only | Min vol 1 mL |  | 2 weeks |
| **Cholinesterase**  | Southmead Hospital | Blood | EDTA tube | 1 tube | Screening test for Suxamethonium sensitivity (Scoline Apnoea). Full clinical details including family history (where known) are essential. | 4 weeks |
| **Chromium & cobalt** | Southmead Hospital | Blood | EDTA tube | 1 tube  | Used in patients with suspected toxicity following exposure or for monitoring of metal-on-metal hip transplants by orthopaedic surgeons.Can measure chromium in urine but blood is preferred | 4 weeks |
| **Chromogranins (A & B)** | SAS Laboratory, Charing Cross Hospital | Blood | EDTA tube | Min vol 2 mL | Sample on ice sent to lab immediately.  | 4 weeks |
| **Citrate (urine)** | Special Chemistry, UCLH | Urine | 24h bottle (acid) | n/a |  | 2 weeks |
| Universal pot | Min vol 8 mL |  | 2 weeks |
| **CK isoenzymes / macro-CK** | GOSH | Blood | Serum (SST) only |  | Sample must be sent to lab immediately following collection | 4 weeks |
| **Clozapine** | Cardiff Toxicology Laboratories, Llandough | Blood | EDTA tube | Min vol 1 mL | Samples should be sent via the clozapine monitoring service | 2 weeks |
| **Cocaine Confirmation (urine)** | Southmead Hospital | Urine | Universal pot | Min vol 1 mL |  | 2 weeks |
| **Complement anti-C1q antibodies** | University Hospital of Wales, Cardiff | Blood | Serum (SST) only | 1 tube | For investigation of SLE with renal involvement | 4 weeks |
| **Complement C5-9 (CD-25, soluble complement)** | University Hospital of Wales, Cardiff | Blood | EDTA tube |  | Sample must be snap frozen in lab ASAP. Please arrange in advance with the paediatric duty biochemist. | 4 weeks |
| **Copeptin** | Freeman Hospital, Newcastle | Blood | Serum (SST) only | Min vol 1 mL | Only for use in confirmation of nephrogenic DI, or as part of a saline stimulation test for diagnosis of cranial DI. | 2 weeks |
| **Copper** | Southmead Hospital | Blood | Trace element tube | Min vol 0.5 mL | ADULTS: Trace element tube only. PAEDS: Lithium heparin tube acceptable. | 2 weeks |
| **Copper (liver)** | Trace Elements Lab, Cardiff | Liver biopsy | Universal pot  |  | Should arrive in lab immediately after collection, wrapped in foil, inside a plain universal container | 4 weeks |
| **Copper (urine)** | Trace Elements Lab, Guildford | Urine | 24h bottle (plain) |  | Plain or acid collections both acceptable. | 4 weeks |
| **Creatine (plasma) and Guanidinoacetate (urine)** | Clinical Biochemistry, Cambridge | Blood and urine | Lithium heparin (PST) and universal pot | Min 1 mL blood & 1 mL urine | Send urgently needs to be frozen on receipt | 4 weeks |
| **Cryoglobulin** | Southmead Hospital | Blood | Serum (SST) only | 1 tube | Laboratory staff must be present at the time of blood collection to ensure sample kept at 37°C - please contact Biochemistry x 22291. | 2 weeks |
| **CSF Neurotransmitters** | Neurometabolic Unit, National Hospital, London | CSF | Special tubes provided by the lab |  | Please phone the duty metabolic biochemist on 21299 at least 24 hours in advance to organise the collection kit. CSF must be immediately flash-frozen in liquid nitrogen post sampling - contact laboratory for details. Referred investigation. Samples can be prioritised. | 4-6 weeks |
| **Cyanide** | Cardiff Toxicology Laboratories, Llandough | Blood | EDTA tube | Min vol 0.5 mL |  | 1 week |
| **Cystatin C** | John Radcliffe Hospital, Oxford | Blood | Serum (SST) or lithium heparin (PST) | Min vol 2 mL |  | 2 weeks |
| **Cystine in White blood cells** | St James University Hospital, Leeds | Blood | Lithium heparin (NO GEL) | Min vol 3 mL | Inform lab in advance. Samples to be sent Mon-Thur only. Collect 5ml sample into gel-free heparin tube (Dark green top). Send to lab before 3pm. | 4 weeks |
| **Cytotoxic antibodies** | Tissue Typing, Southmead hospital | Blood | Serum | 1 tube |  | 4 weeks |
| **DHEA Sulphate** | University Hospital of Wales, Cardiff | Blood | Serum (SST) or lithium heparin (PST) | Min vol 1 mL | Androstenedione and DHEAS are analysed and reported together | 2 weeks |
| **Diabetes antibodies (GAD, IA2, ZnT8)** | Royal Devon & Exeter Hospital | Blood | Serum (SST) only | Min vol 1 mL | For differential diagnosis of type 1 and type 2 diabetes mellitus | 2 weeks |
| **DPD-5FU** | Southmead Hospital | Blood | EDTA tube | 1 tube |  | 4 weeks |
| **Eculizumab** | Cambridge Biomedical | Blood |  |  | Please contact the lab prior to taking the sample. A specific bottle is required | 4 weeks |
| **ELF (Enhanced liver fibrosis) test** | Southmead Hospital | Blood | Serum (SST) only | Min vol 1 mL | Calculated score generated from TIMP-1, P3NP, HA. Please refer to abnormal liver blood test algorithm on remedy <https://remedy.bnssgccg.nhs.uk/adults/hepatology/liver-disease/> | 2 weeks |
| **Epimerase** | Southmead Hospital | Blood | Lithium heparin (NO GEL) only | Min vol 0.5 mL |  | 2 weeks |
| **Erythropoietin (EPO)** | Southmead Hospital | Blood | Serum | Min vol 1 mL |  | 2 weeks |
| **Endomysial Antibodies** | Immunology, Southmead | Blood | Serum (SST) or lithium heparin (PST) | Min vol 1 mL |  | 2 weeks |
| **Essential fatty acids** | Biolab Medical Unit, London | Blood | EDTA tube |  | Must arrive on Mon-Thur | 4 weeks |
| **Ethanol** | Southmead Hospital | Blood | Fluoride oxalate tube | Min vol 1 mL | Serum ethanol measurement is rarely helpful. Discuss with lab in advance. Fluoride oxalate sample is required. | 24 hours (Mon-Fri only) |
| **Ethylene Glycol** | Southmead Hospital | Blood | Fluoride oxalate tube | Min vol 0.5 mL | Laboratory MUST be informed of request by telephone (ext. 23430 or bleep on call biochemist out of hours). | 24 hours (Mon-Fri only) |
| **Faecal elastase** | Southmead Hospital | Faeces | Stool pot |  | Faecal elastase is the preferred test for exocrine pancreatic function | 2 weeks |
| **Fibroblast growth factor 23 (FGF23)** | Norfolk & Norwich University Hospitals | Blood | EDTA tube | 1 tube | Please ensure that the sample is delivered immediately to the lab (this is an unstable analyte) | 4 weeks |
| **Flecanide** | Cardiff Toxicology Laboratories, Llandough | Blood | EDTA tube | Min vol 2 mL | Pre dose sample | 2 weeks |
| **Free Fetal DNA** | NHS blood & transplant, Filton | Blood | Crossmatch sample | 1 tube |  | 2 weeks |
| **Free Phenytoin** | TDM Unit, National Society for Epilepsy, Buckinghamshire | Blood | Serum (SST) or lithium heparin (PST) | Min vol 2 mL | Pre dose sample | 2 weeks |
| **Fructosamine** | Royal United Hospital, Bath | Blood | Serum (SST) or lithium heparin (PST) | Min vol 1 mL | Only indicated for monitoring of diabetes in patients with haemoglobin variants | 2 weeks |
| **Gal-1-PUT (galactosaemia screen)** | Biochemical Genetics, Southmead | Blood | Lithium heparin (NO GEL) | Min vol 0.5 mL | Collect sample into heparin tube. Place tube inside plain universal pot and label pot ‘Do Not Spin’. Do not collect samples on a Friday. | 1 week |
| **Galactose-1-phospahte** | Biochemical Genetics, Southmead | Blood | Lithium heparin (NO GEL) | Min vol 0.5 mL | Do not collect samples on a Friday. | 4 weeks |
| **Galactitol (urine)** | Biochemical Genetics, Southmead | Urine | Universal pot | Min vol 2 mL |  | 4 weeks |
| **Galactokinase** | Biochemical Genetics, Southmead | Blood | Lithium heparin (NO GEL) | Min vol 2 mL | Please contact Paediatric Biochemist on x21299 prior to taking sample due to sample stability constraints. | 4 weeks |
| **Ganglioside Antibodies (ganglioside screen)** | Queen Elizabeth Hospital, Glasgow | Blood | Serum (SST) only | Min vol 1 mL |  | 4 weeks |
| **Gastrin** | SAS Laboratory, Charing Cross Hospital | Blood | EDTA tube | Min vol 2 mL | Sample on ice sent to lab immediately. Patient must off proton pump inhibitors for 2 weeks, patient should be fasted | 4 weeks |
| **Glomerular Basement Membrane Antibodies** | Immunology, Southmead | Blood | Serum (SST) only | Min vol 1 mL |  | 1 week |
| **Glucagon** | SAS Laboratory, Charing Cross Hospital | Blood | EDTA tube | Min vol 2 mL | Sample must be collected and delivered to laboratory on ice. Patient should be fasted. | 4 weeks |
| **Gut Hormones** | SAS Laboratory, Charing Cross Hospital | Blood | EDTA tube | 1 tube | Sample on ice sent to lab immediately. Patient must off proton pump inhibitors for 2 weeks, patient should be fasted | 4 weeks |
| **Hereditary Haemochromatosis (HFE) Screen** | Exeter Genomics Laboratory | Blood | EDTA Tube |  | EDTA whole blood. Testing indicated based on raised transferrin saturation (>45%). Refer to EASL clinical practice guidelines for HFE hemochromatosis, Journal of Hepatology, 2010 | 4 weeks |
| **Human Leukocyte Antigen (HLA)-A29** | Immunology, Southmead | Blood | EDTA tube |  | EDTA whole blood for Birdshot Retinopathy | 3 weeks |
| **Human Leukocyte Antigen (HLA)-DQ2/DQ8** | Immunology, Southmead | Blood | EDTA tube |  | EDTA whole blood for Coeliac Disease | 3 weeks |
| **Human Leukocyte Antigen (HLA)- associated with narcolepsy (HLA-DQB1\*06:02)** | Immunology, Southmead | Blood | EDTA tube |  | EDTA whole blood | 3 weeks |
| **HLH profile** | Immunology, GOSH | Blood | EDTA tube | Min vol 3 mL | Please contact the metabolic biochemist (x21299) prior to taking sample | 4 weeks |
| **Hypertensive drug assay** | Biochemistry and Immunology, Heartlands Hospital | Urine | Universal pot |  | Please discuss with Duty Biochemist before taking sample (x27834).Please state name and dose of drug prescribed along with time patient has been instructed to take medication. | 2 weeks |
| **HPRT activity** | Purine Research Laboratory, St Thomas' Hospital, London | Blood | EDTA tube | Min vol 4 mL | Hypoxanthine Phosphoribosyltransferase deficiency causes Leesch-Nyhan syndrome | 4 weeks |
| **Human Leukocyte Antigen (HLA)-B27** | Immunology, Southmead | Blood | EDTA tube | Min vol 1 mL | Only available for Paediatric patients at request of Hospital Consultant for Ankylosing spondylitis | 3 weeks |
| **IgD** | Protein Reference Unit, Sheffield | Blood | Serum (SST) only |  | Periodic fever / Mevalonic aciduria/ Hyper IgD syndrome | 4 weeks |
| **IGF BP3** | Kings College Hospital, London | Blood | Serum (SST) or lithium heparin (PST) | Min vol 1 mL |  | 2 weeks |
| **IGF-2** | SAS Peptide Laboratory, Guildford | Blood | Serum (SST) only | Min vol 1 mL |  | 2 weeks |
| **IgG Subclasses** | Immunology, Southmead | Blood | Serum (SST) only | Min vol 2 mL | For investigation of IgG4 related disease | 1 week |
| **Immunodeficiency (Immunotyping)** | Immunology, Southmead | Blood | EDTA tube |  | Whole blood. Also known as Lymphocyte subsets | 1 week |
| **Inhibin** | Protein Reference Unit, Sheffield | Blood | Serum (SST) or lithium heparin (PST) | Min vol 1 mL |  | 2 weeks |
| **Interferon alpha** | Hospital Cochin Service de Virologie, Paris | CSF | Universal pot  | Min vol 1 mL |  | 4 weeks |
| **Iohexol** | Southmead Hospital | Blood | Serum | 2 mL | 3 samples with specialist form | 1 week |
| **Iron (liver)** | Trace Elements Lab, Cardiff | Liver biopsy | Universal pot  |  | Should arrive in lab immediately after collection, wrapped in foil, inside a plain universal container | 4 weeks |
| **Lamotrigine** | Cardiff Toxicology Laboratories, Llandough | Blood | EDTA tube | Min vol 1 mL | Pre dose sample | 2 weeks |
| **Laxative Screen (urine)** | Birmingham City Hospital | Urine | Universal pot | Min vol 15 mL |  | 4 weeks |
| **Lead** | Southmead Hospital | Blood | Trace element tube | 1 tube | Blood lead should be requested if symptoms of toxicity are present.  | 2 weeks |
| Urine | Universal pot | Min vol 2 mL | Random urine sample required with NO preservative.  | 2 weeks |
| **Levetiracetam (Keppra)** | Cardiff Toxicology Laboratories, Llandough | Blood | EDTA tube |  | Trough sample required | 4 weeks |
| **Lyso GB3** | Chemical Pathology, Great Ormond Street | Blood and urine | Lithium heparin (PST) and universal pot |  | For Fabry patient monitoring | 4 weeks |
| **Lysosomal acid lipase** | Queen Elizabeth Hospital, Glasgow | Blood | EDTA tube | 1 mL |  | 2 weeks |
| **Myositis line immunoblot** | Immunology, Southmead | Blood | Serum (SST) only | Min vol 1 mL |  | 2 weeks |
| **Myelin associated glycoproteins (MAG) antibodies** | Oxford Immunology | Blood  | Serum (SST) | 1 tube |  | 2 weeks |
| **MOG antibodies** | Oxford Immunology | Blood or CSF | Serum (SST) or universal pot | 1 tube |  | 2 weeks |
| **Manganese** | Kings College Hospital, London | Blood | Trace element tube | 1 tube |  | 4 weeks |
| **Mannose Binding Lectin** | University Hospital of Wales, Cardiff | Blood | Serum (SST) only | Min vol 2 mL |  | 2 weeks |
| **Mercury** | Trace Elements Lab, Guildford | Blood | Trace element tube | Min vol 1 mL |  | 4 weeks |
| Urine | Universal pot | Min vol 1 mL |  | 4 weeks |
| **Metanephrines (plasma)** | Freeman Hospital, Newcastle | Blood | EDTA tube | 1 tube | Must be received on ice and processed by the laboratory within 60 mins of collection. | 2 weeks |
| **Metanephrines (urine)** | Freeman Hospital, Newcastle | Urine | 24h bottle (acid) |  | For investigation of phaeochromocytoma or paraganglioma | 2 weeks |
| **Methanol** | Southmead Hospital | Blood | Fluoride oxalate tube | Min vol 1 mL | Laboratory MUST be informed of request by telephone (x 23430 or bleep on call biochemist out of hours). | 24 hours (Mon-Fri only) |
| **Methylmalonic acid (MMA)** | Southmead Hospital | Urine | Universal pot |  | Urine MMA is preferred. Blood MMA can also be measured, sample sent to Cardiff | 2 weeks |
| **Mexiletine** | Cardiff Toxicology Laboratories, Llandough | Blood | EDTA tube |  | No gel tubes | 4 weeks |
| **Musk Antibodies** | Churchill Hospital, Oxford | Blood | Serum (SST) only | Min vol 1 mL |  | 4 weeks |
| **Mycophenolate** | Kings College Hospital, London | Blood | EDTA tube | Min vol 1 mL | Pre dose sample | 2 weeks |
| **Myositis Antibody Panel** | Immunology, RUH | Blood | Serum (SST) only | 1 tube | Myositis, dermatomyositis, ILD, polymyositis, anti-synthetase syndrome(extended myotis panel available (myositis line immunoblot) – sent to Immunology, Southmead) | 4 weeks |
| **Neuronal Antibodies** | Protein Reference Unit, Sheffield | Blood | Serum (SST) only | Min vol 1 mL |  | 2 weeks |
| **Neutrophil Function Tests** | Southmead Hospital | Blood | Lithium heparin (NO GEL) | Min vol 1 mL, 7 mL ideally | Must also send a normal control sample. Please arrange the test with NBT in advance x48396 | 4 weeks |
| **NMDA receptor Abs** | Churchill Hospital, Oxford | Serum and CSF | Serum (SST) and universal pot | 1 tube / pot | CSF sample requires a paired serum sample | 4 weeks |
| **NTBC / nitisinone monitoring** | Birmingham Children's Hospital | Blood | Lithium heparin (PST) and Guthrie card (DBS) |  |  | 4 weeks |
| **Oestradiol Confirmation** | St James University Hospital, Leeds | Blood | Serum (SST) or lithium heparin (PST) | Min vol 1 mL |  | 2 weeks |
| **Oligoclonal Bands** | Southmead Hospital | CSF and blood (BOTH) | Universal pot for CSF and SST for blood |  | Paired serum and CSF required | 2 weeks |
| **Oligosaccharides (urine)** | St James University Hospital, Leeds | Urine | Universal pot | Min vol 2 mL | Screening test for some lysosomal storage disorders. Lysosomal enzyme screen (white cell enzyme screen) preferred. Please provide clinical details. | 4 weeks |
| **Opiate Confirmation (urine)** | Southmead Hospital | Urine | Universal pot | Min vol 1 mL | To confirm if morphine or codeine present | 1 week |
| **Orexin** | Churchill Hospital, Oxford | CSF | Universal pot  | Min vol 2 mL | Narcolepsy | 6 weeks |
| **Orotic Acid Quantitation (urine)** | Paediatric Chemistry, Sheffield Children's Hospital | Urine | Universal pot | Min vol 5 mL |  | 3 weeks |
| **Ovarian Antibodies** | Protein Reference Unit, Sheffield | Blood | Serum (SST) only | Min vol 1 mL |  | 2 weeks |
| **Oxalate (plasma)** | Birmingham Children's Hospital | Blood | EDTA tube | Min vol 2 mL | Sample must be collected and delivered to the laboratory on ice.  | 4 weeks |
| **Oxalate (urine)** | UCLH | Urine | 24h bottle (acid) |  | A random urine is also acceptable from paediatrics | 2 weeks |
| **Oxypurinol** | Purine Research Laboratory, St Thomas' Hospital, London | Blood | EDTA tube | 1 tube |  | 2 weeks |
| **Pancreatic polypeptide** | SAS Laboratory, Charing Cross Hospital | Blood | EDTA tube | Min vol 1 mL |  | 4 weeks |
| **Paraquat and Diaquat (urine)** | Shefield Toxicology,Sheffield | Urine | Universal pot | Min vol 15 mL | Please contact the Duty Biochemist on x27834 prior to sending a sample. | 1 week |
| **Pemphigoid or Pemphigus** | Immunology, Southmead | Blood | Serum (SST) only | Min vol 1 mL |  | 4 weeks |
| **Pentagastrin** | SAS Laboratory, Charing Cross Hospital | Blood | EDTA tube | Min vol 1 mL | Sample must be collected and delivered to the laboratory on ice. | 3 weeks |
| **Pipecolic Acid** | Paediatric Chemistry, Sheffield Children's Hospital | Blood and urine | Lithium heparin (PST) and universal pot | Min vol 1 mL |  | 4 weeks |
| **PML RARA** | Guy's Hospital | Blood / bone marrow | EDTA tube |  |  | 4 weeks |
| **Pompe Screen** | GOSH | Blood | EDTA tube | 1 tube | Samples should be received in lab by 3 pm Mon-Fri. Samples can be prioritised. Please phone the duty metabolic biochemist on 21299 to discuss.  | 6 weeks |
| **Porphyrin Screen** | University Hospital of Wales, Cardiff | Blood and urine (BOTH) | EDTA tube for blood, universal pot for urine, both protected from the light |  | Protect sample from the light. For diagnosis of porphyria. Please provide clinical information regarding the patient's symptoms and the type of porphyria (acute or cutaneous) suspected. A complete set of samples (EDTA blood and urine) is recommended to ensure a more rapid and accurate diagnosis. | 1 week |
| **Porphyrins (Faeces)** | University Hospital of Wales, Cardiff | Faeces | Stool pot |  | Protect sample from the light. Faecal porphyrins are used for the differentiation of some types of porphyria.  | 2 weeks |
| **Potassium Gated Channel Antibodies** | Churchill Hospital, Oxford | Blood/CSF | Serum (SST) only/ universal pot | Min vol 1 mL |  | 2 weeks |
| **Plasma palmitoyl phosphocholineserine (PPCS)** | Willink Laboratory, Manchester | Blood | EDTA tube | Min 1 mL | PPCS replaces oxysterols as screening test for Niemann-Pick Disease Type C. | 4 weeks |
| **Prednisolone** | Birmingham Heartlands Hospital | Blood | Serum (SST) only | 1 tube |  | 4 weeks |
| **Pro Collagen-3-Peptide (P3NP)** | Norfolk & Norwich University Hospitals | Blood | Serum (SST) only | Min vol 1 mL |  | 2 weeks |
| **PSA (free to total)** | Protein Reference Unit, Sheffield | Blood | Serum (SST) only | Min vol 1 mL |  | 2 weeks |
| **Purines and Pyrimidine screen** | Purine Research Laboratory, St Thomas' Hospital, London | Urine | Universal pot | Min vol 2 mL |  | 4 weeks |
| **Pyruvate Kinase** | Kings College Hospital, London | Blood | EDTA tube | 1 tube |  | 4 weeks |
| **Specific IgE (allergens)** | Immunology, SouthmeadPRU, Sheffield | Blood | Serum (SST) only | Min vol 1 mL | Please state required allergen in the test information | 2 weeks |
| **Red cell enzymes for GSDIII** | GOSH | Blood | Lithium heparin (NO GEL) | Min vol 5 mL | Send only Mon-Thur | 4 weeks |
| **Red cell plasmalogens** | Sheffield Children's Hospital | Blood | EDTA tube | Min vol 2 mL |  | 4 weeks |
| **Renin** | Kings College Hospital, London | Blood | EDTA tube | Min vol 1 mL | Must be received and processed by the laboratory within 3 hours of sample collection. A number of antihypertensive medications interfere with this test, please contact the laboratory to discuss. | 4 weeks |
| **Respiratory Chain Enzymes** | Newcastle Mitochondrial NCG Lab | Muscle biopsy | Special collection kit provided by lab | 2 x lemon-pip sized  | Must be flash frozen at bedside, and transported to the laboratory, in liquid nitrogen. Samples can be prioritised. Please phone the duty metabolic biochemist on 21299 to discuss. | 8-12 weeks |
| **Retinol Binding Protein (serum)** | Protein Reference Unit, Sheffield | Blood | Serum (SST) only | Min vol 4 mL |  | 2 weeks |
| **Retinol Binding Protein (urine)** | Protein Reference Unit, Sheffield | Urine | Universal pot | Min vol 1 mL |  | 2 weeks |
| **Selenium** | Southmead Hospital | Blood | Trace element tube | Min vol 1 mL | ADULTS: Trace element tube only. PAEDS: Lithium heparin tube acceptable. | 2 weeks |
| **Serum Amyloid A** | National Amyloidosis Centre, Royal Free Hospital | Blood | Serum (SST) only | 1 tube |  | 4 weeks |
| **Sirolimus** | Southmead Hospital | Blood | EDTA tube | Min vol 1 mL | Pre dose sample | 3 days |
| **Skeletal antibodies** | Protein Reference Unit, Sheffield | Blood | Serum (SST) only | Min vol 1 mL |  | 2 weeks |
| **Somatostatin** | SAS Laboratory, Charing Cross Hospital | Blood | EDTA tube | Min vol 1 mL | Sample on ice sent to lab immediately.  | 4 weeks |
| **Steroid Profile (urine)** | Kings College School of Medicine, London | Urine | 24h bottle (plain) |  | A random urine is also acceptable from paediatrics | 4 weeks |
| **Sulphonylurea** | SAS Peptide Laboratory, Guildford | Blood | Serum (SST) only | Min vol 1 mL |  | 2 weeks |
| **Systemic sclerosis immunoblot** | Immunology, Southmead hospital | Blood | Serum | 1 tube | Test requested by email from Rheumatologist/ILD Consultants | 2 weeks |
| **T Cell Subsets** | Immunology, Southmead | Blood | EDTA tube |  |  | 2 weeks |
| **Testes Antibodies** | Protein Reference Unit, Sheffield | Blood | Serum (SST) only | Min vol 1 mL |  | 2 weeks |
| **Testosterone confirmation by LCMS** | Leeds Infirmary | Blood | Serum (SST) or lithium heparin (PST) | Min vol 1 mL |  | 2 weeks |
| **Thallium (urine)** | Trace Elements Lab, Guildford | Urine | Universal pot | Min vol 20 mL |  | 4 weeks |
| **Thioguanine nucleotides (TGN & 6MP)** | Purine Research Laboratory, St Thomas' Hospital, London | Blood | EDTA tube | 1 tube |  | 1 week |
| **Thiopentone (Thiopental)** | Cardiff Toxicology Laboratories, Llandough | Blood | EDTA Tube | Min vol 1 mL |  | 2 weeks |
| **Thiopurine methyl transferase (TPMT)** | Purine Research Laboratory, St Thomas' Hospital, London | Blood | EDTA tube | 1 tube | Please contact Duty Biochemist on x27834 prior to taking sample due to sample stability constraints. | 1 week |
| **Thymidine Phosphorylase** | Purine Research Laboratory, St Thomas' Hospital, London | Blood | EDTA tube | Min vol 4 mL | Send only Mon-Thur | 4 weeks |
| **Toluene** | Southmead Hospital | Blood | EDTA tube | 1 tube |  | 2 weeks |
| **Transferrin Immunoblotting (nasal fluid/asialotransferrin)** | Southmead Hospital | Nasal fluid | Universal pot  |  | Investigation or rhinorrhoea  | 2 weeks |
| **Trichloroethylene (urine)** | Southmead Hospital | Urine | Universal pot | Min vol 1 mL |  | 4 weeks |
| **Trimethylamine (urine)** | Paediatric Chemistry, Sheffield Children's Hospital | Urine | Universal pot | Min vol 1 mL |  | 2 weeks |
| **TSH Receptor Antibodies** | Protein Reference Unit, Sheffield | Blood | Serum (SST) only | Min vol 1 mL |  | 2 weeks |
| **TSH Receptor Mutation** | University Hospital of Wales, Cardiff | Blood | EDTA tube | 1 tube |  | 4 weeks |
| **Ubiquinone (CoQ10)** | Neurometabolic Unit, National Hospital, London | Blood | EDTA tube | 2 tubes | Clinical details required and sample must be received within 24 hours of sampling. | 4 weeks |
| **Urine drug screen for statins** | Leicester Royal Infirmary | Urine | Universal pot | Min vol 10 mL | Detects Atorvastatin and Rosuvastatin | 4 weeks |
| **Vacuolated Lymphocytes** | GOSH | Blood | EDTA tube | Min vol 2 mL | Send only Mon-Thur | 4 weeks |
| **Valproate** | Kings College Hospital, London | Blood | Serum (SST) only | Min vol 1 mL | Valproate levels correlate poorly with clinical effect and measurement is rarely indicated. Please give full clinical details. | 4 weeks |
| **Vasoactive interstinal peptide** | SAS Laboratory, Charing Cross Hospital | Blood | EDTA tube | Min vol 1 mL | Sample on ice sent to lab immediately.  | 4 weeks |
| **Very Long Chain Fatty Acids (VLCFA)** | Southmead Hospital | Blood | Lithium heparin tube | Min vol 1 mL |  | 3 weeks |
| **Vitamin B1 / Thiamine** | Nutristasis Unit, St Thomas' Hospital | Blood | EDTA tube | 1 tube | Protect from light and send to lab ASAP | 4 weeks |
| **Vitamin B6 / pyridoxine** | Glasgow Royal Infirmary | Blood | EDTA tube | 1 tube | Red cell pyridoxine is for nutritional monitoring (e.g. in Barth syndrome). Plasma pyridoxine is for ?hypophosphatasia. Sample MUST be protected from the light | 4 weeks |
| **VMA & HVA (Neuroblastoma investigations)** | University Hospital of Wales, Cardiff | Urine | Universal pot | Min vol 0.25 mL (ideally more) | May not be possible to provide result if very dilute sample. If high priority, please phone the duty metabolic biochemist on x21299 to discuss | 1 week |
| **Warfarin** | University Hospital of Wales, Cardiff | Blood | Serum tube (NO GEL - red top) | Min vol 1 mL |  | 2 weeks |
| **Zinc** | Southmead Hospital | Blood | Trace element tube | Min vol 1 mL | ADULTS: Trace element tube only. PAEDS: Lithium heparin tube acceptable. | 2 weeks |